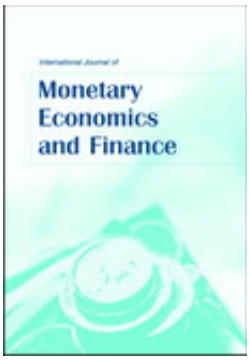

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ESG performance and cost of capital: what do we know? Evidence from the US

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Abstract: This paper empirically examines the impact of environmental, social and governance (ESG) performance and its individual components on the cost of debt and the cost of equity. Using a sample of S&P 500 firms from 2015 to 2021, we find that strong ESG performance reduces the cost of debt and the cost of equity. Furthermore, our analyses on the individual constituents of the ESG performance indicate that firms with high environmental and social performance benefit from both lower cost of debt and cost of equity with the effect more pronounced for cost of equity. The evidence also indicates that high performance in governance only has implications for equity cost of capital. The evidence supports the position that integrating relevant ESG activities in firm business model has capital raising benefits.

Keywords: environmental; social and governance; capital structure; cost of debt; cost of equity.

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1 Introduction

In recent years, attention to environmental, social and governance (ESG) investing, which represents a growing portion of overall capital market investments, has grown considerably. For example, a survey by HSBC (2020) on sustainable financing reveals that almost 41% of investors integrate sustainability information in their investment decisions, amounting to US$45.6 billion, in the first quarter of 2020 during which global investments in sustainable funds skyrocketed. More recently, a global survey conducted by the United Nations-Accenture (2021) shows the majority of 1230 CEOs surveyed across 113 countries are of the view that a strong ESG proposition is an inextricable part of business that can generate business value. This development clearly demonstrates that investors are increasingly interested in firms' ESG performance for their investment decisions (Tamimi and Sebastianelli, 2017). Within the extant literature, two general views around ESG prevail: stakeholder and shareholder perspectives. On one hand, the stakeholder theory argues that management should consider all stakeholders' interests in their decision-making process (Freeman, 2010; Jensen, 2010) and should align its corporate actions to meet the broader expectations of society (Lins et al., 2017). In the context of stakeholder theory, firms should design and strengthen sustainability activities that focus on not just the company's profitability, but also on generating long-term value for all stakeholders (Freeman and Velamuri, 2006). However, for these non-financial considerations to meet ESG obligations comes with significant costs, potentially depleting vital resources from the firm. The shareholder theory, on the other hand, postulates that the central role of managers is to engage in activities that maximise shareholder wealth. Friedman (2007) argued that the only social responsibility of a business is to increase its profit, rather than taking on socially beneficial projects that may only result in value dilution. The shareholder theory expounds on the argument that profit maximisation is the sole purpose of every business and that management has a fiduciary duty to act in the best interests of shareholders (Shleifer and Vishny, 1999). The deontological argument in favour of fiduciary duties is that managers should not devote scarce corporate resources to activities that have not been authorised by the shareholders, regardless of whether there are any consequential social benefits accruing to the firm. This stance, however, disregards the morality and ethical reasoning to adopt ESG

practices because shareholder theory is purely grounded in an economic sense. Consequently, this gives rise to a moral conundrum that necessitates careful deliberation and raises unanswered questions: *Does ESG create value for companies and their shareholders? What are the economic benefits to firms engaging in superior ESG practices?*

Despite a growing number of academic research that links responsible sustainable practices to their impact on business performance (Carayannis et al., 2017; Hillman and Keim, 2001; Di Tommaso and Thornton, 2020), little is known about the nexus between ESG dimensions and components of the cost of capital. While some prior studies investigate the efficacy of sustainability reporting towards cost of equity (El Ghoul et al., 2018; Plumlee et al., 2015), other studies explore the association between ESG profiles and cost of debt (Dennis and Mullineaux, 2000; Nandy and Lodh, 2012). To the best of our knowledge, previous studies that provide evidence on the link between ESG performance and components of cost of capital remain limited. Although the evidence for the benefits associated with ESG efforts becomes overwhelming, our study extends this to show how individual elements of ESG are intertwined with a firm's cost of capital. Specifically, in this paper, our goal is to gain a better understanding of how performance in the firm specific individual ESG performance is linked to both cost of equity and cost of debt.

