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COST OF CAPITAL AND SUSTAINABILITY: A LITERATURE REVIEW

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Working paper series 03: Cost of capital and sustainability: a literature review

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Non-technical summary

Cost of capital is a key element for corporate finance and investment decisions. Global companies and investors are increasingly treating environmental and social risks as a key aspect when making investment and financing decisions, pricing financial assets, and deciding on the allocation of their investment portfolios. Consequently, there is a growing realisation that better environmental (or sustainability) performance results in a reduced cost of capital. CFOs may thus be interested in improving the sustainability profile of the company.

An overview of everything we know

For this article, several existing studies were looked at. In those articles the relationship between sustainability and cost of capital was examined. Most of the studies suggest that there is a negative relationship. That means that sustainability performance is value-relevant and the valuation effect is - partly - realised through lower cost of capital. There are however a number of external factors that have a considerable effect on this relationship.

A wide variety of methodologies

First, there is a wide variety of methods on how to measure environmental or corporate social performance. Even when you only look at the mostly used methods, there are big differences between those methods and the underlying definitions. Sometimes even when the research method and underlying definition align, different rating agencies still come to different outcomes. The problem with those differences is that it is difficult to generalise results. It is important not to overly rely on the results of one particular study too much.

External factors

Moreover, there are several other factors that have a considerable effect on this relationship between cost of capital and sustainability. There are country-related factors, like the social, economic and institutional context in which investors and businesses operate. Stakeholder orientation, financial transparency and the sustainability of specific country are other examples of factors that heavily rely on what country you take into account. There are also company-related factors, like the prevailing culture within a company or the industry it participates in. Lastly, different debt characteristics also have an effect. Think of credit ratings, loan maturity or significant external effects.

All these things strongly influence the strength and direction (sometimes even the existence) of the relationship between sustainability and cost of capital.

A better understanding

Although literature in general supports the idea that there is a negative relationship between cost of capital and social / environmental performance, it is clear that there is a considerable amount of external factors that have an effect on this relationship. New research should investigate in depth those external factors, gather evidence from understudied countries and examine the practices that allow corporates and investors to embed sustainability considerations in cost of capital metrics.

Examples

Box 1 provides an example where ING bank links the interest rate on a loan facility for health technology company Philips to its sustainability performance and rating. If the rating goes up, the interest rate goes down and vice versa. Philips is thus incentivised to improve its sustainability, while ING reduces the risk of its loan.

Box 1: Banks provide sustainable credit facilities

In April 2017, the healthcare technology company Philips agreed an innovative €1bn loan facility with a consortium of banks that features an interest rate linked to the technology firm's year-on-year sustainability performance. The nature of the revolving credit facility means if Philips' sustainability performance improves, the interest rate it has to pay goes down, and vice versa. The five-year loan facility, which matures in April 2022, will be used for "general corporate purposes". The loan is different to previous green loans and bonds, where the pricing is linked to specific green covenants, or the use of proceeds is limited to green purposes.

As part of the consortium of 16 banks offering the loan, ING Bank has conducted the credit risk assessment and acts as the sustainability coordinator for the syndicated loan. Philips' current sustainability performance has been assessed and benchmarked by Sustainalytics, an independent provider of environmental, social and corporate governance (ESG) research and ratings. The potential discount is around 5 to 10 per cent of the credit spread.

ING indicates that the loan agreement with Philips was an additional way for the bank to support and reward clients seeking to become more sustainable. The loan facility follows Philips' 'Healthy People, Sustainable Planet' programme, through which it is aiming to become 'carbon-neutral' throughout its global operations and source all of its electricity needs from renewable sources by 2020 (SDG 12) and to improve the lives of three billion people a year by 2025 by making the world healthier and more sustainable through innovation (SDG 3).

Source: ING and Philips

Box 2 provides a similar example of BNP Paribas and Danone.

Box 2: BNP Paribas and Danone

As part of their new mission (One Planet, One Health), Danone has made considerable shift towards a more sustainable business model. With the demand for green financial products rising, Danone has committed itself in terms of being financially held accountable for sustainability. This has led to a breakthrough in February 2018, when a €2bn Positive Incentive Loan facility was issued in the market. Similar to the Philips and ING example, the discount or premium on margin is indexed on the average of ESG scores and B Corp Certification.

A group of banks, led by BNP Paribas, grant Danone the loan with lower borrowing costs if Danone improves its efforts on ESG-criteria (in which an average of multiple ratings will be taken into account together with the B Corp Certification).

Source: BNP Paribas and Danone

Cost of Capital and Sustainability: A Literature Review

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Abstract

Cost of capital is a key element for corporate financing and investment decisions. The growing relevance of sustainability suggests that managerial decisions that improve corporate environmental footprint and risks might be priced by investors, thus reducing the cost of capital for global companies. The objective of this paper is to survey the literature contributions that have investigated - theoretically and empirically - the relationship between environmental performance and firms' cost of capital. The surveyed papers mostly support the existence of a negative relationship between environmental performance and cost of capital. However, several external factors, including the national institutional and cultural frameworks, seem to have a considerable effect on this relationship. New avenues of research should investigate in depth those factors, gather evidence from understudied countries, and examine the practices that allow corporates and investors to embed sustainability considerations in cost of capital metrics.

Keywords: cost of capital; valuation; sustainability; environmental performance; non-financial disclosure; CSR.

Acknowledgements

The authors would like to thank Peter Bakker of the World Business Council for Sustainable Development for the suggestion to examine the impact of sustainability on firms' cost of capital.

1. Introduction

As climate change and societal issues are addressed by tougher regulation, new emerging technologies, and shifts in consumer behaviors, global companies and investors are increasingly treating environmental and social risks as a key aspect when making investment and financing decisions, pricing financial assets, and deciding the allocation of their investment portfolios. As a consequence, the quantification of the impact of social and environmental performance on firms' cost of capital has become a popular research topic.

At the same time, amid rising concern over the environmental impact of businesses and the responsibility that businesses have in addressing environmental and social issues caused by - or relevant to - their operations, companies and practitioners have started to explore ways to incorporate sustainability considerations in the estimation of cost of capital (Bianchini and Gianfrate, 2018).

Since cost of capital is a measure of investors' perceptions on what is value-relevant, the growing global interest in sustainability suggests that environmental, social and governance (ESG) and corporate social responsibility (CSR) practices might be priced by investors. In this paper, we present a literature review of studies that examine the relationship between environmental performance (EP) and firms' cost of capital (COC). To our knowledge, no comparable systematic analysis of the literature on this branch of research exists. Previous work by Benlemlih (2017), Izzo (2014) and Ambec and Lanoie (2008) review existing literature on the general relationship between corporate social performance (CSP) and corporate financial performance (CFP). However, none of these reviews focuses solely on cost of capital. Artiach and Clarkson (2011) review existing literature on the relationship between cost of equity, corporate disclosure and choice of accounting policy. The disclosure aspect of this review focuses on a broad-based disclosure measure, not environmental or social performance only. Huang and Watson (2015) review existing literature on CSR research in accounting, discussing the relation between CSR and financial performance among other topics, but not focusing solely on it, nor cost of capital.

