ESG & COST OF DEBT

A COMPARISON ACROSS THE U.S. & EU

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Master Thesis

Stockholm School of Economics

2026

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Abstract:

This thesis examines the relationship between Environmental, Social, and Governance (ESG) performance and corporate cost of debt, comparing firms headquartered in the European Union and the United States. Drawing on stakeholder theory, legitimacy theory, and agency theory, the study examines whether ESG performance is negatively associated with borrowing costs and whether this relationship differs across institutional and regional contexts. Beyond evaluating aggregate ESG performance, the thesis separately analyzes each of the three pillars to identify potential differences in how debt markets price sustainability dimensions. Using a sample of 656 publicly listed firms from the U.S. and EU over the period 2016–2025, the study employs pooled ordinary least squares (OLS) regressions with year and sector fixed effects. ESG data and financial variables are obtained from LSEG Workspace. The analysis further tests for non-linear effects and interaction effects related to country-level sustainability and regional differences between the EU and the U.S. Preliminary findings indicate that higher overall ESG performance is associated with a lower cost of debt. The environmental and social pillars display statistically significant negative relationships with borrowing costs, while the governance pillar shows weaker and less consistent effects. The results also suggest the presence of non-linear relationships, particularly for firms with very low ESG performance, which appear to face disproportionately higher financing costs. The effect of ESG performance on cost of debt is significantly stronger in the EU compared to the U.S. and less strong in countries with higher average ESG scores. The thesis contributes to the growing literature on sustainable finance by extending the analysis of ESG and financing costs to a cross-regional setting and by examining how individual ESG pillars are valued in debt markets. The findings provide insight into how institutional environments and sustainability preferences influence corporate financing conditions in the EU and the U.S.

Keywords:

ESG, Sustainability, Cost of Debt, Sustainable Finance, Corporate Finance, European Union, United States

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Master Thesis
Master Program in Finance
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Contents

1. INTRODUCTION 5

1.1. Background 5

1.2. Purpose and Research Question 6

2. LITERATURE REVIEW & THEORY 7

2.1. Background 7

2.1.1. ESG 7

2.1.2. ESG Performance 7

2.1.3. Cost of Debt 8

2.2. ESG and Cost of Debt 9

2.3. ESG and Cost of Debt Across Regions 11

2.4. Theoretical Frameworks 12

2.4.1. Stakeholder Theory 12

2.4.2. Legitimacy Theory 12

2.4.3. Agency Theory 13

2.5. Contributions to Existing Literature 13

3. HYPOTHESIS CONSTRUCTION 15

4. METHODOLOGY 17

4.1. Variable Review 17

4.1.1. Dependent Variable 17

4.1.2. Independent Variables 17

4.1.3. Control Variables 19

4.2. Econometric Model 21

5. DATA & SUMMARY STATISTICS 25

5.1. Sample Overview 25

5.2. Summary Statistics and Correlation Analysis 26

5.2.1. Summary Statistics 26

5.2.2. Correlation Analysis 27

6. RESULTS & EMPIRICAL ANALYSIS 29

6.1. Pooled OLS Regressions 29

6.1.1. The General Effect of ESG Performance on Cost of Debt 29

6.1.2. The Non-Linnear Effect of ESG Performance on Cost of Debt 30

6.1.3. The Different Effect of ESG Performance on Cost of Debt Given Country-Level Sustainability 32
6.1.4. The Difference Between EU and U.S Regarding the Effects of ESG Performance and Cost of Debt 35
6.1.5. Summary of Results 37
6.2. Robustness Tests 40
7. CONCLUSION 41
7.1. Discussion of Results 41
7.2. Relating Results to Theory 42
7.3. Relating Results to Sustainability & Sustainable Development 43
7.4. Limitations 45
7.5. Suggestions for Further Research 45
REFERENCES 47
APPENDIX. 51

1. Introduction

1.1. Background

As concerns about climate change and social equity rise, so has the interest from investors and creditors risen to include environmental, social and corporate governance (ESG) factors in their decision-making process. A 2026 study showed that even just having ESG explained on a bank's website has a significant impact on their total amount of traffic and engagement (Al Amosh & Khatib, 2026). Banks and other lenders are aware of ESG impact. However, in recent years political disruptions like the reelection of the United States of America's (U.S.) President, Donald Trump, have caused backlash against the trend of supporting ESG. In early 2025, Trump declared that ESG is a "way to attack American businesses" and discredited the concept of anthropogenic climate change (Johnson-Hill, 2025). Similarly, the U.S. re-exited the Paris Agreement shortly after Trump's second presidential inauguration (Haskett, 2025). Many decision-makers are left wondering what they can do in the wake of U.S. reversals on environmental and social progress. Banks around the world are looking at how to manage anti-ESG rhetoric and policy from different governments.

The incorporation of ESG into investing decisions and its link to financing have been debated in academia and business over the last few years. Furthermore, ESG have been a focal point in discussions on globalization, competitiveness, and sustainable development (Aleknevičienė & Stralkutė, 2023). ESG related risks in general and environmental risks particularly have increasingly been viewed as relevant metrics in understanding the risk profile of companies and financial securities (Apergis et al., 2022). There has been studies showing that ESG performance can affect cost of equity (Wong et al., 2024), cost of debt (Apergis et al., 2022), and bankruptcy prediction (Atif & Ali, 2021). ESG has shown itself to be a factor for lenders in determining credit spreads. Banks issuing loans show particular interest in the corporate governance pillar when assessing a company (Agnese & Giacomini, 2023). The regional context of ESG has a larger impact of discounting cost of debt as countries with high trust and greater focus on sustainability will also have lower cost of debt (Hoepner et al., 2016). Understanding the relationship between ESG performance and financial benefits is of interest to management, investors, regulators and other key stakeholders. Accurately assessing the extent to which ESG relates to the risk level of companies and financial assets can help inform investment decisions and regulations, among other benefits. Furthermore, understanding what role the regional context plays in shaping this relationship will help key stakeholders avoid relying on misinformed generalizations.

1.2. Purpose and Research Question

The purpose of our study is to analyze the relationship between ESG scores and cost of debt among firms from the European Union (EU) and U.S. at all levels of ESG. This thesis will aim to map the general effect of ESG performance on cost of debt. Beyond the general effect, the thesis will examine potential effect differences between firms in the EU and the U.S. Including a broader scope of nations will also allow us to see if there are similar trends amongst the different ESG levels on a country basis. Additionally, the three pillars of ESG will be analyzed separately in this study. Through separation, we investigate differences in the relationship between the separate pillars and cost of debt and whether the relationship varies across regions. Insight into how sustainability is priced in debt markets will deepen the perspectives on ESG measures. Additionally, the level of linearity of the effect will be investigated. Through this direction we ask the question:

How does ESG performance and the performance of the separate pillars affect cost of debt across the EU and U.S.?

2. Literature Review & Theory

In this literature review, we begin by explaining the groundwork for the concepts of ESG, ESG performance, and cost of debt for our study. These concepts are a required background in understanding the principles referenced in peer literature. After establishing the agreed concepts, we evaluate existing literature in understanding the relationship between ESG scores and company cost of debt. After introducing the general concepts, we then review existing studies on relationships between ESG scores and cost of debt. Our review then concludes with an explanation of how our study expands to the existing work of the other scholars.

2.1. Background

2.1.1. ESG

A commonly used acronym, ESG is an umbrella term standing for environmental, social, and corporate governance (Nordea, 2025). These categories are grouped together as a broader understanding of the impact an organization has outside of the economy. The environmental section represents the ecological influences an organization may have. Carbon emissions, resource depletion, waste, pollution, and effects on biodiversity are common considerations when measuring environmental impact. The social section represents an organization's responsibility towards employees and human communities. Commonly, these are measured via working conditions, labor rights, contribution to community, and diversity and inclusion of employees and workforce. Lastly, the governance section represents how an organization controls internally, both legally and morally. Control mechanisms such as against bribery and corruption, executive and board compensation systems, internal whistleblowing, shareholder voting, and other internal controls demonstrate an organization's governance (LSEG, 2024). Overall, the emphasis towards ESG shows the shift from a shareholder to a stakeholder framework. An organization must recognize everywhere that it has an impact, not only the direct financial benefactors of equity ownership (Freeman, 1994).

2.1.2. ESG Performance

ESG performance is commonly rated by a third-party organization such as Sustainalytics, ISS, or MSCI. In our study, we have elected to use the London Stock Exchange Group (LSEG)'s scoring system. LSEG's system is an internationally consistent scoring system widely used across nations which allows for direct comparison. The system contains 10 categories: 4 for environment, 3 for social, and 3 for governance. Each category is ranked on a scale of 0 to 1. Categories with a direct yes or no benchmark are given a 1 for the satisfactory condition, 0 for dissatisfactory. Numerical metrics are given a percent represented between 0 and 1 and are scored relative to other companies in the metric. For

a given industry (i.e. healthcare, heavy industry, or financial services), a category may be labeled as critical, material, relevant, or not relevant to ensure an organization is appropriately assessed based on potential ESG impact.

There are also some more general limitations of the application of ESG in empirics. An issue related to ESG is "greenwashing", which can be defined as disclosing misleading ESG information (Yu et al., 2020). To deceptively position a firm as sustainable may entail advantages, such as financial performance and reputational capital (Siano et al., 2017). Eliwa et al. (2021) recognizes the potential difference between a company's true sustainability versus its disclosed ESG rating. They describe the disclosure as a substitute for true performance. Companies with weak ESG performance may attempt to game rating services by compensating across categories subsequently engaging in greenwashing.

In contrast to financial measures, ESG is qualitative and inherently difficult to measure. In a study by Berg et al. (2022), six of the leading ESG rating agencies were compared. The different ESG ratings showed great variation, with correlations spanning from 0.38 to 0.71. They found that a rater effect is present, which means that if an agency scores a firm highly in one category it is also likely to do so in other categories. A possible explanation for the rating effect is that rating analysts are responsible for certain firms instead of categories, thus causing their overall assessment to affect different categories (Berg et al., 2022).

A correlation between firm size and ESG scores has been found across literature which can be linked to increased ESG disclosure. More specifically, size influences data availability through increased resources, which in turn influences the ESG score (Drempetic et al., 2020). Disclosure can become a more important input to ESG scores compared to actual ESG performance as the non-availability of data is seen as negative. If the ESG score is not an adequate measure of true ESG performance, green capital might not flow to more sustainable companies (Drempetic et al., 2020). The causal link between ESG and financial performance has also been questioned. Orlitzky et al. (2003) conducted a meta-analysis of 52 studies regarding corporate social/environmental performance's link to financial performance. Based on this sample, they concluded that the relationship tends to be bidirectional and simultaneous (Orlitzky et al., 2003). Moreover, the causation could be reversed as the most profitable firms are best suited to afford the costs of ESG (Bénabou & Tirole, 2010).

2.1.3. Cost of Debt

An organization's cost of debt may be represented in a multitude of ways. Orlitzky et al. (2003) performed a meta-analysis of ESG performance to various cost of debt metrics. The study concluded that ESG scores are more correlated with accounting-based cost of debt metrics such as the previously stated ratio than to market-based metrics like interest

on public bonds. For our study, we are electing to use LSEG's data of measuring cost of debt as a function of the weighted cost of capital. To further expand research into differences between EU and U.S. relationships between ESG and cost of debt, we will require an internationally consistent metric of measuring cost of debt. LSEG's debt metric allows for increased availability of information, and ease of comparability between companies from different regions.

2.2. ESG and Cost of Debt

The theory that a company's ESG performance is related to cost of capital has been the subject of several papers. While most studies support the negative relationship between ESG performance and cost of debt, the degree and cause are still debated. A paper examined the effect between ESG and loan spreads across European loan agreements (Drago & Carnevale. 2020). By examining Thomson Reuters ASSET4 ESG scores, the paper found that on average an increase in the ratings by 10 points reduces the spread by about 4.2% at a highly statistically significant level. The findings suggest that ESG in general is a consideration for lenders and that the relationship is not linear. Drago & Carnevale found that firms with low ESG performance pay higher spreads. However, high performing firms did not get significantly better rates than average firms. This trend shows that there is a plateau to the extent which ESG performance benefits a company's loan costs. The paper noted that ESG scores were only a small portion of a lender's assessment even if there is a significant relationship between ESG scores and loan spreads (Drago & Carnevale. 2020).

Aleknevičienė & Stralkutė (2023) studied the specific relationship between ESG scores and cost of debt for Scandinavian firms. Using specific controls for firm aspects such as size, leverage, profitability, and risk, they found that ESG performance generally lowers cost of debt. While in line with Drago & Carnevale's research, this group believed that the context of sustainability-focused European countries matters for lenders to see the benefits of ESG.

Another paper studied U.S. companies and how ESG performance affects overall cost of capital (Wong et al., 2024). The study compared Refinitiv ESG scores to a company's accounting cost of debt, cost of equity, and weighted average cost of capital as well as separated for each pillar of ESG. Wong et al. (2024) found that higher ESG performance does lower the overall cost of debt, equity, and capital. Both the environmental and social pillars had a significant effect on the cost of financing on a consistent basis. Only governance was considered insignificant. The authors theorized that firms with higher ESG performance indicate that they are better governed, have lower legal or regulatory risk, have a more sustainable long term business plan, and higher customer and employee trust. Both lenders and other investors are therefore likely to have increased confidence in companies with higher ESG performance and thus lower their required returns. Wong

et al. (2024) describes the studied ESG and cost of capital relationship as demonstrating a real financial effect rather than merely increasing firm reputation.

