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MASTER
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MASTER´S FINAL WORK
DISSERTATION

CORPORATE SOCIAL PERFORMANCE AND COST OF CAPITAL

JOÃO PEDRO MARQUES DUARTE DIAS

OCTOBER - 2020

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SUPERVISION:
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ABSTRACT

This study analyses the association between Corporate Social Responsibility (CSR) and Cost of Capital for companies listed in the STOXX Europe 600 index, from 2002 to 2018. The Ohlson and Juettner-Nauroth (2005) and Easton (2004) models are used to compute an *ex-ante* cost of equity measure, while the cost of debt is measured as the ratio of interest expenses to total interest-bearing debt. A measure of Corporate Social Performance (CSP) was computed using the Combined ESG (Environmental, Social and Governance) Score from Refinitiv. Results suggest that CSP is priced by both debt and equity markets. Furthermore, a negative relationship between CSP and cost of equity is found, while the relationship between CSP and cost of debt is positive. Additional tests suggest that equity markets penalize firms lagging in CSP when compared with industry peers, while debt markets penalize industry leaders in CSP. The results are robust for alternative measures of CSP, cost of equity and cost of debt. Furthermore, the associations do not hold during periods of crisis, suggesting CSP is not value relevant during such periods.

KEYWORDS: Cost of Capital; Cost of Equity; Cost of Debt; Corporate Social Responsibility; ESG.

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GLOSSARY

ESG – Environmental, Social and Governance

CER – Corporate Environmental Responsibility

CSR – Corporate Social Responsibility

CSP – Corporate Social Performance

COE – Cost of Equity

COD – Cost of Debt

COC – Cost of Capital

STOXX600 – STOXX Europe 600 index

KLD – Kinder, Lydenberg and Domini

1. INTRODUCTION

Corporate Social Responsibility (CSR) is increasingly becoming a key theme across the business sector. Issues such as climate change, wealth disparity, inequality and the management of scarce resources have forced companies to rapidly adapt to new consumer behaviours and regulations. Furthermore, the European Union' commitments on environmental and sustainability issues have been playing a major role in how companies allocate capital in pursuit of CSR activities, beyond the generation of profit.

Cost of capital is a fundamental force driving investment decisions. Debt markets are gradually incorporating CSR performance measurements in their lending practices, while equity markets increasingly perceive CSR investments as a source of risk mitigation. Since cost of capital (COC) reflects what is value relevant, the adoption of such measures suggests that corporate social performance (CSP) generates value and is priced by investors and lenders in their activities.

However, there is no consensus on the association between CSP and the cost of equity (COE) and debt (COD). Most empirical research points to a negative relationship between CSP and cost of equity (Sharfman & Fernando, 2008; El Ghoul, Guedhami, Kwok & Mishra, 2011; El Ghoul, Guedhami, Kim & Park, 2018) and cost of debt (Goss & Roberts, 2011; Oikonomou, Brooks & Pavelin, 2014; Du, Weng, Zeng, Chang & Pei, 2017). Accordingly, higher investments in socially responsible activities help decrease both interest rates on debt and equity premia. Contrarily, other studies find a positive relationship between COC and CSP (Magnanelli & Izzo, 2017; Menz, 2010) or an inconclusive one (Salama, Anderson & Toms, 2011; Humphrey, Lee & Shen, 2012; Gregory, Tharyan & Whittaker, 2014).

Furthermore, an increasing body of literature shows that other factors have an impact on the association between COC and CSP, such as industry membership (Reverte, 2012; Gregory, Whittaker & Yan, 2016; El Ghoul et al., 2018) and country-level factors such as stakeholder orientation, financial transparency and governance (Dhaliwal, Li, Tsang & Yang, 2014; Gupta, 2018). This study aims to fill a gap in the literature, analysing the association between COC and CSR in the European context, as well as if this relationship holds considering different economic contexts.

To study the associations between CSP and cost of equity and CSP and cost of debt, a sample consisting of 413 firms from the STOXX Europe 600 (STOXX600) is used, belonging to 17 countries of the European Union, for the 2002 to 2018 period. This study employs an *ex-ante* cost of equity measure, using the abnormal growth models of Ohlson and Juettner-Nauroth (2005), as implemented by Gode and Mohanram (2003), and Easton (2004). The cost of debt model follows La Rosa, Liberatore, Mazzi and Terzani, (2018). CSP was measured through the Environmental, Social and Governance (ESG) Combined Score provided by Refinitiv.

Results from this study point to a statistically significant positive relationship between a firm's COD and CSP, suggesting that lenders perceive CSR activities as a waste of a firm's resources, in line with overinvestment theory. This finding is consistent with Sharfman and Fernando (2008), Menz (2010) and Magnanelli and Izzo (2017). Regarding the COE–CSP association, results show a negative relationship between both variables, in line with Sharfman and Fernando (2008) and El Ghoul et al. (2011, 2018). This suggests equity markets perceive CSR investments as a source of value, possible through risk mitigation theory.

After segmenting the sample into firms bellow and above industry median CSP, results show that lenders penalize firms for their efforts to be industry leaders in CSR, while not finding evidence that they reward those who invest less than their peers. An inverse association is found regarding how equity markets perceive CSR investments. Results show that investors penalize firms who are laggers in CSR with higher required equity premiums, while no significant COE-CSP association is found for CSR leaders. This suggests that the industry median CSP score acts as the optimal level, as investors penalize bellow industry performance and lenders penalize above industry performance. This also accords with Ye and Zhang (2011) and Bae, Chang and Yi (2018), who find optimal levels of CSR investments.

The study results are robust for alternative measures of corporate social performance, cost of debt and cost of equity, as well as to alternative models that explore the association between cost of capital and corporate social performance.

An additional test explores if the relationship is robust during different economics conditions. Results show that the relationship is only statistically significant during period of stability, in line with La Rosa et al. (2018) and El Ghoul et al. (2018), implying that CSR is not value relevant to capital markets during crisis periods.

This study offers important contributions to the literature. It provides evidence on the pricing of CSP by the capital markets. It further supports the growing importance of CSR when defining a business strategy, as its impact on COC urges managers to think beyond just financial measures. Results point to divergent positioning by lenders and investors, forcing socially responsible managers to weight the cost of each source of capital when allocating resources. It further examines how capital markets perceive leaders and laggers in CSR within an industry. Moreover, the magnitude of the deviation seems to be irrelevant when already controlling for CSP and industry positioning. Finally, no evidence is found for the impact of CSR on cost of capital during financial crisis periods.

The remaining part of the paper proceeds as follows: Section 2 provides a literature review, where the models and definitions of COE, COD and CSP are presented and testable hypotheses are developed. Section 3 presents the samples and methodologies used. Section 4 discusses findings. Finally, Section 5 presents the conclusions, limitations and future research avenues.

2. LITERATURE REVIEW AND HYPOTHESES

Companies are facing increasing pressure from both shareholders and stakeholders to redesign their operations in a sustainable way. This includes rethinking sources of financing such as the issuance of green bonds, tapping into loans with ESG related constraints, deciding which projects to invest in and how to allocate investment portfolios sustainably. Additionally, firms have been trying to measure how CSR issues affect their businesses, while other firms have made their business to evaluate socially responsible performance through ratings. This paper explores both dimensions, focusing on how CSR ratings might affect the financial performance of a firm, particularly by measuring its impact on the cost of debt and equity capital.

In general terms, firms have two sources of financing: debt and equity capital. Debt financing may come from public sources (by issuing debt securities in the public market) or private sources (for example bank loans). In both sources, cost of debt is the yield to maturity applied in the operation. Equity capital originates from shareholders. The cost of equity is the rate of return investors expect to obtain for investing in a firm's stock.

Corporate Social Responsibility is a subject that can be related to a panoply of concepts such as corporate social performance, corporate governance, corporate citizenship and corporate sustainability. All have the underlying aim of addressing the parallel obligations firms have, other than financial considerations (Freeman, 2010). McWilliams and Siegel (2001, p. 117) defined Corporate Social Responsibility as "actions that appear to further some social good, beyond the interests of the firm and that which is required by law". More recently, the

Environmental, Social and Governance (ESG) concept has emerged, capturing most CSR related activities a firm might pursue (Starks, 2009).

One of the first papers studying the relationship between CSR and cost of capital was by Sharfman and Fernando (2008). Drawing on risk mitigation theory, the authors hypothesize that an improved environmental risk management should lower a firm's cost of debt and equity. With a sample of 267 U.S. companies, mixed results are reported. While cost of equity decreases with better environmental risk management, an increase in cost of debt is observed. The authors infer that the reason behind the increasing cost of debt might reside in the perception of environmental risk management activities as a waste of firm's resources by the debt markets. Another possible explanation presented by authors involves the possible lack of control for the effects of increasing leverage and improved environmental risk management on cost of debt.

2.1. Cost of Equity and CSR

The cost of equity is the rate of return expected by investors for investing in a firm. To determine their required rate of return, investors measure the risk of a firm's cash flows relative to alternative investment opportunities. El Ghoul et al. (2011) argue for a negative relationship between corporate and environmental responsibility and cost of equity, that is driven by both risk mitigation theory and an investor base perspective.

The risk mitigation argument is that responsible firms present lower risk profiles in the eyes of investors, and thus will benefit from a lower cost of capital. In this view, there is a lower probability of adverse events happening to responsible firms, and in case they occur, CSR can act a cushion to mitigate such effects.

Risk mitigation builds on the stakeholder theory framework, in which the business is seen as a net of relationships between its stakeholders. These relationships are managed by executives with the responsibility of maximizing and distributing stakeholder value (Freeman, 2010). CSR can be seen as a way to improve these relationships by reducing the probability of negative events such as costly lawsuits and clean-ups from environmental damage, unsafe products recalls, strikes from dissatisfied employees and brand and reputation erosion from scandals (Godfrey, 2005). In September 2015, Volkswagen (VW) admitted that 11 million of its diesel vehicles were equipped with a device whose purpose was to deceive laboratory diesel-exhaust emission tests. As a result, VW not only lost one-third of its market capitalization from a massive sell-off of its stock but also incurred in billions of dollars in costly regulatory fines, customer and shareholders' legal actions, as well as other financial penalties ("A mucky business", 2015).

CSR can arguably be a competitive advantage, as good performers can motivate and attract more productive employees with less effort, avoid pollution fines and improve community and governmental relations with the company (Soloman & Hansen, 1985). Furthermore, empirical studies find that firms operating in "sin" businesses such as tobacco, gambling and alcohol face higher uncertain future claims and litigation risks than comparable firms in other industries (El Ghoul et al., 2011; Hong & Kacperczyk, 2009). Consistently, studies have shown that companies exposed to carbon risk carry increased uncertainty around regulatory, physical and business hazards (Sharfman & Fernando, 2008; Bauer & Hann, 2010; Schneider, 2011; Chen & Gao, 2012). Such events greatly impact the firm's perceived image, which can materially worsen its' overall risk profile and profitability (Smith, 1994; Boutin-Dufresne & Savaria, 2004; Kim, Li & Li, 2014; Krüger, 2015). Since CSR might act as an "insurance" against negative events, companies with high CSR scores should display lower idiosyncratic risks.

By defining a moral capital framework, Godfrey (2005) argues that if a company experiences such a negative event, a good record of social responsibility can act as insurance against stakeholder boycott and cash outflows. Accordingly, a good record of CSR performance enables firms to build moral capital, i.e., goodwill among stakeholders which can function as a risk management tool. Moreover, Godfrey (2005) proposes that companies which engage in philanthropic activities to "fit in" or to obtain shareholders moral approval, tend to generate negative moral capital, whereas companies that have a genuine interest and activities in line with its values tend to generate positive moral capital. Testing the effect of 178 negative regulatory and legal actions taken upon firms in an 11-year span, Godfrey, Merrill and Hansen (2009) found that firms engaged in CSR activities aimed at society benefited from the "insurance quality" of moral capital, while such activities directed at the firm's trading partners had no such effect.

