How Do ESG Ratings Impact the Cost of Debt? A Study on European Firms

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Palavras-chave: sustentabilidade, fatores ambientais-socias-governança, ESG, responsabilidade social empresarial, RSE/CSR, custo da dívida, teoria do *stakeholder*.

A sustentabilidade é um tema inevitável do século XXI, e vários estudos já exploraram os benefícios económicos de práticas sustentáveis. Esta dissertação explora a relação entre a avaliação de fatores ambientais, sociais e de governança (ESG) de empresas europeias e o seu custo da dívida – uma relação que se supõe ser negativa. Ao usar análise de regressão múltipla, incluindo parâmetros de controlo de características da empresa, de ano e sector económico, esta dissertação identifica uma relação possivelmente quadrática côncava. As variáveis preditivas são desfasadas de um período, para corrigir eventuais problemas de endogeneidade. Na amostra global, verifica-se uma relação positiva entre as variáveis, mas, ao subdividir a amostra em quintis da distribuição da avaliação ESG, verifica-se uma relação negativa nos quintis superiores. Três conclusões decorrem desta dissertação: (1) as empresas no top 20% de avaliação ESG têm um custo da dívida médio e mediano estatisticamente inferiores ao dos 20% inferiores; (2) *em média,* os quintis superiores mostram uma relação negativa entre o custo da dívida e a avaliação ESG; e (3) os coeficientes da avaliação ESG ao quadrado são todos significativos, confirmando uma relação quadrática côncava significativa entre o custo da dívida e a avaliação ESG. Estes resultados, apesar de economicamente modestos, revelam uma vantagem adicional para as empresas que operam de maneira sustentável, além de razões éticas ou outros benefícios económicos previamente estudados.

Abstract [EN]

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Keywords: sustainability, environmental-social-governance, ESG, corporate social responsibility, CSR, cost of debt capital, stakeholder theory.

Sustainability is an unavoidable subject of the 21st century, and research has gone into understanding financial advantages companies may have from being more sustainable. This research paper explores the link between environmental, social and governance (ESG) ratings of European firms and their cost of debt capital – a relationship hypothesised to be negative. With multiple regression analysis, including controls for firm characteristics, year and sector fixed effects, this dissertation identifies a possible concave quadratic relationship. Regressed variables are lagged one period in relation to the dependent variable, to address endogeneity issues. In the general sample, the relationship between the variables is positive, but by subdividing the sample into quintiles of the ESG rating distribution, a negative relationship is found in top quintiles while the positive relationship is still seen in lower quintiles. The conclusion of this dissertation is threefold: (1) the top 20% ESG performers have a statistically lower average and median cost of debt than the bottom ones, meaning the firms that have the top ESG ratings are better off in the debt markets; (2) *on average,* higher quintiles of the ESG rating see a negative relationship with the cost of debt; and (3) the coefficients of the ESG rating squared are all significant, thus confirming a significant concave relationship between the ESG rating and the cost of debt. The results, arguably economically modest, reveal an added benefit for companies that operate sustainably, besides ethical reasons or the other financial benefits identified by previous literature.

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1. Introduction

1.1. Context

Sustainability and corporate social responsibility (CSR) have gained much importance in this century, so much so that they are even relevant in the financial markets. Indeed, in the recent years, global assets under management (AUM) that apply ESG[1] screens in investing decisions have been multiplying, reaching USD 40.5 trillion in 2020 (Baker, 2020), which represents a rough 40% of the total AUM, thus surpassing the USD 100 trillion threshold in 2019 already (Willis Towers Watson, 2020). Even the CEO of BlackRock, the world's largest asset manager in that same year, stated in the 2020 letter to CEOs that the company would be "exiting investments that present a high sustainability-related risk" (Fink, 2020). But why is the corporate (and the investment) world caring about sustainability and social responsibility?

Dr. Milton Friedman (1970) famously defended that "the social responsibility of business is to increase profits", which is the main belief behind the shareholder theory. Since then, however, other beliefs have emerged, namely the stakeholder theory, where the responsibilities of a firm are believed to extend to those that are affected by its activities and not only its owners (Freeman, 1984). Naturally, the concept of CSR emerges from the stakeholder theory, as a responsibility that the firm has towards, namely, society and the environment (two of the many stakeholders a company may have). As such, with the environmental and social issues of the 21st century, sustainability in business has come to the spotlight. Dr. Matthew J. Kiernan explained at length, already in 2009, why sustainable investing has become trendier and why it is an unavoidable theme for investors and companies. Some factors lead sustainability in business to be necessary and even characteristic of "fiduciary best-practice" (Kiernan, 2009, p. 5) Those factors, among others, include the physical resource limitation of the Earth and the accelerated degradation of the environment, simple consumer demand for sustainable practices, regulations (both national and transnational[2]) or the international interdependence of the economies, leading to crises and shocks becoming global very quickly (e.g., the current

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[1] *Environmental, Social and Governance pillars of sustainability. They refer to the "three factors when measuring the sustainability and ethical impact of an investment in a business or company." (Market Business News, 2020).*

[2] *E.g., at least 15 countries have implemented a direct carbon tax (The World Bank Group, 2021), the United States opted for tax credits and deductions for some environmentally friendly practices (Murray, 2020) and the European Union established a taxonomy, to regulate and define what a green investment is (EU TEG, 2020). Moreover, the signing of the Paris Agreement will surely mean more regulations will come, namely if the carbon neutrality objectives want to be met (UNFCCC, 2021).*

coronavirus pandemic). Ultimately, a sustainably managed company is expected to be "better managed, more far-sighted, agile and adaptable" (Kiernan, 2009, p. 3) Kiernan further identifies the set of companies for which sustainable practices are relevant, arguing that that set refers to "just about every company on earth" (Kiernan, 2009, p. 99). Indeed, the major sustainability challenges impact firms that work with natural resources (oil & gas namely), those that depend directly or indirectly on those natural resources (paper, agriculture and by extension food & beverages, clothing and most manufacturers), as well as companies having their brand as a main asset or those that depend on top talent recruitment. These two last points surely cover most multinational companies with which we are acquainted. Finally, if this is not enough, even investors are starting to care about it, as introduced. All these points make this a very relevant subject globally in current times. Ultimately, "companies and countries that do not respond to stakeholders and address sustainability risks will encounter growing skepticism from the markets, and in turn, *a higher cost of capital*." (Fink, 2020).

1.2. CSR or ESG?

Before going further, it is important to distinguish the terms CSR and ESG. While sometimes used interchangeably, they are in fact different nuances of the same concept. Both terms refer to efforts towards more ethical and responsible (sustainable) business practices. The difference lies in their aim: CSR is about "prevent[ing], manag[ing] and mitigat[ing] any negative impact that [companies] may cause" (European Commission, 2021), while ESG is about "*measuring* the sustainability and ethical impact" of investments and companies, often discriminated in criteria (Market Business News, 2020). This is why there are ESG ratings, which are key in doing empirical research as they turn a rather qualitative concept into a quantifiable one. The literature mostly speaks of CSR while using ESG ratings to measure CSR efforts, so, for the purpose of this research, both terms are used as rough synonyms. However, the reader should keep in mind that 'ESG' refers to the measurable efforts of CSR.

1.3. Topic development

Empirical research has gone into the financial attractiveness of CSR or ESG efforts from firms. Academics have looked at any potential relations between CSR and financial performance, CSR and the cost of capital and some between CSR and the cost of debt. Extant literature will be outlined in Section 2.

In this research project, I explore and assess the effect that being "ESG-compliant", i.e., having a good ESG rating, has on the cost of debt of firms. The intuition behind it is that the ESG

rating reflects the sustainability of a firm's practices, which in turn impacts the firm's performance and risk level. My work is meant to shed light on whether creditors value CSR practices enough – or at least understand it as a signal of the quality of the firm's management – to justify accepting lower debt yields.

This research is relevant for companies since it can add evidence on the potential advantages of being ESG-compliant beyond ethical reasons, namely in how being responsible companies can help them raise funds in debt markets. As explained by Kiernan (2009, p.99), this should be a relevant issue for all types of companies. This research will also allow us to understand how lenders perceive the impact of sustainability efforts by their debtors on their businesses, ultimately seeing if there is a general belief, in this market, of the sustainability thesis as explained by Kiernan. Intuition tells us that a sustainable management should make a business less risky (and thus more attractive to lend to). However, the existing literature does not find a consistent relation between CSR and risk, be it idiosyncratic or systematic (see Section 2).

For the interest of equity investors, there seems to be evidence that sustainable investments outperform the benchmark. Indeed, it is interesting to notice that, in the first quarter of 2020, MSCI's ESG-focused indices performed up to 4% better than the MSCI ACWI Fund (Nagy & Giese, 2020), which includes both developed and emerging markets. But opponents of ESG investing argue that superior firm financial performance and better social returns are "illogical" and that an eventual superior performance of ESG-compliant firms is not guaranteed to last (Armstrong, 2020). Some may believe the ESG narrative is merely a sales pitching technique, which simply works with current investor and consumer demands, and that it will not last. This is somewhat of an oxymoron as sustainability is meant to be a strategy that works in the long-term. Additionally, there is empirical evidence to justify the sustainability narrative when it comes to financial performance and cost of equity (see Section 2 for the complete Literature review). While there seems to be a general consensus in the literature on the effects of CSR in financial performance as well as cost of equity, the findings on the cost of debt are less consistent. This dissertation contributes to the existing literature when it comes to CSR (ESG) and the cost of debt capital.