Apergis et al. (2022) studied the relationship between ESG scores and cost of debt internationally. Like the previous studies mentioned, the paper concluded that higher ESG scores do reduce the cost of debt. However, they noted that environmental risk is especially important. Firms with higher exposure to climate change, pollution, or other environmental liabilities tend to have higher cost of debt unless their ESG performance offsets the specific risks. Higher environmental risk industries may include energy, utilities, heavy industry, and other highly carbon intensive sectors. Lenders and bond investors can then view the ESG scores as a signal of lower risk of weak oversight, better management, lower litigation risk, and better long-run resilience. While Apergis et al. (2022) did include firms internationally and controlled for country fixed effects, they did not compare the effects of countries' relationships between ESG and cost of debt.

Another research paper investigated over 19,000 bonds issued by 63 EU banks (Agnese & Giacomini, 2023). The study looked at the bond yield to maturity at issuance compared to the borrower's ESG score. They concluded that ESG scores reduce the cost of debt of a company. Agnese & Giacomini (2023) found a 10-point ESG increase resulted in an average 23 basis point reduction in bond yield. However, when separating the effects for each of the ESG pillars, this study found that only the governance pillar was statistically significant. Agnese & Giacomini (2023) believe that the ESG to cost of debt relationship is driven almost entirely by governance. They suspect that the banks view ESG as reducing opportunistic behavior and improving risk management via governance rather than environmental and social benefits being a risk signal. Their study focused on the period from 2006 through 2021. They found that the ESG effect is stable across economic crises such as the 2008 financial crisis, European sovereign debt crisis, and the impact of COVID-19. Additionally, their conclusion supports the fact that the ESG impact is increasing over time.

Despite support for the relationship between higher ESG performance and a reduction in cost of debt, we should still be skeptical. Eliwa et al. (2021) emphasizes the distinction between ESG performance and disclosure in their paper. By relying on ESG scoring from third parties, only disclosed performance is captured. The disclosure is only based on what a company reports. ESG scoring is not infallible and may be subject to errors in judgement or bias. Meanwhile, there is yet to be a more reliable way to study true ESG performance. ESG disclosure is only a substitute to performance rather than a complement. Eliwa et al. (2021) advises watching out for greenwashing or the overemphasis on ESG disclosure to compensate for poor ESG action. In contrast to Agnese & Giacomini (2023), this study found that the environmental and social pillars had the most significant effects on cost of debt. Meanwhile, corporate governance was weak to inconsistent on predicting lower cost of debt. The difference in effect may be because the firms studied by Eliwa et al. (2021) used accounting cost of debt in their

research whereas Agnese & Giacomini (2023) focused only on bonds issued by banks. The difference in outcome may imply that banks value governance higher than other types of lenders.

For further skepticism in these studies, Gigante & Manglaviti (2022) conducted a meta study on the causality of ESG performance and cost of debt financing. The paper used regression discontinuity as a method of testing the causality. Their conclusion was that while there is a significant negative correlation between ESG performance and cost of debt, there is no statistically significant causal effect. Instead, they suggest that other studies may be capturing other factors such as management quality, firm size, firm profitability, or industry inherent risk. Since the ESG scores cannot be determined as causal, Gigante & Manglaviti (2022) suspect that the benefit of higher scores is largely overstated.

2.3. ESG and Cost of Debt Across Regions

The emphasis on ESG is often influenced by various cultural and political factors. Legally, a nation may have stricter or more relaxed legislation on standards for each of the ESG pillars. Societal trust in institutions may cause lenders to view ESG disclosure as more or less accurate in representing ESG performance. The wealth and development of a nation or region may affect its readiness to view ESG as a priority.

Drago & Carnevale (2020) discovered that countries with high average ESG scores, the ESG-cost of debt relationship was more linear with higher ESG scores resulting in lower loan spreads. For countries with lower average ESG scores, the loan spreads followed a U-shaped pattern. Drago & Carnevale (2020) showed that low-ESG regions may punish perceived overinvestment in ESG. Potentially, too high ESG scores inform the lenders in those regions that resources are being wasted, and profitability may be lowered due to overinvestment. The overinvestment then leads to higher borrowing costs.

Eliwa et al. (2021) additionally found evidence that the ESG-cost of debt relationship is stronger in countries with higher stakeholder orientation. Their study showed that countries with higher emphasis on communities and institutions would more strongly reward higher ESG scores with lower cost of debt. Meanwhile, countries with a greater focus on purely economic benefits will exhibit a weaker effect of ESG on the cost of debt. They concluded that the effect reflects free-market principles that the values and demand of a market will reward behavior accordingly.

Hoepner et al. (2016) researched whether country or corporate sustainability had a more significant relationship with cost of debt. Their first result was that sustainability at the country level has a significant negative relationship with cost of debt. The emphasis and expectations of ESG within a nation have a great impact on how cheaply a firm may borrow debt. The second hypothesis showed weaker or mixed results in the relationship

between corporate level sustainability and lower cost of debt. Even if a company displays high ESG performance, the context of its nation plays a larger role in lowering its potential cost of debt. The authors state that strong societal trust, legal systems, and social responsibility are the larger contributors to cost of debt. They presume that this is because lenders are better able to verify the stability and reliability of a nation compared to individual companies. Additionally, the study suggests that changes for sustainability are more effective in lowering cost of debt at a societal or national level rather than an individual firm level.

2.4. Theoretical Frameworks

2.4.1. Stakeholder Theory

Stakeholder theory suggests that a firm's long-term success is closely linked to the quality of its relationships with stakeholders. In this context, stakeholders are individuals or groups who are, to some degree, affected either positively or negatively by the firm's action (Freeman, 1994). Stakeholder theory can be interpreted as a theoretical framework that encourages organizations to acknowledge and consider their stakeholders, which exist internally or externally to the organization and promotes understanding and managing stakeholder interests (Mahajan et al., 2023).

An instrumental view of stakeholder theory suggests that firms that pursue ESG engagements can create positive synergies with shareholders and non-investing stakeholders and gain reputational advantages that can impact on the firm's overall performance, thus, reducing their cost of debt (Bacha et al., 2021). Stakeholder theory suggests that firms should consider their stakeholders' sustainability interests and take corresponding ESG actions to advance stakeholder value. Firms, through ESG practices, can build and maintain their reputation and motivate stakeholders to provide them with essential resources (Hampl & Vágnerová Linnertová, 2024). A foundational argument for why stakeholder theory suggests a negative relationship between ESG performance and risk is that ESG performance reflects value creation for key external stakeholders. While ESG performance may capture some level of average value creation, or at least a lack of value destruction in the operating environment, the terms are not synonymous, and actions that benefit one stakeholder group may disadvantage another. It has regardless been shown that stakeholders hold preferences for sustainability and are aware of ESG related risks (Hampl & Vágnerová Linnertová, 2024).

2.4.2. Legitimacy Theory

Legitimacy Theory is a related and overlapping theory to stakeholder theory (Hampl & Vágnerová Linnertová, 2024). Legitimacy theory suggests that a firm is legitimate to the extent that its means and ends appear to conform with social norms, values, and expectations. A legitimate organization is one that is perceived to be pursuing socially

acceptable goals in a socially acceptable manner where efficiency and performance alone is not sufficient (Ashforth & Gibbs, 1990).

Under legitimacy theory, companies improve their ESG performance to meet stakeholders' expectations and maintain a perception of legitimacy. If stakeholders are not satisfied with the legitimacy of a company's operations, they will revoke their support, which might manifest as limiting access to capital through higher costs (Hoepner et al., 2016). Firms should subsequently adopt ESG practices that are linked to societal appraisal which would grant them higher perceived legitimacy (Eliwa et al., 2021). Under legitimacy theory, firms that fail to meet basic ESG performance expectation are perceived by stakeholders to be acting in ways that are inconsistent with the values underlying the social contract (Maaloul et al., 2023). It is argued in literature that society expects firms to prevent or repair damage caused by them to their environment, which would lead to a negative relationship between ESG performance and cost of debt (Eliwa et al., 2021). From the perspective of the discussion above, it appears that legitimacy theory would expect that meeting the local expectations is what defines the interaction between ESG performance and cost of debt rather than absolute performance. It is thus fair to assume that more sustainable countries have more pronounced ESG preferences built into the societal contract, leading to a more pronounced relationship.

2.4.3. Agency Theory

Agency theory provides a framework to determine the relationship between those who own and finance the firm (the principals) and those who run the firm (the agent) (Jensen & Meckling, 1976). The theoretical framework mainly relates to decisions that serve the interests of the owners, without being biased by any personal interests of the management (Al Amosh et al., 2024). Under agency theory, ESG performance, particularly corporate governance practices, can lower information asymmetry and subsequently agency costs (Al Amosh et al., 2024). On the other hand, it has also been argued that ESG investments can be seen as agency costs (Drago & Carnevale, 2020). Managers may seek to gain advantage from the legitimacy associated with ESG performance and furthering their own social, political or career agendas, at the expense of shareholders and other stakeholders (Bacha et al., 2021). ESG practices may diverge funds and managerial focus from financial matters (Wong et al., 2024) subsequently creating increased financial risk. Socially responsible firms have also been argued to be at a competitive disadvantage compared to their socially irresponsible competitors (Drago & Carnevale, 2020). Overinvestment in ESG performance beyond what the social contracts demands to create legitimacy can therefore be linked to increased agency costs and subsequently cost of debt.

2.5. Contributions to Existing Literature

There is evidence to show that high ESG scores correlate to lower cost of debt (see e.g. Apergis et al. 2022, Drago & Carnevale. 2020, Wong et al. 2024). The existing studies

have mostly looked at firms without consideration of national context. Instead, the papers focus on how a company's individual ESG performance affects its lending rates. We believe that there is more information to be discovered by researching the aggregate effects of a nation and comparing how different regions may reward ESG through debt rates differently. Hoepner et al. (2016) showed that there exists a different coefficient in ESG-cost of debt relationship that is stronger than an individual firm's. By further looking into how ESG scores relate to cost of debt between the EU and the U.S., we will better understand how lender interest in ESG is shaped.

Additionally, many of the existing studies focus only on aggregate ESG performance and its relationship with debt costs. In addition to comparing the U.S. vs EU firms, we are looking to study the individual effects of each of the three pillars of ESG within a national context. We believe that the EU and the U.S may value environmental, social, or governance impact at different rates. Agnese & Giacomini (2022) found that within bank lending, governance was the strongest pillar. Meanwhile, Eliwa et al. (2021) found that environmental had the strongest effect followed by social, whereas governance had the weakest effect on total accounting cost of debt. By separating the three pillars for both EU firms and U.S. firms, our study will be able to obtain more detailed insight on how regions may reward or disregard the different aspects of ESG.

As countries have different institutions and goals for investors and lenders, we expect that there will be value in researching variations between regions in findings. Studies have suggested that countries with higher ESG performance on a country level will reward higher ESG performance on a firm level with lower cost of debt (Aleknevičienė & Stralkutė. 2023). This potential effect is important to control for when comparing regional differences. By expanding the study to include the U.S., further insight may be gleaned on institutional effects of the ESG-debt relation.

As ESG perception is shaped on cultural and political contexts, we believe it is important to study how the U.S. and EU may respond via cost of debt. The broader study on comparable terms will allow us to understand how sustainability is viewed cross-culturally. Therefore, we believe that our study contributes to existing literature by increasing the understanding of national emphasis on the different pillars of ESG.

3. Hypothesis Construction

Some attention in academia has already been devoted to investigating the relationship between ESG performance and the cost of debt, as well as the relationship between the individual pillar scores and the cost of debt, with varying results. Based on the literature review this thesis concludes that ESG performance tends to negatively affect the cost of debt (see e.g. Agnese & Giacomini, 2023; Apergis et al., 2022; Wong et al., 2024) leading to the first hypothesis and sub-hypotheses:

H1: *A company's ESG score has a significant negative relationship with cost of debt.*

> H1a: *A company's environmental pillar score has a significant negative relationship with cost of debt.*
>
> H1b: *A company's social pillar score has a significant negative relationship with cost of debt.*
>
> H1c: *A company's corporate governance pillar score has a significant negative relationship with cost of debt.*

ESG performance may be related to risk mitigation but still not have a purely linear relationship. Drago & Carnevale (2020) found that investment beyond the optimal risk minimized level is associated with increased risk. The second hypothesis and sub-hypotheses are subsequently:

H2: *A company's ESG score has a non-linear relationship with cost of debt.*

> H2a: *A company's environmental pillar score has a non-linear relationship with cost of debt.*
>
> H2b: *A company's social pillar score has a non-linear relationship with cost of debt.*
>
> H2c: *A company's corporate governance pillar score has a non-linear relationship with cost of debt.*

Previous studies have shown that the relationship between ESG performance and cost of debt is more pronounced in countries with higher general ESG performance (Aleknevičienė & Stralkutė, 2023; Drago & Carnevale, 2020; Eliwa et al., 2021). The third hypothesis and sub-hypotheses are subsequently:

H3: *The anticipated negative impact of a company's ESG score on its cost of debt is greater in more sustainable countries.*

> H3a: *The anticipated negative impact of a company's environmental pillar score on its cost of debt is greater in more sustainable countries.*

H3b: *The anticipated negative impact of a company's social pillar score on its cost of debt is greater in more sustainable countries.*

H3c: *The anticipated negative impact of a company's corporate governance pillar score on its cost of debt is greater in more sustainable countries.*

The level of stakeholder orientation of the economy has been shown to interact with the relationship between ESG performance and cost of debt (Eliwa et al., 2021). U.S. has a generally lower level of stakeholder orientation compared to EU member states (Dhaliwal et al., 2012) and should subsequently depict a less pronounced relationship between the variables. The EU has generally had stricter and more standardized reporting requirements as well as a stricter view on harmful activities in relation to ESG compared to North America (Bannier et al., 2023). This could lead to EU firms being more accurately assessed in relation to their ESG performance while also facing greater ESG-related legal risks. This dichotomy between the regulatory environment in the EU and the U.S leads to the fourth hypothesis and sub-hypotheses.