Although empirical results on the sustainability – cost of capital relationship exhibit variance, the majority of the research included in this review finds a statistically significant negative relationship between the two variables, suggesting that sustainability performance is value-relevant and that the valuation effect is – at least partially - realized through lower cost of capital. The findings differ across geographies, time periods, choice of method, and choice of sustainability measure. Additionally, a number of country-, firm- and, for cost of debt, loan-specific external variables play a role in explaining the strength of the relationship between environmental performance and cost of capital. The

heterogeneity in the measures of sustainability used, apparent flaws in some of the most commonly used sustainability metrics, and the reliability issues inherent in sustainability reporting by companies in the first place limit the generalisability of these results.

The remainder of the paper is structured as follows. Section 2 describes the methodology and the sustainability measures used in existing research, as well as the issues regarding these measures and sustainability reporting in general. Section 3 discusses existing research on the relationship between sustainability and cost of equity. Section 4 introduces empirical research on cost of debt, and section 5 concludes, presenting our main findings and avenues for future research.

2. Methodology and Environmental Performance Metrics

2.1 Methodology

We limit the review to English-language articles published in the Elsevier, Emerald, Springer and Wiley online databases. We do not restrict the sample by publication date or geography, nor by impact factor of the publication. We have used a set of eight sustainability-related keywords chosen based on a pre-identified sample of 14 articles, each paired with “cost of equity”, “cost of debt” and “cost of capital”. Each of these pairs were then run through the four databases. Thus, we performed a total of 24 searches for each database, producing 4,052 hits across the four databases. The keywords used, and number of hits found in each database are given in Appendix I. After reviewing the hits, 58 articles published between 2008 and 2018 were included in this review. A graph depicting the number of articles published each year is given in Appendix II and a summary table of the included articles in online Appendix III.

For the purpose of this review, studies that focus on a measure of sustainability performance and/or a measure of sustainability disclosure and its impact on cost of capital have been included. The choice to include measures of sustainability disclosure as well as performance is based on the notion that for sustainability disclosure to be value-relevant, investors must, by default, consider sustainability performance value-relevant as well. Therefore, any study that identifies a link between environmental disclosure and cost of capital inherently supports the notion that sustainability performance is linked to cost of capital as well. Although some of the articles focus explicitly on cost of (debt or equity) capital, many also take a broader approach, examining the role of sustainability in explaining firm value, expected cash flows, or the systematic risk of a company. These studies have also been included, with emphasis placed on their findings regarding the link between environmental performance and cost of capital.

Existing empirical literature on the link between environmental performance and cost of capital exhibits considerable heterogeneity in the choice of measure for sustainability and cost of capital. The majority of existing research focuses on developed markets, particularly the United States. More recently, acknowledging the importance of the institutional and cultural context in which companies and investors operate for the cost of capital – sustainability relationship, more research using global samples has emerged. Even so, emerging markets are underrepresented in the existing empirical literature, which, given their growing economic and environmental importance globally, is an important limitation in current research.

2.2 Measuring Environmental performance

Measuring corporate environmental performance (EP) varies considerably across studies and over time. Du, Weng, Zeng, Chang and Pei (2017) recognize four major approaches for EP measurement in existing literature: (i) analysis of publicly available environmental disclosures, (ii) using the toxic release inventory (TRI) database maintained by the U.S. Environmental Performance Agency (EPA), (iii) using data from social performance databases, such as the KLD (also known as MSCI ESG STATS), and (iv) using a content analysis framework created by Clarkson et al. (2008) and based on the Global Reporting Initiative (GRI) reporting guidelines. In the research reviewed for this paper, two additional commonly used measures of environmental performance were firms' carbon intensity and different researcher-constructed or publicly administered CSR performance surveys or analysis frameworks.

The KLD database uses a binary scoring system across six categories: environment, community, product, diversity, employee relations, human rights and corporate governance. Firms are given strength and concern scores in these categories. Additionally, the database has exclusionary screens, which measure firm participation in controversial businesses: alcohol, gambling, firearms, military, nuclear power, and tobacco (El Ghoul et al. 2011). The KLD database coverage begins in 1991 with approximately 600 firms, growing up to circa 2,400 U.S. firms by 2003. Since 2013, the database has also rated the 2,600 largest non-U.S. firms (Huang et al. 2015). The KLD database provides independent and consistent social ratings of a large sample of firms (Graves and Waddock, 1994) Plumlee et al. (2015) credit the database for measuring both positive and negative environmental performance, as opposed to the TRI which only documents negative actions. Additionally, the researchers note that the KLD database covers a broad range of environmental issues beyond pollution, thus being a more comprehensive measure of environmental performance than simple measures of emissions intensity.

The KLD database is broadly used in research on firms' environmental performance, but it has also come under extensive criticism since its inception. Sharfman (1996) criticizes the measure for the lack of an underlying theory for the choice of variables, while Graves and Waddock (1994) note that the equal weighting of different CSR dimensions is an arbitrary choice not supported by theory. Mattingly and Berman (2006) posit that the data is better suited to measure corporate social action rather than corporate social performance (i.e. the presumed outcome of action). Semenova and Hassel (2015) argue that KLD concern scores are good measures of the environmental impact of industrial activities, but the strength scores are not and the commonly used method of netting KLD scores is, therefore, not a valid measure of a firm's overall environmental performance. Goss and Roberts (2011) echo Semenova and Hassel's conclusions in stating that net KLD scores are not representative of firms' CSR performance. Furthermore, the assumption of cardinality for ordinal CSR measures like KLD is problematic: assigning a score of +2 to one company and +1 to another implies the former is better, but this does not mean that it performs twice as well as the other one (Surroca, Tribo and Waddock 2010, Goss and Roberts 2011).

The TRI database is maintained by the U.S. EPA and it includes annual data on the toxic chemicals released by U.S. companies in selected industries, mainly mining, utilities, manufacturing and hazardous waste processing. The program covers over 675 toxic chemicals and 22,000 facilities. Although a widely used measure of environmental performance, this database has come under criticism for (i) data accuracy due to lack of routine validation checks of company-reported data, (ii) changes in U.S. EPA instructions in 1994, which caused a large reduction in reported emissions, and (iii) data reliability, as some of the data in TRI are estimated rather than measured (Toffel and Marshall, 2004). Furthermore, the TRI measures chemical emissions and as such cannot be considered a comprehensive indicator of a firm's total environmental performance (Ambec and Lanoie, 2008). Especially the latter argument can easily be extended to the use of carbon emissions as a measure of environmental performance, which, although not yet common, has grown in popularity with the introduction of carbon pricing in different countries.

Another measure of environmental performance commonly used is the Sustainability Asset Management Group GmbH (SAM) ESG ratings database. SAM provides ESG research for the Dow Jones Sustainability Indices and has received numerous industry awards for the quality of its ESG research. It assesses firms' opportunities and risks across a number of general and industry-specific ESG criteria. The data is derived from an annual ESG company questionnaire, complemented with additional information from company-published information. SAM calculates a total CSP score from 0 to 100 for each firm from the ESG dimensions for both general and industry-specific criteria (RobecoSAM, 2016). Humphrey, Lee and Shen (2012) credit SAM's ratings methodology for (i) differentiating between firms

engaged in the same activities, (ii) considering firms' industry membership and hence not downgrading a well-performing firm in an environmentally loaded industry such as mining, while upgrading a poor performer in a less environmentally loaded industry such as software development, and (iii) having a balanced scoring method across categories as opposed to the unequal number of strengths and concerns in each criterion of the KLD database.