Our empirical analysis is based on data for 3066 firm-year observations of listed firms in US from 2015 to 2021. This paper contributes to the existing literature in the following two ways. Firstly, our analysis examines the implication of ESG practices on capital raising by decomposing cost of capital into cost of equity and cost of debt for the same sample of firms. This sheds light on whether investors and lenders distinguish across the multi-dimensional ESG performance in their investment and lending decisions. Although there is empirical evidence on the impact of ESG practices on cost of capital, the extant literature remains largely inconclusive and falls short of showing clear results. Secondly, we decompose ESG rating into its separate components and, in doing so, provide fresh insights on the relative impacts of each ESG component on the firm's cost of capital. The results contribute to the ongoing debate over the trade-off between ESG investments and cost of capital. Our findings add to the literature by reaffirming the critical role ESG achievements can play in lowering cost of capital for businesses, and such evidence can exert influence on managers to intensify ESG efforts for the direct benefit of improving corporate financial well-being.

Our paper proceeds as follows. Section 2 presents a review of literature and hypotheses. In Section 3, we present our study's data, sample selection procedures, and analytical methods. In Section 4, we present our analyses and findings. Finally, we provide our conclusions and suggestions for future research in Section 5.

2 Literature review

Several studies have examined the link between ESG and cost of equity suggesting that firms with strong ESG characteristics tend to have lower risk profile (Dhaliwal et al., 2011; Gupta, 2018). In this regard, Diamond and Verrecchia (1991) and Leuz and Verrecchia (2005) provide evidence for the proposition suggesting that higher ESG disclosure can – through lower cost of capital – improve risk valuations. Other studies, however, argue that investing in ESG activities does not benefit shareholders. For

instance, Friedman and Friedman (1962) took direct aim at any firm investing resources in social activities and argued that such activities are often wasteful in nature and would not benefit the shareholders. ESG investments may present agency conflicts between managers and shareholders in the sense that firms may be exposed to negative externalities at the expense of corporate profits (Barnea and Rubin, 2010). Furthermore, such ESG investments represent a costly diversion of managerial time and attention to the extent that resources are being exploited in a wasteful and inefficient manner (Richardson and Welker, 2001).

There are competing theories on whether ESG practices are important in corporate strategy. Shareholder theory which is well-known for its criticism against a firm's social responsibility initiatives, dated back to Friedman (2007) who postulates that "the only social responsibility of corporations is to make money." As such, investments in social activities entail additional costs and would not bring any financial benefit to firms. Richardson and Welker (2001) point out that corporations should not have social agenda but rather should make good use of firm resources to identify and fund profitable investments. Legitimacy theory, on the other hand, suggests that firms engage in sustainability efforts to portray firm's commitment towards fulfilling societal norms and expectation, regardless of whether it is beneficial or otherwise (Deegan and Unerman, 2011). In this regard, Schaltegger and Hörisch (2017) find evidence that corporations that engage in non-financial ESG activities are primarily driven by managerial "legitimacy-seeking" motives. Additionally, Deegan and Unerman (2011) posit that firms continually strive to increase legitimacy by aligning their actions as per social norms and values. Jensen (2010) advances the notion of adopting a long-term perspective called "enlightened value maximisation" which seeks to undertake the requisite trade-offs among its stakeholders. In this regard, Eldar (2014) offers a way of resolving the dichotomy between engaging in a "morally acceptable behaviour" and "self-interested behaviour". Following his understanding of the conception of normative business ethics, he focuses on the underlying contract between "society" and "business" that grounds ethical norms and responsibilities in ways that are within the boundary of the legal system. Within this narrative, firms can pursue profit-maximising goals and accomplish altruistic goals which are not necessarily inconsistent with the objective of either stakeholder or shareholder theory. In other words, it can be argued that all parties stand to benefit when companies engage in ESG activities. Thus, activities directed towards ESG goals should be viewed as conferring benefits to both the shareholders and society at large, provided that such activities would not be tantamount to breaching executives' fiduciary obligations. Brockett and Rezaee (2012), Dhaliwal et al. (2011), Nirino et al. (2020) and Richardson and Welker (2001) find evidence that market value of firm increases when firms strategically invest in ESG activities, suggesting that the inclusion of ESG factors enhances value creation. To support this notion, Albarrak et al. (2019), Tamimi and Sebastianelli (2017) and Vitolla and Raimo (2018) argue that ESG performance can enhance a firm's competitive advantage and corporate reputation, resulting in increased financial benefits such as lower cost of capital.