1.4. The Cost of Debt Capital

For the purpose of this paper, it is important to understand the components of the cost of debt capital. Van Binsbergen et al. (2010) use a classic supply/demand model to estimate the marginal cost curve of debt capital and find robust results for several firm characteristics that

explain a firm's cost of optimal debt choices. They find that the intercept of the marginal cost and benefit curves, the equilibrium cost of debt, depends on firm characteristics like size, leverage, book-to-market, collateral, intangibles, cash flows, and whether the firm pays dividends. These were important findings for me to determine appropriate controls for the models. This choice is detailed in Section 3.3.

Limited research has gone into exploring the effect of CSR on cost of debt, using ESG ratings. The existing research is mostly done in U.S. samples, while the only one, to the best of my knowledge, done in a cross-country sample finds contradictory results. As for papers using samples of other markets, their authors either focus on a single country, or on a single pillar of sustainability. Existing research also commonly looks at bond spreads as a measure of cost of debt (Goss & Roberts (2010), Oikonomou et al. (2014), Cooper & Uzun (2015) and Ge & Liu (2015)) and while this makes sense for a sample from the United States, this application is more limited in Europe. Indeed, the corporate sector in the European Union is proportionately more financed by bank loans than by corporate bonds, unlike in the United States, where the opposite is true (AFME, 2014). It is therefore more relevant, in Europe, to use a measure of cost of debt that is not linked to bonds, as I would otherwise have to exclude companies that do not emit bonds, and the research would therefore not be reflective of the real cost of debt nor representative of the population (more on the cost of debt in Section 3.3.1.). My contribution is thus to try and consolidate the findings for firms in Europe, for all three pillars of sustainability (Environmental, Social and Governance), using an appropriate measure of the cost of debt.

Some questions I attempt to answer with this dissertation are:

- How does ESG compliance impact the cost of debt and why?
- Is the relationship linear and is there evidence of causality?
- How does this relationship differ in my sample vs. existing literature, in the U.S. and with bond spreads as measure of cost of debt?
- Ultimately, how much financial sense does it make for a company to be ESG-compliant?

2. Literature Review

2.1. ESG and financial performance

The findings are not always consistent but seem to point in a similar direction. McWilliams & Siegel (2000) find that, including a research and development control variable, the impact of

CSR is neutral while Barnett & Salomon (2006), looking at Social Responsibility Investment (SRI) funds, find that the relationship is rather curvilinear, and that the performance varies depending on the social screens they use to assess the companies studied. Their conclusion is that the more managers commit to sustainability, the higher the benefits are, while investment policies in the middle, i.e., between perfect diversification (without screens) and thorough screening, are worse-off. Nelling & Webb (2008), by applying Granger causality models, find a weaker relationship than before, though still positive. Their conclusions are rather opposite to the expected; that it is financial performance that drives CSR practices. Wu & Shen (2013) look at banks and their motives to engage in CSR and find a positive relationship between CSR and financial performance, when carried out for strategic purposes, while they find no existing relationship between the two variables when the motive is greenwashing. Flammer (2015) tries a different approach, looking at CSR proposals from shareholders, which are "close calls", i.e., that barely pass or fail (to approximate random sampling). She finds that the implementation of CSR proposals leads to positive returns and superior accounting performance. Most recent findings, particularly Flammer's approximated random sampling, show promising results for the sustainability thesis, in terms of financial performance. The causality is still uncertain, as we cannot state for sure that it is not a superior financial performance that entices companies to engage in CSR practices, as suggested by Nelling & Webb.

2.2. ESG and the cost of equity

Looking further into what causes superior financial performance, we find studies looking into the impact of CSR on the cost of equity. El Ghoul et al. (2011) find that "firms with better CSR scores exhibit cheaper equity financing." This study shows that employee betterment practices, environmental policies and product strategies contribute to this relationship. They also find that belonging to "vice" industries increases a firm's cost of equity. This is a very important finding as it implies a perceived lower risk (as per the classical risk/return relationship) in firms with better CSR scores, as well as higher market valuations for these firms. Michaels & Grüning (2017) look at a slightly different relationship, addressing somewhat the issue of greenwashing and information asymmetry, by looking at CSR disclosure. They find that more transparent CSR disclosure is associated with a lower cost of equity. This means that companies that opt for transparency and voluntary disclosure of their CSR practices benefit from it with lower cost of equity financing. The findings in ESG and cost of equity are fairly consistent and leave room for more research in the relationship with cost of debt, to help understanding the general impact of ESG on the average cost of capital of a firm.

2.3. ESG and the cost of debt

As introduced, the literature here is less consistent than with financial performance or cost of equity, namely in the variables used. Goss & Roberts (2011) look specifically at the impact of CSR on bank debt. They find a statistically significant but economically modest relation. They find that this relation is particularly strong for low-quality borrowers. Oikonomou et al. (2014) look at the effect of CSR on bond spreads and credit ratings, as well as the difference when the bond maturity is longer. The findings are that good CSR performance translates into lower corporate bond spreads. Cooper & Uzun (2015) also look at bonds and find that strong CSR is associated with lower cost of debt financing. Their findings suggest that the more involved and engaged managers are, the stronger that relationship is (reminiscent of Barnett & Salomon (2006)'s findings on SRI funds). On the other hand, Magnanelli & Izzo (2017) do not manage to confirm the hypothesis that CSR is associated with reduced firm risk and thus lower cost of debt financing, as they find a positive relationship between CSR and cost of debt. Curiously, all of the above except Magnanelli & Izzo used samples of U.S. firms as well as bond spreads as a measure of cost of debt. Instead, they opted for an international sample and for an accounting measure of the cost of debt (a ratio of interest expense to debt). Few other studies have looked at firm samples outside of the U.S., likely due to the added difficulty of getting data. Still, Bhuiyan & Nguyen (2019) looked at an Australian sample and found a negative relationship between CSR practices and costs of equity and debt, and Bacha et al. (2020) looked at French non-financial firms, with the added dimension of audit quality, and also found a negative relationship between CSR and cost of debt. Another paper, by La Rosa et al. (2018) looked at an overall European sample, but only looked at the impact of the social pillar on interest rate, debt rating and access to debt financing. Their findings are promising since social practices were linked with lower cost of debt, but they lack the other two dimensions of sustainability: environment and governance.

Given the findings, there is room to explore the relationship between CSR and the cost of debt, especially in Europe and using an accounting measure of the cost of debt. The expectation is that this relationship is negative, i.e., that a higher ESG-score results in a lower cost of debt, due to the decreased risk-profile that it would imply. The findings of Magnanelli & Izzo are counter-intuitive and thus, spur motivation for a more in-depth analysis of the topic, including the missing pillars of sustainability, thus complementing the findings of La Rosa et al.

2.4. ESG and firm risk

Some relevant research went into the effect of CSR on firm risk (systematic and idiosyncratic), which is intuitively linked to the cost of debt. Orlitzky & Benjamin (2001) find that a higher corporate social performance is correlated with lower financial risk. They make use of a market measure of risk (standard deviation of stock returns) and an accounting measure of risk (the ratio of standard deviation to mean of the return on capital invested) and find a stronger relationship with the use of a market measure. The findings of Bouslah et al. (2012) are somewhat consistent in that CSR practices are generally correlated with lower risk, but the results depend on the dimension of CSR analysed. Sun & Cui (2014) find that stronger CSR performance is associated with a lower default risk, particularly in "high dynamism environments", i.e., with more uncertainty. Becchetti et al. (2015) find a that an aggregate measure of CSR is associated with higher firm risk (idiosyncratic volatility), implying that CSR reduces the flexibility of response to shocks and therefore less predictable returns. They however also consistently find that better CSR is associated with lower risk of conflict with stakeholders. Sassen et al. (2016) find that performance in the social pillar of CSR, in particular, have the strongest relation with lower idiosyncratic and systematic risk, that environmental performance is associated with lower idiosyncratic risk but only in environmentally sensitive industries with systematic risk, and find no strong relationship between governance and risk. Albuquerque et al. (2018) find a more consistently negative relationship, i.e., that CSR is related with a lower firm risk, including with the use of an instrumented CSR. These findings will be useful for some implications of this research, namely regarding the relationship that firm risk has with the cost of debt.

3. Data & Methodology

The main methodology used in this dissertation is that of ordinary least squares (OLS) regressions, to estimate the potential relationship between the ESG rating of a firm and its cost of debt. I apply OLS to the full dataset and, after doing significance tests of difference of means and medians between subsets of the sample, also apply OLS to quintiles of the main independent variable (ESG rating).