Heinkel, Kraus and Zechner (2001) have introduced a theoretical framework through which the CSR-COC relationship is explored based on investors base theory. The authors categorize risk-averse investors into green and neutral, and firms into green, polluting and reformed. When building their portfolios, neutral investors are indifferent to the ethical behaviour of a firm, while green investors only invest in firms that meet their ethical criteria. According to the framework, with lower demand for their stocks, polluting firms have a smaller investor base, finding risk harder to diversify. This lack of demand and risk-sharing ability leads to a decrease in the polluting firms' share price as well as a higher cost of equity capital (Merton, 1987). Heinkel et al. (2001) have demonstrated that at least 25% of investors need to be green to prompt polluting firms to change their behaviour and invest in greener technologies. Hong and Kacperczyk (2009) provide evidence that U.S. institutions with greater social-norm constraints, such as pension funds, hold fewer sin stocks in their portfolio than less norm-constrained institutions, such as mutual or hedge funds, as the latter are less exposed to news and analyst's coverage. Furthermore, the authors find that sin stocks present higher expected returns than comparable stocks, as investors face higher risks related to litigation actions. El Ghoul et al. (2011) have concluded that better CSR performers exhibit a lower cost of equity and that companies in the nuclear power and tobacco industries display a significantly higher cost of equity capital among U.S. sin stocks. Chava (2014) provides further evidence that investors require higher returns on stocks excluded by environmental screens related to chemical hazards, emissions and climate change concerns when compared with firms without such concerns. According to Chava (2014), sin firms see lower demand for their stock from institutional investors and see a lower bank participation rate in their loan syndicate.

In contrast, some authors find little to no evidence for the negative relationship between CSP and the cost of equity. While estimating the cost of equity in green and toxic portfolios, Gregory et al. (2014) claim that although the market associates CSR strengths with improved financial performance, the effect derives mainly from a greater expectation of future growth rather than cost of equity capital. Moreover, several studies are inconclusive: Gregory et al. (2016) show that the lower cost of equity exhibited by firms with high CSP is a result of industry membership and, once controlled for, the effect of cost of capital on firm' value is minimal. In the British context, Salama et al. (2011) report an economically meaningless negative relationship between systematic financial risk and environmental performance. Similarly, Humphrey et al. (2012) find no impact of different levels of CSP on the risk-adjusted performance of U.K. based firms. Some authors even suggest an optimal level of CSP. Stemming from overinvestment theory, Bartkus, Morris and Seifert (2002) suggest that managers may overinvest in philanthropy beyond an optimal level for self-interests, at the shareholders' expense.

Data from several studies suggest that the business cycle might play a part in this relationship. A study by El Ghoul et al. (2018) points out that during non-crisis periods, corporate environmental responsibility (CER) can help reduce the probability and costs of adverse events such as environmental scandals, while during the global financial crisis of 2008, the financial distress and bankruptcy costs had a higher priority than decreasing the probability of such events. During periods of crisis, investors seem to prefer firms with better short-term financial performance as opposed to higher CER performance. This finding is consistent with that of Lins, Servaes and Tamayo (2015), who report that high-CSR firms exhibited higher stock returns than low-CSR firms during the 2008–2009 financial crisis.

Taken together, while most empirical research is in favour of a negative relationship between CSP and COE, there is a relatively small body of literature that finds little or no support for it. This inconsistency may be due to other variables that play a role on the relationship, such as the type of measure used to assess CSP, industry membership, the choice of sample and other cultural and institutional factors that impact the context of the firm (Schoenmaker, Gianfrate & Wasama, 2018).

2.2. Cost of Debt and CSR

Proponents of CSR defend a negative relationship between it and cost of debt, arguing that responsible firms are perceived as less risky by lenders and thus should obtain better financing conditions. On the other hand, opponents of CSR argue that such activities represent a waste of limited and finite resources and firms that pursue such activities destroy value, suggesting a positive relationship between both variables.

The main driver of cost of debt is a firm's default risk. This risk is assessed by the capital markets, composed of credit institutions, rating agencies and the bond markets. The level of default risk of a company stems from its ability to meet future obligations through debt repayments. The greater the uncertainty of its future activities, the higher the default probability and risk, thus the higher the cost of debt. As previously argued, the uncertainty of a firm's future activities – idiosyncratic risk - can originate from unexpected negative events. Since lenders are exposed to the borrowers' idiosyncratic risk in their lending activities, they may require higher interest payments, additional guarantees on the loan and/or offer lower maturity rates to compensate for that risk. A similar argument applies to bad corporate social behaviour, as creditors also bear reputational risk derived from their clients' actions and may require borrowers to mitigate such CSR related risks.

As specialized risk appraisers, lenders have an incentive to incorporate CSR measures in their risk assessment models. Prior research reports that lenders are increasingly incorporating environmental and carbon issues into their lending decisions (Thompson, 1998; Coulson & Monks, 1999; Thompson & Cowton, 2004; Cogan, 2008; Weber, 2012). Attig, El Ghoul and Guedhami (2013) suggest that more socially responsible firms exhibit higher credit ratings, consistent with the idea that these firms have a lower risk. Consequently, firms with higher credit quality should obtain better borrowing conditions and a lower spread on their loans (Coulson & Monks, 1999; Soppe, 2004). This relationship seems to hold in the United States, both with private lenders and the public debt markets, with factors such as geography having a larger impact in the relationship than the widely studied industry effect (Erragragui, 2018; Ge & Liu, 2015; Jiraporn, Jiraporn, Boeprasert & Chang, 2014). Similar results are found in European companies. A recent study by La Rosa et al. (2018) reports a negative relationship between a firm's CSP and cost of debt in a sample of firms included in the S&P Europe 350 index, from 2005 to 2012. The authors further conclude that improved CSP is associated with higher credit ratings.

Similarly, Oikonomou et al. (2014) find that a good CSP is rewarded with a lower cost of debt while a bad performance penalizes it. Based on an extensive sample of 3,240 U.S. bond issues across 17 different industries, from 1991 to 2008, the authors investigate the separate impact of the several dimensions of CSP on corporate debt pricing and the credit quality of bond issues. Results show that CSR dimensions such as greater product safety and quality, local community support and good relations with employees, all contribute to a lower corporate bond yield spread.

Overall, there is support for a negative relationship between CSP and COD based on risk mitigation theory. The risk reduction is further corroborated with the research done on the association between credit ratings and CSP. Some papers quantified this reduction of cost of debt: Jung, Herbohn and Clarkson (2018) showed that Australian firms with higher carbon risk and lower risk awareness paid 38 to 62 basis points more on their loans than more aware companies. Using a larger sample of 1,265 U.S. companies between 1991 and 2006, Goss and

Roberts (2011) study the relationship between bank loans and KLD[1] strengths and concerns and find that firms exhibiting CSR concerns are penalized with an increase of 7 to 18 basis points on their bank loans. Interestingly, the authors find that credit providers penalize low-quality borrowers that engage in CSR activities but are indifferent to high-quality borrowers that engage in similar activities.

Some argue that stakeholders and societal demands are now pressuring corporations to engage in activities that promote the general public well-being, resulting in a deviation from a strict profit maximization objective. This view is commonly called delegated philanthropy. Investors, customers and employees are willing to give up personal benefits such as purchasing power to improve social well-being, for example, by paying higher prices for more sustainable products and demanding companies to adopt more sustainable practices (Benabou & Tirole, 2010). Managers are thus pressured to invest beyond what is financially optimal.

Recent events document demanding pressure from stakeholders, especially in bigger, more profitable firms that produce final goods. In July 2019, Amazon workers from the United States and Europe left their work for six hours to protest against their employer workload practices and the abuse of temporary job contracts. Thousands of workers were planning to strike later in the year due to the inaction of Amazon regarding climate change. Other workers from some of the biggest technology companies, such as Google and Microsoft, were also planning on joining the protests. These companies quickly tried to prevent such events by announcing measures to address their employees' complaints. Jeff Bezos, from Amazon, announced the day before the strike that by 2030, Amazon would be entirely powered by renewable energy and would have net-zero carbon emissions by 2040. Google followed a similar approach and increased its investment in renewable energies ("Hundreds of workers defy Amazon rules", 2020).

Overinvestment theory, an alternative to risk mitigation theory, draws its support from agency theory (Jo & Harjoto, 2012). The view is that discretionary investments in socially and environmentally responsible activities pose a costly deviation from the optimal use of scarce resources (Goss & Roberts, 2011).

[1] Kinder, Lydenberg and Domini (KLD), also known as MSCI ESG STATS, is a financial advisor who provides social screening of firms to clients via its reports and socially screened mutual funds.

Some argue that managers overinvest in philanthropy and CSR to improve their own image, as good behaviours benefit the manager's reputation at the cost of the shareholder (Barnea & Rubin, 2010). Friedman (1962) first argued that the pursuit of philanthropic activities by corporations is inefficient and should be left to individual shareholders, reflecting information asymmetry and agency problems between managers and shareholders (Boatsman & Gupta, 1996; Jensen, 2000). Either way, lenders that perceive these activities as resource wasteful will require higher returns. Following Goss and Roberts (2011), both types of excess spending will be considered under the overinvestment hypothesis, proposing that companies with better CSR scores have higher levels of cost of capital. Accordingly, the overinvestment hypothesis posits that a firm's CSR engagement is a diversion of corporate resources and thus makes the firm more vulnerable to credit screening by lenders, resulting in a higher cost of capital.

Menz (2010) was the first paper focusing solely on the relationship between COD and CSP. Menz (2010) analysed the relationship between 498 Euro corporate bonds spreads and RobecoSAM CSR scores, observed over 38 months. Following a similar risk mitigation argument to Sharfman and Fernando (2008), Menz (2010) hypothesized a negative relationship between CSR scores and firms' credit spreads. However, the study found a weak positive relationship between both variables. The author concluded that it is possible that the credit ratings used in the model already account for CSR issues and that an additional non-certified CSR rating does not improve the explanatory power of CSR to bondholders. This conclusion is interesting given the previous noted explanatory power of credit ratings on lower credit costs. Additionally, agency conflicts regarding the difficulty of simultaneous shareholder and bondholder value creation could help explain the results. In Suto and Takehara (2017), the authors study the relationship between CSP and COD, finding a positive link between both variables in the period spanning 2008 to 2013. The relationship is significant only for the 2008 to 2010 period, indicating that during the financial crisis, lenders saw CSR spending as a risk to the future of the company, pricing this risk through cost of debt.

In a sample of 332 international firms, Magnanelli and Izzo (2017) also find a positive significant relationship between cost of bank debt and CSP in the period from 2005 to 2009. This may be derived from the sample selection, where 40% of the companies operate in the U.S., where CSR activities may not be regarded by lenders as a source of value due to greater stakeholder-centricity. Furthermore, like Menz (2010), Magnanelli and Izzo (2017) include financial companies in their sample and obtain their CSR ratings from RobecoSAM database.

This may bias the results because the amount of bonds issued by financial services reduces cross-industrial variance (thus most researchers exclude them).