H4: *The anticipated negative impact of a company's ESG score on its cost of debt is greater in the EU compared to the U.S.*

H4a: *The anticipated negative impact of a company's environmental pillar score on its cost of debt is greater in the EU compared to the U.S.*

H4b: *The anticipated negative impact of a company's social pillar score on its cost of debt is greater in the EU compared to the U.S.*

H4c: *The anticipated negative impact of a company's corporate governance pillar score on its cost of debt is greater in the EU compared to the U.S.*

4. Methodology

4.1. Variable Review

This subsection of the thesis will be devoted to explanation of the construction of each variable and its relevance to the problem at hand. The sections begin with an explanation of the dependent variable followed by the independent variables, and control variables.

4.1.1. Dependent Variable

The dependent variable for this study is the cost of debt (*CoD*). Previous studies have used different measures for cost of debt ranging from pure accounting ratios to pure market metrics. Market-based metrics typically include bond yields (Agnese & Giacomini, 2023; Apergis et al., 2022) or loan spreads (Drago & Carnevale, 2020; Hoepner et al., 2016). Accounting based metrics typically consist of some metric for financial expenses divided by debt or total liabilities (see e.g. Aleknevičienė & Stralkutė, 2023; Bacha et al., 2021; Eliwa et al., 2021). In this thesis, the metric used for cost of debt will, similar to previous studies (Alves & Meneses, 2024; Hampl & Vágnerová Linnertová, 2024; Kordsachia, 2021; Wong et al., 2024), be the cost of debt aspect of the weighted cost of capital formula, as provided by LSEG workspace.

The LSEG Workspace cost of debt (*CoD*) is the cost to the company of issuing new debt, adding the weighted cost of short-term debt and the weighted cost of long-term debt based on the 1-year and 10-year points of an appropriate credit curve. The determination of the appropriate credit curve for a company considers various risk factors, including company-specific information, credit ratings, and the current economic environment. *CoD* represents the marginal debt cost and reflects the current financing conditions of the company and is, therefore, more likely to immediately incorporate changes in the ESG score compared to other proxies (Alves & Meneses, 2024). It is also an after-tax cost of debt (Kordsachia, 2021) and is, therefore, more appropriate for comparing financing costs between firms in different countries (Alves & Meneses, 2024). Given the calculation, *CoD* is also available for a larger number and more comparable sample of firms ensuring sufficient sample size.

4.1.2. Independent Variables

The main independent variable for this thesis is the ESG score (*ESG*) provided by LSEG Workspace, formerly referred to as Thomson Reuters Asset 4 and Refinitiv Eikon. LSEG (2024) gathers firm ESG data from annual reports, CSR reports, corporate websites, stock exchange filings, NGO websites, and media outlets. The ESG score is calculated by capturing and calculating over 870 company level ESG measures, of which a subset of 186 of the most comparable and material per industry, powers the overall company

assessment and scoring process. These are grouped into ten categories that reformulate the environmental (*E*) score, social (*S*) score, corporate governance (*G*) score, and the final ESG score. The ESG score is a relative sum of the category weights, which vary per industry for the environmental and social categories. The respective weights are normalized to percentages ranging between 0 and 100. LSEG sets the metrics so the category cannot be gamed for a higher score via exceptional secondary factors instead of the primary target of one of their categories. To combat greenwashing, LSEG uses controls for each of its rating categories. Notably, the ratings have a capping metric wherein a subcategory for a pillar is unable to be weighted beyond its relevance for an industry. This is to prevent a company from overrepresenting one initiative to compensate for poor ESG performance elsewhere.

LSEG ESG scores are widely used in literature (see e.g. Agnese & Giacomini, 2023; Apergis et al., 2022; Bannier et al., 2023; Gigante & Manglaviti, 2022), less prone to selection bias, and show more relevant results in terms of variability and distribution than comparable ESG ratings (Habermann & Fischer, 2023). We will use lagged terms for all independent variables in line with previous studies (see e.g. Agnese & Giacomini, 2023; Drago & Carnevale, 2020; Habermann & Fischer, 2023) mainly to mediate concerns with reverse causality.

In addition to evaluating the ESG score and the separate pillar scores, we will also construct separate variables to evaluate hypotheses and sub-hypotheses H2-H4. To test for non-linear relationships, the independent variables build on the framework developed by Drago & Carnevale (2020) by constructing squared ESG terms and categorical ESG dummy variables. The ESG categorical dummy variables equate to whether the firm has a high ESG score (*ESGHigh)* or low ESG score (*ESGLow)* given by which tertile of the distribution the firm belongs to each year.

To test H3, this thesis also draws inspiration from (Drago & Carnevale, 2020) by including interaction terms between firm level ESG performance *(ESG)* and country level ESG performance. The metric used for country-level ESG performance is country-level halves based on average ESG scores among firms from that country. The sample used for calculating the country-level halves is separate from the main sample and consists of all firms with an available ESG score from Europe and North America each year. The set of firms used to calculate the average ESG score per country excludes financial and real estate firms. The median will subsequently be determined by the median average ESG score for a country that has at least one non-financial and non-real estate firm with an available ESG score in each year based on a sample of North American and European firms (see Appendix 3. for breakdown of average ESG scores per country and year). The country level halves are used to construct the country level dummy variable for high ESG performance *(ESGCountryH).* To test H4, this thesis includes another interaction term between the firm-level ESG performance *(ESG)* and a dummy variable *(EU)* which equals one if the firm is located within the European Union.

4.1.3. Control Variables

Control variables are factors that are included to account for their potential influence on the dependent variable. All financial information used in the study is expressed in U.S. Dollars (USD). The firms that use different currencies in their financial statements will have their financial information adjusted using exchange rates. The currency translation has already taken place when the data is exported from LSEG Workspace. The study will assume that the translation is accurate and not employ any additional translation. The firm-level control variables used in this study are debt ratio *(Lev)*, firm size *(Size)*, profitability *(RoA)*, market-to-book ratio *(MB)*, and interest coverage ratio *(ICR)*. Additionally, the country-level control variable central bank rate *(Rate)* is used.

Debt Ratio

Debt ratio *(Lev)* is defined as a ratio of total debt divided by total assets. Total debt represents total debt outstanding which includes notes payable/short-term debt, current portion of long-term debt/capital leases, and total long-term debt. Total assets represent the total assets of a company. *Lev* is expected to be positively associated with cost of debt. Those firms with a lower leverage are expected to have better solvency and a lower interest rate than firms with a higher leverage (Eliwa et al., 2021).

Firm Size

Firm Size *(Size)* is defined as the logarithm of total assets. Larger firms have been shown to be better able to withstand negative shocks to cash flow and are less likely to default (Bacha et al., 2021). Larger firms are then viewed as less risky by banks and should enjoy lower yields on debt. Larger firms are also expected to have more resources for external finance at a lower cost compared to smaller firms (Eliwa et al., 2021).

Profitability

Return on assets is used as the proxy for profitability *(RoA)* in this study. Return on assets is calculated as the income after taxes for the fiscal period divided by the average total assets and is expressed as percentage. Average total assets is the average of total assets at the beginning and the end of the year. More profitable firms are believed to be in a better financial position and often acquire loans with lower interest rates (Eliwa et al., 2021). More profitable firms are also expected to imply less uncertainty for lenders and greater capacity to service the debt (Hampl & Vágnerová Linnertová, 2024).

Market-to-book Ratio

Market-to-book ratio *(MB)* is calculated by dividing the company's closing share price by the end of fiscal period by its book value per share. Book value per share is calculated by dividing total equity from latest fiscal period by outstanding current total shares. Market-to-book ratio is considered a proxy for growth opportunities in this study. A standard trade-off model suggests that high-growth companies have a low cost of debt

(Bacha et al., 2021). In trade-off theory, on the other hand, it is often argued that growth opportunities can be considered a form of intangible assets. Intangible assets are typically more difficult to use as collateral value in the event of bankruptcy (Matemilola et al., 2018). Nevertheless, while the relationship between market-to-book ratio and cost of debt is ambiguous, it should be taken into account due to its general influence on cost of capital (Wong et al., 2024).

Interest Coverage Ratio

Interest coverage ratio *(ICR)* measures the number of times within a fiscal period the company generates enough operating income to meet its interest payments. It is calculated as earnings before interest and taxes for the fiscal period divided by interest expense for the same period. *ICR* is a measure of a firm's capabilities to meet its financial obligations. It is subsequently likely that firms with a higher rate of interest coverage have a lower cost of debt (Eliwa et al., 2021).

Central Bank Policy Rate

Central bank policy rate *(Rate)* is a proxy for the relevant debt market conditions for a given firm each year. It is calculated as a monthly average policy rate running from January to December with the simplified assumption that each policy change occurs at the beginning of each month. For the United States, the federal funds rate is used as the operational target of monetary policy. For the euro area (including Denmark), the deposit facility rate is selected as it has become the effective policy rate in the European Central Bank's floor system and closely anchors short-term money market rates. For Sweden and Poland, the respective policy and reference rates are used. While these rates are not identical in institutional design, they serve analogous roles in transmitting monetary policy and are therefore considered comparable measures of the monetary policy stance.

An alternative approach to using *Rate* which is common in literature is to use country fixed effects (Agnese & Giacomini, 2023; Apergis et al., 2022). However, several countries in the sample are represented by only a small number of observations (see Table 2. for country-level breakdown). Estimating country fixed effects under such conditions may lead to imprecise estimates and a substantial loss of degrees of freedom which is especially problematic when variables display low time-variance. It further creates issues when the effect of country-level sustainability is assessed which depicts very little variation over time within respective countries (see Appendix 3. for country-level sustainability per year). Some studies have opted to not use country fixed effects applying similar reasoning (see e.g. Alves & Meneses, 2024; Bannier et al., 2023; Eliwa et al., 2021). *Rate* is expressed in number of percentages, i.e. 1% is expressed as 1.

Table 1. Definitions of control variables and their expected signs

Control Variable	Definition	Expected Sign
Debt Ratio *(Lev)*	Total debt divided by total assets	+
Firm Size *(Size)*	The logarithm of total assets	-
Profitability *(RoA)*	Income after taxes for the divided by the average total assets	-
Market-to-Book Ratio *(MB)*	Closing share price by the end of fiscal period divided by book value per share	+/-
Interest Coverage Ratio (ICR)	Earnings before interest and taxes for the fiscal period divided by interest expense for the same period	-
Central Bank Policy Rate (*Rate*)	The monthly average policy rate for the relevant central bank each year	+

Note: Expected sign refers to expected effect on cost of debt.

4.2. Econometric Model

The main econometric model used in this thesis is a pooled OLS model including year and GICS sector fixed effect dummies with heteroskedasticity-robust standard errors. Model 1, as specified below, is used to test hypothesis and sub-hypotheses 1.

$$CoD_{it} = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 Lev_{i,t} + \beta_3 Size_{i,t} + \beta_4 RoA_{i,t} + \beta_5 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (1)$$

$$CoD_{it} = \beta_0 + \beta_1 E_{i,t-1} + \beta_2 Lev_{i,t} + \beta_3 Size_{i,t} + \beta_4 RoA_{i,t} + \beta_5 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (1a)$$

$$CoD_{it} = \beta_0 + \beta_1 S_{i,t-1} + \beta_2 Lev_{i,t} + \beta_3 Size_{i,t} + \beta_4 RoA_{i,t} + \beta_5 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (1b)$$

$$CoD_{it} = \beta_0 + \beta_1 G_{i,t-1} + \beta_2 Lev_{i,t} + \beta_3 Size_{i,t} + \beta_4 RoA_{i,t} + \beta_5 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (1c)$$

To control for unobserved heterogeneity, time-fixed effect dummies (γ_t) and sector effect dummies (δ_i) are used in line with previous studies. Our model does not control for firm fixed effects as time variations in ESG performance are limited (Arouri & Pijourlet, 2017).