3.1. Hypothesis

H1: My main hypothesis is that a better ESG score is associated with a lower cost of debt. The main intuition behind H1 is that companies with better ESG score and thus better

CSR practices have better management, better performance, and lower risk, which is perceived by creditors.

3.2. Sample construction

I base myself on secondary data only for this research, like for other studies of this type. The sample of companies are the constituents from 2008 of the STOXX Europe 600 Index, which considers "large, mid and small capitalization companies across 17 countries of the European region" (Qontigo, 2021). By using such an index, I get a sample that is heterogeneous, particularly in size, and the analysis is thus not limited to large capitalisation firms. Refinitiv (formerly Thomson Reuters) DataStream is used to retrieve annual data on the companies. The source for ratings on ESG criteria is the Refinitiv ESG company scores, also available on DataStream. The availability of the scores was the main factor impacting the time horizon analysed. Refinitiv only started rating ESG practices in 2003 with a limited number of indices and only included the constituents of the Dow Jones STOXX in 2008 (Refinitiv, 2020). As the STOXX Europe 600 Index is part of the STOXX family, the analysis can only start in 2008 and ends with the fiscal year 2020.

3.3. Regression variables[3]

3.3.1. Cost of debt (KD)

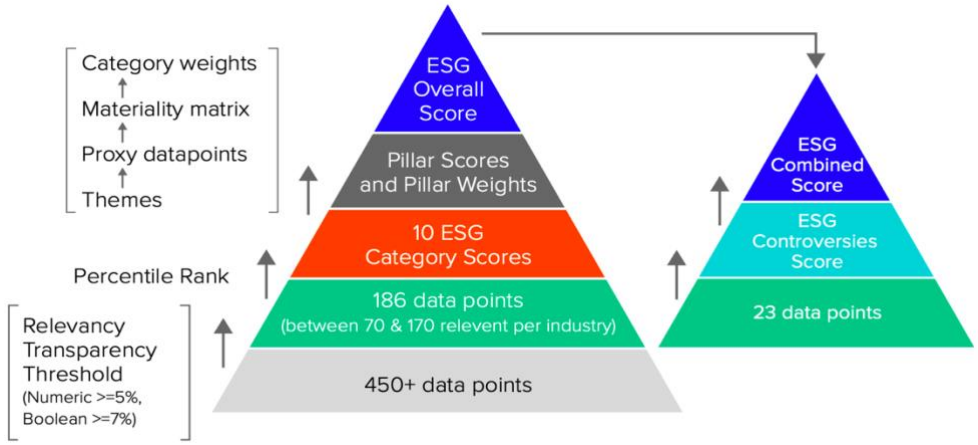
The dependent variable of this study is the ratio of interest expenses to total (interest-bearing) debt, a definition that is in line with the literature that uses an accounting measure for cost of debt rather than bond spreads (e.g., Pittman & Fortin (2004), Francis et al. (2005), Sánchez-Ballesta & Garcia-Meca (2011) and Frank & Shen (2016)). Interest expenses are the sum of interest expenses on short-term borrowings and on long-term debt while the total interest-bearing debt is the sum of short-term borrowings and the total long-term debt. I use the pre-tax cost of debt, since it reflects in theory the actual interest rate charged by lenders. The after-tax cost of debt is an artificial concept to account for the interest tax shield of debt, which, here, is not relevant.

[3] *See the full list of variables extracted and calculated in Appendix A.*

3.3.2. ESG score

The ESG score, as defined by Refinitiv, includes several components of the three pillars of sustainability. Overall, the Environmental pillar, composed of an 'Emissions', 'Resource use' and 'Innovation' category, weighs 44% of the total score. The Social pillar, with 'Community', 'Human rights', 'Product responsibility' and 'Workforce' categories, weighs 31%. The Corporate Governance pillar weighs the remaining 26% and includes a 'Shareholders', 'CSR strategy' and 'Management' category. The 'ESG Overall Score' can be complemented with a ESG Controversies Score to form the ESG Combined Score. This score assesses whether the company rated was included in any of 23 controversies defined by Refinitiv[4]. It affects the overall score negatively if the company was involved in any controversies and has no effect otherwise. Figure 1 illustrates the scoring methodology.

Figure 1
ESG Scoring Methodology (Refinitiv, 2020).



To create these scores, Refinitiv uses a variety of sources: company annual reports, company websites, NGO websites, stock exchange filings, CSR reports, news sources and content from ESG-trained research analysts. While a great deal of these sources is internal to the companies rated, and so prone to a positive bias towards the companies' practices, Refinitiv claims to include human and algorithmic processes to ensure maximum data quality (Refinitiv, 2020).

The ESG Combined score is my main independent variable (SCORE). I choose to use the Combined Score rather than the Overall Score to ensure that any scandals in which a given company may be involved are reflected in the rating, as it is not guaranteed that such events would be reflected in the Overall Score, through the standard methodology of the categories in

[4] *See Appendix B for the list of controversies.*

each pillar. While some of the literature opts for creating their own scores for CSR using the data from the ESG databases (e.g., Nelling & Webb (2009), Goss & Roberts (2010) or El Ghoul et al. (2011)), I choose to use the scores by Refinitiv as the methodology is explicitly stated. I also use a second independent variable, SCORE squared (SCORE^2), as a way to account for a possible non-linear (here quadratic) relationship between SCORE and KD.

3.3.3. Control variables

Firm control variables must be included in the regression, as several other factors are known to impact the cost of debt. As introduced, Van Binsbergen et al. (2010) identify several variables as explanatory of the cost of debt of firms, namely: collateralizable assets, total asset size, the book-to-market ratio, intangible assets, cash flow to assets and a dividend dummy. In literature studying the relation between CSR and the cost of capital and/or the cost of debt, there is a consensus on using a measure of size (Sharfman & Fernando, 2008, El Ghoul et al., 2011, Oikonomou et al., 2014, Cooper & Uzun, 2015, Ge & Liu, 2015, Magnanelli & Izzo, 2017, Bhuyian & Nguyien, 2019, and Bacha et al., 2020), leverage for all except Bacha et al. and, additionally, some use measures of operational profitability with some form of return on assets or on investment, a measure of interest coverage to control for the ability to service the interest obligations and a proxy for default risk (Sánchez-Ballesta & Garcia-Mea, 2011), and the firm beta as a measure of exposure to market risk is also common. Thus, I control for several firm characteristics, namely: the natural logarithm of total assets (SIZE), the ratio of total debt to total assets (LEV), the ratio of earnings before interest and tax to interest expenses, or interest coverage ratio (ICR), the book-to-market ratio (BTM), the return on assets defined by the ratio of earnings before interest and tax to assets (ROA), the firm's beta (BETA), the sum of net cash flows from operating, investing and financing activities scaled to total asset size (CF) and a dummy variable, for dividend-paying firms (DIVP). I decided to exclude the measures of collateral and intangibles suggested by Van Binsbergen et al. since the relationship found between those two variables and the cost of debt is surprising. They find that both variables have a negative relation with the cost of debt, while intuitively, they should be inversely correlated between themselves. Additionally, the literature looking at the cost of debt and CSR does not include such control variables.

From past literature, I expect: SIZE to have a negative relationship with the cost of debt as larger firms tend to be less risky borrowers; LEV to have a positive relationship since firms with higher levels of debt can be expected to have more difficulty repaying the debt obligations in the future; ICR, following the same logic, is expected to have a negative relationship; BTM

is expected to have a negative relationship, per Van Binsbergen et al. (2010), as firms with low BTM ratio (referred to as growth firms) have a higher opportunity cost for debt as it may limit future growth opportunities; ROA to have a negative relationship as a higher ROA implies a higher profitability and thus a better capability to repay debt obligations; BETA to have a positive relationship as it is a direct measure of riskiness of the firm; CF is hypothesized to have a positive relationship with the cost of debt according to the pecking order theory of capital structure of firms, which states that a firm prefers to use internal funding (CFI Education Inc., 2021), meaning that a firm with high cash flow will behave as having a high cost of debt, given the higher opportunity cost; and DIVP a positive relationship as dividend-paying firms will have fewer funds available to pay interest and repay debt, as per Van Binsbergen et al.(2010).

3.4. Regression models

All models have KD as dependent variable and SCORE and its square as base independent variables. The control variables used is what differs between models, as I progressively add more controls in each model. They all include sector and year fixed effects. Additionally, all independent variables are lagged by one period, as some of the literature suggests (Sharfman & Fernando (2008), Oikonomou et al. (2014) or Magnanelli & Izzo (2017)), in order to avoid coincidental relationships between variables. The point is to assess whether certain firm characteristics and ESG performance in time *t-1* explain the cost of debt faced in time *t*, ultimately looking to avoid endogeneity problems. This is an elementary way to identify a possible causal relationship between the variables.