Given the possible financial benefit associated with engaging in ESG investments, it begs the question of what implications such investments can have on the components of cost of capital i.e., cost of equity and cost of debt – an area of research which remains inconclusive in the literature. Firms with superior sustainability performance have the incentive to signal their superior performance to the market to improve stakeholders' perceptions about the firms' social standings. Although there are several

empirical studies that examined the relationship between ESG performance and cost of capital, very few studies attempted to analyse the impact of individual dimensions of ESG on the components of cost of capital. There is a good reason to expect providers of equity capital to prefer firms with stronger ESG performance as equity holders are more convinced with firm-level commitment towards the ESG agenda (Borghesi et al., 2014). In this regard, El Ghoul et al. (2011) and Plumlee et al. (2015) find evidence that companies benefit from a lower cost of equity through ESG performance. In addition, Dennis and Mullineaux (2000) find that extensive disclosure of information on ESG performance should lead to a higher credit rating and lower cost of debt as a result of increased transparency which, in turn, reduces information asymmetry.

On the contrary, some prior research provides opposite findings on the relationship between ESG and cost of debt. For instance, Goncalves et al. (2022) examined the impact of sustainability on cost of capital based on a sample of large European firms listed on the Euro 600 index. The results indicate that sustainability performance is positively related to cost of debt, indicating lenders perceive investments in ESG as being costly and inefficient use of a firm's resources. Furthermore, their findings support the notion that sustainability practices may lead to higher costs and greater default risk, and capital lenders demand higher returns for the increased risk by charging higher spreads. In a similar vein, using CSR reports, Magnanelli and Izzo (2017) and Menz (2010) found a positive relationship between corporate social performance and cost of debt due to the additional expenses associated with implementing socially responsible practices. Their findings suggest that lenders may perceive firms that engage in excessive investments in ESG initiatives as potentially deviating from the objective of shareholder wealth maximisation. In the eyes of the lenders, they view these firms with a perceived lack of focus on profit maximisation as riskier in their assessments.

Our study is in line with Goncalves et al. (2022) who examined the relationship between ESG and cost of debt and cost of equity. However, our study differs from theirs in two main aspects. First, our study specifically examines US companies, whereas their focus is on European firms. Second, we decompose ESG performance into its component scores and provide additional insights on whether each score component has stronger or weaker effect on the two components of the cost of capital – cost of debt and cost of equity. Hence, the analysis of how each ESG component affects both cost of debt and cost of equity is crucial in our examination. Mattingly (2017) pointed out that aggregate ESG score tend to be less sensitive in capturing ESG practices than the three individual dimensions that comprise the aggregate score. In this study, to develop a more thorough and comprehensive understanding of how the various ESG categories can influence the trade-off between ESG performance and cost of financing, we analyse the isolated impact of the individual dimensions of ESG (i.e., Environmental, Social and Governance), in addition to the combined ESG measure, on firm's cost of equity and cost of debt.

2.1 Hypothesis development

Our study examines the impact of ESG performance on the components of cost of capital, breaking down cost of capital into cost of debt and cost of equity. Dhaliwal et al. (2011) suggest that firms proactively engage in their ESG practices and engage in voluntary

disclosure of these practices as a means to safeguard and uphold their legitimacy. Additionally, stronger ESG performance is known to be associated with a reduction in downside risk; ultimately leading to lower risk profiles thus lower cost of capital. As such, companies today prioritise ESG agenda, not only as a means to improve corporate perception (Michelon et al., 2015) but also as a communication tool to signal high commitment towards strong ESG performance (Milne and Gray, 2013). ESG achievement is therefore regarded as an imperative tool to legitimise business activities and alleviate firm-investor information asymmetry (Deegan and Unerman, 2011).

2.1.1 ESG performance and cost of debt

A growing body of research suggests that ESG considerations are being incorporated by lending institutions as part of the overall credit evaluation analysis (Bhuiyan and Nguyen, 2019; Cooper and Uzun, 2015; Dennis and Mullineaux, 2000; Kleimeiter and Viehs, 2018; Shad et al., 2020). For instance, Dennis and Mullineaux (2000) find that extensive disclosure of information on ESG performance increases transparency and reduces information asymmetry which in turn leads to a higher credit rating and lower cost of debt. Gutsche et al. (2017) find that firms with good ESG ratings borrow at a relatively favourable rate to reflect the lower probability of default. Using 3000 sample banks in US, Nandy and Lodh (2012) find evidence supporting the notion that companies with stronger ESG profiles benefit from lower cost of loans than firms with lower ESG profiles. As such, lending institutions perceive firms with higher ESG achievements as having lower default risks, resulting in a lower cost of debt. We, therefore, posit our first hypothesis that:

H_1: There is no association between ESG performance and cost of debt.