Outside the use of external CSR ratings and emissions databases, a number of studies reviewed in this paper use a self-constructed measure of environmental performance, typically based on a CSR checklist or content analysis framework that relies on the Global Reporting Initiative (GRI) guidelines (see, for example, Plumlee et al. 2015). Additionally, a number of researchers rely on publicly administered CSR surveys or databases provided by local authorities in the markets studied (see, for example, Pae and Choi 2011). These measures are typical especially in research on emerging markets, such as China, as most of the existing databases for CSR or ESG ratings do not cover these markets (Du et al. 2017). The issue of comparability is, naturally, even higher with these studies, as the measure of environmental performance varies study per study.

The difficulty in generalising results of studies that use different measures of environmental performance has also been studied empirically. Research on environmental performance measures has revealed a high degree of heterogeneity between different ratings providers, particularly between ratings from different countries. Sharfman (1996) compares the KLD database CSR scores to *Fortune* magazine corporate reputation survey, finding that the correlations between rating scores explain less than 50% of the variance in the variables compared. On the other hand, Semenova and Hassel (2015) identifies correlations above 50% for a comparison of the KLD, Asset4 and GES databases. In a more recent paper, Chatterji, Durand, Levine and Touboul (2016) study the validity of six major social rating databases: KLD, Asset4, Calvert, FTSE4Good, DJSI and Innovest and find firstly, that the theoretical definition underlying the CSR scores differs across databases, and secondly, that even when the CSR construct is defined in the same way, different rating agencies measure it differently. The mean pairwise correlations between indices vary from 0.13 to 0.52 across all indices studied, indicating low validity of the CSR measures used. When taking the rating agency's country into consideration, the researchers find a much higher correlation between ratings, suggesting that location plays an important role in determining the definition of CSR. Taking an analogy from the home bias in the investment literature (Chan, Covrig and Ng, 2005), the higher correlation also suggests that rating agencies have more information on CSR practices close to home.

Rowley and Berman (2000) argue that corporate social performance (CSP) as a whole is not a viable concept theoretically or operationally and should, therefore, be considered in specific operational

settings only. The authors note that the proliferation of ways in which CSR performance is measured renders it impossible to make valid comparisons between results of different studies. Furthermore, most studies on the relationship between CSP and financial performance (CFP) involve multiple industries and we cannot assume that a given dimension of CSR performance in one industry is relevant for another. Most notably, the authors argue strongly in favour of building a theoretical framework to explain under which conditions a relationship between corporate social and financial performance should be expected. This criticism is still valid today, as, apart from one notable exception (Heinkel, Kraus and Zechner, 2001, discussed in section 3), the vast majority of research on this topic engages in “scanning data for statistically significant results linking CSP and FP”, instead of considering the theoretical aspects of this relationship.

Given the range of issues with existing measurements of environmental performance, one must approach research on the relationship between corporate environmental and financial performance with caution. In particular, it is important not to generalise the results of one study too easily.

3. Corporate Social Performance and Cost of Equity

The majority of the research on the relationship between corporate environmental/social performance (CSP) and cost of capital (COC) is empirical, trying to document a statistically significant relationship between the two variables of interest. However, an early research paper by Heinkel, Kraus and Zechner (2001) introduces an equilibrium model to provide a theoretical explanation for how ethical investing can influence a firm’s cost of capital. The framework includes two types of risk-averse investors: neutral and green, and three types of firms: polluting, green and reformed. Green investors will only invest in green and reformed firms, while neutral investors have no preference. All firms act to maximize their share price. Two variables are key to determining whether exclusionary investing affects corporate behaviour: the proportion of total investors that are green and the cost of reform. Using empirically reasonable variables, Heinkel, Kraus and Zechner (2001) show that circa 25% of investors need to be green to induce polluting firms to reform. At the time of this research, approximately 10% of investable funds were invested in a socially responsible manner. This proportion is not enough to induce reform in polluting firms, but it does increase cost of capital for all firms. The increase in cost of capital results from a reduced demand for polluting firms’ stocks, which decreases diversification possibilities between technologies and thus raises all firms’ cost of capital. The pioneering work by Heinkel, Kraus and Zechner (2001) can be seen as the theoretical backdrop for later empirical research on the relationship between CSP and COC.

The first empirical study on the relationship between a firm's environmental performance and cost of capital was conducted by Sharfman and Fernando (2008), who examine the impact of environmental risk management on the cost of debt and equity capital in a sample of 267 publicly listed U.S. firms. The researchers use the CAPM to estimate each firm's cost of equity and the Bloomberg database to estimate each firm's marginal cost of borrowing. The results point to a statistically significant positive relationship between cost of debt and environmental risk management, but a statistically significant negative relationship between environmental risk management and both cost of equity and weighted average cost of capital. The overall negative relationship between environmental performance and cost of capital seems, therefore, to be driven by cost of equity.

In the research that follows Sharfman and Fernando (2008), two methods of studying the relationship between sustainability and cost of equity have emerged: (i) using, like Sharfman and Fernando, an asset pricing model to estimate firms' cost of equity in portfolios/individual firms sorted on a measure of environmental performance and (ii) regressing cost of equity on a measure of environmental performance and control variables. In the latter method, an implied cost of equity is typically used.

Three studies represent the first strand of research. Koch and Bassen (2013), rely on the CAPM to estimate cost of equity capital but augment it with a carbon risk factor. The researchers find that carbon price movements are a statistically significant risk factor for utility companies with extremely high-emitting fuel mix, leading to a higher cost of equity. Gregory, Tharyan and Whittaker (2014) employ the Fama-French 3-factor model to estimate cost of equity in green and toxic portfolios. The results show that markets value several dimensions of CSR and that the majority of this effect is attributable to higher expected cash flows, while the overall implied cost of capital differences between green and toxic portfolios are small: the overall CSR performance is associated with only a 0.19% difference in cost of capital. A later study by Gregory, Whittaker and Yan (2016) uses the Carhart 4-factor model and finds that the lower cost of capital of high CSR firms is attributable to industry membership and that the valuation effect of CSR performance is driven by earnings persistence. This result is restricted to the short term, as the researchers only examine the impact of CSR on returns one period ahead.

The second strand of research, which regresses a measure of cost of equity on sustainability and control variables is considerably more popular among researchers. The first study of such kind is attributable to El Ghoul, Guedhami, Kwok and Mishra (2011), who study the relationship between corporate social responsibility (CSR) and cost of equity capital across a broad sample of US firms before the financial crisis. The researchers examine CSR performance in more detail and show that out of the six qualitative issues measured in the KLD database, employee relations, environmental policies and

product strategies have a statistically significant negative relationship with cost of equity capital. The researchers also document a positive relationship between cost of equity and firm participation in two controversial business areas: nuclear power and tobacco. Findings from further research are inconclusive: Salama, Anderson and Toms (2011) document a negative but economically meaningless relationship between a company's environmental performance and its systematic financial risk in the U.K. Humphrey, Lee and Shen (2012), also in the U.K., consider both general and industry-specific ESG criteria to measure sustainability performance. The researchers find no evidence of a difference in the risk-adjusted performance of high- and low-ESG firms, regardless of the measure of ESG performance used. Li, Eddie and Liu (2014) find a statistically significant positive relationship between emissions intensity and cost of debt in Australia, but not between emissions intensity and cost of equity.