To test hypothesis and sub-hypotheses 2, we have constructed two models, one that estimates a squared-term approach (Model 2.1) and one with an interacting-dummy

approach (Model 2.2) to test for different non-linear effects. Model 2.1 is specified as below.

$$CoD_{it} = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 ESG^2_{i,t-1} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 RoA_{i,t} + \beta_6 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (2.1)$$

$$CoD_{it} = \beta_0 + \beta_1 E_{i,t-1} + \beta_2 E^2_{i,t-1} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 RoA_{i,t} + \beta_6 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (2.1a)$$

$$CoD_{it} = \beta_0 + \beta_1 S_{i,t-1} + \beta_2 S^2_{i,t-1} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 RoA_{i,t} + \beta_6 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (2.1b)$$

$$CoD_{it} = \beta_0 + \beta_1 G_{i,t-1} + \beta_2 G^2_{i,t-1} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 RoA_{i,t} + \beta_6 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (2.1c)$$

Where ESG^2_{it-1} is the lagged squared ESG performance. Following the approach by Drago & Carnevale (2020) we have included a second model to test for nonlinearity in the relationship between cost of debt and ESG performance using ESG performance dummies.

$$CoD_{it} = \beta_0 + \beta_1 ESGHigh_{i,t-1} + \beta_2 ESGLow_{i,t-1} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 RoA_{i,t} + \beta_6 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (2.2)$$

$$CoD_{it} = \beta_0 + \beta_1 EHigh_{i,t-1} + \beta_2 ELow_{i,t-1} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 RoA_{i,t} + \beta_6 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (2.2a)$$

$$CoD_{it} = \beta_0 + \beta_1 SHigh_{i,t-1} + \beta_2 SLow_{i,t-1} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 RoA_{i,t} + \beta_6 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (2.2b)$$

$$CoD_{it} = \beta_0 + \beta_1 GHigh_{i,t-1} + \beta_2 GLow_{i,t-1} + \beta_3 Lev_{i,t} + \beta_4 Size_{i,t} + \beta_5 RoA_{i,t} + \beta_6 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (2.2c)$$

$ESGHigh_{i,t-1}$ and $ESGLow_{i,t-1}$ are dummy variables indicating if the lagged ESG performance is high or low respectively i.e. if it is in the top tertile respectively bottom tertile of the distribution in the given year. The same logic applies to each of the pillar variables.

To test hypothesis and sub-hypotheses 3, two models are constructed. The first model focuses on how the general effect of ESG performance on cost of debt depends on country-level sustainability (Model 3.1). The second model explores how non-linear effects interact with country-level sustainability (Model 3.2). Model 3.1 is specified as below.

$$CoD_{it} = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 ESGCountryH_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} * ESG_{i,t-1} + \beta_4 Lev_{i,t} + \beta_5 Size_{i,t} + \beta_6 ICR_{i,t} + \beta_7 Size_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (3.1)$$

$$CoD_{it} = \beta_0 + \beta_1 E_{i,t-1} + \beta_2 ESGCountryH_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} * E_{i,t-1} + \beta_4 Lev_{i,t} + \beta_5 Size_{i,t} + \beta_6 RoA_{i,t} + \beta_7 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (3.1a)$$

$$CoD_{it} = \beta_0 + \beta_1 S_{i,t-1} + \beta_2 ESGCountryH_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} * S_{i,t-1} + \beta_4 Lev_{i,t} + \beta_5 Size_{i,t} + \beta_6 RoA_{i,t} + \beta_7 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (3.1b)$$

$$CoD_{it} = \beta_0 + \beta_1 G_{i,t-1} + \beta_2 ESGCountryH_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} * G_{i,t-1} + \beta_4 Lev_{i,t} + \beta_5 Size_{i,t} + \beta_6 RoA_{i,t} + \beta_7 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (3.1c)$$

Where $ESGCountryH_{i,t-1}$ is a proxy for country-level sustainability representing whether a country has high average ESG scores in the given year or not. The country-level sustainability dummy variables are calculated by taking the average ESG performance in the country and sorting each country into yearly halves. If the country places in the top half the previous year, then $ESGCountryH_{i,t-1}$ equals 1 otherwise 0.

Model 3.2 is specified below.

$$CoD_{it} = \beta_0 + \beta_1 ESGHigh_{i,t-1} + \beta_2 ESGLow_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} + \beta_4 ESGCountryH_{i,t-1} * ESGHigh_{i,t-1} + \beta_5 ESGCountryH_{i,t-1} * ESGLow_{i,t-1} + \beta_6 Lev_{i,t} + \beta_7 Size_{i,t} + \beta_8 RoA_{i,t} + \beta_9 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (3.2)$$

$$CoD_{it} = \beta_0 + \beta_1 EHigh_{i,t-1} + \beta_2 ELow_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} + \beta_4 ESGCountryH_{i,t-1} * EHigh_{i,t-1} + \beta_5 ESGCountryH_{i,t-1} * ELow_{i,t-1} + \beta_6 Lev_{i,t} + \beta_7 Size_{i,t} + \beta_8 RoA_{i,t} + \beta_9 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (3.2a)$$

$$CoD_{it} = \beta_0 + \beta_1 SHigh_{i,t-1} + \beta_2 SLow_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} + \beta_4 ESGCountryH_{i,t-1} * SHigh_{i,t-1} + \beta_5 ESGCountryH_{i,t-1} * SLow_{i,t-1} + \beta_6 Lev_{i,t} + \beta_7 Size_{i,t} + \beta_8 RoA_{i,t} + \beta_9 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (3.2b)$$

$$CoD_{it} = \beta_0 + \beta_1 GHigh_{i,t-1} + \beta_2 GLow_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} + \beta_4 ESGCountryH_{i,t-1} * GHigh_{i,t-1} + \beta_5 ESGCountryH_{i,t-1} * GLow_{i,t-1} + \beta_6 Lev_{i,t} + \beta_7 Size_{i,t} + \beta_8 RoA_{i,t} + \beta_9 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (3.2c)$$

To test hypothesis and sub-hypotheses 4 two additional models are constructed (Model 4.1 and 4.2). Model 4.1 is an expansion of Model 3.1 which includes an interaction term between ESG performance and the EU dummy variable.

$$CoD_{i,t} = \beta_0 + \beta_1 ESG_{i,t-1} + \beta_2 ESGCountryH_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} * ESG_{i,t-1} + \beta_4 EU_i * ESG_{i,t-1} + \beta_5 Lev_{i,t} + \beta_6 Size_{i,t} + \beta_7 RoA_{i,t} + \beta_8 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t} \quad (4.1)$$

$$CoD_{i,t} = \beta_0 + \beta_1 E_{i,t-1} + \beta_2 ESGCountryH_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} * E_{i,t-1} \quad (4.1a)$$
$$+\beta_4 EU_i * E_{i,t-1} + \beta_5 Lev_{i,t} + \beta_6 Size_{i,t} + \beta_7 RoA_{i,t} + \beta_8 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t}$$

$$CoD_{i,t} = \beta_0 + \beta_1 S_{i,t-1} + \beta_2 ESGCountryH_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} * S_{i,t-1} \quad (4.1b)$$
$$+\beta_4 EU_i * S_{i,t-1} + \beta_5 Lev_{i,t} + \beta_6 Size_{i,t} + \beta_7 RoA_{i,t} + \beta_8 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t}$$

$$CoD_{i,t} = \beta_0 + \beta_1 G_{i,t-1} + \beta_2 ESGCountryH_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} * G_{i,t-1} \quad (4.1c)$$
$$+\beta_4 EU_i * G_{i,t-1} + \beta_5 Lev_{i,t} + \beta_6 Size_{i,t} + \beta_7 RoA_{i,t} + \beta_8 ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t}$$

Model 4.2 is an expansion of Model 3.2 which has an interaction term between firm-level ESG performance dummies $ESGLow_{i,t-1}$ and $ESGHigh_{,t-1}$ with the EU_i dummy variable.

$$CoD_{it} = \beta_0 + \beta_1 ESGHigh_{i,t-1} + \beta_2 ESGLow_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} \quad (4.2)$$
$$+\beta_4 ESGCountryH_{i,t-1} * ESGHigh_{i,t-1} + \beta_5 ESGCountryH_{i,t-1} * ESGLow_{i,t-1}$$
$$+\beta_6 EU_i * ESGHigh_{i,t-1} + \beta_7 EU_i * ESGLow_{i,t-1} + \beta_8 Lev_{i,t} + \beta_9 Size_{i,t} + \beta_{10} RoA_{i,t}$$
$$+\beta_{11} ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t}$$

$$CoD_{it} = \beta_0 + \beta_1 EHigh_{i,t-1} + \beta_2 ELow_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} \quad (4.2a)$$
$$+\beta_4 ESGCountryH_{i,t-1} * EHigh_{i,t-1} + \beta_5 ESGCountryH_{i,t-1} * ELow_{i,t-1}$$
$$+\beta_6 EU_i * EHigh_{i,t-1} + \beta_7 EU_i * ELow_{i,t-1} + \beta_8 Lev_{i,t} + \beta_9 Size_{i,t} + \beta_{10} ICR_{i,t}$$
$$+\beta_{11} Size_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t}$$

$$CoD_{it} = \beta_0 + \beta_1 SHigh_{i,t-1} + \beta_2 SLow_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} \quad (4.2b)$$
$$+\beta_4 ESGCountryH_{i,t-1} * EHigh_{i,t-1} + \beta_5 ESGCountryH_{i,t-1} * SLow_{i,t-1}$$
$$+\beta_6 EU_i * SHigh_{i,t-1} + \beta_7 EU_i * SLow_{i,t-1} + \beta_8 Lev_{i,t} + \beta_9 Size_{i,t} + \beta_{10} RoA_{i,t}$$
$$+\beta_{11} ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t}$$

$$CoD_{it} = \beta_0 + \beta_1 GHigh_{i,t-1} + \beta_2 GLow_{i,t-1} + \beta_3 ESGCountryH_{i,t-1} \quad (4.2c)$$
$$+\beta_4 ESGCountryH_{i,t-1} * GHigh_{i,t-1} + \beta_5 ESGCountryH_{i,t-1} * GLow_{i,t-1}$$
$$+\beta_6 EU_i * GHigh_{i,t-1} + \beta_7 EU_i * SLow_{i,t-1} + \beta_8 Lev_{i,t} + \beta_9 Size_{i,t} + \beta_{10} RoA_{i,t}$$
$$+\beta_{11} ICR_{i,t} + \alpha Rate_{i,t} + \gamma_t + \delta_i + \epsilon_{i,t}$$

5. Data & Summary Statistics

In this section, the sample and the timeframe used will be described. The first section will be used to describe the original dataset and the process to arrive at the final sample used to run the regressions. The second section will focus on the descriptive statistics of the final sample.

5.1. Sample Overview

The initial dataset consists of firms in either the S&P 500 index or the iShares STOXX Europe 600 index with headquarters located in the EU or the U.S. and an ESG score recorded in at least one of the last ten fiscal years. In total, the initial dataset consists of 679 firms with available data for each firm from the last ten fiscal years. Due to the use of lagged ESG variables, one year of data is lost. To arrive at the final sample, observations with missing values are excluded. The final sample consists of 297 EU firms (2,293 firm-year observations) and 359 U.S. firms (2,868 firm-year observations).

Table 2. Number of firms and firm-year observations per country

Country	Firms	Firm-year observations
Austria	5	42
Belgium	10	55
Cyprus	1	3
Denmark	20	165
Finland	16	133
France	51	421
Germany	56	432
Ireland	16	127
Italy	23	171
Luxembourg	5	31
Netherlands	27	208
Poland	6	49
Portugal	3	27
Spain	18	149
Sweden	40	280
Total EU	***297***	***2,293***
United States of America	***359***	***2,868***
Total Sample	**656**	**5,161**

Note: Country refers to country of headquarters

The final sample ranges from 2016-2025 for financial metrics and 2015-2024 for ESG metrics. The coverage spans over ten years rather than nine due to some firms having

their fiscal year-end earlier in the year. All firms will subsequently have a maximum of nine fiscal years represented in the sample, leading to significantly fewer observations in 2016 and 2025. The spread of firm-year observations between years is reasonably evenly distributed disregarding 2016 and 2025. 2,293 firm-year observations divided by 297 EU firms implies an average coverage of 7.72 years per for EU firms where the number for the American counterpart being 7.99 years.

Table 3. Number of firms per year

Year	Firms	Coverage, %
2016	154	23.5%
2017	511	77.9%
2018	541	82.5%
2019	574	87.5%
2020	593	90.3%
2021	607	92.5%
2022	622	94.8%
2023	625	95.3%
2024	625	95.3%
2025	309	47.1%
Total Sample	**5,161**	**87.4%**

Note: All ESG metrics refer to the previous year

While there is no lone reason for loss of coverage, it should be noted that LSEG ESG coverage has increased over time, which contributes to increasing availability of all relevant metrics in the later years.