The regressions all follow the same structure as in Equation 1. I start with a base model that excludes control variables (but includes sector and year fixed effects). Subsequent models progressively add controls for firm characteristics.

$$KD_{i,t} = a_0 + \beta_1 SCORE_{i,t-1} + \beta_2 SCORE^2{}_{i,t-1} + \sum_j \beta_j Control_{j_{i,t-1}} + \varepsilon_{i,t} \quad (1)$$

3.5. Descriptive statistics

The analysis of the 600 constituents for 12 years (as we exclude one year of analysis given the lag) should allow for 7200 observations but, given the delisting of some of the constituents (due to bankruptcy, M&A or other), some observations with missing information for some firms and the exclusion of outliers, we are left with 4412 observations for which there is data for *all* variables, at any given year. Table I shows the number of observations and the average

KD and SCORE per economic sector as well as per year. The most represented sectors are Industrials and Financials, with each roughly representing 20% of the observations. As for the years, the observations are evenly distributed and while there was generally a higher average cost of debt around the time of the financial crisis and Europe's sovereign debt crisis (2008-2012), the difference with the average cost of debt in later years is not very large (in the order of 1 percentage point). This observed general decrease in cost of debt is also in line with the general decrease in interest rates seen in the Eurozone since the financial crisis and especially since 2012 (ECB, 2021).

Table I
Sample breakdown by economic sector and year.

Economic Sector	*N*	*%*	*KD*	*SCORE*
Energy	290	6.57	4.19	58.46
Basic Materials	475	10.77	4.47	61.93
Industrials	926	20.99	4.11	57.57
Consumer Cyclicals	526	11.92	4.32	59.94
Consumer Non-Cyclicals	362	8.20	4.21	59.62
Financials	794	18.00	2.90	52.69
Healthcare	239	5.42	4.06	55.59
Technology	343	7.77	4.04	57.50
Utilities	457	10.36	3.92	58.11
Total	4412	100.00		

Year	*N*	*%*	*KD*	*SCORE*
2009	376	8.52	4.52	50.00
2010	391	8.86	4.38	53.17
2011	393	8.91	4.49	54.73
2012	384	8.70	4.52	55.26
2013	353	8.00	4.54	56.42
2014	365	8.27	4.11	56.87
2015	370	8.39	3.82	57.80
2016	362	8.20	3.62	62.23
2017	362	8.20	3.44	61.38
2018	349	7.91	3.38	62.56
2019	355	8.05	3.24	65.08
2020	352	7.98	3.92	58.08
Total	4412	100.00		

The variable KD is displayed in percent.

Table II provides descriptive statistics for the regression variables on Panel A and the correlation coefficients between those variables in Panel B. Except for the dummy DIVP, most variables are close to be normally distributed given the excess kurtosis and skewness both being close to zero. The variable ICR stands out, being the variable with most positive skewness (1.31) and highest excess kurtosis (1.08). As for the correlations, we see a weak negative relation (-0.02) between our variables of interest (KD and SCORE), and no major strong correlation between any variables. Generally, the assumption that the variables are independent holds and there is no reason to believe there are multicollinearity issues. We already observe unexpected correlations with the dependent variable, namely LEV and ROA. These correlations will be reflected in the regressions, as seen further.

Table II

Descriptive statistics and correlation coefficients for the regression variables.

	Mean	St. Dev.	Min	Q1	Median	Q2	Max	Ex. Kurtosis	Skewness
Panel A. Descriptive statistics for regression variables									
KD	3.92	1.84	0.00	2.63	3.80	5.10	9.64	-0.11	0.39
SCORE	58.05	17.28	8.78	46.76	59.76	71.22	93.63	-0.24	-0.46
LEV	28.32	14.57	0.00	18.06	26.90	38.11	71.21	-0.32	0.34
SIZE	16.81	1.66	12.77	15.53	16.63	17.86	21.44	-0.24	0.50
BETA	1.00	0.42	-0.21	0.70	0.97	1.27	2.21	-0.16	0.34
ICR	7.06	6.69	-12.18	2.62	5.38	9.90	30.10	1.31	1.08
ROA	5.88	4.85	-9.92	2.25	5.67	8.81	21.79	0.45	0.28
BTM	54.31	48.55	-120.00	1.54	46.39	84.98	210.53	0.14	0.79
CF	9.47	9.04	-16.19	3.36	8.74	14.93	35.20	0.14	0.28
DIVP	0.93	0.25	0.00	1.00	1.00	1.00	1.00	10.03	-3.47
	KD	*SCORE*	*LEV*	*SIZE*	*BETA*	*ICR*	*ROA*	*BTM*	*CF*
Panel B. Pearson correlation coefficients between regression variables									
KD	1.00								
SCORE	-0.02	1.00							
LEV	-0.07	-0.01	1.00						
SIZE	-0.30	0.20	-0.16	1.00					
BETA	0.01	0.01	-0.15	0.21	1.00				
ICR	-0.19	0.01	-0.37	-0.07	-0.11	1.00			
ROA	0.13	0.04	0.10	-0.31	-0.23	0.59	1.00		
BTM	-0.16	0.00	-0.04	0.34	0.20	-0.19	-0.37	1.00	
CF	0.03	-0.02	0.13	-0.20	-0.17	0.16	0.29	-0.19	1.00

The variables KD, LEV, ROA, BTM and CF in Panel A are displayed in percent.

4. Empirical Results

4.1. Multivariate regression – Full dataset

In this section, I consider the entire dataset as a whole to perform the OLS multiple regression analysis, to understand the effects of ESG ratings on the cost of debt. Table III reports the main results of this analysis, on several models, using the same dependent variable (KD, the cost of debt). While model 1 only takes the ESG score and its square as independent variables, models

2 and 3 introduce the control variables. Model 2 includes a first set of controls as introduced in Section 3.4. and model 3 adds the remaining controls.

	(1)	(2)	(3)
SCORE	0.265***	0.364***	0.250***
	(3.732)	*(5.259)*	*(3.926)*
SCORE^2	-0.257***	-0.302***	-0.213***
	(-3.621)	*(-4.397)*	*(-3.377)*
LEV		-0.159***	-0.369***
		(-11.147)	*(-24.227)*
SIZE		-0.221***	-0.188***
		(-13.284)	*(-11.758)*
BETA			0.023*
			(1.668)
ICR			-0.513***
			(-27.592)
ROA			0.335***
			(17.472)
BTM			-0.058***
			(-4.127)
CF			-0.063***
			(-4.645)
DIVP			-0.267***
			(-5.293)
INTERCEPT	-0.672***	-0.567***	-0.169**
	(-10.598)	*(-9.111)*	*(-2.189)*
Year effects	Yes	Yes	Yes
Sector effects	Yes	Yes	Yes
N	4412	4412	4412
Adj. R²	0.174	0.225	0.355

Table III
ESG score and the cost of debt.

This table reports results from regressing the cost of debt (KD) on SCORE, SCORE^2 and control variables over the period 2009-2020, using the entire dataset of 4412 firm-years.

All coefficients are standardized for a better comparison of the magnitude of the effects of the independent variables of the cost of debt.

t-statistics are reported inside the parentheses.

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

The results of the three models are surprising and contradict my initial hypothesis. The coefficients for the SCORE variable in the three models, significant in all cases at the 1% level, are positive. In the base model (1), I already find a positive relationship between the ESG rating and the cost of debt of firms. Indeed, these results show that a one standard deviation increase in the ESG rating (+17.28) results, on average, in an increase of 0.265 standard deviations in the cost of debt (i.e., an increase by 48.76 basis points[5]), which is contrary to my initial expectation. Adding the control variables, first LEV and SIZE in model 2, followed by BETA, ICR, ROA, BTM, CF and DIVP in model 3, increases the explanatory power of the model (as

[5] *Hereinafter always abbreviated 'bp'.*

seen by the adjusted R^2 of 35.5% in model 3) and confirms the result of model 1. Indeed, model 3 shows that a one standard deviation increase in the ESG rating results, on average, in an increase by 46.00 bp in the cost of debt.

Despite this unexpected result, there is room for exploring further since SCORE^2 has a negative and significant coefficient in all models, suggesting a concave relationship between SCORE and KD. This would therefore mean that while initial efforts towards a better ESG rating are not rewarded by creditors, consistent efforts are. This also means – as I will demonstrate further – that top ESG performers benefit from a lower cost of debt than average ESG performers, while average performers do not necessarily benefit from a lower cost of debt than bottom performers.

As for the control variables, SIZE (-), BETA (+), ICR (-) and BTM (-) have relationships with the cost of debt that are in line with the expectations outlined in Section 3.3.3. CF shows a negative relationship, contrary to expectations, which goes against the pecking order theory. However, it can still be justified logically, as a reflection of the safety that cash may represent for creditors. DIVP also seems to have a negative relationship with the cost of debt, contrary to the expected. Rather than being explained by the fact that paying dividends may limit a firm's ability to repay debt, perhaps this relationship instead shows the power of dividends, as signal of strong firm performance, which in turn pleases creditors. The most unexpected coefficients are those of ROA (+) and LEV (-). Indeed, the data shows a positive relationship between a firm's return on assets and its cost of debt, and a negative one between leverage and the cost of debt. The negative correlation (Table II) and regression coefficients (Table III) between KD and LEV are also found by Sánchez-Ballesta & Garcia-Mea (2011) and La Rosa et al. (2018) but not addressed in their analyses. I therefore assume that the coefficients of the control variables are not essential for the main purpose of the analysis in this dissertation[6]. As there is no reasonable explanation for these relationships, I assume that it is an irregularity of the data gathered for these control variables. Non-tabulated results find that nothing changes significantly by removing these variables from the regression, except for a decrease in the adjusted-R^2, and I thus decide to include these control variables in the findings, despite the irregular relationship.