On the other hand, Girerd-Potin, Jimenez-Garces and Louvet (2014) show that French investors require a risk premium for holding non-socially responsible stocks. Later, Li, Liu, Tang and Xiong (2017) confirm this result in the Chinese market: The researchers find a negative and statistically significant relationship between carbon information disclosure (CID) and cost of equity. The researchers note a negative and statistically significant (10%) relationship between non-financial CID and cost of equity, as well as a negative and statistically significant (5%) relationship between financial CID and cost of equity. Suto and Takehara (2017) also find a negative relationship between corporate social performance and cost of equity in Japan and note that institutional ownership of a firm impacts this relationship and reduces cost of equity.

Empirical results on the COE – CSP relationship are therefore inconclusive, though mostly in favour of a negative relationship between the two variables. Some studies indicate that a statistically significant negative relationship exists between cost of equity and environmental performance, while others find no, or only marginal statistical significance between the variables of interest or find a statistically significant but economically negligible relationship. As discussed before, the choice of environmental performance metric is likely to play a large role in the heterogeneity of existing empirical results. The next paragraph discusses findings from studies where environmental disclosure has been chosen as the explanatory variable instead of environmental performance.

3.1 Disclosure and Cost of Equity

The first study on the link between non-financial disclosure and cost of equity was conducted by Orens, Aerts and Cormier (2010), who study the link between web-based non-financial disclosure and a firm's cost of debt and implied cost of equity capital in a sample of European and North American companies. Using a broad disclosure measure, the researchers show that cross-sectional levels of non-

financial web-based disclosure are negatively associated with cross-sectional differences in the implied cost of equity capital. These findings are supported by later research from Gruning (2011), who studies the interaction between disclosure, market liquidity and cost of equity in listed German firms and finds a reduction in investors' return expectations associated with higher disclosure levels. Embong, Mohd-Saleh and Hassan (2012) also find a statistically significant negative relationship between disclosure and cost of equity capital for large firms in Malaysia. On the other hand, Qiu, Shaukat and Tharyan (2016) document a positive and statistically significant relationship between a firm's overall environmental and social disclosure score and its stock price in the U.K. but find no significant relationship between firms' cost of equity and disclosure scores. These results are not conclusive since all of the abovementioned studies use a broad disclosure measure, rendering it difficult to draw conclusions regarding the impact of environmental disclosure alone on the cost of equity capital.

Later research with a stronger focus on sustainability performance is mostly supportive of a negative relationship between environmental disclosure and cost of capital. Reverte (2012) posits that higher CSR disclosure quality is associated with lower cost of equity capital in Spanish firms, and that this effect is more pronounced for firms in environmentally sensitive industries. Ng and Rezaee (2015) find a statistically significant negative relationship between economic sustainability disclosure and cost of equity capital and note that the relationship is more pronounced when ESG performance is strong. Chauhan and Kumar (article in press) study the impact of nonfinancial ESG disclosure on firm value in Indian firms, finding a statistically significant negative relationship between ESG disclosure and cost of equity, but not cost of debt. However, in a recent study of the Malaysian market, Atan, Alam, Said and Zamri (2018) find a statistically significant positive relationship between a firm's total ESG score and its weighted average cost of capital (WACC). It should be noted, however, that Atan et al's sample is limited to only 54 firms, which makes the results more susceptible to bias in the sample.

As before, the variance in empirical results can partially be explained with differences in the measure of disclosure used: many of the studies cited here rely on specifically prepared disclosure surveys or checklists, hand-collected disclosure data, or disclosure data published by public authorities in the local market. Although the measures themselves may be sound, their heterogeneity makes it difficult to generalize any one set of results (Rowley and Berman, 2000). There are also external factors such as the social and cultural context a firm operates in, the legal requirements with respect to corporate disclosure, and the role of third-party assurance on corporate disclosure, which play a role in explaining the strength and direction of the COE-CSP relationship. The following three subsections: 3.2, 3.3 and 3.4 discuss empirical findings from each of these factors in detail.

3.2 Culture, Institutional Context and the COE – CSP Relationship

The relationship between environmental performance and cost of capital reflects the capital markets' perception of what is value-relevant for businesses. For this reason, sustainable business practices may be considered more valuable in a country or an industry where tough environmental regulation exists or is to be expected. Dhaliwal et al. (2014) note that the importance of CSR disclosure depends on the extent to which the culture and laws of a country support non-shareholder stakeholders' interest in a firm's operations and disclosure. Taking note of these factors, much of the more recent research on the relationship between sustainability and cost of capital has emphasised the role of cultural, economic, geographical and institutional factors in supporting or weakening this relationship.

The first study of this kind was conducted by Dhaliwal, Li, Tsang and Yang (2014), who examine the impact of country-level stakeholder orientation and financial transparency on the relationship between corporate social responsibility disclosure and cost of equity capital. Studying a global sample prior to the financial crisis, the researchers conclude that the reduction in cost of capital as a result of higher CSR disclosure is stronger in more stakeholder-oriented countries and in less financially transparent countries.

Later research supports Dhaliwal et al.'s findings: Feng, Wang and Huang (2015) identify a statistically significant negative relationship between CSR performance and cost of equity in North America and Europe, but not in Asia. Martínez-Ferrero, Banerjee and García-Sánchez (2016) find an economically and statistically significant negative relationship between CSR practices and cost of capital, noting also that CSR performance shields cost of capital from the punitive impact of earnings management, an effect which is stronger in countries with strong investor protection and weaker in countries with strong commitment to CSR. Matthiesen and Salzmann (2017) find a negative relationship between CSR performance and cost of equity and show that this relationship is stronger in countries with lower levels of assertiveness, higher levels of humane orientation, and higher institutional collectivism. Gupta (2018) finds a negative, statistically significant relationship between environmental performance and cost of equity in a broad international sample spanning 43 countries. The relationship is stronger in countries with weaker country-level governance.

On the other hand, El Ghouli, Guedhami, Kim and Park (2018) show that the negative relationship between corporate environmental responsibility (CER) and cost of equity holds across different legal, economic and geographic settings and is robust to alternative measures of cost of equity, to endogeneity, the use of an alternative model (GMM), and to accounting for noise in analyst forecasts. The strength of the results may be driven by the choice of sample, as El Ghouli et al. limit their study

to a global sample of manufacturing firms. Industry membership has been shown to have a strong effect on the relationship between sustainability disclosure and cost of capital (see, for example, Reverte 2012 or Gregory, Whittaker and Yan 2016) and it is conceivable that investors across geographical and economic settings would be more attuned to environmental risks in a notably emissions-intensive industry. These results find support from an earlier study by Cajias, Fuerst and Bienert (2014), who record significant differences in the strength and significance of the negative relationship between CSR performance and cost of equity capital across industries in the U.S. market, particularly between consumer- and asset-oriented industries.

Some research also supports the notion that company culture can impact the strength of the relationship between sustainable performance and cost of capital. Pae and Choi (2011) examine the relationship between corporate governance, ethical commitment and cost of equity capital in the Korean market, finding that a statistically significant negative relationship exists between corporate governance and cost of equity capital, and that this relationship is more pronounced for companies with weak corporate ethical commitment.

These findings show the importance of economic, institutional, industrial, cultural and geographic context in determining whether higher sustainability performance leads to lower cost of (equity) capital. Furthermore, the findings are unanimous in supporting the negative relationship between environmental performance and cost of equity, suggesting that the omissions of country-level and cultural factors may have driven the variance in results from earlier studies.