The initial sample in line with previous studies (see e.g. Eliwa et al. (2021)) excludes financial firms and real estate firms due to limited comparability in accounting standards, regulations, and operations. The industry indicator used in this study is based on GICS sector codes rather than industry codes due to certain industries consisting of limited number of firms (See Appendix 1. For the industry breakdown). In total, the final sample consists of firms from 9 sectors. The sector with the highest level of representation is industrials, which makes up 25.0% of the sample (164 firms). The least represented sector is communication services, which makes up 5.8% of the sample (38 firms) (see Appendix 2. for sector breakdown).

5.2. Summary Statistics and Correlation Analysis

5.2.1. Summary Statistics

Some extreme values can be observed for the variables before data handling (see Appendix 4.). *CoD*, *MB* and *ICR* all exhibit minimum values that are significantly negative. To reduce the risk of outliers and harmonize the distribution, *CoD, RoA, Size*

and the ESG metrics are winsorized at 1 and 99%. *MB* and *ICR* are winsorized at 5 and 95% due to their higher level of skewness and kurtosis.

The descriptive statistics of the winsorized variables are provided in Table 4. The mean and median of the main dependent variable *ESG* and the independent variable *CoD* are reasonably close, indicating a symmetric distribution of the variables (Altman et al., 2017). *Size* and *Lev* also appear to have symmetric distributions applying the same logic as above. All ESG metrics exhibit a broad span between maximum and minimum which is in line with previous studies which have relied on the same metric (see e.g. Alves & Meneses, 2024; Drago & Carnevale, 2020; Eliwa et al., 2021). Even after winsorization *ICR* and *MB* exhibit some tendencies of extreme values and large variance. Precautions have been taken to ensure that the values were correctly extracted from LSEG Workspace. However, it is not easily verifiable whether these values were correctly entered into LSEG Workspace. As a control measure, the models have also been estimated with a stricter boundary for outliers yielding similar results. It can thus be concluded that these outliers do not significantly affect the results.

Table 4. Descriptive statistics after variable winsorization

Variable	Mean	Median	Std. Dev	Min	Max
CoD	2.742	2.679	1.508	0.000	5.896
ESG	64.908	68.059	16.337	20.847	91.137
E	61.483	67.222	24.074	0.000	96.254
S	68.938	73.216	19.024	19.357	96.663
G	61.476	64.501	20.064	12.577	94.338
Lev	0.296	0.284	0.160	0.001	0.819
Size	23.631	23.612	1.289	20.625	26.589
ROA	0.069	0.058	0.070	-0.159	0.304
MB	5.123	3.150	5.182	0.503	20.667
ICR	19.663	9.267	26.919	1.192	110.419

Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1.

5.2.2. Correlation Analysis

Table 5. displays the pairwise correlation coefficients for the relevant variables. The negative correlation between *ESG, E,* and *S* and *CoD* is in line with our expectations. Interestingly, we observe the opposite and stronger correlation between *CoD* and *G*. *ESG* is relatively positively correlated with *Size*. This relationship is consistent with existing literature (see e.g. Alves & Meneses, 2024; Bacha et al., 2021; Maaloul et al., 2023). In general, a rule of thumb suggests that a correlation of 0.7 or higher indicates possible issues with multicollinearity (Atif & Ali, 2021). All relevant pairwise correlations being below this threshold suggest that we do not have any significant multicollinearity issues.

Table 5. Correlation matrix

	CoD	*ESG*	*E*	*S*	*G*	*Lev*	*Size*	*RoA*	*MB*
CoD	1.000								
ESG	-0.031	1.000							
E	-0.071	0.847	1.000						
S	-0.080	0.865	0.701	1.000					
G	0.100	0.608	0.285	0.263	1.000				
Lev	0.209	0.030	0.032	0.007	0.023	1.000			
Size	0.102	0.443	0.453	0.354	0.244	0.129	1.000		
RoA	-0.146	-0.105	-0.103	-0.040	-0.103	-0.496	-0.199	1.000	
MB	0.023	-0.094	-0.103	-0.069	-0.040	-0.096	-0.212	0.492	1.000
ICR	0.021	-0.158	-0.176	-0.096	-0.121	0.017	-0.224	0.205	0.345

To further verify the lack of multicollinearity issues in the model, the variance inflation factor for the respective variables is calculated. Perfect multicollinearity violates the basic assumptions that are needed to run the regression models. A variable's variance inflation factor can tell us how correlated the variable is with the remaining variables. Generally, a VIF of 5-10 indicates a multicollinearity issue that must be resolved (Kim, 2019). In Table 6., the VIF of the main variables can be observed. *RoA* has the highest VIF out of the variables with a VIF ranging between 1.837 and 1.847, thus indicating that the models do not have significant issues with multicollinearity.

Table 6. Variance inflation factor

Variable	**VIF**	**VIF**	**VIF**	**VIF**
CD	1.552	1.562	1.561	1.542
ESG	1.264			
E		1.292		
S			1.164	
G				1.085
Lev	1.441	1.441	1.440	1.444
Size	1.361	1.379	1.275	1.174
ICR	1.840	1.839	1.837	1.847
ROA	1.521	1.521	1.519	1.524
MB	1.192	1.195	1.187	1.193
Rate	1.520	1.519	1.520	1.519

6. Results & Empirical Analysis

This section will be devoted to reporting the results from the different models. The first section will describe the results from the respective models with the second section providing tests of robustness.

6.1. Pooled OLS Regressions

6.1.1. The General Effect of ESG Performance on Cost of Debt

Table 7. reports the results of Model 1 where the first column reports the regression coefficients of the model run with *ESG* as the independent variable. The following columns report the same model with each of the pillar scores (*E*, *S,* and *G*) as the independent variable. In each of the models, the coefficient of the variable is reported in plain text with the standard error reported in respective parenthesis. The significance level is indicated by the number of * next to each coefficient, with * indicating the 10% level, ** the 5% level and *** the 1% level.

Table 7. Results of Model 1

Variable	Model 1	Model 1a	Model 1b	Model 1c
ESG	-0.006***			
	(0.001)			
E		-0.005***		
		(0.001)		
S			-0.007***	
			(0.001)	
G				0.001
				(0.001)
Lev	1.441***	1.441***	1.467***	1.434***
	(0.110)	(0.110)	(0.110)	(0.111)
Size	-0.013	-0.005	-0.009	-0.055***
	(0.014)	(0.014)	(0.014)	(0.013)
RoA	-1.127***	-1.106***	-1.172***	-1.240***
	(0.305)	(0.302)	(0.304)	(0.304)
MB	-0.010***	-0.010***	-0.009***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)
ICR	-0.004***	-0.004***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Rate	0.708***	0.700***	0.691***	0.744***
	(0.022)	(0.023)	(0.023)	(0.021)
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

ESG is negative and significant at the 1% level, suggesting that higher ESG performance is associated with lower cost of debt. Similar results are observable for both *E* and *S*. Interestingly, the opposite sign is observed for *G,* albeit not significant at a 10% level. A re-estimation of Model 1 (See Appendix 7.) has been made which includes an interaction term between each of the ESG metrics and *Lev.* The result of this re-estimation shows that each of the interaction terms are significant while *ESG, E,* and *S* are non-significant, suggesting that the effect mainly scales with *Lev*. Under this re-estimation *G* is positive and significant with *G*Lev* being negative and significant suggesting that corporate governance performance only impacts cost of debt negatively for higher levels of leverage.

6.1.2. The Non-Linnear Effect of ESG Performance on Cost of Debt

The results of Model 2.1 are reported in Table 8., and the results of Model 2.2 are reported in Table 9. The first model uses a squared-term approach while the latter utilizes dummy variables for relatively high and low ESG performance.

Table 8. Results of Model 2.1

Variable	Model 2.1	Model 2.1a	Model 2.1b	Model 2.1c
ESG	0.000			
	(0.006)			
ESG^2	-0.000			
	(0.000)			
E		0.000		
		(0.002)		
E^2		-0.000**		
		(0.000)		
S			0.002	
			(0.005)	
S^2			-0.000*	
			(0.000)	
G				-0.009**
				(0.003)
G^2				0.000***
				(0.000)
Lev	1.443***	1.443***	1.475***	1.432***
	(0.110)	(0.110)	(0.110)	(0.111)
Size	-0.011	-0.004	-0.007	-0.057***
	(0.014)	(0.014)	(0.014)	(0.013)
RoA	-1.144***	-1.141***	-1.188***	-1.191***
	(0.305)	(0.302)	(0.304)	(0.304)
MB	-0.010***	-0.009***	-0.009***	-0.010***
	(0.003)	(0.003)	(0.003)	(0.003)
ICR	-0.004***	-0.004***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Rate	0.707***	0.697***	0.688***	0.746***
	(0.022)	(0.023)	(0.023)	(0.021)
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

There is no significant observable effect suggesting a non-linear relationship between *ESG* and *CoD* provided in the table above. For *E* and *CoD* the squared term is the significant one suggesting a non-linear relationship providing a better description of the relationship. A similar relationship is observed for *S* and *CoD* albeit significant only at the 10% level. Interestingly, *G* displays a negative coefficient while G^2 is positive, both being significant at the 5% level and the 1% level respectively. This result suggests an observable non-linear effect where firms receive decreasing marginal benefits from improved corporate governance performance. The relationship between the variables constitutes a ratio of approximately 1/100 suggesting that we cannot conclude if the aggregate effect ever reaches positive levels.

Table 9. Results of Model 2.2

Variable	Model 2.2	Model 2.2a	Model 2.2b	Model 2.2c
ESGHigh	-0.068**			
	(0.033)			
ESGLow	0.125***			
	(0.035)			
EHigh		-0.071**		
		(0.034)		
Elow		0.191***		
		(0.035)		
SHigh			-0.139***	
			(0.034)	
Slow			0.134***	
			(0.035)	
GHigh				0.051
				(0.033)
Glow				-0.001
				(0.033)
Lev	1.443***	1.443***	1.472***	1.432***
	(0.110)	(0.110)	(0.110)	(0.111)
Size	-0.022	-0.011	-0.016	-0.055***
	(0.014)	(0.014)	(0.013)	(0.013)
ROA	-1.171***	-1.157***	-1.208***	-1.221***
	(0.305)	(0.302)	(0.304)	(0.303)
MB	-0.009***	-0.009***	-0.009***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)
ICR	-0.004***	-0.004***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Rate	0.717***	0.706***	0.698***	0.744***
	(0.022)	(0.022)	(0.022)	(0.021)
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

The coefficients *ESGHigh* and *EHigh* are weakly significant with their low performance counterpart being positive and significant at a 1% level. The results of *ESG* and *E* suggest a potential non-linear and rather skewed effect where low performing firms face comparatively higher cost of debt while high performing firms do not differ as significantly from the midrange performing firms. The coefficients *SHigh* and *SLow* are in line with what would be expected from a linear relationship with firms that perform better regarding social sustainability receiving lower cost of debt. The coefficient *GHigh* and *GLow* are both non-significant.

6.1.3. The Different Effect of ESG Performance on Cost of Debt Given Country-Level Sustainability

To compare how the relationship between ESG performance and cost of debt differs depending on the country-level sustainability Model 3.1 and 3.2 have been constructed.

The results from Model 3.1 are reported in Table 10. and the results from Model 3.2 are reported in Table 11. Model 3.1 focuses on how the general effect of ESG performance on cost of debt depends on country-level sustainability. Model 3.2 explores how non-linear effects interact with country-level sustainability. For brevity and legibility, all coefficients of the control variables have been excluded from this point onwards.

Table 10. Results of Model 3.1

Variable	Model 3.1	Model 3.1a	Model 3.1b	Model 3.1c
ESG	-0.005***			
	(0.001)			
*ESGCountryH*ESG*	0.001			
	(0.002)			
E		-0.004***		
		(0.001)		
*ESGCountryH*E*		-0.001		
		(0.001)		
S			-0.005***	
			(0.001)	
*ESGCountryH*S*			-0.000	
			(0.002)	
G				-0.000
				(0.001)
*ESGCountryH*G*				0.002
				(0.001)
ESGCountryH	-0.589***	-0.434***	-0.490***	-0.699***
	(0.152)	(0.116)	(0.152)	(0.103)
Control variables	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

The interaction terms between *ESGCountryH* and *ESG, E, S,* and *G* respectively are all non-significant. The results suggest that the country-level sustainability does not affect the relationship between sustainability performance and cost of debt.