In a literature review, Schoenmaker et al. (2018) analysed 58 articles that focus on the relationship between CSP and cost of (debt and equity) capital. The authors find that the majority of studies report a negative relationship between the cost of equity and CSP, but some do not find any statistically significant relationship, or just a weak and economically negligible one, rendering the overall relationship inconclusive. The mixed conclusions can be a result of the measure of sustainability used and other external factors that play a role on the relationship, such as country-level characteristics, the voluntary or mandatory disclosure of CSR reports and external assurance. The same heterogeneity of results issue is present in the COD - CSP relationship, with results varying with the type of measurement used, and its' strength and direction are influenced by other external factors such as securitization, credit ratings and country-level institutional and cultural characteristics.

The research done until now has focused on the linear relationship between COC and CSP. Focusing on the cost of debt side, Ye and Zhang (2011) and Bae et al. (2018) have examined the existence of a non-linear relationship between COD and CSP, finding a "U-shaped" association between both variables that points to an optimal level of CSP.

Ye and Zhang (2011) are the first researchers to document a U-Type relationship between both variables. The authors fundament their hypothesis on risk mitigation theory, examining if better CSP - measured as the ratio of donations to charity over sales - reduces cost of debt in a sample of Chinese firms. The authors document a negative relationship between both variables for a ratio below 0.357. With higher charity contributions, the relationship turns to a positive one. Thus, cost of debt seems to be higher for extremely high or extremely low levels of CSP. When the authors divide their sample into an underinvestment group ($CSR < 0.357$) and an overinvestment subsamples ($CSR > 0.357$), they find negative and positive relationships, respectively.

Bae et al. (2018) find the same type of relationship with a wide sample of 5,810 syndicated bank loans issued by U.S. firms, for the period of 1991-2008. The authors conclude that CSR strengths decrease loan spreads at a decreasing rate, while CSR concerns increase COD at a decreasing rate. The authors conclude that for borrowing firms which are not evaluated by rating agencies, investing in CSR is seen as inefficient and a waste of a firm's funds. When controlling for business cycles, the authors find that during the technology crisis (2000-2002) and the global financial crisis (2008), firms with CSR strengths saw lower spreads on their loans. Furthermore, the non-linearity effect remained significant during these periods, which indicates that the relationship is not sensitive to different periods. The nonlinearity effect of CSR on cost of debt suggest that lenders perceive CSP as a form of risk reduction, up until a certain level. After the optimal point is reached, creditors view CSR investments as ineffective and a costly use of a firm's resources.

This paper analyses the following research questions:

Research question 1: Considering prior research support for both negative and positive relationships between cost of capital and CSP, it remains unclear if and how capital markets price investments in CSR.

Research question 2: If there is an association between COC and CSP, does one theory prevail or do both risk mitigation and overinvestment views influence this relationship?

Research question 3: Considering how the business cycle greatly influences how lenders and investors provide capital and how companies allocate it, how do more sustainable companies fare against less sustainable ones during periods of crisis?

As previously noted, the literature on the association between cost of capital and CSP so far provides mixed results. Although some studies find no support for a relationship between both variables, literature reviews such as that conducted by Schoenmaker et al. (2018) have shown that most studies find a negative one. Accordingly, as markets seem to price CSP, an association between CSP and COC is expected:

H1.A: There is an association between CSP and cost of debt.

H1.B: There is an association between CSP and cost of equity.

From the cost of equity point of view, risk mitigation, moral capital and the investor base frameworks point to a decrease in equity premiums derived from better CSP (Heinkel et al., 2001; Godfrey, 2005). Other studies find no support for the relationship or even suggest a positive one (Bartkus et al., 2002). McWilliams and Siegel (2001) and Godfrey (2005) advanced the idea of an optimal level of CSR investment with regards to cost of equity, while Ye and Zhang (2011) and Bae et al. (2018) provide support for such optimal level on the cost of debt side, in the American and Asian contexts. These studies suggest that both risk mitigation and overinvestment theories play a role in pricing corporate social investments, echoing how lenders and investors perceive firms who under or overinvesting in CSR. In this sense, the following hypotheses are advanced:

H2.A: The association between COD and CSP changes as firms under or overinvest in CSR.

H2.B: The association between COE and CSP changes as firms under or overinvest in CSR.

As business cycles greatly influence how firms allocate their capital, corporate social investments may vary according to different periods of economic growth and crisis. Accordingly, lenders and investors might perceive CSR investments differently during such periods.

H3.A: CSR investments are perceived differently by lenders during periods of crisis.

H3.B: CSR investments are perceived differently by investors during periods of crisis.

3. Sample And Methodology

3.1. Sample Construction

In order to study the relationship between CSP and cost of equity and debt, the following databases were used: (a) Refinitiv, which provides comprehensive ESG Scores on more than 9,000 public companies since 2002, (b) Thompson Institutional Brokers Earnings Services (I/B/E/S), which provides consensus analyst forecast data and (c) Compustat, which provides financial data and industry affiliation.

To confirm the data is homogeneous, I sample firms from the STOXX Europe 600 index, for the 2002 – 2018 time-period. The STOXX600 index has a fixed number of 600 constituents, representing large, mid and small capitalization companies across 17 countries of the European region. All constituent companies in the index are selected, except for companies belonging to the financial sector, as their capital market decisions are greatly constrained by industry-specific regulation, fundamentally different from non-financial industries (Pittman & Fortin, 2004). Furthermore, companies with unavailable ESG scores or insufficient data to compute cost of capital metrics are also excluded from the sample. To study the individual relationships between CSP and cost of equity and cost of debt, and based on different data availability, I separate the data in two different samples, which will be the base for the models described in subsequent sections. To facilitate the analysis, I will refer to them as the cost of equity and cost of debt samples from this point forward. For both samples, I exclude firm-year observations with negative shareholder's equity values, as these represent companies in financial distress and thus, their financing sources and conditions have different characteristics from those which this study targets. Finally, to minimize estimation biases from extreme values, I exclude dependent variables' observations at 1% and 99% percentiles.

3.2. ESG Score

Refinitiv database from Thomson Reuters (2020) offers one of the most comprehensive databases on ESG performance, covering close to 9,000 companies globally, with a time-series going back to 2002.

The underlying ESG data framework encompasses 450 company-level ESG measures based on verifiable reported data in the public domain. Each measure is grouped into the following 10 categories that are rolled up into an environmental, social or corporate governance pillar score: resource use; emissions; innovation; workforce; human rights; community; product responsibility; management; shareholders; CSR strategy.

The scoring is built on a percentile rank methodology, producing a 0 to 100 score in each category, based on each company's relative performance to its sector (for the environmental and social categories) and country of incorporation (for the governance category) peers. After the rank attribution, the category score is computed based on three factors: how many companies are worse than the current one; how many companies have the same value; and how many companies have a value at all. The category score is derived from the following equation:

$$(1) \qquad Score = \frac{\#\ Companies\ with\ a\ worse\ value + \frac{\#\ Companies\ with\ the\ same\ value}{2}}{\#\ Companies\ with\ a\ value}$$

ESG scores are aggregated based on the 10 category weights, which are calculated based on the Refinitiv magnitude matrix.[2]

Furthermore, Refinitiv computes an ESG Controversies Score, which discounts the ESG performance score based on negative media stories captured from global media sources. During the year, if a company is involved in a scandal or related to a negative event (e.g. lawsuits, ongoing legislation disputes or fines), its ESG controversies score is penalized. Impacts related to developments linked to the negative event may still be reflected in the subsequent year score.

[2] Detailed ESG Score calculations are available in Thomson Reuters (2020).

The controversies score also controls for market capitalization bias resulting from more media attention being given to larger companies than smaller companies.

A combined ESG score is computed based on these two scores, as the weighted average of the ESG scores and ESG controversies score per fiscal period when companies are involved in ESG controversies, with recent controversies reflected in the latest completed period. The ESG Combined Score equals the ESG Score when firms are not involved in ESG controversies. This research employs the Combined ESG Score (*Comb_ESG*) as a measure of a firm's corporate social performance.

3.3. Cost of Debt

3.3.1. Cost of Debt Measure

The ratio between a firm's interest expenses to total interest-bearing debt outstanding has been used in the literature to study the relationship between cost of debt and corporate social performance (Ye & Zhang, 2011; Magnanelli & Izzo, 2017; La Rosa et al., 2018). I follow such studies and employ the same measure. Total debt comprises a firm's total interest-bearing debt and is equal to the sum of short- and long-term debt. Financial expenses are expenses resulting from external financing.

3.3.2. Sample Description

The sample consists of 388 firms, belonging to 17 countries in the European Union and 12 industry sectors[3], totalling 4,383 firm-year observations.

Appendix I presents the sample composition by country. Panel A demonstrates that the United Kingdom, France, and Germany are the most represented countries in the sample, with 25,58%, 15,40% and 11,34% respectively.

Appendix II presents the sample composition by industry. In Panel A it is observed that Industrials, Consumer Discretionary, and Basic Materials are the most represented industries in the sample, with 27,29%, 18,73% and 10,79% respectively.

3.3.3. Methodology

To test hypotheses *H1.A* to *H3.A*, three different models are adopted which aim to investigate any association between cost of debt and CSP, while controlling for firm-specific

[3] Based on ICB industry classification.

characteristics, as well as year, industry and country effects. Following La Rosa et al. (2018), Equation 2 seeks to test *H1.A*:

$$(2) \quad COD_{i,t} = \beta_0 + \beta_1 Comb\_ESG_{i,t} + \beta_2 Size_{i,t} + \beta_3 Lev_{i,t} + \beta_4 IntCov_{i,t} + \beta_5 TobinQ_{i,t} + \beta_6 Beta_{i,t} + \beta_7 Perf_{i,t} + \beta_8 Liq_{i,t} + \beta_9 Tang_{i,t} + \beta_{10} AssetG_{i,t} + \beta_{11} OCF_{i,t} + \beta_{12} Year_t + \beta_{13} Industry_i + \beta_{14} Country_i + \varepsilon_{i,t}$$

Where *i* denotes each company and *t* the corresponding year. The measure of CSR performance (*Comb_ESG*) serves as the first independent variable and is computed as described in section 3.2. Firm control variables are defined as follows:

Firm's size (*Size*): Computed as the natural logarithm of a firm's market value of equity, in thousands of euros. Studies suggest that the impact of negative events in a firm's cash flows tend to be lower for larger firms, decreasing its default risk. Additionally, larger firms can provide more collateral than smaller firms, thus being viewed as less risky by lenders (Diamond, 1989; Goss & Roberts, 2011). A negative association is predicted between *Size* and *COD*.

Leverage (*Lev*): Computed as the ratio between total debt and the market value of equity. The leverage ratio has been shown to be positively correlated with cost of debt, based on the argument that default risk increases with leverage (Goss & Roberts, 2011). On the other hand, higher leverage ratios might also be associated with higher creditworthiness, resulting in a lower cost of debt (Ye & Zhang, 2011). Thus, it is difficult to predict the relationship between both variables.

Interest coverage ratio (*IntCov*): Computed as the sum of income before extraordinary items and interest expenses, divided by interest expenses. A higher interest coverage ratio indicates that the firm can generate sufficient resources to meet its debt obligations, reducing debt costs (Álvarez-Botas & González, 2019). A negative sign is expected on *IntCov*.

Tobin Q ratio (*TobinQ*): Measured as the sum of the market value of equity and total debt, divided by total assets. A low Tobin Q ratio (between 0 and 1) is usually representative of an undervalued stock, while a Tobin Q ratio higher than 1 implies that the stock is overvalued. It is analogous to the market-to-book ratio which has been used as a control for risk, market mispricing and a proxy for growth opportunities (Goss & Roberts, 2011). Based on prior research, a negative association between the *TobinQ* and cost of debt is expected.