3.3 Voluntary versus Mandatory Disclosure and the COE – CSP Relationship

Within the literature on the relationship between sustainability disclosure and cost of equity, a specific strand of research exists, which focuses on the differences between voluntary and mandatory disclosure. Voluntary environmental disclosure presumably has a signalling role in the economy, with good CSR performers producing direct voluntary disclosures that cannot be easily replicated by poor CSR performers. This should theoretically increase firm value and potentially lower a firm's cost of capital due to reduced information asymmetry (Clarkson et al. 2013).

The first study to specifically focus on voluntary disclosure was presented by Clarkson, Fang and Richardson (2013), who study the role of voluntary environmental disclosure in explaining firm valuation and, in particular, the channel through which this valuation effect is realized (cost of capital or future profitability). Focusing on the U.S. market and five highly-polluting industries in 2003 and 2006, the researchers document a positive and statistically significant relationship between

environmental performance and cost of capital, but no such relationship between voluntary environmental disclosure and cost of capital. Voluntary environmental disclosure does have an incremental valuation effect, but this effect is realised through higher future profitability, not cost of capital.

Li and Foo (2015) find similar results in the Chinese market, studying a broad sample of listed Chinese firms in 2008-2012. The researchers identify a statistically significant negative relationship between CSR report quality and ex-ante implied cost of equity, and a statistically significant difference in cost of equity for firms that disclose CSR information (lower cost of capital) and firms that do not (higher cost of capital). However, there seems to be no difference between the impact of mandatory and voluntary disclosure. Kim, An and Kim (2015) find that carbon intensity is positively related to the cost of equity capital in Korea, but whether firms disclose sustainability reports voluntarily or by law does not impact the relationship. It should be noted here that third-party verification of carbon emissions is compulsory in the Korean market. Research on the role of assurance in sustainability disclosure suggests that third-party verification strengthens the connection between sustainability disclosure and cost of capital (see Martínez-Ferrero and García-Sánchez (2017), discussed below). In this instance, it may have contributed to reducing the difference between mandatory and voluntary disclosure.

Other studies have identified a stronger impact on cost of capital in one type of disclosure over the other. Plumlee, Brown, Hayes and Marshall (2015) show that firms with better relative environmental performance have lower cost of equity capital than their less prudent peers, and that higher quality positive voluntary disclosure is negatively associated with cost of equity and vice versa. Harjoto and Jo (2015) specifically examine the differential impact of mandatory versus voluntary CSR expenditure on the implied cost of equity capital in publicly listed U.S. firms between 1993 and 2009, showing that the negative effect of CSR on cost of capital is driven by mandatory CSR spending. Voluntary CSR spending has the opposite effect initially, but results in lower COC in the longer term.

3.4 External Assurance and the COE – CSP Relationship

Another relevant strand of research considers the role of third-party assurance in the relationship between sustainability disclosure and cost of capital. Martínez-Ferrero and García-Sánchez (2017) use a global sample of companies from 16 different countries and nine activity sectors in 2007-2014 to study the interaction between sustainability assurance, type of assurance provider and cost of capital. The researchers find, firstly, that the issuance of a sustainability report has a statistically significant negative relationship with a firm's cost of capital. Secondly, that securing external assurance for a

sustainability report has the same effect, and thirdly, that the decrease in cost of capital is larger when assurance is provided by one of the Big Four accounting firms.

This strand of research is promising as it confirms the validity of the criticism (Toffel and Marshall, 2004) expressed against the TRI as a measure of environmental performance due to the lack of validity checks on company-reported data by the U.S. EPA. It also raises concern over the measures of environmental performance that rely entirely on company-published, unverified environmental disclosures, which are common especially in research covering emerging markets, as explained in section 2. Intuitively, one would expect the role of external assurance be more important in markets where the institutional setting and CSR requirements are not yet fully developed, which provides an additional incentive to examine this phenomenon in the context of emerging markets.

This section provided an overview of current research into the relationship between corporate social and/or environmental performance and cost of equity. The majority of the studies surveyed support the notion that better environmental performance is associated with lower cost of equity. However, the heterogeneity of the samples and measures of environmental performance, as well as the issues inherent in existing measures of environmental performance make it difficult to generalise any specific set of results. These issues also partially explain the variance in results over time. Interesting recent contributions to research in this field come from studies on the role of country-level factors, voluntary and mandatory disclosure, and external assurance on the COE-CSP relationship. Future research should also focus more on emerging markets, given their growing importance in economic and environmental terms globally. The following section gives an overview of current research into the relationship between CSP and cost of debt.

4. Corporate Social Performance and Cost of Debt

Sharfman and Fernando's (2008) paper on the relationship between environmental performance and cost of debt and equity capital in a sample of 267 U.S. firms, is one of the first studies in this field. The researchers hypothesize that environmental risk management reduces a firm's expected cost of financial distress and the probability of extreme environmental events, therefore leading to lower cost of debt. Although the relationship between environmental risk management, as measured by KLD and TRI scores, and cost of equity and weighted average cost of capital is found to be negative, the researchers find no support for their hypothesis with respect to the cost of debt. Instead, the results point to a statistically significant positive relationship between environmental risk management and cost of debt.

After Sharfman and Fernando's (2008) seminal research article, numerous papers studying the relationship between different measures of social and/or environmental performance and cost of capital have emerged, the majority of them focusing on cost of equity capital. The first study on the CSP-COC relationship that focused entirely on cost of debt was conducted by Menz (2010). Menz examines the standards of CSR and the valuation of Euro corporate bonds in a sample of 498 bonds observed over 38 months between 2007 and 2010. Based on the thesis that socially responsible firms are regarded as more commercially successful and less risky, Menz hypothesizes that firms with higher CSR scores, as measured by SAM Research, should have lower cost of debt. The results, however, do not support a statistically significant relationship between cost of debt, as measured by credit spreads, and the social performance of firms. Menz concludes that credit ratings are more important for bond investors than CSR ratings. This is an interesting finding given that more recent research (see, for example, Ge and Liu, 2015 and La Rosa et al., 2017) suggests that credit ratings are one of the channels through which corporate social performance (CSP) lowers a firm's cost of debt (COD). These findings are discussed in more detail in section 4.2.

The findings from later studies largely contradict those of Sharfman and Fernando (2008) and Menz (2010) with respect to cost of debt. Schneider (2011) studies 48 U.S. companies active in the pulp and paper and chemical industries in 1994-2004 and identifies a highly statistically significant negative relationship between environmental performance (EP), as measured by TRI, and yield spreads. Again, the importance of credit ratings is highlighted, as the EP-COD relationship is strongest for low-rated bonds and not significant for bonds rated A- or higher. Goss and Roberts (2011) study a much broader sample covering 1,265 U.S. companies between 1991 and 2006, and examine the KLD strength and concern scores separately, as recommended by Semonova (2010). They find that poor CSR performers pay between 7 and 18 bps more for bank loans than their more responsible peers, but higher CSR performance is not rewarded. The effect is stronger for loans issued without security, but insignificant for loans with it. Oikonomou, Brooks and Pavelin (2014) build on Menz (2010) and Goss and Roberts (2011), examining the impact of corporate social performance (CSP) on the pricing of corporate debt and the credit quality of bond issues. The sample, though focused solely on the U.S. market, is more comprehensive than in previous studies, spanning 17 industry supersectors and covering 3,240 bond issues from 742 unique firms between 1991 and 2008. Like Goss and Roberts (2011), Oikonomou et al. also rely on the KLD STATS database for CSP data and consider strengths and concerns separately. The findings show that support for local communities, higher levels of product safety and quality, and good employee relations all materially decrease cost of debt. The aggregate measures of CSP show that good CSR performance is rewarded with a lower cost of debt, while transgressions in this respect are penalized. The relationship is stronger for longer-maturity bonds. In one of the rare contributions

from emerging markets, Du, Weng, Zeng, Chang and Pei (2017) examine the role of environmental performance, as measured by company-published environmental information analysed according to the GRI guidelines, on cost of debt in privately-owned Chinese firms. The researchers find an economically and statistically significant negative relationship between corporate environmental performance and interest rates on debt.