Table 11. Results of Model 3.2

Variable	Model 3.2	Model 3.2a	Model 3.2b	Model 3.2c
ESGHigh	-0.064			
	(0.039)			
ESGLow	0.089**			
	(0.037)			
*ESGCountryH*ESGHigh*	0.026			
	(0.068)			
*ESGCountryH*ESGLow*	0.022			
	(0.080)			
EHigh		-0.089**		
		(0.040)		
Elow		0.130***		
		(0.038)		
*ESGCountryH*EHigh*		0.075		
		(0.069)		
*ESGCountryH*Elow*		0.085		
		(0.080)		
SHigh			-0.033	
			(0.041)	
Slow			0.141***	
			(0.037)	
*ESGCountryH*SHigh*			-0.166**	
			(0.068)	
*ESGCountryH*Slow*			-0.115	
			(0.087)	
GHigh				0.055
				(0.036)
Glow				0.044
				(0.038)
*ESGCountryH*GHigh*				-0.090
				(0.070)
*ESGCountryH*Glow*				-0.022
				(0.072)
ESGCountryH	-0.548***	-0.570***	-0.416***	-0.513***
	(0.072)	(0.071)	(0.071)	(0.070)
Control variables	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

There are no results in the table above suggesting that country-level sustainability affects the relationship between *ESG* and *CoD*. The table above suggests that country-level sustainability affects the relationship between ESG performance and cost of debt differently between the different pillars. There are no results in the table above suggesting that country-level sustainability affects the relationship between environmental performance and cost of debt. The table above suggests that low social performance is associated with higher cost of debt seemingly unaffected by country-level sustainability. The expected positive effect on low social performance and cost of debt is only supported in more sustainable countries. Neither of the corporate governance pillar terms nor

interaction terms display significance at the 10% level. There are no results provided by the table above suggesting that country-level sustainability affects the relationship between *G* and *CoD.*

6.1.4. The Difference Between EU and U.S Regarding the Effects of ESG Performance and Cost of Debt

Models 4.1 and 4.2 are extensions of Models 3.1 and 3.2 respectively. Both Models include interaction terms between their respective ESG metrics and the EU dummy variable.

Table 12. Results of Model 4.1

Variable	Model 4.1	Model 4.1a	Model 4.1b	Model 4.1c
ESG	-0.003**			
	(0.001)			
*ESGCountryH*ESG*	0.010***			
	(0.002)			
*EU*ESG*	-0.010***			
	(0.001)			
E		-0.002**		
		(0.001)		
*ESGCountryH*E*		0.007***		
		(0.002)		
*EU*E*		-0.010***		
		(0.001)		
S			-0.003***	
			(0.001)	
*ESGCountryH*S*			0.007***	
			(0.002)	
*EU*S*			-0.008***	
			(0.001)	
G				0.001
				(0.001)
*ESGCountryH*G*				0.011***
				(0.002)
*EU*G*				-0.010***
				(0.001)
ESGCountryH	-0.923***	-0.747***	-0.781***	-1.016***
	(0.157)	(0.122)	(0.156)	(0.109)
Control variables	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

The table above suggests a general tendency for the relationship between ESG performance and cost of debt. Generally, ESG performance is negatively related to cost of debt. This relationship is less pronounced in more sustainable countries but more pronounced within the EU. This relationship is consistent across both the environmental

pillar and the social pillar. The result of the table above does not suggest a general relationship between *G* and *CoD* but rather a positive relationship only in more sustainable countries and a negative relationship within the EU.

Table 13. Results of Model 4.2

Variable	Model 4.2	Model 4.2a	Model 4.2b	Model 4.2c
ESGHigh	0.024			
	(0.039)			
ESGLow	0.151***			
	(0.037)			
*ESGCountryH*ESGHigh*	0.470***			
	(0.121)			
*ESGCountryH*ESGLow*	0.504***			
	(0.119)			
*EU*ESGHigh*	-0.520***			
	(0.109)			
*EU*ESGLow*	-0.557***			
	(0.097)			
EHigh		-0.000		
		(0.040)		
Elow		0.174***		
		(0.038)		
*ESGCountryH*EHigh*		0.511***		
		(0.117)		
*ESGCountryH*Elow*		0.470***		
		(0.125)		
*EU*EHigh*		-0.514***		
		(0.105)		
*EU*Elow*		-0.443***		
		(0.103)		
SHigh			0.036	
			(0.041)	
Slow			0.207***	
			(0.037)	
*ESGCountryH*SHigh*			0.190	
			(0.131)	
*ESGCountryH*Slow*			0.396***	
			(0.125)	
EU SHigh*			-0.413***	
			(0.121)	
*EU*Slow*			-0.588***	
			(0.098)	
GHigh				0.130***
				(0.036)
Glow				0.123***
				(0.039)
*ESGCountryH*GHigh*				0.404***
				(0.129)
*ESGCountryH*Glow*				0.372***
				(0.117)
*EU*GHigh*				-0.493***
				(0.115)
*EU*Glow*				-0.541***
				(0.104)

ESGCountryH	-0.732*** (0.076)	-0.734*** (0.076)	-0.568** (0.074)	-0.667*** (0.073)
Control variables	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

The table above provides results that while significant, hard to draw general conclusions from. In general, the EU dummy interaction terms display negative signs suggesting that there are potential tendencies of EU firms having lower cost of debt beyond what is captured by the policy rate. Country-level sustainability terms display positive signs, possibly indicating a non-linear relationship in which its interpretation is more complex by the significant negative effect of *ESGCountryH.* The interpretation is that firms in high sustainability countries are facing more favorable conditions and face negative consequences non-linearly by being a high and low performer.

An innate limitation of this approach is that it compares differences across groups that become smaller as more dummy variables and interaction terms are added, increasing the susceptibility to noise and idiosyncratic firm-level factors. A re-estimation of the model where an EU dummy replaces the policy rate control variable has been estimated where, except for *ESGCountryH*GLow*, country-level sustainability interaction terms are no longer significant (see Appendix 6.). The deviation between the results presented in Table 13. and Appendix 6. further suggests that the estimators are potentially capturing effects beyond the intended ones, questioning the validity of drawing general conclusions from the results presented in Table 13.

6.1.5. Summary of Results

ESG is often in literature and colloquially treated as a single coherent metric. The results of the models rather suggest that each of the separate pillars have deviating properties that are of relevance. The discussion from this point onwards will therefore focus more on how the relationship between ESG performance and cost of debt is made up of three sub-relationships between each of the pillars and cost of debt.

The result of Model 1a suggests that there is a negative relationship between environmental performance and cost of debt. The result of Model 1a is aligned with sub-hypothesis H1a and previous literature (see e.g. Apergis et al., 2022; Drago & Carnevale, 2020; Eliwa et al., 2021). Testing for non-linearity in relationships adds additional complexity and we cannot with great certainty conclude a non-linear relationship between environmental performance and cost of debt. The results of Model 2.2b do, however, suggest an asymmetric treatment where low performers pay higher debt costs while high performers are not necessarily paying lower debt costs compared to midrange performers. It can therefore be reasonable to suggest that partial support for H2a is found. The result

of Model 4.1a suggests the effect of environmental performance on cost of debt is dampened in more sustainable countries but heightened in the EU. The results are thus contrary to H3a but in line with H4a.

The results of Model 1b suggest that there is a negative effect of social performance on cost of debt. The general relationship is like that of environmental performance and suggests support for H1b. Generally, the result of Model 2.1b and Model 2.2b does not support a significant non-linear relationship between social performance and cost of debt. The result of Model 3.2b suggests that a firm with higher social performance faces more favorable debt conditions in more sustainable countries. The result of Model 4.1b suggests that the effect of social performance on cost of debt is dampened in more sustainable countries but heightened in the EU. The results are thus contrary to H3b but in line with H4b.

The result of Model 2.1c suggests a non-linear relationship between corporate governance and cost of debt where the marginal effect is decreasing with performance. The result of Model 2.2c supplements this view by suggesting that firms with relatively high corporate governance performance receive higher cost of debt. The result of Model 4.1c complicates the interpretation further suggesting, in general, that corporate governance has a positive effect on cost of debt in more sustainable countries but a negative effect in the EU.

The effect of overall ESG performance on cost of debt generally resembles that of environmental performance. Support is found for hypothesis H1 in line with previous literature (see e.g. Apergis et al., 2022; Drago & Carnevale, 2020; Eliwa et al., 2021). Indicative results are found for hypothesis H2 where the positive relationship between *ESGLow* and *CoD* is statistically significant while the relationship between *ESGHigh* and *CoD* is weaker in significance and magnitude. We find similar support for H4 as for H4a and similar opposite to expected effects for H3 as H3a. The relationship between ESG performance on cost of debt is a weighted average of the distinct sub-effects of each of the pillars. The individual weighting and the level of noise in each of the relationships of the pillars on cost of debt subsequently make up the entire effect. It is thus unclear whether it is wise to draw any general conclusions from the models that utilize *ESG* as the independent variable.

Table 15. Summary of support for each hypothesis and sub-hypothesis

H1	A company's ESG score has a statistically significant negative relationship with cost of debt.	Supported
H1a	A company's environmental pillar score has a statistically significant negative relationship with cost of debt.	Supported
H1b	A company's social pillar score has a statistically significant negative relationship with cost of debt.	Supported
H1c	A company's corporate governance pillar score has a statistically significant negative relationship with cost of debt.	Not supported
H2	A company's ESG score has a non-linear relationship with cost of debt.	Indicatively supported
H2a	A company's environmental pillar score has a non-linear relationship with cost of debt.	Indicatively supported
H2b	A company's social pillar score has a non-linear relationship with cost of debt.	Not supported
H2c	A company's corporate governance pillar score has a non-linear relationship with cost of debt.	Supported
H3	The anticipated negative impact of a company's ESG score on its cost of debt is greater in more sustainable countries.	Rejected
H3a	The anticipated negative impact of a company's environmental pillar score on its cost of debt is greater in more sustainable countries.	Rejected
H3b	The anticipated negative impact of a company's social pillar score on its cost of debt is greater in more sustainable countries.	Rejected
H3c	The anticipated negative impact of a company's corporate governance pillar score on its cost of debt is greater in more sustainable countries.	Rejected
H4	The anticipated negative impact of a company's ESG score on its cost of debt is greater in the EU compared to the U.S.	Supported
H4a	The anticipated negative impact of a company's environmental pillar score on its cost of debt is greater in the EU compared to the U.S.	Supported
H4b	The anticipated negative impact of a company's social pillar score on its cost of debt is greater in the EU compared to the U.S.	Supported
H4c	The anticipated negative impact of a company's governance pillar score on its cost of debt is greater in the EU compared to the U.S.	Partially supported

6.2. Robustness Tests

It is typical in empirical studies to perform robustness tests by modifying the models and re-test the hypotheses (Al Amosh et al., 2024). As part of the study, several versions of the models have been estimated, yielding mostly qualitatively similar results where a few tests are reported in this section with a special focus on fundamentally deviating results.

As an alternative metric for cost of debt interest expense divided by total debt is used. Undefined ratios are excluded. Estimating Model 1 with this alternative measurement yields qualitatively similar results albeit at lower significance levels. With this alternative measurement of cost of debt, *ESG* is no longer significant at the 10% level (see Appendix 8.). This result indicates robustness, but concerns should be raised regarding the signs of the control variables. Leverage is negatively related to cost of debt, contrary to expectations, putting the validity of this test into question.

As an alternative metric for country sustainability, the in-sample median has been used as a cutoff point yielding similar results to the baseline Model 4.1 (see Appendix 9.) implying reasonable robustness. On the other hand, a specification of Model 4.1 using the average ESG score per country and year *(ESGCountryAvg)* indicates a non-significant relationship for *ESG*EU* and *E*EU* and a positive non-significant relationship for *S*EU* (See Appendix 10.).

To conclude, the general results regarding the relationship between ESG performance and cost of debt appear robust while the country-level results warrant greater caution.

7. Conclusion

7.1. Discussion of Results

In this study, we have investigated the effect of ESG performance and the separate pillar scores on cost of debt using a sample consisting of 656 EU and U.S. firms during the period 2016-2025. The result of our empirical models suggests that investing in improved environmental performance and social performance can yield financial benefits for firms in the form of lower debt costs. This effect is stronger within the EU compared to the U.S. and stronger in countries where average ESG performance is lower. The result further suggests that further corporate governance investments are mainly valuable from a cost of debt perspective, if the firm has significant leverage or if the current level of corporate governance performance is at relatively low levels. Corporate governance performance has a positive effect on cost of debt in more sustainable countries and a negative effect within the EU.

The findings suggest that the relationship between firm-level ESG performance and country-level ESG performance is of a substitutionary nature. The reasoning by Hoepner et al. (2016) suggests that country-level sustainability signals, among other factors, societal trust, stronger institutions, more predictable ESG risk mitigation, lower corruption, and predictable enforcement. Firm-level sustainability might be a useful substitute to establish stakeholder relationships when these factors are lacking at a societal level. This line of reasoning is supported by the findings of a recent paper which showed that ESG performance can serve as a substitute for a weaker legal environment (Priem & Gabellone, 2024). These findings can provide meaningful insight for regulators and legislators in how improving ESG performance at country or regional level can help improve market conditions for debt investments. What remains to be investigated is whether the broader factors only coincide with societal sustainability or which direction a potential causal relationship exhibit.

The findings further suggest that the greater emphasis placed on ESG within the EU has been effective at shaping the effect of all ESG pillars on cost of debt. A reasonable interpretation of these findings is that debt investors perceive ESG related risks as more likely to materialize for EU firms compared to U.S. firms. Additionally, the increased level of stakeholder orientation within the EU and the availability of accurate information through stricter disclosure requirements likely plays a role.

Another relevant question is to what extent statistical significance equates to economic significance. For management to be interested in investing in ESG for strict financial reasons, the benefits will have to be sufficiently sized. The bulk of our results suggest that the average marginal effect of increasing a pillar score with one point equates to less than 0.01 percentage points improved cost of debt. For a firm to benefit from this

improvement, the firm will likely have a significant portion of debt financing and areas where improvement can be achieved cost effectively. On the other hand, while the average effect remains potentially humble our results suggest that increasing environmental performance from a relatively low level will be more effective, indicating a potentially lower threshold for environmental improvements for these firms.