Beta: The market beta is estimated by regressing daily stock returns on the STOXX600 index (considered the European market proxy in this study) over the previous 5 years. Prior research suggests an adverse effect of a firm's systematic risk on its creditworthiness and default probability and thus, on its cost of debt. (Attig et al., 2013). A positive sign is expected on *Beta*.

Other typical control measures have been included: A measure of performance (*Perf*), computed as income before extraordinary items divided by sales; The ratio of current assets to current liabilities as a proxy for a firm's liquidity (*Liq*); A measure of asset tangibility (*Tang*), computed as the ratio between property, plant and equipment and total assets; The yearly relative variation of total assets (*AssetG*) and; Operating Cash Flow (*OCF)*, as the ratio between operating cash flow and total assets. All control variables should exhibit a negative association with the cost of debt (Goss & Roberts, 2011; Ye & Zhang, 2011; La Rosa et al., 2018).

Finally, industry membership is controlled for with dummy variables, on the basis that different industries display different levels of perceived risk for lenders. Furthermore, country controls have also been included, considering how the culture and context of a firm influence how lenders of such firms perceive CSR investments (Schoenmaker et al., 2018). All variables are described in Appendix III with the respective computation formula.

Under and overinvestments in CSR are measured by the variable *IndDev*, employed in Equation 3. *IndDev* measures CSP deviations from the industry median. Firms belonging to the same industry are subject to equivalent regulations and have similar access to sources of capital and investment opportunities. Furthermore, both social and financial performances are only meaningful when compared with firms operating in equivalent economic conditions. Thus, it makes sense for lenders and investors to categorize CSR investments as excessive or insufficient based on the industry CSP median level.

(3) $$COD_{i,t} = \beta_0 + \beta_1 Comb\_ESG_{i,t} + \beta_2 IndDev_{i,t} + \beta_3 Size_{i,t} + \beta_4 Lev_{i,t} + \beta_5 IntCov_{i,t} + \beta_6 TobinQ_{i,t} + \beta_7 Beta_{i,t} + \beta_8 Perf_{i,t} + \beta_9 Liq_{i,t} + \beta_{10} Tang_{i,t} + \beta_{11} AssetG_{i,t} + \beta_{12} OCF_{i,t} + \beta_{13} Year_t + \beta_{14} Industry_i + \beta_{15} Country_i + \varepsilon_{i,t}$$

Finally, Equation 4 aims to further explore this deviation, namely, it tests if the magnitude of the deviation affects the relationship. *SqrDev* is added to the model, computed as the square of *IndDev*. Squaring the CSP deviation from the industry median allows controlling for firms with extremely low and high investments in CSR.

(4) $COD_{i,t} = \beta_0 + \beta_1 Comb\_ESG_{i,t} + \beta_2 IndDev_{i,t} + \beta_3 SqrDev_{i,t} + \beta_4 Size_{i,t} + \beta_5 Lev_{i,t} + \beta_6 Perf_{i,t} + \beta_7 IntCov_{i,t} + \beta_8 Liq_{i,t} + \beta_9 Tang_{i,t} + \beta_{10} AssetG_{i,t} + \beta_{11} Beta_{i,t} + \beta_{12} TobinQ_{i,t} + \beta_{13} OCF_{i,t} + \beta_{14} Year_t + \beta_{15} Industry_i + \beta_{16} Country_i + \varepsilon_{i,\mathrm{t}}$

3.4. Cost of Equity

3.4.1. Cost of Equity Measure

The metric most often employed in empirical research to estimate the equity risk premium can be defined as the cost of equity capital less the risk-free rate of interest. There are two main types of study design used to study the relationship between CSR and cost of equity premium: the first one consists of estimating the cost of equity with an asset pricing model of firms which are sorted on a measure of corporate social performance. In the second method, an implied cost of equity is regressed on a measure of environmental performance and control variables (Schoenmaker et al., 2018). Concerning the first method, both the standard single-factor model and the Fama and French (1993) three-factor model have been shown to provide poor proxies for the cost of equity (Fama & French, 1997). Additional concerns have been raised over conventional proxies for realized returns by Elton (1999), calling for alternative methods. On the other hand, an implied cost of equity approach has been argued to be particularly useful because it attempts to isolate cost of equity effects from growth and cash flow effects (Hail & Leuz, 2006, 2009; Chen, Chen and Wei, 2009). Furthermore, Pástor, Sinha and Swaminathan (2008) evidence supports that a class of implied cost of capital models reasonably capture the time-variation in expected returns. Based on the previous exposure, I follow the second strand of research and estimate the ex-ante cost of equity implied in current stock prices and analyst forecasts.

While several methods currently exist for the measurement of implied cost of equity capital, the literature provides no consensus on their performance, or even on how to evaluate that performance. For example, Botosan and Plumlee (2005) argue that the proxies should be evaluated based on their relationship with known risk factors such as market risk, leverage, information risk, firm size, and growth. In opposition, Easton and Monahan (2010) defend that the appropriate criterion should be realized returns. Regarding the proxies, the most commonly used models to estimate cost of equity in the literature are the Claus and Thomas model (2001, CT), the (Gebhardt, Lee and Swaminathan model (2001, GLS) the Ohlson and Juettner-Nauroth model (2005, OJ), and the Easton model (2004, ES). After assessing the performance of five models, including the GLS, OJ and the price/earnings to growth (PEG) model, Botosan and Plumlee (2005) conclude that the PEG model proposed by Easton (2004) and the target price model proposed in Botosan and Plumlee (2002) were the superior ones. For this study, the most recent models of Ohlson and Juettner-Nauroth (2005) and Easton (2004) were selected. Both have the benefit of being parsimonious. Furthermore, the Ohlson and Juettner-Nauroth (2005) measure is highly correlated the with Claus and Thomas (2001) measure, with a correlation coefficient of 0.945 (Hail & Leuz, 2006). As both OJ (K_{OJ}) and ES (K_{ES}) measures can be a noisy proxy for the underlying "true" cost of equity capital, the average of the aforementioned two measures is used as the final proxy for the implied cost of equity, to the extent that as the noise represents random errors, the averaging methodology should potentially remove a fraction of that noise. Appendix A provides a brief explanation of both models.

Following common methodology in the literature, I subtract the ten-year German Treasury bond yield from the estimated cost of equity of each model, yielding the risk premium. The final sample includes sample firms with valid cost of equity measures under both models as well as sufficient data on ESG and control variables.

3.4.2. Sample Description

The sample consists of 413 firms, belonging to 17 countries in the European Union and 12 industry sectors, totalling 4,276 firm-year observations.

Panel B in Appendix I presents the sample composition by country. It is observed that the United Kingdom, France, and Germany are the most represented countries in the sample, with 26,64%, 16,30% and 12,37% respectively. Panel B in Appendix II presents the sample composition by industry. It is observed that Industrials, Consumer Discretionary, and Health Care are the most represented industries in the sample, with 25,07%, 19,04% and 11,30% respectively.

3.4.3. Methodology

Regarding firm-specific control variables, I follow El Ghoul et al. (2011) and use size, leverage, the book-to-market ratio, the market beta, a long-term growth rate and earnings forecast dispersion, as well as year, industry and country effects. To examine H1.B, the following base model is employed:

(5) $$COE_{i,t} = \beta_0 + \beta_1 Comb\_ESG_{i,t} + \beta_2 Beta_{i,t} + \beta_3 Size_{i,t} + \beta_4 Lev_{i,t} + \beta_5 BTM_{i,t} + \beta_6 LTG_{i,t} + \beta_7 Disp_{i,t} + \beta_8 Year_t + \beta_9 Industry_i + \beta_{10} Country_i + \varepsilon_{i,t}$$

The adaptations made to Equation 5 are analogous to those discussed in section 3.3.3. Equations 6 and 7 are used to test *H2.B* and *H3.B:*

(6) $$COE_{i,t} = \beta_0 + \beta_1 Comb\_ESG_{i,t} + \beta_2 IndDev_{i,t} + \beta_3 Beta_{i,t} + \beta_4 Size_{i,t} + \beta_5 Lev_{i,t} + \beta_6 BTM_{i,t} + \beta_7 LTG_{i,t} + \beta_8 Disp_{i,t} + \beta_9 Year_t + \beta_{10} Industry_i + \beta_{11} Country_i + \varepsilon_{i,t}$$

(7) $$COE_{i,t} = \beta_0 + \beta_1 Comb\_ESG_{i,t} + \beta_2 IndDev_{i,t} + \beta_3 SqrDev_{i,t} + \beta_4 Beta_{i,t} + \beta_5 Size_{i,t} + \beta_6 Lev_{i,t} + \beta_7 BTM_{i,t} + \beta_8 LTG_{i,t} + \beta_9 Disp_{i,t} + \beta_{10} Year_t + \beta_{11} Industry_i + \beta_{12} Country_i + \varepsilon_{i,t}$$

Where *i* denotes each company and *t* the corresponding year. The measure of CSR performance (*Comb_ESG*) serves as the first independent variable and is computed as described in section *3.2*. Firm control variables are defined as follows:

Beta: According to the Capital Asset Pricing Model (CAPM), *Beta* should be positively associated with cost of equity. The market beta is estimated by regressing daily stock returns on the STOXX600 index (considered the European market proxy in this study) over the previous 5 years. As such, a positive coefficient is expected.

Firm Size (*Size*): Computed as the natural logarithm of total assets, in thousands of euros. Fama and French (1992) suggest that that cost of equity is negatively related to a firm’s size, while Hail and Leuz (2006) provide evidence of this relationship using an implied cost of equity. A negative coefficient is expected regarding *Size.*

Leverage (*Lev*): Computed as the ratio between total debt and the market value of equity. Modigliani and Miller (1958) have shown that a higher leverage ratio increases cost of equity, when considering no taxes and transaction costs. Furthermore, higher subsequent stock returns are earned by higher levered firms (Fama and French, 1992). Thus, a positive association is expected.

Book-to-market ratio (*BTM*): Computed as the ratio between book value and market value of equity. Fama and French (1992) suggest a positive relationship between the book-to-market ratio and implied cost of equity, as higher book-to-market firms are expected to earn higher ex-post returns than firms with low *BTM*. Furthermore, the book-to-market ratio is a proxy for a firm’s growth opportunities (La Porta, Lopez-de-Sinalizes, Shleifer & Vishny, 2002). Recent studies such as Gebhardt et al. (2001), Gode and Mohanram (2003) and Hail and Leuz (2006) have provided support for a positive association, thus a positive sign is expected.

Long-Term Growth Rate (*LTG*): The consensus five-year growth rate, available in I/B/E/S. Although it might be difficult to predict how long-term growth alone affects the implied cost of equity, Gode and Mohanram (2003) propose a positive association between both variables. The authors argue that high-growth firms tend to be perceived as risky by the market because of the significant impact any misestimation of growth have on prices, i.e., a higher probability of negative returns for high-growth firms. Thus, a positive association is expected.

Forecast Dispersion (*Disp*): Provided by I/B/E/S, it is computed as the coefficient of variation of 1-year-ahead earnings forecast. *Disp* is expected to be positively associated with the implied cost of equity, as earnings volatility can be regarded as a source of risk in firm valuations (Madden, 1999) and likely captures cash flows risk.

In addition to firm-specific controls, year, industry and country controls are included in all regressions as Fama and French (1997) find that there is substantial variation in factor loadings across industries, while Hope (2003) shows that analyst forecast accuracy varies significantly across countries.