In addition to studies using the KLD and TRI databases or company-published information, a few studies exist that use historical carbon emissions as a measure of environmental performance. Li, Eddie and Liu (2014) study the potential effect of carbon emissions intensity on companies' cost of debt and equity capital in Australia. Using a sample of 210 listed Australian firms in 2006-2010, the researchers find a statistically significant positive relationship between emissions intensity and cost of debt, but not between emissions intensity and cost of equity. Jung, Herbohn and Clarkson (2016) focus more closely on risk awareness by studying the interaction between a firm's historical carbon emissions, awareness of carbon risk exposure, and cost of public debt in a sample of 255 firm-year observations of Australian firms from eight different industries in 2009-2013. The results show that firms with higher carbon risk and lower risk awareness pay between 38 and 62 basis points more for their loans than companies with demonstrated carbon awareness. The result is robust across different measures of carbon awareness and across industries, though more important for companies in high emitting industries.

Even though the majority of research on the CSP-COD relationship after Sharfman and Fernando's (2008) and Menz's (2010) initial findings supports the notion that better environmental performance leads to lower cost of debt, opposite results have also been found. Suto and Takehara (2017) find a positive relationship between cost of debt and CSP in a sample of Japanese firms in 2008-2013. The relationship is statistically significant only in 2008-2010, suggesting that debtors became more aware of CSP when estimating firm risk after the financial crisis. Magnanelli and Izzo (2017) study the CSP – cost of bank debt relationship in an international sample of 332 firms across different industries from 2005 to 2009. Measuring CSP with the CSR ratings provided by the Dow Jones Sustainability Index and RobecoSAM, the researchers find a statistically and economically positive relationship between CSP and cost of bank debt, suggesting that higher CSR performance is not interpreted by banks as reducing risk but as a costly diversion of firm resources. Magnanelli and Izzo's result may be driven by sample selection, as the majority of the companies selected operate in the U.S. (132 out of 332 firms), where prior research has not identified lender support for CSR performance, presumably due to lower stakeholder-centricity of the economy (see section 3.2). Furthermore, it should be noted that Magnanelli and Izzo, like Menz (2010), include financial companies in their sample – something most researchers exclude as their inclusion would reduce cross-industrial variance due to the amount of

bonds they issue. Finally, the measure of environmental performance used, the RobecoSAM, is the same employed by Menz (2010). As discussed in section 2, the correlation between different commonly used measures of environmental performance is low, suggesting that these measures capture different aspects of firm performance and that the results derived using one measure of environmental performance may not be generalizable to others.

4.1 Disclosure and Cost of Debt

As with studies on the CSP-COE relationship, some of the studies on CSP-COD focus on a measure of environmental disclosure instead of environmental performance. The research on CSR disclosure and cost of debt is largely focused on emerging markets, especially China. This is due to data availability: as mentioned in section 2, the most commonly used sustainability measures in existing research are the CSR scores provided by the KLD or a comparable social performance database, and the TRI database maintained by the U.S. EPA. Most of these measures are not available for Chinese companies (Du et al. 2017), so research must focus on company-published information instead.

As mentioned in section 3.1, the first study on the link between non-financial disclosure and cost of debt and equity capital was conducted by Orens, Aerts and Cormier (2010). Using a sample of 668 European and North American companies, the researchers find that web-based non-financial disclosure is negatively related to the rate of interest paid on bonds, but this relationship differs across geographies: it is statistically significant for Continental European firms, but not for North American firms. In general, the relationship is stronger in countries where the mandatory requirements for corporate disclosure are lower, which supports the notion the cultural and institutional context in which companies and investors operate impacts the relationship between environmental performance (or disclosure) and cost of capital. The findings of this study may not be generalizable to the broader CSP-COD debate since the disclosure measure used is very broad. Furthermore, the sample is limited to large listed companies, which may benefit more from CSP activities than their smaller counterparts (see, for example, Embong Mohd-Saleh and Hassan 2012). Finally, Orens et al. do not distinguish between negative and positive disclosure – an approach which has been criticized, for example, by Semenova and Hassel (2015) due to the difference in the ability of negative and positive disclosure to capture environmental performance.

Subsequent evidences are mixed: Gong, Xu and Gong (2015) study Chinese industrial companies in 2010-2013 and find that high CSR disclosure quality is associated with lower cost of corporate bonds. This relationship is weaker in firms located in areas with weak institutional environment, providing further support for the notion that cultural factors may impact the CSR-cost of capital relationship

(see sections 3.2 and 4.2). The researchers also contribute to research on the difference in investors' reaction to mandatory and voluntary CSR disclosure – a phenomenon studied by, for example, Plumlee, Brown, Hayes and Marhsall (2015) regarding cost of equity. In another study of the Chinese market, Fonseka, Rajapakse and Richardson (2018) examine the impact of environmental information disclosure (EID) and energy product type on the cost of debt in a sample of Chinese energy firms in 2008-2014. The researchers document a statistically significant negative relationship between environmental disclosure and cost of debt. Including the type of energy product in the analysis shows that the EID-COD relationship is only negative for solar and wind power firms, but positive for gas, thermal power and hydro firms. This shows that energy firms that produce less polluting energy products benefit from more favourable lending terms. On the other hand, Chauhan and Kumar (article in press) find no statistically significant relationship between ESG disclosure and cost of debt in the Indian market.

Taken together, the results suggest that environmental disclosure is associated with a lower cost of debt funding, but that the strength and direction of this relationship varies across geographies. These results are in accordance with previous studies conducted on the impact of the cultural context on the CSP-COE relationship (see section 3.2). As shown by the limited number of articles reviewed in this section, this phenomenon ought to be more extensively studied for the relationship between CSP and COD in the future.

In recent years, more focused research has emerged on the COD-DSP relationship. Namely, researchers focus on (i) the relevance of country-level factors for the COD-CSP relationship, (ii) the role of credit risk and credit ratings as a channel through which the impact of CSP on COD is realized, and (iii) the potential non-linearities in the COD-CSP relationship. The following three subsections, 4.2, 4.3 and 4.4 discuss these recent findings in more detail.

4.2 Culture, Institutional Context and the COD – CSP Relationship

The role of country-level factors in moderating or strengthening the relationship between cost of capital and sustainability has not yet received much attention in the literature on cost of debt capital. Two interesting contributions to the literature come from Cheung, Tan and Wang (2016) and Hoepner, Oikonomou, Scholtens and Schroder (2016).