7.2. Relating Results to Theory

The result of the study supports a negative relationship between ESG performance, environmental performance, and social performance with cost of debt. The presented results are consistent with stakeholder theory to the extent that stakeholder value and preferences coincide with ESG performance. The results further suggest a lower marginal effect of ESG performance, environmental performance, and social performance on cost of debt in countries where average ESG performance is higher. The results are contrary to what would be suggested by legitimacy theory. Under legitimacy theory, we would expect that firms will adjust their ESG performance to meet local expectations and be rewarded for meeting them. A possible explanation for this result could rather be to view ESG performance as an asset where the lack of supply would imply an increased price. The concept of a "greenium" implies that investors with ESG preferences would be willing to accept lower returns in exchange for higher ESG preferences (Wang & Xia, 2023). Applying the same logic and assuming a sufficient level of debt market segregation and similar investor preferences should suggest that ESG performance is more valuable when ESG performance is scarce.

The relationship between the corporate governance pillar and cost of debt is harder to directly interpret. Corporate governance performance has a non-significant general effect on cost of debt. We do, however, observe a significant negative effect that decreases with corporate governance performance, potentially becoming positive at high levels of performance. It is also observable that the interaction term *G*Lev* is significantly negative while *G*, in the same model, is significantly positive. The natural interpretation of this result is that lenders mainly value corporate governance if the risk of financial distress is substantial. This aligns with agency theory suggesting that agency costs only materialize in debt contracts when the agency costs are reasonably likely to be substantial for the lender. Furthermore, it can also be concluded that lenders expect firms to meet basic corporate governance standards for regulatory reasons while not necessarily going beyond the minimum requirement.

While increased transparency can lower agency costs, it can also possibly reveal information that changes the perception of the firm's riskiness. Corporate governance performance can also be indication of to what extent the firm prioritizes its shareholders. Haberman & Fischer (2023) argue that a positive relationship between financial distress risk and corporate governance performance can be the result of diverting management

attention. If the corporate governance scores capture shareholder friendliness at the expense of other stakeholders, we would expect a positive relationship between these variables under stakeholder theory. These diverse and counteracting effects could explain the noisier relationship between corporate governance performance and cost of debt compared to the other pillars.

7.3. Relating Results to Sustainability & Sustainable Development

Through our paper, we have studied the relationships between ESG scores and cost of debt between regions. We believe that analyzing these relationships can help us understand the development of sustainable projects. Though it is recognized that ESG scores are flawed for true impact, they remain our best feasible metric of understanding company actions towards sustainability (Yu et al., 2020, Siano et al., 2017, Eliwa et al., 2021). Our findings provide insight into how debt markets view these sustainability initiatives. The influence and availability of debt determine which sustainable projects may be able to start as well as provides a control against behavior that would lower a firm's ESG scores, hurting sustainability efforts. Understanding how cost of debt is allocated based on ESG action becomes key in understanding how lenders act on sustainability.

Before explaining how our paper directly impacts sustainability, it should be understood how a firm's ESG performance represents sustainability itself. The United Nations lists 17 goals for global sustainable development (United Nations, n.d.). While the goals are not only intended for business action, each of the three pillars of ESG relates to these goals in how an organization may provide action for sustainable development. The environmental pillar measures a company's impact via emissions, resource use, innovation, and impact on biodiversity. The UN has many goals related to environmental sustainability. Goal 6: clean water and sanitation is impacted by industrial pollution which ESG scores aim to track. Goal 12: responsible consumption and production is a goal of environmental score tracking as the companies that produce the goods and services for consumption. Through the environmental metric, we can monitor a company's responsibility in their production, ensuring safety for the environment and workers. Goals 13, 14, and 15 relate to climate action and biodiversity in water and on land respectively. ESG scores track an organization's innovation and approach to climate actions as well as its impact on biodiversity. All these goals for environmental sustainability contribute to a planet with a stable ecosystem able to support human life as well as monitor climate impact towards issues like global warming.

The social pillar relates to how organizations impact communities, human rights, product responsibility, and workforce organization. UN goals 5: gender equality, 8: decent work and economic growth, 9: industry, innovation, and infrastructure, 10: reduced in inequalities, and 11: sustainable cities and communities are all impacted by this pillar. A

sustainable world is one where the demographics or background of an individual does not limit their opportunity for a fair and equal life. The UN considers human rights and just economic growth as contributors to a peaceful and fair society which can promote sustainability. Additionally, the UN views that women, those in poverty, and others protected by the social pillar of ESG tend to bear more of the impact of environmental disasters and climate change. Further socioeconomic equality allows those impacted the most by these factors to influence actions to mitigate harm. The social ESG scores aim to track that an organization promotes these targets of equality, workforce protection, and impact on communities.

The governance pillar relates to corporate social responsibility, management structure, and shareholder rights. UN goal 16: peace, justice, and strong institutions, requires companies with strong governance. Governance prevents corruption and poor management behavior that can undermine institutions. Through organizations playing their fair role in a peaceful and just society, further sustainable actions may be efficiently made to ensure the betterment of all.

Our findings suggest that ESG scores have a negative association with cost of debt. This result implies that lenders interpret ESG initiatives as risk minimizing or otherwise valuable endeavors. Generally, we find that firms in countries with higher average ESG performance had lower cost of debt while firm-level ESG performance in these countries had a lower marginal impact, when EU membership is controlled for. Our findings are of importance when deciding on strategies for reaching sustainable development goals as they suggest that environmental and social initiatives are linked to improved financing conditions. This holds particularly for firms in countries where average ESG performance is lower and subsequently serves as motivation for individual firms to attempt to improve their performance in these areas. For sustainable measures, our study also shows that companies with lower ESG scores are punished more via higher cost of debt in countries with a high average ESG level. Furthermore, from a regulatory perspective our findings suggest that the overall ESG performance in the country might be more impactful in determining the debt condition compared to the firm-level performance. This insight can help regulators and decision-makers understand the value of prioritizing collective transition in their strategy to reach the United Nations Sustainable Development Goals. Understanding the financial mechanisms towards how different regions will approach sustainability will help when designing solutions to reach sustainability targets at a national and organizational level. Our thesis has shown how ESG scores affect a company's cost of debt based on region. From this insight, decision makers may better understand how to support sustainable efforts in terms of debt.

7.4. Limitations

Due to data availability, we have only studied active firms. By only including active firms an issue of survivorship bias can arise. Survivorship bias is a common limitation in accounting and finance research that has been shown to have the ability to significantly affect the validity of empirical results (Elton et al., 1996). We see no indication to believe that survivorship bias has significantly affected our results.

There are also general limitations of the data and methodology used to conduct this type of study. As previously mentioned, the accuracy of ESG scores to capture actual ESG performance is limited. Cost of debt and financial risk more generally can also be captured in different ways and whether our metric is substantially coherent across the sample can be debated. Due to data availability reasons the sample consisted of reasonably large publicly listed firms which have especially good access to capital markets questioning to what extent the findings will hold in other settings. For country-level sustainability it can also be questioned if the effect has been sufficiently isolated. Average ESG scores on a country-level might be correlated to other relevant metrics such as legal systems, level of stakeholder orientation, corruption, and global reputation etc. Isolating only country-level sustainability becomes difficult if there is extensive overlap. Furthermore, due to time-invariance of the relevant variables, the ability to control for firm and country level factors is limited. An innate limitation of relying on interaction terms in general and interaction dummies specifically is that it may impose new multicollinearity issues and be sensitive to idiosyncratic firm-level noise. While no alternative specification can rid of these limitations while still controlling for the factors of interest, there is reason to suspect especially Model 4.2 for displaying these dissatisfactory tendencies. Furthermore, the results show lower levels of robustness for country-level sustainability variables.

7.5. Suggestions for Further Research

Our thesis has expanded previous studies to help understand the relationship between a company's ESG scores and its cost of debt. Particularly, our thesis focuses on expanding prior regional studies to then compare intercontinental effects on the relationship between ESG and debt between the U.S. and EU. The natural conclusion is then to expand research to include further regions. A future study could examine if there is a similar trend in results for companies across South America, Asia, or Africa. Understanding regional differences may provide deeper insight into how creditors view ESG initiatives across countries. However, a study with broader regional comparisons may have difficulties finding comparable information. Company ESG scores are not as widely collected in other countries. Comparable data may not be available, leading to skewed results due to limited information.

A further research proposal following our study would be to examine the effects of one nation changing its ESG standards. For example, examining the effect on cost of debt after a country has passed legislation that effectively required an ESG metric. A study could compare the change both within the country and the change in standard compared to other regions. At the introduction of our study, we noted the change in ESG perception caused by the reelection of U.S. President, Donald Trump, and his efforts to discourage banks to invest in ESG. As data becomes available, a study could research the changes within the U.S. compared to other regions on how ESG scores raise or lower the cost of debt spreads of a company. The study would potentially show how changes in policy or culture of one region affect how ESG relates to debt in other regions.

Another suggestion would be to research the change in cost of debt after a notable change in ESG score. For example, if a company succeeds in an initiative that increases its ESG score, how might the company's cost of debt change. Similarly, investigating the cost of debt effect of a firm being involved in an ESG scandal would be of interest. Changes in ESG are often a part of a change that would directly affect cost of debt, outlining the importance of controlling for these factors. A company discovered to be falsifying something like carbon emissions would be expected to then have to pay fines or lose market share as customers change to better suppliers. These actions would have a direct impact on how a lender would view a company before they considered direct ESG implications.

Furthermore, deeper understanding of what factors in the local debt environment determine the relationship between ESG and cost of debt is of relevance. While our and previous studies' (see e.g. Hoepner et al. (2016)) findings suggest that country-level sustainability equates to a more attractive debt markets the exact mechanisms are still only theorized. It is beyond the scope of this thesis to test whether average ESG scores, actual average ESG performance, or the correlation between average ESG scores and other country-level factors that are the key drivers of this effect.

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Appendix.

Appendix 1. Number of firms per industry in final sample

Industry (GICS name)	Number of Firms	% of total
Aerospace & Defense	21	3.2%
Air Freight & Logistics	7	1.1%
Automobile Components	3	0.5%
Automobiles	11	1.7%
Beverages	14	2.1%
Biotechnology	14	2.1%
Broadline Retail	5	0.8%
Building Products	13	2.0%
Chemicals	24	3.7%
Commercial Services & Supplies	11	1.7%
Communications Equipment	7	1.1%
Construction & Engineering	12	1.8%
Construction Materials	6	0.9%
Consumer Staples Distribution & Retail	13	2.0%
Containers & Packaging	7	1.1%
Distributors	2	0.3%
Diversified Telecommunication Services	12	1.8%
Electric Utilities	27	4.1%
Electrical Equipment	13	2.0%
Electronic Equipment, Instruments & Components	10	1.5%
Energy Equipment & Services	7	1.1%
Entertainment	10	1.5%
Food Products	20	3.0%
Gas Utilities	6	0.9%
Ground Transportation	6	0.9%
Health Care Equipment & Supplies	24	3.7%
Health Care Providers & Services	19	2.9%
Health Care Technology	1	0.2%
Hotels, Restaurants & Leisure	24	3.7%
Household Durables	5	0.8%
Household Products	7	1.1%
IT Services	13	2.0%
Independent Power and Renewable Electricity Producers	5	0.8%
Industrial Conglomerates	6	0.9%
Interactive Media & Services	5	0.8%
Leisure Products	2	0.3%
Life Sciences Tools & Services	14	2.1%
Machinery	41	6.3%
Marine Transportation	1	0.2%
Media	8	1.2%

Metals & Mining	11	1.7%
Multi-Utilities	15	2.3%
Oil, Gas & Consumable Fuels	28	4.3%
Paper & Forest Products	4	0.6%
Passenger Airlines	5	0.8%
Personal Care Products	4	0.6%
Pharmaceuticals	18	2.7%
Professional Services	14	2.1%
Semiconductors & Semiconductor Equipment	22	3.4%
Software	25	3.8%
Specialty Retail	13	2.0%
Technology Hardware, Storage & Peripherals	7	1.1%
Textiles, Apparel & Luxury Goods	14	2.1%
Tobacco	2	0.3%
Trading Companies & Distributors	10	1.5%
Transportation Infrastructure	4	0.6%
Water Utilities	1	0.2%
Wireless Telecommunication Services	3	0.5%
Total Sample	**656**	**100.0%**

Appendix 2. Number of firms per sector in final sample

Sector (GICS name)	**Number of Firms**	**% of total**
Communication Services	38	5.8%
Consumer Discretionary	79	12.0%
Consumer Staples	60	9.1%
Energy	35	5.3%
Health Care	90	13.7%
Industrials	164	25.0%
Information Technology	84	12.8%
Materials	52	7.9%
Utilities	54	8.2%
Total Sample	**656**	**100.0%**