Despite the number of studies investigating the ESG-cost of debt relationship, a fundamental question remains unanswered: Taking into account each dimension of the ESG separately, to what extent does each of these dimensions affect cost of debt? We posit that lending institutions may assign different priorities/strengths to each ESG dimension differently and thus cost of debt may vary widely, depending on the nature and the degree of risk associated across the different ESG dimensions. In this study, we therefore disaggregate ESG scores into three separate dimensions, contributing to the existing literature by examining specifically the effects of the respective ESG dimension on the cost of debt. Based on the above discussion, we postulate the following sub-hypotheses:

H_{1a}: There is no association between the level of environmental performance (E) and cost of debt.

H_{1b}: There is no association between the level of social performance (S) and cost of debt.

H_{1c}: There is no association between the level of governance performance (G) and cost of debt.

2.1.2 ESG performance and cost of equity

The second part of our study examines the relationship between ESG performance and cost of equity. Past empirical studies have consistently shown the nexus between ESG performance and cost of equity capital and the findings on the relationship between cost of equity and ESG performance is more consistent compared to the relationship pertaining to cost of debt. Using a sample of 3000 firms, Ng and Rezaee (2015) conclude that disclosure of ESG dimensions has the ability to reduce the cost of equity through a reduction of perceived risk and uncertainty about the firm's future cash flows. Similarly, Dhaliwal et al. (2014) support the view that high-quality ESG disclosures are significantly associated with a reduction in the cost of equity capital.

Furthermore, Plumlee et al. (2015) analysed a sample of US listed firms over a six-year period from 2000 to 2005 to examine the relationship between voluntary environmental disclosures and cost of equity. Their findings suggest that enhanced voluntary environmental disclosures is associated with higher firm value through a reduction in cost of equity capital. These findings suggest that investors integrate firms' sustainability performance into their investment decision-making process. El Ghoul et al. (2018) analysed environmental disclosures using an international sample of 30 countries from 2002 to 2011 and conclude that firms with strong ESG profile have significantly lower cost of equity. This leads to the following hypothesis:

H_2: There is no association between the level of ESG performance and cost of equity.

As discussed earlier, there is evidence that each component of ESG has a potential differential impact on the cost of capital. Clarkson et al. (2011) show that systematic differences exist across the individual dimensions of sustainability performance (environmental, social, and governance) as investors view each of these dimensions as differentially beneficial that could impact the cost of equity differently. Based on the discussion above, we develop the following hypotheses:

H_{2a}: There is no association between the level of environmental performance (E) and cost of equity.

H_{2b}: There is no association between the level of social performance (S) and cost of equity.

H_{2c}: There is no association between the level of governance performance (G) and cost of equity.

3 Data and methodology

We draw our data from Refinitiv database on S&P 500 from 2015 to 2021. The initial sample was for a 20-year period (2002-2021), however, to minimise the impact of too many missing values, we sampled the period with the most complete data. The sample mainly represents large US companies. We do this for two main reasons. First, large companies are more likely to be engaged in ESG activities. Second, this allows us a proper comparison to Goncalves et al. (2022) who study the relationship between ESG performance and cost of capital for large European companies. The selection of the data period also allows us to avoid possible bias due to too many missing values related to ESG. Data on firms in the financial sector (i.e., Banks, Insurance, Capital Markets,

Consumer Finance, Diversified Financial Services) are excluded. Consistent with Erragragui (2018) who found that firms in the financial sector have substantially higher cost of debt due to their frequent restructuring, we excluded these companies in the financial sector to avoid upward bias. Our final sample consists of 438 firms for the 7-year period from 2015 to 2021.

ESG scores are the main independent variables, data is extracted from Refinitiv database as it offers the most comprehensive coverage and calculates over 630 different ESG metrics. According to Refinitiv, the pillar weights, under Refinitiv's ESG scoring methodology, are normalised to produce a score between 0 and 100. ESG combined scores from the database offer a transparent and objective measure of a company's relative ESG performance, commitments and effectiveness. The ESG combined scores are constructed based on company-reported data and are discounted for significant ESG controversies. ESG controversies are negative media effects and are contributed to the ESG combined score as a discount. The E score includes data on three categories: emission (which reflects themes such as emissions, waste, biodiversity, and environmental management systems), innovation (which reflects themes such as product innovation, green revenues, research and development and capital expenditure), and resource use (which reflects themes such as water, energy, sustainable packaging, and environmental supply chain). The S score includes data on four categories: community, human rights, product responsibility (which reflects themes such as responsible marketing, product quality, and data privacy), and workforce (which reflects themes such as diversity and inclusion, career development and training, working conditions, and health and safety). The G score includes data on three categories: CSR strategy (which reflects two themes: CSR strategy, and ESG reporting and transparency), management (which reflects two themes: structure and compensation), and shareholders (which reflects two themes: shareholder rights and takeover defences).