[6] *In some cases, authors even choose to omit the control variables from the tables altogether, especially in studies with many independent variables of interest (see, e.g., Oikonomou et al., 2014).*

4.2. Univariate analysis

To further ascertain the relationship found in Section 4.1., I looked deeper into the dataset. Inspired by El Ghoul et al. (2011), I carried out a univariate analysis of the cost of debt, comparing a sub-sample of 'good' and 'bad' ESG performers. In Table IV, I show the average cost of debt (Panel A) and the median cost of debt (Panel B) of firms that are in the top versus the bottom halves of the ESG score distribution. In both panels, the cost of debt is lower in the top half of ESG compliers. The differences – of 13.0 and 17.3 bp in Panels A and B, respectively – though economically relatively small, are statistically significant at the 5% level. These results thus somewhat contradict the findings from before and justify looking deeper into how the ESG rating may explain cost of debt.

Table IV
Univariate tests.

		N	KD
Panel A. Means			
SCORE ≥ Median	(1)	2206	3.860
SCORE < Median	(2)	2206	3.990
Difference	(1)-(2)		-0.130**
t-Statistic			-2.355
Panel B. Medians			
SCORE ≥ Median	(1)	2206	3.711
SCORE < Median	(2)	2206	3.884
Difference	(1)-(2)		-0.173**
Z-Statistic			-2.213

This table presents mean (Panel A) and median (Panel B) comparison tests for the average cost of debt in subsamples of high (above median) and low (below median) ESG rating (SCORE). The total sample includes 4412 firm-years between 2009-2020.

KD is presented in percent.

**Statistical significance at the 5% level.

4.3. Multivariate analysis by quintiles

To better understand what the data shows in different parts of the distribution of the variable SCORE, I divided the data into quintiles[7]. I already outlined in the analysis of Table III that there appears to be a concave relationship between KD and SCORE, so it seems relevant to look at linear relationships in portions of the distribution of SCORE. This means that, instead of only looking at the entire distribution of SCORE, I try to understand what happens in isolated parts of this distribution. This allows me to identify possible different relationships depending on where a given firm performs in the distribution of the ESG rating. Figure 2, which presents

[7] *Quintiles seemed to be a sufficiently small portion of the data to be able to look at different parts of the distribution, but sufficiently big to ensure a large enough number of observations.*

the average and median cost of debt in each quintile, shows a concave quadratic relationship, as suggested by the coefficients of SCORE^2 in Table III. The graph also shows that a firm in quintile 4 is no better than a firm in quintile 2, or even 1, of ESG performance. The hypothesis made in Section 4.1. that initial efforts towards sustainability are not rewarded (and to some extent even penalized) but that excellence in this area is rewarded, seems to hold. To try and ascertain this, I have looked at how the ESG score may explain the cost of debt in the top versus the bottom quintiles of the distribution. In Table V, I confirm that the difference of means (of 19.0 bp) and of medians (of 22.6 bp) between the top and bottom quintiles is significant at the 5% and 10% levels, respectively, and economically more significant than the differences between top and bottom halves.

As such, I present in Table VI regressions with the same variables as before but, this time, only looking at a subset of the full dataset. Model 1 does not contain control variables, models 2 and 3 add control variables in the same order as in Section 4.1. and model 4 excludes the union of non-significant controls in top and bottom quintiles (BETA, BTM, CF and DIVP). All models account for sector and year fixed effects.

Table V
Univariate tests.

		N	KD
Panel A. Means			
SCORE ≥ P80	(1)	885	3.756
SCORE < P20	(2)	882	3.946
Difference	(1)-(2)		-0.190**
t-Statistic			-2.131
Panel B. Medians			
SCORE ≥ P80	(1)	885	3.604
SCORE < P20	(2)	882	3.829
Difference	(1)-(2)		-0.226*
Z-Statistic			-1.794

This table presents mean (Panel A) and median (Panel B) comparison tests for the average cost of debt in subsamples of top (above 80th percentile) and bottom (below 20th percentile) ESG rating (SCORE). The total sample includes 1767 firm-years between 2009-2020, representing two quintiles of the entire dataset.

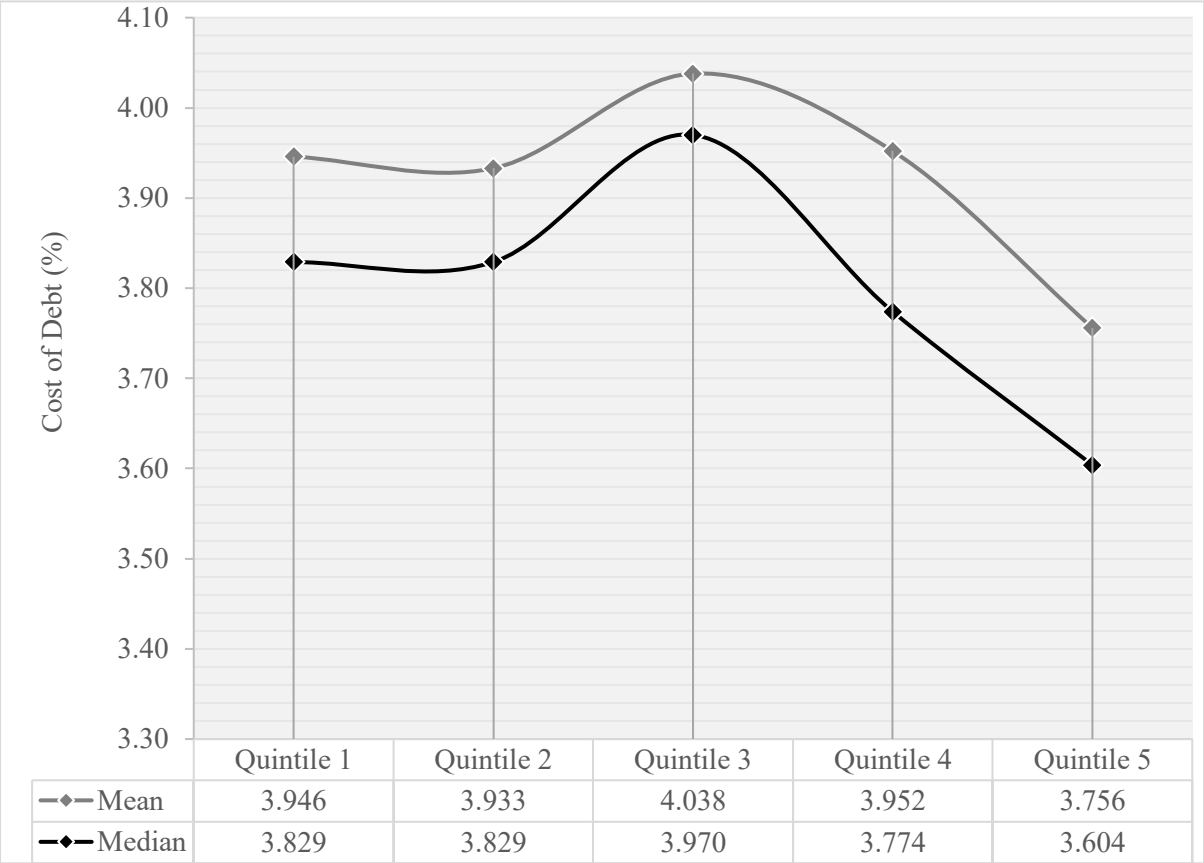
KD is presented in percent.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level

The results show a relationship consistent with the findings in the previous section in the bottom quintile, i.e., a positive relation between ESG score and the cost of debt. However, in the top quintile, this relationship is consistently negative, but not statistically significant. With the addition of firm controls, the coefficient however comes close to be statistically significant at the 10% level. The results from these regressions are nevertheless consistent with Figure 2 and the concave relationship between the cost of debt and the ESG rating of a firm.

Figure 2
Cost of debt per quintile.



This figure shows the average (top curve) and median (bottom curve) cost of debt per quintile of the variable SCORE. Quintile 1 refers to 8.78 ≤ SCORE ≤ 43.86, Quintile 2 to 43.87 ≤ SCORE ≤ 54.74, Quintile 3 to 54.75 ≤ SCORE ≤ 64.18, Quintile 4 to 64.20 ≤ SCORE ≤ 73.80 and Quintile 5 to 73.82 ≤ SCORE ≤ 93.63, the maximum score on the dataset.