4. RESULTS

4.1. Cost of Debt

4.1.1. Descriptive Statistics

Table I reports descriptive statistics for all variables in the cost of debt empirical model. The average cost of debt for a European firm is 4,83%, while on average, firms exhibit a leverage ratio of 0.2447, a liquidity ratio of 1.4498 and a performance of 7,77%. Regarding CSR measures, the average Combined ESG score stands at 53.5015, which indicates that firms, on average, are still half-way through their full sustainability potential.

4.1.2. Correlation Matrix

Appendix V presents the Pearson correlation matrix. A statistically significant negative correlation (-0.119) is found between cost of debt and *Comb_ESG*. Overall, there is a statistically significant correlation between the independent variables. The correlations between *Size* and *Comb_ESG,* with a coefficient of 0.401 and *OCF* and *TobinQ,* with a coefficient of 0.730 (p-value < 0.01), are relatively high. The Variance Inflation Factors (VIFs) were computed for all variables to test for potential multicollinearity. As the VIF statistics for each independent variable are only slightly above 1.0, multicollinearity is not a major concern and all variables are kept in the model (Neter, Wasserman & Kutner, 1985).

Table I. COD Sample Descriptive Statistics

	Obs.	Mean	Median	Standard Deviation	Minimum	Maximum
COD	4383	0.0483	0.0438	0.0319	0.0002	0.4733
Comb_ESG	4383	53.5015	54.58	18.6041	2.83	93.13
Beta	4383	0.9081	0.9009	0.3307	0.0772	2.2817
Size	4383	15.9851	15.8904	1.2119	11.4624	19.4417
TobinQ	4383	1.4397	1.1487	1.3722	0.171	63.5675
Liq	4383	1.4498	1.287	0.7644	0.1814	8.2926
Lev	4383	0.2447	0.2369	0.1164	0.0184	0.5066
AssetG	4383	0.0881	0.0434	0.3524	-0.8695	9.5997
Tang	4383	0.2647	0.2176	0.1967	0.0002	0.9357
Perf	4383	0.0777	0.0671	0.0913	-1.2597	1.3772
IntCov	4383	15.0217	6.3072	55.2999	-228.4521	2330.2168
OCF	4383	0.1024	0.0917	0.0736	-0.1608	2.7505

All variables are described in Appendix III.

4.1.3. Model Results

Table II. reports the main results from the regressions estimated using the pooled Ordinary Least Squares method. In all models, cost of debt serves as the dependent variable. Several CSR metrics are included as explanatory variables, and every model specification includes ten firm-specific control variables, as well as year, industry, and country effects.

Regarding the association between the explanatory variable *Comb_ESG* and cost of debt, Model (1) shows a positive and statistically significant coefficient at the 1% level. This suggests that firms showing better corporate social performance pay higher interest rates on debt. This finding is consistent with that of Sharfman and Fernando (2008), Menz (2010) and Magnanelli and Izzo (2017), implying that lenders perceive CSR investments as a waste of a firm's resources. As *Comb_ESG* is significant in all models at least at the 10% level, there is support for a relationship between CSP and COD, validating H1.A.

Table II. COD Regression Models Results

Variables	(1)	(2)	(3)
Intercept	0.132***	0.147***	0.147***
	(16.55)	(15.96)	(15.98)
Comb_ESG	0.000132***	-0.000235*	-0.000238**
	(4.66)	(-1.95)	(-1.97)
IndDev		0.000376***	0.000376***
		(3.14)	(3.14)
SqrDev			-0.00000115
			(-0.97)
Beta	0.00625***	0.00700***	0.00697***
	(3.93)	(4.36)	(4.34)
Size	-0.00315***	-0.00318***	-0.00319***
	(-7.09)	(-7.17)	(-7.20)
TobinQ	-0.00121**	-0.00111**	-0.00111**
	(-2.39)	(-2.18)	(-2.19)
Liq	0.00255***	0.00263***	0.00263***
	(3.99)	(4.11)	(4.11)
Lev	-0.0807***	-0.0807***	-0.0807***
	(-20.28)	(-20.30)	(-20.28)
AssetG	-0.00712***	-0.00713***	-0.00714***
	(-5.91)	(-5.92)	(-5.93)
Tang	-0.0101***	-0.00989***	-0.00981***
	(-3.74)	(-3.66)	(-3.63)
Perf	-0.00123	-0.00111	-0.000874
	(-0.23)	(-0.21)	(-0.17)
IntCov	-0.0000800***	-0.0000802***	-0.0000804***
	(-9.73)	(-9.76)	(-9.78)
CashFlow	0.0287***	0.0275***	0.0276***
	(3.17)	(3.04)	(3.05)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Country	Yes	Yes	Yes
Observations	4383	4383	4383
Adj. R-Squared	0.272	0.273	0.273
F-Test	31.25	30.93	30.39
P-value	0.0000	0.0000	0.0000

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. (1), (2) and (3) – Pooled OLS. t statistics are presented in parentheses.
All variables are defined in Appendix III.

Model (2) further explores the CSP-COD relationship concerning deviations from the industry median. Interestingly, adding this variable to the model turns the coefficient on *Comb_ESG* negative and significant at the 10% level, while *IndDev* shows a positive sign, statistically significant at the 1% level. As deviations are measured in negative (CSP < industry median) and positive (CSP > industry median) terms, this result indicates that firms underinvesting in CSP pay lower interests on debt (i.e., a negative *IndDev* measure times a positive coefficient), while firms with ESG scores above industry medians are penalized. These results are consistent with Ye and Zhang (2011) and Bae et al. (2018), suggesting the relationship between COD and CSP changes based on whether firms are under or overinvesting in CSR. Although this points to the acceptance of H1.B, these results are further explored in section 4.3. to better examine this association.

Model (3) results show that the magnitude of the CSP deviation is not significant for the COD-CSP relationship. Here, the significance level of *Comb_ESG* coefficient increases to 5%. It seems that when already considering individual ESG scores and deviation from industry peers, the magnitude of the deviation does not impact the COD-CSP relationship.

Regarding control variables, most display the predicted signs. *Beta* is positive and significant at the 1% level across all models, indicating that cost of debt increases with higher systematic risk. *Size* is negative and statistically significant (p-value < 0.01) in all models, as predicted by previous literature (Goss & Roberts, 2011; Sharfman & Fernando, 2008). Regarding variable *TobinQ*, there is a negative and statistically significant relationship with COD in all models (p-value < 0.05). *Lev* is negatively associated with COD at a 1% significance level, supportive of the argument that more creditworthy are able to take on more leverage. Variables *AssetG*, *Tang* and *IntCov* show the predicted negative association with COD across all models, with a significance level of 1%. As such, firms with more tangible assets (guarantees), higher interest coverage ratios, as well as positive asset growth, display a lower cost of debt. *Perf* also shows a negative coefficient, although not statistically significant. Variables *Liq* and *OCF* do not have the expected negative relation with cost of debt, although statistically significant (p-value < 0.01) and in line with La Rosa et al. (2018).

4.2. Cost of Equity

4.2.1. Descriptive Statistics

Table III presents the descriptive statistics regarding all variables in the cost of equity empirical models. The average implied cost of equity premium estimate for a European firm is 8,55%, with the Easton model producing a higher mean estimate than the OJ model (8.68% and 8,43% respectively), in line with El Ghoul et al. (2011). Similar to the cost of debt model results, European firms show an average Combined ESG score of 54,3284. Regarding control variables, the average firm size is close to $e^{(15.9496)}$, with an average book to market ratio of 0.4685 and a leverage level of 39.74%. On average, firms exhibit a Beta of 0.8945.

Table III. COE Sample Descriptive Statistics

	Obs.	Mean	Median	Standard Deviation	Minimum	Maximum
K_{ES}	4276	0.0868	0.0799	0.0384	-0.0431	0.3056
K_{OJ}	4276	0.0843	0.0759	0.0415	0.0014	0.596
COE	4276	0.0855	0.0782	0.0358	0.0201	0.2846
Comb_ESG	4276	54.3284	55.34	18.1762	1.88	93.88
Beta	4276	0.8945	0.8851	0.3219	0.028	2.2817
Size	4276	15.9496	15.9306	1.433	10.5383	19.9788
BTM	4276	0.4685	0.377	0.3314	0.0011	4.0692
Lev	4276	0.3974	0.237	0.5606	0	11.8426
Disp	4276	0.1083	0.0565	0.5939	0	27.375
LTG	4276	0.1101	0.0922	0.1137	-0.2825	2.068

All variables are described in Appendix IV.

4.2.2. Pearson Correlation Matrix

Appendix VI presents the Pearson correlation matrix. A statistically significant positive correlation (0.0553) is found between the average implied cost of equity and the Combined ESG score. Overall, there is a statistically significant correlation between independent variables. The correlation between *Lev* and *BTM*, with a coefficient of 0.533 (p-value < 0.01), is relatively high. Once again, the Variance Inflation Factors (VIFs) were computed for all variables and all results are low (< 2), which indicates that potential multicollinearity is not a major concern and all variables are kept in the model.

4.2.3. Model Results

Table IV reports the main results from the COE-CSP regressions estimated using the pooled Ordinary Least Squares method. In all models, the dependent variable is the average implied cost of equity, *COE*. Several CSR metrics are included as explanatory variables and all model specifications include six firm-specific control variables, as well as year, industry, and country effects.

Model (1) seeks to examine the association between corporate social performance and the implied cost of equity. Regarding the *Comb_ESG* variable, a negative and statistically significant coefficient (p-value < 0.01) is reported across all models. This result is in line with the majority of research done on the COE-CSR relationship (Sharfman & Fernando, 2008; El Ghoul et al., 2011; El Ghoul et al., 2018), suggesting that firms which are more socially responsible are rewarded by investors with a lower cost of equity capital. As an association between CSP and COE is found across all models, there's support for the notion that a firm's corporate social responsibility is priced in by investors. Thus, H1.B is validated.

Once again, Model (2) employs *IndDev* to explore the CSP-COE relationship considering deviations from the industry median. *Comb_ESG* is still negative and significant at the 1% level. Interestingly, *IndDev* shows a positive coefficient, statistically significant at the 1% level. From this result, it can be inferred that negative deviations from the industry median (negative *IndDev*) are seen as beneficial by investors, who require lower equity premiums. On the other hand, when a firm CSP is above the industry median level, its implied cost of equity increases. This means that investing in corporate social responsibility up until a level equal to industry peers is seen as valuable by investors while overinvesting in CSR is seen as a waste of resources. The results are further explored in section 4.3. in order to better examine this association.

Results from Model (3) report a positive but not statistically significant coefficient on *SqrDev*. By squaring the deviation from the industry mean, the model emphasizes under and overinvestments. Although the coefficient is positive, one cannot conclude that bigger deviations have an impact on the CSP-COE relationship, as the p-value is higher than 0.10.

Regarding firm-specific control variables, a positive and statistically significant coefficient is reported for all variables across the three models, at the 1% significance level. Furthermore, all control variables exhibit the expected sign, except for *Size*. Interestingly, *Size* exhibits a positive and statistically significant coefficient at the 1% level, contrary to the consistent negative association found in the literature (El Ghoul et al., 2011), implying that bigger firms tend to pay higher equity premiums. However, this positive association might have to do with sample selection, as I restrict the sample to firms which are constituents of the STOXX600, thus all relatively large in *Size* terms, so that no true differentiation between large and small firms can be made.

The control variable *Beta* shows a positive and statistically significant coefficient at the 1% level in all specified models. This finding is consistent with that of Hail and Leuz (2006) and El Ghoul et al. (2011). The book to market ratio (*BTM*) variable yields a positive coefficient, statistically significant at the 1% level across all models, indicating that investors require higher equity premiums for firms with lower growth opportunities. Regarding the control variable *Lev*, its coefficient is in the correct direction and significant at p-value < 0.01. Results are in line with previous studies by Gode and Mohanram (2003), Hail and Leuz (2006) and El Ghoul et al. (2011).