Cheung, Tan and Wang (2016) study an international sample of 1,462 loan facilities issued by 622 firms in 20 countries and consider the impact of national stakeholder orientation on the relationship between CSR performance and cost of debt. Arguing that stakeholder groups have higher expectations

with respect to a firm's CSR performance and are more likely to publicly scrutinize a firm's CSR performance in more stakeholder-oriented countries, the researchers hypothesize that the relationship between CSR performance, as measured by FTSE4Good ESG ratings, and cost of debt should be stronger in these countries. The researchers find no support for a relationship between CSR performance and cost of debt in the overall sample. However, the relationship is negative and highly statistically significant when stakeholder orientation is accounted for, suggesting that the failure of Goss and Roberts (2011) to document a lower cost of debt associated with higher CSR performance may have been driven by the sample, being restricted to the U.S. market.

Hoepner, Oikonomou, Scholtens and Schroder (2016) find similar results. Studying a sample of 470 loan agreements from 28 countries between 2005 and 2012, the researchers document an economically and statistically significant relationship between country-level sustainability and cost of bank debt: a one-unit increase in a country's sustainability score decreases cost of debt by 64 basis points on average. The effect is driven by environmental performance, being twice as impactful as the social dimension. The researchers fail to find support for the impact of firm-level sustainability on the cost of bank loans. The researchers suggest that firm-level sustainability may only be priced through country-level sustainability. It should be noted, however, that the sustainability measure used in this study, from Oekom research, provides only a single rating and does not lend itself to separating positive and negative performance. Furthermore, the sample consists mostly of financially robust European and North American firms. Since previous research has shown that the relationship between non-financial disclosure and cost of capital is less important for investment grade companies (see, for example, Schneider 2011), it is possible that the lack of company-level sustainability effect on cost of debt is driven by the financial robustness of the sample companies.

These results suggest that the COD-CSP relationship is strongly influenced by country-level factors. Given the preponderance of U.S. samples in existing literature, future research should focus on comprehensive international samples, which render comparisons between countries possible. Furthermore, special emphasis should be placed on emerging markets, as they are currently severely underrepresented in existing research and the difference in their cultural, social, economic and institutional context is likely to significantly influence the relationship between environmental performance and cost of capital.

4.3 Credit Ratings, Credit Risk and the COD – CSP Relationship

Although a growing body of literature addresses the connection between corporate social performance (CSP) and cost of capital, the link between CSP and credit risk has received considerably

less attention. As discussed in section 4, many existing studies have documented the importance of credit ratings for the CSP-COD relationship (see, for example, Menz 2010, Schneider 2011 and Goss and Roberts 2011). However, most of these studies use credit ratings only as a control variable or at most an interaction variable. More recent research on the CSP – COD relationship has begun to consider the role of credit risk and credit ratings as a channel through which the impact of CSP on cost of debt is realized. This section gives an overview of the existing research on this topic.

The first paper in which the relationship between CSP and credit ratings is considered as part of the CSP-COD relationship is from Ge and Liu (2015). Building on the work by Menz (2010) and Oikonomou et al. (2014), Ge and Liu contribute to existing literature by using multiple dimensions of CSR performance and by considering the explanatory power of CSP over credit ratings, a known determinant of cost of debt. Using a large sample of U.S. firms and the KLD strength and concern scores for environmental performance, the researchers find that higher overall CSR performance is associated with better credit ratings and, after controlling for credit ratings, with lower bond yield spreads. CSR strengths are negatively, and CSR concerns positively associated with bond yield spreads. A closer examination of the components of CSR performance shows that overall scores in community, product, employee and governance dimensions are associated with lower cost of debt. For environment, community and governance, only the strengths are associated with lower cost of debt. Finally, the researchers find fewer covenant restrictions imposed on better CSR performers.

As stated before, research on this front is still limited, but Ge and Liu's (2015) findings are validated by an earlier study from Jiraporn et al. (2014), as well as by later research from Erragragui (in press) and La Rosa, Liberatore, Mazzi and Terzani (2017). Jiraporn, Jiraporn, Boeprasert and Chang (2014) find that a firm's geographical location is a significant determinant of CSR performance in the U.S., even more so than the widely studied industry effect (see, for example, Reverte 2012, or Gregory et al. 2016). Using this relationship, Jiraporn et al. show that CSR performance has a highly significant positive relationship with credit ratings. Although the researchers do not study the relationship between CSR performance and COD directly, they conclude that better CSR performers enjoy lower COD due to the negative relationship between higher credit ratings and cost of debt. Erragragui (in press) finds a statistically significant positive relationship between environmental concerns and perceived default risk for firms in the U.S. He also finds support for the negative relationship between governance and environmental strengths, and cost of debt. La Rosa, Liberatore, Mazzi and Terzani (2017) use a sample of European listed companies included in the S&P Europe 350 index in 2005-2012 and find a statistically significant negative relationship between a firm's social performance and cost of debt. The researchers also document a positive relationship between corporate social performance and credit ratings.

The relationship between CSP and credit risk is an interesting new avenue of research moving on from considering credit ratings as an external determinant of cost of debt to studying their role as a channel through which part of the influence of CSP on cost of debt materializes. Indicative findings suggest that the relationship holds in the U.S. and in Europe, though more research is needed to confirm the initial results. Furthermore, given the importance of country-level factors on the CSP – cost of capital relationship (see sections 3.2 and 4.2), future research should focus on international samples that allow comparison across geographical areas, as well as on emerging markets, where the institutional context can differ greatly from developed markets.

4.4 Nonlinearity in the COD – CSP relationship

Prior research has focused solely on the relationship between environmental performance and cost of capital, not considering the evolution of this relationship as environmental performance, or CSR spending increases or decreases. Three papers have, so far, identified a U-shaped relationship between CSR performance and cost of debt, two of them studying the Chinese market and one the U.S.

Ye and Zhang (2011) and Zhou, Zhang, Wen, Zeng and Chen (2018) both find a U-shaped relationship between CSR performance and cost of debt in China. Ye and Zhang (2011) study publicly listed Chinese companies in 2007 and 2008. Measuring CSR performance as the ratio of charitable donations to annual sales, Ye and Zhang document a highly statistically significant negative relationship between CSR and cost of debt, which only holds when the CSR ratio is below 0.357. For higher CSR spending, the relationship is reversed. Thus, firms with extremely low or extremely high CSR spending are punished with higher cost of debt. Zhou, Zhang, Wen, Zeng and Chen (2018) study the relationship between carbon risk, as measured by a scale of 0-3 based on whether a company has been punished for carbon emissions, and cost of debt financing. The sample covers 191 publicly listed Chinese companies from high-carbon industries between 2011 and 2015. Like Ye and Zhang (2011), Zhou et al. also find a U-shaped relationship between carbon risk and COD, noting that this relationship is mainly driven by private (as opposed to state-owned) firms.

These results are supported by a recent paper from Bae, Chang and Yi (article in press), who document the same non-linear relationship between corporate social responsibility and the cost of bank debt in an extensive sample of 5,810 private syndicated bank loans issued by U.S. companies between 1991 and 2008. Bae et al. use the strength and concern scores from the KLD database to rank the firms in their sample according to CSR performance. The authors show that as a borrower marginally increases

CSR engagement, the cost of debt is reduced at a decreasing rate. This relationship is strongest in firms with moderate levels of CSR concerns.