Looking at Model 4 in Table VI, which only includes statistically significant controls, I find that a firm in the top quintile of SCORE (≥73.82) would, on average, benefit from a decrease of -0.043 standard deviations in cost of debt for an increase in SCORE by one standard deviation, i.e., a **decrease** in KD by 7.54 bp for an increase in SCORE by 4.58 points. Conversely, a firm in the bottom quintile (SCORE ≤43.86) would, on average, have a 0.152 standard deviation **increase** (30.21 bp) for a one standard deviation increase in SCORE (9.31 points)[8]. The relationships between the control variables and the dependent variable are in line with the findings of Table III, in both subsamples.

These results thus show the aforementioned concave relationship that may exist between my variables of interest. While in overall terms, it does not seem that creditors value ESG efforts,

[8] *See descriptive statistics for all quintiles in Appendix C.*

it does seem that they value them, if done consistently and meaningfully, in a way that is reflected by a top ESG rating. While this may be bad news for firms that wish to do *some* efforts towards sustainability, it is good news for firms that wish to do big efforts in that direction. The results also somewhat discourage firms that wish to do greenwashing and only engage in ESG superficially, since, at least in debt markets, those efforts are not rewarded.

Table VI
ESG score and the cost of debt.

	(1)		(2)		(3)		(4)	
	Top Q	Bottom Q	Top Q	Bottom Q	Top Q	Bottom Q	Top Q	Bottom Q
SCORE	-0.039	0.122***	-0.037	0.178***	-0.043	0.143***	-0.043	0.152***
	(-1.255)	*(3.749)*	*(-1.209)*	*(5.442)*	*(-1.628)*	*(4.496)*	*(-1.640)*	*(4.855)*
LEV			-0.234***	-0.145***	-0.517***	-0.309***	-0.522***	-0.316***
			(-7.148)	*(-4.688)*	*(-15.130)*	*(-8.886)*	*(-15.709)*	*(-9.156)*
SIZE			-0.106***	-0.255***	-0.091**	-0.236***	-0.102***	-0.241***
			(-2.627)	*(-6.863)*	*(-2.531)*	*(-6.297)*	*(-2.916)*	*(-6.668)*
BETA					-0.017	0.037		
					(-0.573)	*(1.172)*		
ICR					-0.664***	-0.409***	-0.672***	-0.417***
					(-16.084)	*(-9.330)*	*(-16.702)*	*(-9.523)*
ROA					0.374***	0.284***	*0.387***	0.279***
					(8.816)	*(6.339)*	*(9.560)*	*(6.291)*
BTM					-0.033	-0.072**		
					(-1.052)	*(-2.192)*		
CF					-0.017	-0.079**		
					(-0.591)	*(-2.389)*		
DIVP					-0.046	-0.198*		
					(-0.292)	*(-1.948*		
INTERCEPT	-0.732***	-0.807***	-0.555***	-0.670***	-0.349*	-0.295	-0.387***	0.522***
	(-6.230)	*(-4.577)*	*(-4.704)*	*(-3.935)*	*(-1.819)*	*(-1.489)*	*(-3.735)*	*(-3.183)*
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	885	882	885	882	885	882	885	882
Adj. R²	0.202	0.170	0.249	0.233	0.434	0.315	0.436	0.305

This table reports results from regressing the cost of debt (KD) on SCORE and controls variables over the period 2009-2020, for the top and bottom quintiles of the variable SCORE, thus using a subset of 1767 firm-years. Each model (1-4) includes the same variables between the top and bottom quartile, to make them directly comparable. Model 4 excludes the union of non-significant variables of the top and bottom quintiles of model 3.

All coefficients are standardized for a better comparison of the magnitude of the effects of the independent variables of the cost of debt.

t-statistics are reported inside the parentheses.

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

4.4. The turning point

The next question we may ask ourselves is from what point it becomes advantageous to engage in ESG efforts? Figure 2 seems to suggest there is a turning point in the ESG rating after which

it becomes beneficial for a company, in terms of the cost of debt, to improve its rating. To assess this, I perform in Table VII the same regressions as in Table VI but, this time, for all the quintiles (showing as well top and bottom quintiles as in Table VI for the sake of comparison), using no controls in model (1) and all the firm controls in (2). While it is still the case that only the coefficient for SCORE on the bottom quintile is statistically significant (in model 2), I find that the turning point should be between quartiles 2 and 3. This finding is compatible with the graph of Figure 2, which shows that the turning point should be around Quintile 3. We can take the midpoint between the beginning of Quintile 2 and the end of Quintile 3 as reference of where this turning point should be, i.e., $SCORE^* = \frac{43.87+64.18}{2} = 54.03$. This value is close to the mean and median of SCORE (cf. Table II) and leaves a possible optimist conclusion for above-average ESG ratings being rewarded in the debt markets. These findings, while promising, still however lack statistical significance, particularly in the negative coefficients, so my conclusions cannot be stated with a very high confidence level.

4.5. Further discussion

In this section, I try to argue what may explain the behaviour of the data. Table VI seems to show that for a bottom ESG performer, efforts to improve its ESG rating are either not rewarded or even penalised by creditors, while benefits only appear for the top performers. The implication is that allocating resources to sustainable practices in a company is worth it if the company intends to do it seriously, because small efforts are seen as a bad allocation of resources. These findings are similar to those by Barnett & Salomon (2006), who found a curvilinear relationship between CSR and the performance of SRI funds (funds that screen out socially irresponsible firms), meaning that "*managers should either wholeheartedly commit to broadly screening socially irresponsible firms from their funds, or exclude very few firms such that they do not interfere with their ability to diversify.*" In my analysis, it seems that, in the bottom quintiles, sustainability efforts are irrelevant, and the cost of debt depends solely on the factors known by financial theory. As a firm starts to invest to improve its ESG rating, debt markets price it as a misallocation of funds, and only in more engaged firms does sustainability make a difference. As such, it seems that there is no real penalisation for firms that disregard sustainability and social responsibility, while there is a benefit from doing it "wholeheartedly".

The findings by Barnett & Salomon (2006) also conclude that as a fund manager does a better job at selecting responsible firms, the possible loss of diversification is offset as "better-managed and more stable firms are selected", thus agreeing with Kiernan (2009)'s thesis that

more sustainable and thus better-managed firms are better-off financially. The implication seems to be that firms selected through a more thorough SRI screen are expected to be those with better ESG ratings and, in turn, that a better ESG rating means that a given firm is better managed (i.e., more focused on the long-term success of the firm) and more stable, which possibly explains the lower cost of debt in these top ESG performers.

The question remains why bottom performers, which by inference should therefore be more badly managed and less stable, do not have a higher cost of debt financing. While the diversification justification applies to funds – which may invest in several firms, socially responsible or not, and thus not be exposed to any idiosyncratic risk – it does not to individual firms. My hypothesis is that sustainability is still *only* seen as a differentiation factor, only really benefitting the top 'performers'.

Table VII

ESG score and the cost of debt – all quintiles.

	(1)					(2)				
	Top Q	Q4	Q3	Q2	Bottom Q	Top Q	Q4	Q3	Q2	Bottom Q
SCORE	-0.039	-0.022	-0.055*	0.017	0.122***	-0.043	-0.017	-0.039	0.001	0.143***
	(-1.255)	*(-0.725)*	*(-1.772)*	*(0.558)*	*(3.749)*	*(-1.628)*	*(-0.626)*	*(-1.380)*	*(0.044)*	*(4.496)*
LEV						-0.517***	-0.389***	-0.317***	-0.347***	-0.309***
						(-15.130)	*(-11.55)*	*(-9.018)*	*(-10.205)*	*(-8.886)*
SIZE						-0.091**	-0.141***	-0.108***	-0.309***	-0.236***
						(-2.531)	*(-4.000)*	*(-3.023)*	*(-8.710)*	*(-6.297)*
BETA						-0.017	0.089***	-0.028	0.025	0.037
						(-0.573)	*(2.884)*	*(-0.869)*	*(0.796)*	*(1.172)*
ICR						-0.664***	-0.511***	-0.520***	-0.469***	-0.409***
						(-16.084)	*(-12.800)*	*(-12.189)*	*(-11.560)*	*(-9.330)*
ROA						0.374***	0.333***	0.386***	0.289***	0.284***
						(8.816)	*(8.096)*	*(8.779)*	*(6.865)*	*(6.339)*
BTM						-0.033	-0.104***	-0.087***	0.023	-0.072**
						(-1.052)	*(-3.340)*	*(-2.597)*	*(0.741)*	*(-2.192)*
CF						-0.017	-0.095***	-0.079**	-0.053*	-0.079**
						(-0.591)	*(-3.102)*	*(-2.526)*	*(-1.771)*	*(-2.389)*
DIVP						-0.046	-0.386***	-0.360***	-0.210**	-0.198*
						(-0.292)	*(-3.374)*	*(-3.335)*	*(-1.969)*	*(-1.948)*
INTERCEPT	-0.732***	-0.551***	-0.622***	-0.613***	-0.807***	-0.349*	0.030	-0.074	-0.103	-0.295
	(-6.230)	*(-4.064)*	*(-4.228)*	*(-4.032)*	*(-4.577)*	*(-1.819)*	*(0.182)*	*(-0.426)*	*(-0.574)*	*(-1.489)*
Year effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Sector effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	885	882	882	881	882	885	882	882	881	882
Adj. R²	0.202	0.189	0.182	0.176	0.170	0.434	0.406	0.343	0.366	0.315

This table reports results from regressing the cost of debt (KD) on SCORE and controls variables over the period 2009-2020, for all quintiles of the variable SCORE, thus using the entire sample of 4412 firm-years. Model 1 only includes the independent variable SCORE while Model 2 includes all control variables. All quintiles are shown, including the top and bottom quintiles already shown in Table VI, for the sake of comparison between quintiles.