Table IV. COE Regression Models Results

	(1)	(2)	(3)
Intercept	0.0313***	0.0489***	0.0488***
	(4.16)	(5.38)	(5.36)
Comb_ESG	-0.000141***	-0.000551***	-0.000548***
	(-4.71)	(-4.47)	(-4.45)
IndDev		0.000425***	0.000424***
		(3.43)	(3.43)
SqrDev			0.000000884
			(0.70)
Beta	0.00895***	0.00988***	0.00990***
	(5.09)	(5.56)	(5.57)
Size	0.00232***	0.00221***	0.00221***
	(5.48)	(5.21)	(5.20)
BTM	0.0285***	0.0283***	0.0282***
	(16.10)	(15.99)	(15.95)
Lev	0.00894***	0.00903***	0.00905***
	(8.97)	(9.08)	(9.10)
Disp	0.00652***	0.00653***	0.00654***
	(8.74)	(8.76)	(8.77)
LTG	0.0749***	0.0746***	0.0746***
	(18.81)	(18.74)	(18.75)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Country	Yes	Yes	Yes
Observations	4276	4276	4276
Adj. R-Squared	0.374	0.376	0.376
F-Test	51.16	50.53	49.58
P-value	0.0000	0.0000	0.0000

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. (1), (2) and (3) – Pooled OLS. t statistics are presented in parentheses.
All variables are defined in Appendix IV.

Both analysts forecast variables, the 1-year-ahead EPS forecast dispersion (*Disp*) and the consensus long-term growth forecast (*LTG)*, are in line with previous studies (El Ghoul et al., 2011) and have a statistically significantly (p-value < 0.01) effect on the implied cost of equity across the three models. As such, the results imply that the market requires higher equity premiums for riskier, higher long-term growth and more leveraged firms, as well as for firms displaying more disperse analyst forecast.

4.3. Underinvestment and Overinvestment Group Samples

To further explore the implications related to firms under and overinvesting in CSR, each sample was partitioned into underinvestment (*ESG* ≤ industry median) and overinvestment (*ESG* > industry median) subsamples, using I*ndDev* as the explanatory variable. For the underinvestment subsample, negative *IndDev* values were converted to absolute ones, thus higher *IndDev* represent higher negative deviations from the industry median (lower scores). For parsimony, only *IndDev* coefficients are reported in Table V, although both models contain the respective full set of control variables as well as year, industry, and country indicators, which present the expected signs at the standard significance levels.

Panel A. reports a statistically insignificant negative relationship between *IndDev* and *COD* for firms in the underinvestment group, and a positive statistically significant *IndDev* for the overinvestment group (p-value < 0.01). The results indicate that negative divergences from the industry median are not priced in by lenders, while companies with above industry median scores are penalized with higher interest rates. It also suggests that the positive coefficient on *IndDev* found in Models (2) and (3) of Table II are only significant for those firms overinvesting in CSR. These results further support the conclusion of Jung et al. (2018), which suggest that lenders perceive a firm's carbon risk differently regarding high and low emitting industries.

Alternatively, Panel B results show a positive relationship between *COE* and *IndDev* for the underinvestment subsample, significant at the 5% level, and a statistically insignificant negative coefficient for the overinvestment group. This suggests that negative divergences from the industry median translate into higher required equity premiums. From a different perspective, this also suggests that CSR investments are rewarded up until an industry-standard level for firms lagging in CSP.

These results are interesting, with a possible explanation deriving from the contrasting resources allocation approaches between investors and lenders. While lenders are only interested in those firms wasting resources beyond some optimal level, investors are worried if firms present CSP below their peers, supporting the overinvestment and risk mitigation theories, respectively. Thus, as the association between CSP seems to change based on whether firms are considered as underinvestors or overinvestors, Hypotheses 2.A and 2.B. are validated.

Table V. Additional tests exploring the COC-CSP relationship nature.

	Panel A. COD Model		**Panel B.** COE Model	
Variables	Underinvestment subsamples	Overinvestment subsamples	Underinvestment subsamples	Overinvestment subsamples
IndDev	-0.0000873	0.000164***	0.000144**	-0.0000360
	(-1.27)	(2.64)	(2.10)	(-0.51)
Firm-controls	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Observations	2010	2303	1950	2254
Adj. R-Squared	0.253	0.299	0.414	0.364
F-Test	13.62	19.49	27.96	26.32
P-value	0.0000	0.0000	0.0000	0.0000

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. t statistics are presented in parentheses.
All variables used in Panel A and Panel B models are described in Appendices III and IV, respectively.

4.4. Robustness and Additional Tests

4.4.1. Alternative measures for Corporate Social Responsibility, Cost of Equity and Cost of Debt

There is no consensus in the literature on the best proxies for CSP, COE and COD measures. As such, different dependent and explanatory variables are employed to test the robustness of previous results.

Regarding the COD-CSP relationship, I follow Álvarez-Botas and González (2019) and subtract the industry median value from cost of debt, resulting in a cost of debt "premium" as an alternative measure. The re-estimated models are reported in Appendix VII. Model (1) shows a positive *Comb_ESG* coefficient (p-value < 0.01), in line with previous findings. This further supports the notion that lenders penalize CSP. Models (2) and (3) report a negative *Comb_ESG* coefficient but without statistical significance. These results are not surprising, considering the industry adjusted ESG score (*IndDev*) reports a positive and highly statistically significant coefficient (p-value < 0.01), possibly shadowing any explanatory power a firm's ESG score might have on cost of debt measure, which is also adjusted to the industry median. Once again, variable *SqrDev* shows no impact on the relationship.

Following El Ghoul et al. (2011), the COE models are re-estimated by replacing the dependent variable *COE* with the individual cost of equity premiums from the Easton (K_{ES}) and Ohlson and Juettner-Nauroth (K_{OJ}) models, as well as the earnings-to-price (K_{EP}) ratio, as described in Appendix A. The EP ratio is a special case of the Easton (2004) model, which assumes no abnormal earnings growth. Results are reported in Appendix VIII. Across all models, a negative *Comb_ESG* coefficient is found, statistically significant at the 1% level, confirming previous conclusions that CSP helps decrease the cost of equity. Variable *IndDev* loads a positive and statistically significant coefficient at the 1% level in Panel A and Panel B models, and a 5% significance level in models from Panel C. *SqrDev* shows no statistical significance in any model, in line to previous results.

The combined ESG score (*Comb_ESG*) employed in previous models is discounted when companies are involved in ESG controversies. To better understand the direct effect of CSR on the relationship, I use the ESG score (*ESG*) provided by Refinitiv, which is unaffected by controversies. Furthermore, both *IndDev* and *SqrDev* are re-calculated using the ESG score. Untabulated robustness tests display similar coefficient results to previous models in Tables II and IV. Regarding the COD-CSP relationship, a positive and statistically significant relationship is found between *ESG* and *COD*, in line with previous findings. Re-testing Models (2) and (3), *ESG* becomes statistically insignificant, suggesting scores adjusted for controversies affecting firms help better explain the COD-CSP relationship, implying that lenders price in such events in their activities. *IndDev* shows a positive coefficient (p-value < 0.05), while *SqrDev* is not significant.

Regarding the results from COE-CSP relationship, *ESG* is negative at the standard significant levels across all models. *IndDev* shows a positive sign (p-value 0.05), while *SqrDev* is not significant. These results are in line with those reported in Table IV. Although results are generally robust, the higher Adjusted R-Squared scores and lower statistical significance levels reported in Tables II and IV suggest that the Combined ESG score is more adequate when measuring the COC-CSP relationship, enhancing the impact of controversies in the relationships.

Finally, initial models are re-estimated using the industry average ESG score to compute variables *IndDev* and *SqrDev*. Untabulated results show that the alternative variables present equal signs and statistically significant levels to results in Tables II and IV. Overall, the results are robust for the various alternative measures and models used to access the association between COC and CSP.

4.4.2. Results for the Under-and Overinvestment robustness tests

In this section, results from Table V are tested using the alternative measures of cost of debt and cost of equity, as described in section 4.4.1. Negative deviations (for the Underinvestment subsamples) are measured in absolute terms. Untabulated results report a statistically insignificant negative *IndDev*, suggesting that when firms exhibit lower than average ESG scores (CSR investment), lenders do not price such activities. On the contrary, *IndDev* is positive and statistically significant (p-value < 0.05) for firms with higher than industry median CSP, implying that lenders penalize CSR industry leaders with higher costs of debt.

Models from Table IV are re-estimated using the Easton (K_{ES}), Ohlson and Juettner-Nauroth (K_{OJ}) and Earnings–price ratio (K_{EP}) measures as alternative COE measures. For the Underinvestment subsamples, results show that *IndDev* is positive across all models and statistically significant at the 1% and 5% levels for K_{ES} and K_{EP} measures, respectively, although not significant for the K_{OJ} measure. This confirms previous findings that the lower the CSP of a firm when compared with peers, the higher the cost of equity. It also means that investing in CSR is rewarded until the industry median level. Regarding the Overinvestment subsample, *IndDev* is not statistically significant for every alternative COE measure.

Overall, previous findings are robust when considering alternative dependent variables. There is a reinforcement of the idea that debt markets penalize industry leaders in CSR, once again alluding to the proposition that lenders penalize the pursuit of corporate responsibility beyond a “sufficient” level. While firms are not rewarded for lower CSP in relation to industry peers, they are disincentivized from being more responsible than necessary. On the other hand, results suggest that low CSP firms that improve their score are rewarded by the equity markets, while there is no meaningful relationship between CSP and COE for industry leaders.

4.5. Crisis impact on the cost of capital – CSP relationship

This section examines whether periods of crisis affect the relationship between CSP and the cost of capital. Bae et al. (2018) affirm that firms pay significantly higher loan spreads during crisis periods, while El Ghoul et al. (2018) suggest that corporate environmental responsibility becomes irrelevant during such periods. Models in Table II and IV are re-estimated after partitioning both COD and COE samples into two periods: crisis periods, considering years from 2008 to 2012 (financial and sovereign debt crisis)[4], and stability periods (2002-2007 and 2013-2018). For parsimony, Table VI omits results regarding control variables, as most coefficients exhibit the predicted signs at the standard statistical significance levels. For parsimony, *SqrDev* is not included in the analysis, as previous findings find no effect of it on the COC-CSP relationship.

Table VI. Regression results for the impact of crisis periods on the COC-CSP association

	Panel A. COD Model		**Panel B. COE Model**	
Variables	Crisis	Stability	Crisis	Stability
Comb_ESG	0.000163	-0.000380***	0.0000872	-0.000599***
	(0.53)	(-2.78)	(0.22)	(-4.68)
IndDev	0.0000276	0.000487***	-0.000303	0.000514***
	(0.09)	(3.59)	(-0.75)	(4.01)
Firm-controls	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Country	Yes	Yes	Yes	Yes
Observations	1356	3027	1111	3165
Adj. R-Squared	0.227	0.293	0.328	0.404
F-Test	10.23	26.11	14.86	46.59
P-value	0.0000	0.0000	0.0000	0.0000

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. t statistics are presented in parentheses.
All variables used in Panel A and Panel B models are presented in Appendices III and IV, respectively.