Appendix 3. Average ESG scores per country and year

Country	2015	2016	2017	2018	2019
Austria	51.164*	54.571*	55.381*	57.023*	55.568*
Belgium	45.493	51.167*	53.347*	51.631	53.865*
Cyprus	10.125	12.659	12.369	12.299	16.362
Denmark	54.189*	55.297*	57.796*	55.406*	50.870
Finland	59.585*	62.978*	63.779*	65.934*	67.808*
France	60.557*	62.537*	64.423*	62.382*	59.124*
Germany	56.405*	58.782*	60.090*	56.188*	53.605*
Ireland	45.467	47.845	49.331	51.112	49.666
Italy	63.628*	62.056*	60.820*	57.979*	57.246*
Luxembourg	52.240*	56.628*	60.437*	64.340*	57.800*
Netherlands	59.512*	62.855*	61.957*	62.619*	57.521*
Poland	33.253	37.232	41.095	41.553	43.428
Portugal	63.521*	59.925*	56.854*	60.031*	56.326*
Spain	61.770*	60.605*	61.939*	60.052*	59.370*
Sweden	58.832*	54.682*	56.376*	57.322*	51.923*
United States of America	44.610	40.434	38.207	36.724	36.903
Country	**2020**	**2021**	**2022**	**2023**	**2024**
Austria	56.152*	58.304*	59.726*	61.605*	61.251*
Belgium	54.121*	57.009*	55.865*	59.304*	58.734*
Cyprus	40.920	44.235	38.859	41.982	34.754
Denmark	51.624*	51.737*	51.854*	52.427	54.792*
Finland	62.519*	50.471	50.611*	53.173*	53.304
France	58.852*	59.387*	58.125*	59.985*	63.146*
Germany	49.504	49.023	50.848*	53.216*	57.835*
Ireland	50.621	53.035*	56.049*	54.945*	55.210*
Italy	57.269*	55.203*	55.327*	56.623*	58.416*
Luxembourg	56.822*	56.827*	58.684*	62.534*	61.048*
Netherlands	58.118*	59.389*	60.550*	61.882*	60.573*
Poland	45.051	46.530	48.016	50.823	53.453*
Portugal	59.293*	60.263*	64.757*	65.321*	71.074*
Spain	60.654*	62.193*	65.164*	65.985*	66.958*
Sweden	48.694	42.478	43.706	44.900	45.600
United States of America	38.365	39.819	41.533	42.118	42.688

*Note: Average ESG scores is based on all firms with an available ESG Scores each year. Due to lagging of the ESG metrics the relevant period precedes each annual observation of the financial metrics. Country being classified as a sustainable country (ESGCountryH = 1) is denoted by: *.*

Appendix 4. Descriptive statistics before variable winsorization

Variable	Mean	Median	Std. Dev	Min	Max
CoD	2.772	2.679	1.941	-0.229	81.391
ESG	64.868	68.059	16.523	1.303	94.729
E	61.491	67.222	24.087	0.000	98.793
S	68.887	73.216	19.206	1.725	98.202
G	61.461	64.501	20.197	2.547	99.410
Leverage	0.303	0.284	0.210	0.000	3.892
Size	23.627	23.612	1.315	18.600	27.430
ROA	0.069	0.058	0.079	-0.856	0.822
MB	1.069	3.150	175.475	-10036.846	613.183
ICR	89.722	9.267	1790.093	-6004.393	94882.474

Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1.

Appendix 5. Model summary statistics

Model	Observations	R^2	Adj. R^2	F-Statistic
Model 1	5,161	0.596	0.595	368.1
Model 1a	5,161	0.597	0.595	373.0
Model 1b	5,161	0.598	0.596	373.5
Model 1c	5,161	0.594	0.592	358.2
Model 2.1	5,161	0.597	0.595	354.8
Model 2.1a	5,161	0.598	0.596	360.8
Model 2.1b	5,161	0.599	0.597	360.0
Model 2.1c	5,161	0.594	0.592	344.3
Model 2.2	5,161	0.596	0.594	352.2
Model 2.2a	5,161	0.597	0.596	358.8
Model 2.2b	5,161	0.598	0.596	357.0
Model 2.2c	5,161	0.594	0.592	343.1
Model 3.1	5,161	0.606	0.604	386.5
Model 3.1a	5,161	0.606	0.604	389.5
Model 3.1b	5,161	0.607	0.605	388.3
Model 3.1c	5,161	0.604	0.602	382.4
Model 3.2	5,161	0.605	0.603	361.5
Model 3.2a	5,161	0.607	0.605	361.1
Model 3.2b	5,161	0.607	0.605	360.7
Model 3.2c	5,161	0.604	0.602	356.3
Model 4.1	5,161	0.615	0.613	404.4
Model 4.1a	5,161	0.615	0.613	407.0
Model 4.1b	5,161	0.615	0.613	404.5
Model 4.1c	5,161	0.614	0.612	399.5
Model 4.2	5,161	0.614	0.612	401.6
Model 4.2a	5,161	0.614	0.612	404.0
Model 4.2b	5,161	0.614	0.612	401.5
Model 4.2c	5,161	0.613	0.611	396.6

Appendix 6. Results of Model 4.2 with *EU* instead of *Rate*

Variable	Model 4.2	Model 4.2a	Model 4.2b	Model 4.2c
ESGHigh	-0.025			
	(0.039)			
ESGLow	0.077**			
	(0.037)			
*ESGCountryH*ESGHigh*	0.026			
	(0.143)			
*ESGCountryH*ESGLow*	-0.086			
	(0.146)			
*EU*ESGHigh*	-0.019			
	(0.137)			
*EU*ESGLow*	0.096			
	(0.132)			
EHigh		-0.068*		
		(0.040)		
Elow		0.083**		
		(0.038)		
*ESGCountryH*EHigh*		-0.001		
		(0.136)		
*ESGCountryH*Elow*		-0.115		
		(0.147)		
*EU*EHigh*		0.073		
		(0.129)		
*EU*Elow*		0.223*		
		(0.133)		
SHigh			-0.029	
			(0.041)	
Slow			0.119***	
			(0.038)	
*ESGCountryH*SHigh*			-0.185	
			(0.144)	
*ESGCountryH*Slow*			-0.112	
			(0.143)	
EU SHigh*			0.035	
			(0.139)	
*EU*Slow*			-0.002	
			(0.125)	
GHigh				0.061*
				(0.036)
Glow				0.039
				(0.039)
*ESGCountryH*GHigh*				-0.090
				(0.139)
*ESGCountryH*Glow*				-0.269**
				(0.134)
*EU*GHigh*				0.078
				(0.129)
*EU*Glow*				0.181
				(0.126)
ESGCountryH	-0.374***	-0.341***	-0.287***	-0.282***
	(0.105)	(0.100)	(0.094)	(0.088)
EU	-0.977***	-1.042***	-0.941***	-1.058***
	(0.101)	(0.096)	(0.091)	(0.083)
Control variables	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES

Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

Appendix 7. Results of Model 1. including interaction between *Lev* and *ESG*

Variable	**Model 1**	**Model 1a**	**Model 1b**	**Model 1c**
ESG	0.001			
	(0.002)			
*ESG*Lev*	-0.024***			
	(0.005)			
E		-0.001		
		(0.001)		
*E*Lev*		-0.014***		
		(0.003)		
S			-0.000	
			(0.002)	
*S*Lev*			-0.019***	
			(0.005)	
G				0.007***
				(0.001)
*G*Lev*				-0.019***
				(0.004)
Lev	2.923***	2.230***	2.678**	2.580***
	(0.347)	(0.226)	(0.337)	(0.280)
Size	-0.019	-0.010	-0.014	-0.061***
	(0.014)	(0.014)	(0.014)	(0.013)
RoA	-1.191***	-1.198***	-1.205***	-1.281***
	(0.303)	(0.302)	(0.304)	(0.302)
MB	-0.010***	-0.010***	-0.010***	-0.009***
	(0.003)	(0.003)	(0.003)	(0.003)
ICR	-0.003***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Rate	0.725***	0.716***	0.707***	0.754***
	(0.022)	(0.022)	(0.022)	(0.021)
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

Appendix 8. Results of Model 1. with an alternative metric for cost of debt

Variable	Model 1	Model 1a	Model 1b	Model 1c
ESG	-0.003			
	(0.003)			
E		-0.005**		
		(0.002)		
S			-0.006**	
			(0.003)	
G				0.005**
				(0.002)
Lev	-4.531***	-4.529***	-4.504***	-4.514***
	(0.405)	(0.404)	(0.405)	(0.406)
Size	-0.328***	-0.295***	-0.308***	-0.361***
	(0.043)	(0.045)	(0.043)	(0.041)
RoA	-0.315	-0.241	-0.315	-0.442
	(0.961)	(0.958)	(0.961)	(0.962)
MB	0.011	0.011	0.011	0.012
	(0.008)	(0.008)	(0.008)	(0.008)
ICR	-0.005	-0.005	-0.005	-0.005
	(0.004)	(0.004)	(0.004)	(0.004)
Rate	0.069	0.036	0.037	0.083
	(0.064)	(0.067)	(0.066)	(0.063)
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: Cost of debt is defined as interest expenses divided by total debt. Cost of debt is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.*

Appendix 9. Results of Model 4.1 with in-sample median as cutoff point

Variable	Model 4.1	Model 4.1a	Model 4.1b	Model 4.1c
ESG	-0.002* (0.001)			
*ESGCountryH*ESG*	0.009*** (0.002)			
*EU*ESG*	-0.009*** (0.001)			
E		-0.001* (0.001)		
*ESGCountryH*E*		0.007*** (0.002)		
*EU*E*		-0.009*** (0.001)		
S			-0.002** (0.001)	
*ESGCountryH*S*			0.004* (0.002)	
*EU*S*			-0.008*** (0.001)	
G				0.002** (0.001)
*ESGCountryH*G*				0.011*** (0.002)
*EU*G*				-0.009*** (0.001)
ESGCountryH	-0.943*** (0.176)	-0.792*** (0.135)	-0.609*** (0.175)	-1.018*** (0.113)
Control variables	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. ESGCountryH is defined as equaling 1 if the relevant country has an average ESG score greater than or equal to the median country average ESG score each year. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

Appendix 10. Results of Model 4.1 with country average ESG score

Variable	Model 4.1	Model 4.1a	Model 4.1b	Model 4.1c
ESG	-0.003 (0.002)			
*ESGCountryAvg*ESG*	0.000 (0.000)			
*EU*ESG*	-0.002 (0.004)			
E		-0.002 (0.001)		
*ESGCountryAvg*E*		0.000 (0.000)		
*EU*E*		-0.003 (0.003)		
S			-0.007*** (0.002)	
*ESGCountryAvg*S*			-0.000 (0.000)	
*EU*S*			0.006 (0.004)	
G				0.004*** (0.001)
*ESGCountryAvg*G*				0.001*** (0.000)
*EU*G*				-0.008** (0.003)
ESGCountryAvg	-0.038*** (0.003)	-0.037*** (0.004)	-0.035*** (0.004)	-0.039*** (0.003)
Control variables	YES	YES	YES	YES
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. ESGCountryAvg is defined as the average ESG score for all firms in the relevant country each year. Table reports coefficients in plain text and standard errors in parenthesis. Variables: ESG, E, S, G and ESGCountryAvg have been centered to reduce multicollinearity. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

Appendix 11. Results of Model 1 for only EU firms

Variable	Model 1	Model 1a	Model 1b	Model 1c
ESG	-0.008***			
	(0.002)			
E		-0.007***		
		(0.001)		
S			-0.008***	
			(0.002)	
G				0.001
				(0.001)
Lev	1.225***	1.208***	1.262***	1.243***
	(0.212)	(0.212)	(0.212)	(0.213)
Size	-0.016	-0.004	-0.010	-0.067***
	(0.023)	(0.023)	(0.022)	(0.021)
RoA	-0.815	-0.624	-0.905	-0.804
	(0.710)	(0.701)	(0.707)	(0.712)
MB	-0.022***	-0.024***	-0.021***	-0.021***
	(0.007)	(0.007)	(0.007)	(0.007)
ICR	-0.003**	-0.003**	-0.002*	-0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*

Appendix 12. Results of Model 1 for only U.S. firms

Variable	Model 1	Model 1a	Model 1b	Model 1c
ESG	-0.002			
	(0.001)			
E		-0.001		
		(0.001)		
S			-0.002**	
			(0.001)	
G				0.001
				(0.001)
Lev	1.366***	1.365***	1.376***	1.363***
	(0.121)	(0.121)	(0.121)	(0.122)
Size	-0.099***	-0.100***	-0.094**	-0.112***
	(0.018)	(0.018)	(0.017)	(0.016)
RoA	-1.612***	-1.626***	-1.607***	-1.670***
	(0.319)	(0.317)	(0.318)	(0.318)
MB	-0.012***	-0.012***	-0.012***	-0.012***
	(0.003)	(0.003)	(0.003)	(0.003)
ICR	-0.003***	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)
Year-fixed effects	YES	YES	YES	YES
Sector-fixed effects	YES	YES	YES	YES

*Note: CoD is expressed in number of percentage points i.e. 1% would be expressed as 1. Table reports coefficients in plain text and standard errors in parenthesis. ESG metrics refer to the previous year. *** p < 0.01, ** p < 0.05, * p < 0.1.*