All coefficients are standardized for a better comparison of the magnitude of the effects of the independent variables of the cost of debt.

t-statistics are reported inside the parentheses.

*** Statistical significance at the 1% level.

** Statistical significance at the 5% level.

* Statistical significance at the 10% level.

5. Conclusion

5.1. Concluding remarks

In this dissertation, I have analysed the link between ESG ratings – and therefore sustainability practices – of firms and the cost of debt they face. By looking at the entire sample, I find a positive link between the two variables, contrary to expectations but in line with Magnanelli & Izzo (2017). However, the inclusion of a squared variable hinted that the relationship is not linear, and in fact N-shaped. As such, and inspired by El Ghoul et al. (2011), I split and analysed the dataset in subsamples, first in equal halves, and then in quintiles. The findings are more promising for the sustainability thesis, as they suggest consistent efforts are rewarded in the debt markets. Indeed, the somewhat N-shaped relationship was observed. The findings are in line with those on SRI funds by Barnett & Salomon (2006), in that the higher ESG score firms have, the better managed and stabler they are, which in turn I find is reflected in the lower cost of debt of top performers. While the regressions on the top quintile do not reveal a statistically significant relationship between SCORE and KD at any acceptable significance level, three conclusions still remain:

- the top quintile of SCORE has a statistically lower average and median cost of debt than the lower one, meaning the firms that have the top ESG ratings are better off in the debt markets;
- *on average,* higher quintiles of SCORE see a negative relationship with KD;
- the coefficients of the variable SCORE^2 in the regressions of Table III are all significant at the 1% level, thus confirming a significant concave relationship between SCORE and KD.

5.2. Recommendations for future research

For the purpose of further research on the relationship between ESG practices and the cost of debt of firms, ideas can be taken and developed from this dissertation.

Firstly, it is relevant to consider the definition of cost of debt. As outlined in Section 1.4., some studies opt for a market definition (bond spreads) and others for an accounting definition (ratio of interest expenses to debt). Both methods have advantages and disadvantages but seem to result in different findings. Studies using bond spreads find, more consistently than those with the accounting measure, a negative relationship between the CSR practices of a firm and its cost of debt. As suggested by Orlitzky & Benjamin (2001) for their market measure of risk, it is likely that market data is more influenced by a firm's image than an accounting measure.

Therefore, given the importance of CSR (ESG) practices for a firm's image – and even more so if the hypothesis of it being mostly a differentiation factor is true – it is possible that this holds too for a market measure of the cost of debt (the bond spread). This in turn may explain a more consistently negative relationship between the spreads and CSR performance. Future research should thus consider this possible difference in significance of the relationships found depending on the measure of cost of debt used and, e.g., as La Rosa et al. (2018), include two measures of cost of debt (one market and one accounting measure).

It is also important to consider changes to the data collected. First, on the source of the ESG ratings, most of the extant research in CSR uses the Kinder-Lydenberg-Domini (KLD) database to create the ratings, but due to data availability constraints, I used a less common database, Refinitiv. While their methodology is transparently outlined, the other database may be more reliable. The main limitation of the database used was the time horizon available. As the STOXX indices were only included in 2008, I was limited in my time horizon analysed. Secondly, on the regression variables, it is possible that a different set of controls might have provided more robust results. Namely, it might have been relevant to include a control variable for research and development expenditure, which McWilliams and Siegel (2000) find to moderate the relationship between CSR and financial performance, or a control on audit quality as explored by Bacha et al. (2020); the latter possibly being especially relevant in this sample, with small, mid and large capitalisation firms. Thirdly, while my objective was to look at the overall impact of CSR/ESG, it might have been relevant to include an analysis per pillar of sustainability (Environmental, Social and Governance), to identify whether one pillar has a more significant relationship with the cost of debt. Doing so might have yielded more significant results in a given pillar, instead of having a more diluted effect of the overall rating on the cost of debt. My results still identify a relationship between ESG efforts and the cost of debt (regardless of the pillar), which was indeed the objective of this dissertation.

As for the methodology, I encourage future research that finds a more consistent relationship between the variables to do deeper robustness checks. Instrumental variables and/or Granger causality can be used to try and infer causality between CSR and the firm measure of interest (be it cost of equity, debt or financial performance), and can thus be used to confirm the strength of a relationship.

Regarding the open question on bottom performers (see Section 4.5.), it would be interesting for future research to look at the performance of consistently low ESG performers, over an extended period of time, to identify potential problems with being consistently irresponsible

(or unsustainable). Such research would help the sustainability thesis as my conclusions do not necessarily discourage firms to be bottom ESG performers, just like Barnett & Salomon (2006)'s conclusions do not discourage investment in funds that do not do any sustainability screening.

Finally, I encourage future research to investigate the difference in behaviour in top versus bottom quintiles (or other subdivision) of ESG performers, which, to the best of my knowledge, was not done before (apart from El Ghoul et al. (2011), who performed a simple univariate test of the difference of means and medians between top and bottom half, as in Table IV). This difference is very relevant in motivating companies to engage in serious efforts toward environmental, social and governance practices that are sustainable since, as introduced, these should be relevant for companies in all industries and, per evidence shown, do not penalise and in fact even contribute to better firm performance. As Dr Matthew J. Kiernan introduces in his book[9], this new trend towards sustainability, comparing it to the industrial revolutions of the past, will create new winners and new losers. Increasing evidence seems to be showing who these will be.

[9] *Referenced before as Kiernan (2009), his book entitled "Investing in a Sustainable World – Why Green is the New Color of Money on Wall Street" was a big inspiration for the writing of this dissertation. Already 12 years prior to the writing of this research paper, Dr Kiernan argues in a scientific manner how and why sustainable investing matters, why the corporate and investment world needs to care about it, and particularly why it matters for our capitalist system, which he argues needs reform. The book inspired me to contribute, with empirical evidence, to the sustainability thesis.*

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7. Appendices

7.1. Appendix A – List of all variables extracted and calculated.

Abbreviation given	DataStream Code	Name	Description
Panel A. Variables extracted			
XINT	WC01251	Interest Expense on Debt	Includes but not restricted to interest expense on short-term debt, interest expense on long-term debt and capitalized lease obligations, amortization expense associated with the issuance of debt, "similar charges".
DT	WC03255	Total Debt	All interest-bearing and capitalized lease obligations. It is the sum of long- and short-term debt.
ESGS	TRESGS	ESG Score	Overall company score based on the self-reported information in the environmental, social and corporate governance pillars
ESGCONT	TRESGCCS	ESG Controversies Score	Company's exposure to environmental, social and governance controversies and negative events reflected on global media.
SCORE	TRESGCS	ESG Combined Score	Overall company score based on the self-reported information in the environmental, social and corporate governance pillars (ESG Score) with an ESG Controversies overlay.
TTA	WC02999	Total Assets	Sum of total current assets, long-term receivables, investment in unconsolidated subsidiaries, other investments, net PPE and other assets
ET	WC03501	Common Equity	Common Shareholder's Equity (incl. retained earnings, capital suprplus…).
BETA	897E	Historic BETA	-
P	P	Price – Trade	Official closing price
SHOUT	WC05301	Common Shares Outstanding	Number of shares outstanding at the company's year-end. Difference between issued shares and treasury shares.
EBIT	WC18191	-	Earnings before interest and taxes.
CFF	WC04890	Net Cash Flow Financing	Net cash receipts and disbursements resulting from reduction and/or increase in long- or short-term debt, proceeds from sale of stock, stock repurchased/redeemed/retired, dividends paid and other financing activities

Appendix A, continued.