The dependent variables adopted for this study are cost of debt (RD) and cost of equity (RE).[1] Based on prior research, we also include a set of firm-specific fundamental control variables in our econometric model. Previous studies suggest larger firms are generally perceived to be less risky and have access to more favourable financing, as documented by Rajan and Zingales (1995) and Fama and French (2002). We consider the natural logarithm of market capitalisation (MC) as a proxy for firm size. We introduce return on equity (ROE) and weight of debt (WD) as control variables in accordance with the literature suggesting that firm's profitability and leverage can have an influence on cost of capital (Fernando et al., 2010; Hope et al., 2009). Further, we include price-to-book ratio (PB) as a proxy for firm's valuation which are generally taken into consideration due to the influence on cost of capital (Dhaliwal et al., 2014; El Ghoul et al., 2011).

Table 1 shows summary statistics of the variables adopted in this study. The number of observations for each variable is lower than the total 3,066 firm-year observations due to missing values. Our data covers a period that is characterised by a wide range of ESG combined scores and E, S, G component scores. For instance, ESG combined scores have a mean of 54.30 and a standard deviation of 17.49. This shows that there are enough variations in ESG combined scores and E, S, and G component scores for the research purposes of this study. Decent ranges of variations in RD and RE are also observed in our data.

Table 1 Summary statistics

Variable	*Number of observations*	*Mean*	*Standard deviation*	*Median*	*Minimum*	*Maximum*
ESG	2969	54.30	17.49	55.32	2.49	91.98
E	2969	51.71	27.30	57.46	0.00	98.55
S	2969	61.06	20.26	62.88	5.62	97.95
G	2969	59.60	20.42	62.28	2.26	99.56
RD (%)	2927	2.64	1.19	3.00	0.00	16.00
RE (%)	2927	7.09	3.36	7.00	1.00	24.00
WD	2927	0.20	0.15	0.18	0.00	0.86
WE	2927	0.80	0.15	0.82	0.14	1.00
PB	2840	8.06	21.49	3.92	0.46	540.01
MC (inUSD millions)	3017	57511.68	139613.87	22749.39	69.44	2406898.27
ROE (%)	2878	0.81	16.33	0.17	–28.45	847.13

Table 1 reports the summary statistics for ESG ratings, firm characteristics and cost of debt and cost of equity. Data is extracted from Refinitiv database on 438 firms in the constitution list of S&P 500 from 2015 to 2021. Variable definitions are detailed in Appendix 1.

Model specifications:

We test the impact of ESG scores on the individual components of cost of capital by estimating regression models for both cost of debt and cost of equity. The ordinary least square (OLS) regression for the panel data, along with both fixed-effect and random-effect models are estimated, after which we use the Hausman test to compare the estimates between the fixed effect models and the corresponding random effect models (Greene, 2008). Based on the results of the corresponding Hausman tests and F tests, fixed effect models are chosen over the random effect models and the OLS models. Therefore, only results of fixed effect models along with the *p*-values of the Hausman tests and F tests are reported in our tables. Furthermore, the results are consistent with previous studies (Reverte, 2012; Schultz et al., 2010), justifying that the use of fixed-effect models over random-effects models to provide more robust estimations. To test our hypothesised relationships, we use the R software and for brevity, we do not report the fixed intercepts for each effect. Appendix 1 lists the definition and measurement of all variables used in this study.