Panel A presents the results regarding the COD-CSP relationship, where both coefficients on *Comb_ESG* and *IndDev* are positive but statistically insignificant during crisis periods. During stability periods, Panel A reports a negative and statistically significant coefficient on *Comb_ESG* (p-value < 0.01) and a positive one on *IndDev* (at the 1% level). Panel B exhibits equivalent results for the COE sample, with both coefficients on *Comb_ESG* and *IndDevv* showing statistically insignificant coefficients during crisis periods. For the stability subsample, a negative and a statistically significant coefficient on *Comb_ESG* is found (p-value < 0.01), while *IndDev* is positive and significant at the 1% level.

These results validate H3.A and H3.B, and are in line with studies such as La Rosa et al. (2018) and El Ghoul et al. (2018), who find no statistically significant relationship between CSP and COD and CSP and COE during periods of crisis, respectively. Both studies advance the explanation that during periods of crisis, firms prioritize avoiding financial distress and

[4] There is no clear consensus regarding the crisis period. I consider the period from 2008 to 2012, as defined in the European Business Cycle Indicators Technical Paper on October 11, 2016.

bankruptcy, as well as maintaining profitability levels. The positive effects CSR might have on the cost of capital, by reducing the probability of negative events or increasing moral capital, become secondary in such circumstances. Furthermore, El Ghoul et al. (2018) point to investor short-termism during crisis periods, who emphasize short term financial performance over long-term CSR performance.

5. CONCLUSION

The main objective of this study is to analyse the association between corporate social performance and the cost of equity and debt, for firms belonging to the STOXX600. A sample of a maximum of 413 firms was used to study each relationship, analysed during the 2002 to 2018 period.

In line with Sharfman and Fernando (2008), Menz (2010) and Magnanelli and Izzo (2017) the current study suggests a positive relationship between corporate social performance and the cost of debt, indicating that socially responsible firms are penalized by lenders through an increase in interest rates. On the other hand, this study points to a negative relationship between corporate social performance and the cost of equity, in line with Sharfman and Fernando (2008) and El Ghoul et al. (2011, 2018). This suggests that investors reward firms displaying higher corporate social performance with lower required equity premiums.

When comparing CSP with industry peers, results point to an optimal level of CSR investment. In the first analysis regarding both relationships, lenders and investors seem to penalize firms who overinvest in CSR (CSP above industry-standard) and reward those who underinvest in CSR (bellow industry-standard CSP). Robustness tests suggest that lenders are only sensitive to firms who overinvest in CSR, while investors are sensitive only to firms who underinvest in CSR. Furthermore, results indicate that the magnitude of the deviation from the optimal level does not have an additional impact on the relationships.

The study results are robust for alternative measures of corporate social performance, cost of debt and cost of equity, as well as to alternative models employing these alternative measures to test under-and overinvestment theories regarding debt and equity markets.

However, previous research suggests that the impact of CSR on the cost of capital varies depending on the economic cycle, with mixed results (El Ghoul et al., 2018; La Rosa et al., 2018;

Suto & Takehara, 2017). This study finds that during periods of financial crisis, CSR and the degree of under-and overinvestment in CSR activities become irrelevant to both lenders and investors.

This study is innovative and important for several reasons, offering practical implications for managers and policy makers. First, it is the first study analysing both COE-CSP and COD-CSP relationships on a European context that analyses the optimal level of CSP performance concerning firms in the same industry. It also provides evidence on the pricing of CSP by the capital markets, helping to shed some light into the mixed results advanced by the literature. It further supports the growing importance of considering CSR as value relevant when defining a business strategy, as its impact on COC urges managers to think beyond just financial measures. Moreover, the results point to divergent positioning by lenders and investors regarding CSR. While lenders seem to perceive CSR investments as a waste of resources, investors perceive them as mitigators of risk. This forces socially responsible managers to weight the cost of each source of capital when allocating firm resources. This study further examines how capital markets perceive CSR leaders and laggers within an industry. Investors seem to reward CSP laggers which invest in CSR up to the industry CSP median, while lenders penalize overinvestments (i.e. leaders with CSP above the industry median). Moreover, the magnitude of the deviation seems to be irrelevant when already controlling for CSP and industry positioning. This study finds no evidence that CSR has a meaningful impact on cost of capital during periods of financial crisis.

Finally, environmental and social issues such as climate change have been behind major political policies aiming towards a more sustainable future. One such example is the Paris Agreement, adopted by nearly every nation in 2015, to achieve climate-neutrality before the end of the century. In order to make finance flows consistent with the long-term climate goals, policy makers who champion such actions must also understand how the capital markets price sustainable activities and regulate accordingly.

The main limitation of this study has to do with the measurement of CSP and the ability to generalize study findings, as prior research employs various measurement methods, which vary considerably across rating providers and geographies (Du et al., 2017; Schoenmaker et al., 2018). Another limitation inherent to every study has to do with the measurement of cost of equity and cost of debt. Even though this study employs measures of cost of capital widely used in the literature, different estimation methods use contrasting valuation models and assumptions, which may impact regression results (Schoenmaker et al., 2018).

As future research, an equivalent study can be developed that explores how different measures of CSP impact the relationship with cost of capital. Future research might also focus on building a comprehensive theoretical framework that contributes to a better understanding of how CSR impacts the cost of capital, as only few paper have attempted to do so (Heinkel et al., 2001; Godfrey, 2005). Finally, future research should further explore any non-linearities in the relationship, as current studies are scarce (Schoenmaker et al., 2018).

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APPENDICES

Appendix A. Implied cost of equity capital models

Common variables:

P_t= stock price at year *t* end;

$eps_{t+\tau}$ = forecasted earnings per share for year $t+\tau$;

dps_{t+1} = expected divided per share for year $t+1$.

Model 1: Ohlson and Juettner-Nauroth model (2005, OJ)

This model is a generalization of the Gordon constant growth model. It relates the current price (P_t) to estimated one-year-ahead earnings per share (eps_{t+1}), two-year-ahead earnings per share (eps_{t+2}), forecasted dividends per share (dps_{t+1}), and an assumed perpetual growth rate gamma (γ). The model requires positive 1-year-ahead and 2-year-ahead earnings forecasts in order to provide a positive root. The short-term growth $((eps_{t+2} - eps_{t+1})/eps_{t+1})$ is assumed to decay asymptotically to (γ), which is set to be equal to a long-term economic growth rate. The model defines a 1-year explicit forecast horizon, after which forecasted earnings grow at a near-term rate that decays to a perpetual rate. Following the Gode and Mohanram's (2003) implementation of the model, the near-term earnings growth rate (g_2) is the average of: (i) the percentage difference between 2-year-ahead and 1-year-ahead earnings forecasts, and (ii) the I/B/E/S long-term growth (LTG) forecast. The real perpetual growth rate is also set to 3%, corresponding to a very long-term economic growth rate. The term ($\gamma - 1$) is set to be equal to the risk-free rate minus 3%, where the risk-free rate is the yield on the 10-year German bond.

Because I perform a cross-sectional analysis, the choice of γ being equal to 3% does not affect the overall results, as it only affects the overall level of risk premium and not the relative implied risk premia of different firms.

$$K_{OJ} = A + \sqrt{A^2 + \frac{eps_{t+1}}{P_t}(g_2 - (\gamma - 1))}$$

Where:

$$A = \frac{1}{2}\left((\gamma - 1) + \frac{dps_{t+1}}{P_t}\right)$$

$$dps_{t+1} = dps_0$$

$$g_2 = \frac{STG + LTG}{2}$$

$$STG = \frac{eps_{t+2} - eps_{t+1}}{eps_{t+1}}$$

$$(\gamma - 1) = r_f - 0.03$$

Model 2: Easton (2004):

The Easton model is a special case of the abnormal earnings growth valuation model developed by Ohlson and Juettner-Nauroth (2005). It allows share price to be expressed in terms of one year-ahead (eps_{t+1}) and two year-ahead (eps_{t+2}) earnings per share forecasts, cost of equity (K_{ES}) and forthcoming dividends per share (dps_{t+1}) to derive a measure of abnormal earnings growth. The explicit forecast horizon is 2 years, after which forecasted abnormal earnings are assumed to grow in perpetuity at a constant rate. This model requires positive change in 1-year-ahead and 2-years-ahead earnings per share forecasts to yield a numerical solution. The valuation equation is given by:

$$P_t = \frac{eps_{t+2} - eps_{t+1} + (K_{ES} dps_{t+1})}{k_{ES}^2}$$

Where $dps_{t+1} = dps_t$

In this model, the implied cost of equity is the internal rate of return (IRR) that equates the stock price derived from the Easton model to the observed stock price, minus the yield on the 10-year Germany Treasury bond.

Alternative model for Robustness Tests

Model 3: Earnings–price (EP) ratio:

Easton (2004) model special case assuming zero abnormal earnings growth. The EP ratio is given by:

$$EP = \frac{eps_{t+1}}{P_t}$$

Appendix I. Samples composition by country

	Panel A. Cost of debt Sample		**Panel B.** Cost of equity Sample	
Country	N	%	N	%
Austria	82	1.87	56	1.31
Belgium	77	1.76	80	1.87
Denmark	169	3.86	171	4.00
Finland	178	4.06	134	3.13
France	675	15.40	697	16.30
Germany	497	11.34	529	12.37
Ireland	98	2.24	79	1.85
Italy	123	2.81	107	2.50
Luxembourg	41	0.94	30	0.70
Netherlands	242	5.52	205	4.79
Norway	124	2.83	101	2.36
Poland	22	0.50	13	0.30
Portugal	36	0.82	30	0.70
Spain	125	2.85	158	3.70
Sweden	384	8.76	352	8.23
Switzerland	389	8.88	395	9.24
United Kingdom	1121	25.58	1139	26.64
Total	4383	100.00	4276	100.00

Appendix II. Samples composition by industry

	Panel A. Cost of debt Sample		**Panel B.** Cost of equity Sample	
Industry (ICB)	N	Percentage (%)	N	Percentage (%)
Basic Materials	473	10.79	398	9.31
Consumer Cyclicals	21	0.48	24	0.56
Consumer Discretionary	821	18.73	814	19.04
Consumer Non-Cyclicals	23	0.52	24	0.56
Consumer Staples	463	10.56	462	10.80
Energy	202	4.61	164	3.84
Health Care	472	10.77	483	11.30
Industrials	1196	27.29	1072	25.07
Real Estate	17	0.39	156	3.65
Technology	209	4.77	250	5.85
Telecommunications	223	5.09	206	4.82
Utilities	263	6.00	223	5.22
Total	4383	100.00	4276	100.00

Appendix III. Cost of debt model variables definition

Panel A. Dependent variables		
COD	Interest expenses / Total interest-bearing debt	Francis et al. (2005); La Rosa et al. (2018)
Panel B. Explanatory variables		
Comb_ESG	ESG Combined score obtained from Refinitiv database.	La Rosa et al. (2018)
IndD*ev*	ESG Combined Score minus Industry-Year Median value	Author
SqrDev	Square of *IndDev* measure	Author
Crisis	Crisis periods, considered the period from 2008 to 2012, as defined by the European Commission	European Business Cycle Indicators Technical Paper (October 11, 2016)
Panel C. Control variables		
Beta	Estimated by regressing 5-year daily stock returns in year t on the STOXX600 index daily returns.	La Rosa et al. (2018)
Size	Natural logarithm of a firm's market value at *t-1*	Ye and Zhang (2011); La Rosa et al. (2018)
TobinQ	(Market value + total debt)/total assets	Bae et al. (2018); La Rosa et al. (2018)
Liq	Current assets/current liabilities	La Rosa et al. (2018)
Lev	Total debt/total assets	Bae et al. (2018); Huang et al. (2017)
AssetG	(Total $assets_t$ - total $assets_{t-1}$)/total $assets_{t-1}$	La Rosa et al. (2018)
Tang	Property, plant and equipment/total assets	Jung, Herbohn and Clarkson (2016)
Perf	Income before extraordinary items/sales	La Rosa et al. (2018)
IntCov	(Income before extraordinary items + interests exp.)/interests exp.	La Rosa et al. (2018)
OCF	Operating cash flow/total assets	Goss & Roberts (2011)
Industry	Industry dummy variable based on ICB industry classification.	
Year	Year dummy variable.	
Country	Country dummy variable	