Abbreviation given	DataStream Code	Name	Description
Panel A. Variables extracted, continued			
CFI	WC04870	Net Cash Flow Investing	Net cash receipts and disbursements from capital expenditures, decrease/increase from investments, disposal of fixed assets, increase in other assets and other investment activities.
CFO	WC04860	Net Cash Flow Operating Activities	Funds from operations, Funds from/for working capital, Extraordinary items.
DIV	WC04551	Cash Dividends Paid Total	Total common and preferred dividends paid to shareholders of the company.
IND	TR1	TRBC Economic Sector Code	Part of a 5-level hierarchical structure, the economic sector is the highest (most general level), with 13 economic sectors. 50: Energy 51: Basic materials 52: Industrials 53: Consumer cyclicals 54: Consumer non-cyclicals 55: Financials 56: Healthcare 57: Technology 59: Utilities 60: Real estate 61: Institutions, associations and organisations 62: Government activity 63: Academic and educational services

Abbreviation given	Name	Formula
Panel B. Variables used and calculated		
KD	Cost of Debt	XINT / DT * 100
SCORE	ESG Rating	SCORE
LEV	Leverage	DT / ET * 100
SIZE	Size	Ln (TTA)
BETA	Beta	BETA
ROA	Return on Assets	EBIT / TTA * 100
ICR	Interest Coverage Ratio	EBIT / XINT
CF	Cash Flows	(CFF + CFI + CFO) / TTA * 100
DIVP	Dividend Dummy	= 1 if DIV > 0; 0 otherwise

7.2. Appendix B – List of controversies according to Refinitiv.

Category	Name (N)	Label (L)	Description (D)
Community	TR.ControvAntiCompetition	Anti-competition controversy	Number of controversies published in the media linked to anti-competitive behavior (e.g., anti-trust and monopoly), price-fixing or kickbacks.
Community	TR.ControvBusinessEthics	Business ethics controversies	Number of controversies published in the media linked to business ethics in general, political contributions or bribery and corruption.
Community	TR.ControvCopyrights	Intellectual property controversies	Number of controversies published in the media linked to patents and intellectual property infringements.
Community	TR.ControvCriticalCountries	Critical countries controversies	Number of controversies published in the media linked to activities in critical, undemocratic countries that do not respect fundamental human rights principles.
Community	TR.ControvPublicHealth	Public health controversies	Number of controversies published in the media linked to public health or industrial accidents harming the health and safety of third parties (non-employees and non-customers).
Community	TR.ControvTaxFraud	Tax fraud controversies	Number of controversies published in the media linked to tax fraud, parallel imports or money laundering.
Human rights	TR.ControvChildLabor	Child labor controversies	Number of controversies published in the media linked to use of child labor issues.
Human rights	TR.ControvHumanRights	Human rights controversies	Number of controversies published in the media linked to human rights issues.
Management	TR.ControvMgtComp	Mgt compensation controversies count	Number of controversies published in the media linked to high executive or board compensation.
Product responsibility	TR.ControvConsumer	Consumer controversies	Number of controversies published in the media linked to consumer complaints or dissatisfaction directly linked to the company's products or services.
Product responsibility	TR.ControvCustomerHS	Controversies customer health and safety	Number of controversies published in the media linked to customer health and safety.
Product responsibility	TR.ControvPrivacy	Controversies privacy	Number of controversies published in the media linked to employee or customer privacy and integrity.
Product responsibility	TR.ControvProductAccess	Controversies product access	Number of controversies published in the media linked to product access.
Product responsibility	TR.ControvRespMarketing	Controversies responsible marketing	Number of controversies published in the media linked to the company's marketing practices, such as over-marketing of unhealthy food to vulnerable consumers.
Product responsibility	TR.ControvResponsibleRD	Controversies responsible R&D	Number of controversies published in the media linked to responsible research and development (R&D).
Resource use	TR.ControvEnv	Environmental controversies	Number of controversies related to the environmental impact of the company's operations on natural resources or local communities.
Shareholders	TR.ControvAccounting	Accounting controversies count	Number of controversies published in the media linked to aggressive or non-transparent accounting issues.
Shareholders	TR.ControvInsiderDealings	Insider dealings controversies count	Number of controversies published in the media linked to insider dealings and other share price manipulations.
Shareholders	TR.ControvShareholders	Shareholder rights controversies count	Number of controversies published in the media linked to shareholder rights infringements.
Workforce	TR.ControvDiversityOpportunity	Diversity and opportunity controversies	Number of controversies published in the media linked to workforce diversity and opportunity (e.g., wages, promotion, discrimination and harassment).
Workforce	TR.ControvEmployeesHS	Employee health & safety controversies	Number of controversies published in the media linked to workforce health and safety.
Workforce	TR.ControvWorkingCondition	Wages or working condition controversies count	Number of controversies published in the media linked to the company's relations with employees or relating to wages or wage disputes.
Workforce	TR.Strikes	Strikes	Has there has been a strike or an industrial dispute that led to lost working days?

Source: Refinitiv (2020)

7.3. Appendix C – Descriptive statistics for all quintiles of SCORE.

	Mean	St. Dev.	Min	Q1	Median	Q2	Max
Panel A. Descriptive statistics for regression variables of the Top Quintile							
KD	3.76	1.75	0.19	2.46	3.60	4.80	9.40
SCORE	80.20	4.58	73.82	76.27	79.47	83.49	93.63
LEV	28.21	13.61	0.73	19.17	26.55	38.08	63.29
SIZE	17.26	1.47	14.30	16.21	17.13	18.08	21.43
BETA	0.99	0.39	0.00	0.72	0.96	1.23	2.15
ICR	7.78	6.49	-6.93	3.20	6.15	10.80	30.10
ROA	6.45	4.76	-8.60	3.31	6.26	9.03	21.31
BTM	57.59	43.83	-0.21	27.90	51.46	86.13	199.46
CF	9.45	8.30	-15.39	4.19	8.85	13.92	34.81
DIVP	0.97	0.17	0.00	1.00	1.00	1.00	1.00

	Mean	St. Dev.	Min	Q1	Median	Q2	Max
Panel B. Descriptive statistics for regression variables of the fourth Quintile							
KD	3.95	1.81	0.02	2.68	3.77	5.03	9.60
SCORE	68.84	2.78	64.20	66.47	68.86	71.21	73.80
LEV	28.35	13.91	0.26	19.11	27.13	36.99	70.21
SIZE	16.85	1.52	12.79	15.73	16.60	17.85	21.41
BETA	1.01	0.40	0.00	0.72	0.98	1.27	2.19
ICR	6.62	5.94	-12.18	2.62	5.27	9.05	29.11
ROA	5.76	4.45	-9.77	2.52	5.68	8.46	21.28
BTM	54.00	45.48	-16.29	18.04	47.77	80.27	209.81
CF	8.46	8.73	-15.65	2.78	7.78	13.62	34.88
DIVP	0.94	0.24	0.00	1.00	1.00	1.00	1.00

	Mean	St. Dev.	Min	Q1	Median	Q2	Max
Panel C. Descriptive statistics for regression variables of the third Quintile							
KD	4.04	1.77	0.04	2.82	3.97	5.29	9.58
SCORE	59.56	2.70	54.75	57.28	59.73	61.91	64.18
LEV	28.67	15.03	0.21	18.47	26.99	38.21	70.50
SIZE	16.83	1.64	12.90	15.49	16.80	17.91	21.33
BETA	1.01	0.41	-0.21	0.71	0.97	1.28	2.20
ICR	6.63	6.58	-11.97	2.46	5.11	9.04	29.99
ROA	5.65	4.87	-9.87	2.16	5.50	8.39	21.52
BTM	54.12	49.95	-32.63	1.38	45.74	84.65	210.53
CF	9.85	8.95	-15.89	3.65	9.40	15.94	35.13
DIVP	0.92	0.27	0.00	1.00	1.00	1.00	1.00

	Mean	St. Dev.	Min	Q1	Median	Q2	Max
Panel D. Descriptive statistics for regression variables of the second Quintile							
KD	3.93	1.85	0.04	2.64	3.83	5.10	9.64
SCORE	49.53	3.16	43.87	46.75	49.75	52.26	54.74
LEV	27.69	14.62	0.62	16.72	26.71	37.76	69.77
SIZE	16.82	1.82	12.82	15.38	16.36	18.18	21.44
BETA	1.02	0.45	-0.17	0.69	1.01	1.33	2.21
ICR	7.21	7.00	-9.86	2.52	5.32	10.31	29.97
ROA	5.85	5.06	-9.68	1.88	5.49	9.19	21.79
BTM	50.18	51.59	-120.00	0.78	39.08	83.28	208.09
CF	9.82	9.36	-16.19	3.75	8.73	15.78	35.02
DIVP	0.92	0.27	0.00	1.00	1.00	1.00	1.00

Appendix C, continued.

	Mean	St. Dev.	Min	Q1	Median	Q2	Max
Panel E. Descriptive statistics for regression variables of the Bottom Quintile							
KD	3.95	1.99	0.00	2.62	3.83	5.15	9.59
SCORE	32.02	9.31	8.78	25.92	34.27	39.86	43.86
LEV	28.66	15.59	0.00	16.17	27.60	39.56	71.21
SIZE	16.26	1.69	12.77	14.96	15.89	17.37	21.42
BETA	0.97	0.43	0.03	0.65	0.94	1.25	2.21
ICR	7.07	7.31	-11.77	2.20	5.11	10.16	30.09
ROA	5.67	5.07	-9.92	1.83	5.32	8.79	21.53
BTM	55.66	51.23	-40.57	1.38	46.54	88.80	209.14
CF	9.76	9.76	-14.21	2.81	9.07	15.54	35.20
DIVP	0.91	0.28	0.00	1.00	1.00	1.00	1.00