The proposition that the CSP-COD relationship is U-shaped implies that an optimal level of CSR spending exists, beyond which lenders consider CSR spending as a waste of firm resources. These preliminary results suggest that the relationship exists at least in China and the U.S. Given the difference of these two markets in terms of their level of development, economic and social context, as well as culture, one might assume that the U-shape of the COD-CSP relationship may be universal. Future research should focus on verifying the conclusions of these initial findings, but also to extend this study to other markets and other measures of cost of capital.

This section provided an overview of current research into the relationship between corporate social and/or environmental performance and cost of debt. Most studies surveyed support a negative relationship between better environmental performance and cost of debt. However, the results are plagued by the same issues as research on CSP and cost of equity, namely the heterogeneity of the samples and measures of environmental performance, as well as the issues inherent in existing measures of environmental performance. Furthermore, the strength and direction of the relationship between CSP and COD is influenced by maturity of loans (Oikonomou et al. 2014), issuance of security for a loan (Goss and Roberts, 2011), industry membership (Jung, Herbohn and Clarkson, 2016) and large external events, such as the financial crisis (Suto and Takehara, 2017). Interesting recent contributions and potential avenues of future research in this field come from studies on (i) the role of country-level factors in explaining the COD-CSP relationship, (ii) credit ratings and credit risk as transitory mechanism through which CSP impacts COD, and (iii) the potential non-linearity of the COE-CSP relationship.

5. Conclusion and Avenues for Future Research

Research on corporate social/environmental performance and cost of capital is, in general, supportive of a negative relationship between these two variables. However, a number of external factors have a considerable effect on this relationship.

Country-level factors, such as the cultural, social, economic and institutional context in which investors and businesses operate plays a significant role in determining the strength, direction and sometimes even the existence of CSP-COC relationship for both cost of equity and cost of capital. Country-level factors that have been shown to impact the CSP-COC relationship are stakeholder orientation (Dhaliwal et al. 2014 and Cheung et al. 2016), financial transparency (Dhaliwal et al. 2014), the degree

of investor protection and commitment to CSR (Martinez-Ferrero et al. 2016), the level of assertiveness, humane orientation and institutional collectivism (Matthiesen and Salzmann 2017), country-level governance (Gupta 2018), institutional environment (Gong et al. 2015) and country-level sustainability (Hoepner et al. 2016). Additionally, some studies support the notion that culture on company-level may impact the COC-CSP relationship (Pae and Choi, 2011).

In addition to country-level factors, industry membership is a significant determinant of the CSP-COC relationship, with research typically identifying a more prominent reduction in cost of capital in industries with high emissions intensity (see, for example, El Ghouli et al. 2018, Reverte 2012 and Gregory et al. 2016). Cajias, Fuerst and Bienert (2016) note a particularly strong difference between consumer and asset-oriented industries. Some research, particularly on the Chinese market has documented a difference in the way cost of capital reacts to environmental performance in private and state-owned firms, private ownership being typically associated with a larger reduction in cost of capital (Zhou et al. 2018 and Li et al. 2015).

In terms of research on the cost of debt capital, a number of debt characteristics has been linked to the COD-CSP relationship. Credit ratings (see, for example, Menz 2010, Schneider 2011 and La Rosa et al. 2017), loan maturity (Oikonomou et al. 2014), issuance of security (Goss and Roberts 2011) and significant external events (Suto and Takehara 2017) have all been linked to the relationship between COD and CSP. The relationship is more pronounced in lower rated firms, for long-term maturities, for loans issued without security, and following catastrophic events. In general, the conclusion could be made that factors which increase loan- or firm-specific risk also heighten the importance of CSR performance for debtors.

Future research on the CSP-COC relationship should focus more on emerging markets, given (i) their growing importance in environmental and economic terms globally, (ii) the role that country-level factors play in the CSP-COC relationship, and (iii) the clear underrepresentation of these markets in current research. Another interesting avenue of future research is the theory behind the relationship between CSP and COC. To date, only one paper has attempted to create a comprehensive theoretical framework to explain the impact of socially responsible investing on cost of equity capital (Heinkel, Kraus and Zechner 2001). As pointed out by Rowley and Berman (2000), the lack of a theoretical framework is a serious flaw, which renders existing empirical research a simple data analysis exercise without contributing to a better understanding of the relationship between CSP and COC. Furthermore, much of the existing literature on the CSP-COC relationship relies on the KLD database to measure CSR performance. Given the issues inherent in this measure (see, for example, Semenova and Hassel 2015 and Surroca, Tribo and Waddock 2010), future research should consider alternative

measures. Humphrey, Lee and Shen (2012) speak strongly in favour of the SAM ESG measure, which has gained international recognition as well. Given that the only two research papers captured by this review which used SAM-reported ESG measures found a positive relationship between cost of debt and environmental performance, validity checks of existing studies ought to be performed using this and other ESG or CSR performance measures.

In addition to the above, research on the cost of equity the role of external assurance of environmental disclosure and performance measures is a very recent addition to existing research and ought to be explored further. In research that focuses on cost of debt, the impact of environmental performance on credit risk merits further attention both in terms of theoretical and empirical contributions. Although, as discussed above, no theoretical framework exists to explain the exact relationship between cost of debt and environmental performance, most researchers refer to the role of environmental performance in reducing information asymmetry and risk of financial distress when explaining the theory underpinning their hypothesized relationship between the two variables. Empirical evidence to support these assumptions, as well as a more robust theoretical framework would both be interesting additions to current research. Additionally, the U-shaped relationship documented between CSR performance and cost of debt in the Chinese and U.S. markets is an interesting finding, which ought to be explored further in different geographical contexts as well as with respect to the cost of equity.

Finally, future research should investigate whether and the extent to which cost of capital is estimated by practitioners and investors to *explicitly* factor for sustainability factors.

6. References

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7. Appendices

Appendix I: Keywords and the number of hits across databases used.

Keywords	Elsevier		Emerald		Wiley		Springer	
	Hits	Relevant	Hits	Relevant	Hits	Relevant	Hits	Relevant
carbon risk	18	3	1	x	11	x	6	2
climate risk	32	2	3	x	18	x	34	x
corporate social responsibility	308	25	231	6	302	1	522	x
ESG	96	7	36	x	106	x	106	1
corporate social performance	58	5	44	x	62	1	125	x
environmental sustainability	341	x	41	x	83	x	170	x
environmental performance	541	x	102	6	222	x	295	x
environmental responsibility	82	1	41	x	59	x	110	x
carbon risk	2	2	1	x	5	x	4	x
climate risk	5	1	1	x	3	x	8	x
corporate social responsibility	145	5	67	x	82	3	161	3
ESG	44	x	17	x	38	x	51	1
corporate social performance	40	x	18	x	20	x	65	4
environmental sustainability	48	x	6	x	15	x	22	x
environmental performance	98	x	35	x	62	1	75	x
environmental responsibility	19	x	16	x	17	x	29	x
carbon risk	2	2	0	x	5	1	4	x
climate risk	7	x	0	x	0	x	6	x
corporate social responsibility	73	1	31	x	41	4	112	x
ESG	21	x	6	x	22	1	28	3
corporate social performance	15	x	9	x	8	x	37	6
environmental sustainability	34	x	2	x	6	x	22	x
environmental performance	51	x	15	x	24	4	44	1
environmental responsibility	9	x	9	x	6	x	19	1
	2089	54	732	12	1217	16	2055	22

The "Relevant" column does not include duplicates.

Appendix II: Sample Statistics – Number of Publications per Year