Appendix IV. Cost of equity model variables definition

Panel A. Dependent variables		
K_{OJ}	Implied cost of equity model derived from Ohlson and Juettner-Nauroth (2005) model minus the 10-year German Treasury bond rate.	Ohlson and Juettner-Nauroth (2005)
K_{ES}	Implied cost of equity model derived from Easton (2004) model minus the 10-year German Treasury bond yield.	Easton (2004)
COE	Cost of Equity: Average of K_{OJ} and K_{ES}. Both models are described in appendix A.	Author
Panel B. Explanatory variables		
Comb_ESG	ESG Combined score obtained from Refinitiv database.	
IndDev	ESG Combined Score – Industry-Year Median value	Author
SqrDev	Square of *IndDev* measure	Author
Crisis	Crisis periods, considered the period from 2008 to 2012, as defined by the European Commission	European Business Cycle Indicators Technical Paper (October 11, 2016)
Panel C. Control variables		
Beta	Market Beta estimated by regressing 5-year daily stock returns in year *t* on the STOXX600 index daily returns.	El Ghoul et al. (2011)
Size	Natural logarithm of total assets	El Ghoul et al. (2011)
Lev	Ratio of total debt to the market value of equity	El et al. (2018)
BTM	Book to market ratio computed as (book value of equity /market value of equity)	Fama and French (1992), Hail and Leuz (2006)
LTG	Long-term growth forecast reported obtained from I/B/E/S	El Ghoul et al. (2011)
Disp	Dispersion of analyst forecast: Computed as standard deviation of 1-year-ahead analyst forecasts of earnings per share divided by the mean 1-year-ahead analyst forecasts of earnings per share.	Gebhardt, Lee, & Swaminathan (2001)
Industry	Industry dummy variable based on ICB industry classification.	
Year	Year dummy variable.	
Country	Country dummy variable.	

Appendix V. Cost of debt Pearson Correlation Matrix

	COD	Comb_ESG	Beta	Size	TobinQ	Liq	Lev	AssetG	Tang	Perf	IntCov	OCF
COD	1											
Comb_ESG	-0.119***	1										
Beta	-0.00622	0.237***	1									
Size	-0.135***	0.401***	0.110***	1								
TobinQ	-0.0722***	-0.0488***	-0.161***	-0.00416	1							
Liq	0.126***	-0.136***	0.00837	-0.243***	0.146***	1						
Lev	-0.247***	0.0891***	-0.0810***	0.0638***	-0.0911***	-0.264***	1					
AssetG	-0.105***	-0.0843***	-0.0665***	-0.0151	0.0262*	-0.00770	0.0134	1				
Tang	-0.0310**	0.0966***	-0.0475***	0.0973***	-0.101***	-0.185***	0.167***	-0.0600***	1			
Perf	-0.0787***	0.00711	-0.192***	0.125***	0.336***	0.151***	-0.0231	0.100***	0.0346**	1		
IntCov	-0.124***	-0.0111	-0.0411***	-0.00229	0.341***	0.0966***	-0.218***	0.0277*	-0.0433***	0.188***	1	
OCF	0.0181	-0.0643***	-0.112***	0.0163	0.730***	0.101***	-0.122***	-0.0341**	0.0846***	0.310***	0.271***	1

Note: *, ** and *** refer to 10%, 5% and 1% significance levels, respectively.
Variables: COD Interest expenses divided by total interest-bearing debt; Comb_ESG ESG Combined Score provided by Refinitiv; Beta Market Beta; Size Natural logarithm of a firm's market value at *t-1*; TobinQ Summation of market value and total debt, divided by total assets; Liq Current assets divided by current liabilities; Lev Total debt divided by total assets; AssetG Yearly relative variation of total assets; Tang Property, plant and equipment divided by total assets; Perf Income before extraordinary items divided by sales; IntCov Income before extraordinary items plus interest expenses divided by interest expenses; OCF Operating cash flow divided by total assets

Appendix VI. Cost of equity Pearson Correlation Matrix

	K_{ES}	K_{OJ}	COE	Comb_ESG	Beta	Size	BTM	Lev	Disp	LTG
K_{ES}	1									
K_{OJ}	0.604***	1								
COE	0.887***	0.904***	1							
Comb_ESG	0.0479***	0.0510***	0.0553***	1						
Beta	0.323***	0.237***	0.310***	0.192***	1					
Size	0.176***	0.157***	0.185***	0.383***	0.237***	1				
BTM	0.374***	0.266***	0.355***	0.0536***	0.242***	0.337***	1			
Lev	0.268***	0.187***	0.253***	0.0752***	0.0990***	0.367***	0.533***	1		
Disp	0.193***	0.0843***	0.152***	-0.0308**	0.105***	0.0510***	0.0740***	0.0601***	1	
LTG	0.180***	0.278***	0.258***	-0.0279*	0.138***	-0.102***	-0.0137	-0.0753***	0.0135	1

Note: *, ** and *** refer to 10%, 5% and 1% significance levels, respectively.
Variables: KES Easton model implied cost of equity premium; KOJ Ohlson and Juettner-Nauroth model implied cost of equity premium; COE Average implied cost of equity premium; Comb_ESG ESG combined score provided by Refinitiv; Beta Market Beta; Size Natural logarithm of total assets; Lev Total debt to market value of equity ratio; BTM Book value to market value of equity ratio; LTG long-term growth forecast; Disp Coefficient of variation of 1-year-ahead earnings forecast

Appendix VII. COD Measure Robustness test

	(1)	(2)	(3)
Intercept	0.0677***	0.0797***	0.0800***
	(8.49)	(8.69)	(8.71)
Comb_ESG	0.000131***	-0.000178	-0.000180
	(4.60)	(-1.48)	(-1.50)
IndDev		0.000316***	0.000316***
		(2.64)	(2.64)
SqrDev			-0.000000972
			(-0.82)
Beta	0.00496***	0.00559***	0.00556***
	(3.13)	(3.49)	(3.47)
Size	-0.00295***	-0.00298***	-0.00299***
	(-6.67)	(-6.73)	(-6.75)
TobinQ	-0.000951*	-0.000863*	-0.000865*
	(-1.88)	(-1.70)	(-1.71)
Liq	0.00255***	0.00261***	0.00262***
	(3.99)	(4.09)	(4.09)
Lev	-0.0797***	-0.0797***	-0.0797***
	(-20.06)	(-20.08)	(-20.06)
AssetG	-0.00689***	-0.00690***	-0.00691***
	(-5.73)	(-5.74)	(-5.75)
Tang	-0.00999***	-0.00979***	-0.00972***
	(-3.70)	(-3.62)	(-3.60)
Perf	-0.00152	-0.00141	-0.00122
	(-0.29)	(-0.27)	(-0.23)
IntCov	-0.0000773***	-0.0000774***	-0.0000776***
	(-9.41)	(-9.44)	(-9.45)
OCF	0.0245***	0.0235***	0.0236***
	(2.71)	(2.60)	(2.61)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Country	Yes	Yes	Yes
Observations	4383	4383	4383
Adj. R-Squared	0.167	0.168	0.168
F-Test	17.27	17.10	16.81
P-value	0.0000	0.0000	0.0000

Note: *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively. t statistics are presented in parentheses.

Variables: COD Interest expenses divided by total interest-bearing debt; Comb_ESG ESG Combined Score provided by Refinitiv; IndDev Comb_ESG minus the industry median Combined ESG score; SqrDev Square of IndDev; Beta Market Beta; Size Natural logarithm of a firm's market value at *t-1*; TobinQ Summation of market value and total debt, divided by total assets; Liq Current assets divided by current liabilities; Lev Total debt divided by total assets; AssetG Yearly relative variation of total assets; Tang Property, plant and equipment divided by total assets; Perf Income before extraordinary items divided by sales; IntCov Income before extraordinary items plus interest expenses divided by interest expenses; OCF Operating cash flow divided by total assets

Appendix VIII. COE Measure Robustness test

Variables	**Panel A.** Easton Model (2004)			**Panel B.** Ohlson and Juettner-Nauroth model (2005)			**Panel C.** Earnings–price ratio		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Intercept	0.0443***	0.0609***	0.0606***	0.0183*	0.0369***	0.0369***	0.0291***	0.0401***	0.0400***
	(5.43)	(6.18)	(6.15)	(1.94)	(3.24)	(3.23)	(4.01)	(4.57)	(4.56)
Comb_ESG	-0.000147***	-0.000534***	-0.000529***	-0.000135***	-0.000568***	-0.000568***	-0.000107***	-0.000364***	-0.000362***
	(-4.53)	(-4.00)	(-3.97)	(-3.60)	(-3.68)	(-3.67)	(-3.70)	(-3.06)	(-3.05)
IndDev		0.000401***	0.000399***		0.000449***	0.000448***		0.000266**	0.000266**
		(2.99)	(2.98)		(2.89)	(2.89)		(2.23)	(2.23)
SqrDev			0.00000156			0.000000209			0.000000566
			(1.14)			(0.13)			(0.46)
Beta	0.0124***	0.0132***	0.0133***	0.00554**	0.00652***	0.00653***	-0.00799***	-0.00741***	-0.00739***
	(6.50)	(6.88)	(6.90)	(2.52)	(2.93)	(2.93)	(-4.72)	(-4.32)	(-4.31)
Size	0.00176***	0.00165***	0.00165***	0.00289***	0.00277***	0.00277***	0.00442***	0.00435***	0.00435***
	(3.83)	(3.59)	(3.58)	(5.44)	(5.20)	(5.20)	(10.80)	(10.60)	(10.60)
BTM	0.0326***	0.0323***	0.0323***	0.0244***	0.0242***	0.0241***	0.0259***	0.0258***	0.0257***
	(17.01)	(16.90)	(16.85)	(11.00)	(10.89)	(10.88)	(15.19)	(15.10)	(15.08)
Lev	0.0106***	0.0107***	0.0107***	0.00730***	0.00740***	0.00741***	0.00397***	0.00403***	0.00404***
	(9.81)	(9.89)	(9.93)	(5.85)	(5.93)	(5.93)	(4.13)	(4.20)	(4.21)
Disp	0.00932***	0.00933***	0.00934***	0.00372***	0.00373***	0.00373***	-0.00594***	-0.00593***	-0.00593***
	(11.54)	(11.56)	(11.57)	(3.97)	(3.99)	(3.99)	(-8.25)	(-8.25)	(-8.24)
LTG	0.0496***	0.0493***	0.0494***	0.100***	0.0998***	0.0998***	-0.0388***	-0.0390***	-0.0390***
	(11.51)	(11.45)	(11.46)	(20.05)	(19.99)	(19.99)	(-10.12)	(-10.17)	(-10.17)
Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4276	4276	4276	4276	4276	4276	4276	4276	4276
Adj. R-Squared	0.363	0.364	0.364	0.268	0.270	0.269	0.325	0.326	0.326
F-Test	48.73	48.06	47.18	31.74	31.34	30.74	41.41	40.75	39.97
P-value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000