To estimate the effect of ESG and its three component scores on the cost of debt, we use the following OLS models:

$$RD_{it} = \alpha_0 + \alpha_1 \,.\, ESG_{it} + \alpha_2 \,.\, MC_{it} + \alpha_3 \,.\, PB_{it} + \alpha_4 \,.\, WD_{it} + \alpha_5 \,.\, ROE_{it} + \varepsilon_{it} \quad (1)$$

$$RD_{it} = \alpha_0 + \alpha_1 \,.\, E_{it} + \alpha_2 \,.\, MC_{it} + \alpha_3 \,.\, PB_{it} + \alpha_4 \,.\, WD_{it} + \alpha_5 \,.\, ROE_{it} + \varepsilon_{it} \quad (1a)$$

$$RD_{it} = \alpha_0 + \alpha_1 \,.\, S_{it} + \alpha_2 \,.\, MC_{it} + \alpha_3 \,.\, PB_{it} + \alpha_4 \,.\, WD_{it} + \alpha_5 \,.\, ROE_{it} + \varepsilon_{it} \quad (1b)$$

$$RD_{it} = \alpha_0 + \alpha_1 \,.\, G_{it} + \alpha_2 \,.\, MC_{it} + \alpha_3 \,.\, PB_{it} + \alpha_4 \,.\, WD_{it} + \alpha_5 \,.\, ROE_{it} + \varepsilon_{it} \quad (1c)$$

where *RD* is cost of debt (multiplied by 100), *ESG* is the ESG combined score, *E* is the E score,*S* is the S score, *G* is the G score. The control variables are *MC* which is the natural logarithm of the company market capitalisation*; PB* is the price-to-book ratio; *WD* is the weight of debt*;* and *ROE* is the return on equity. The subscripts *i* and *t* represent firms and years.

Similarly, to estimate the effect of ESG and its three component scores on the cost of equity, we use the 4 following models:

$$RE_{it} = \alpha_0 + \alpha_1 \,.\, ESG_{it} + \alpha_2 \,.\, MC_{it} + \alpha_3 \,.\, PB_{it} + \alpha_4 \,.\, WD_{it} + \alpha_5 \,.\, ROE_{it} + \varepsilon_{it} \quad (2)$$

$$RE_{it} = \alpha_0 + \alpha_1 \,.\, E_{it} + \alpha_2 \,.\, MC_{it} + \alpha_3 \,.\, PB_{it} + \alpha_4 \,.\, WD_{it} + \alpha_5 \,.\, ROE_{it} + \varepsilon_{it} \quad (2a)$$

$$RE_{it} = \alpha_0 + \alpha_1 \,.\, S_{it} + \alpha_2 \,.\, MC_{it} + \alpha_3 \,.\, PB_{it} + \alpha_4 \,.\, WD_{it} + \alpha_5 \,.\, ROE_{it} + \varepsilon_{it} \quad (2b)$$

$$RE_{it} = \alpha_0 + \alpha_1 \,.\, G_{it} + \alpha_2 \,.\, MC_{it} + \alpha_3 \,.\, PB_{it} + \alpha_4 \,.\, WD_{it} + \alpha_5 \,.\, ROE_{it} + \varepsilon_{it} \quad (2c)$$

where *RE* is cost of equity (multiplied by 100); *ESG* is the ESG combined score; *E* is the E score, *S* is the S score, *G* is the G score, *MC* is the natural logarithm of the company market capitalisation; *PB* is the price-to-book ratio; *WD* is the weight of debt; and *ROE* is the return on equity. The subscripts *i* and *t* represent firms and years.

4 Analysis and findings

4.1 The effect of ESG and its component scores (E, S, and G) on cost of debt (RD).

Table 2 summarises the findings from models 1, 1a, 1b, and 1c on the relationship between ESG and its component scores (E, S, and G) and the cost of debt, as posited by H_1, H_{1a}, H_{1b}, and H_{1c}. The findings indicate that cost of debt is significantly negative correlated to the overall ESG score as well as the E and the S component scores. However, cost of debt is found not to be significantly correlated with the G score. The findings indicate that higher ESG score, E score, and S score are associated with lower cost of debt which corroborate the findings of Gutsche et al. (2017) and Nandy and Lodh (2012). A plausible explanation is that firms with higher ESG performance mitigate idiosyncratic risk and therefore are more likely to secure more favourable borrowing terms, leading to lower cost of debt (Nandy and Lodh, 2012). On the contrary, some research studies (Goncalves et al., 2022; Magnanelli and Izzo, 2017; Menz, 2010) do not show clear correlations between the individual ESG dimension and cost of debt. In this study, we sub-divided ESG into three different dimensions and demonstrate the distinctive influence each ESG component may have on the cost of debt. Therefore, we do not assume a priori that lenders are indifferent towards the individual performance of the three ESG dimensions. We find empirical evidence that supports the positive benefits of firms pursuing ESG agenda in terms of lowering their cost of debt.

The models also indicate consistent relationship of ESG and other control variables. Price-to- book ratio does not have any effect on cost of debt. Larger companies have significantly lower cost of debt, in line with the findings of Botosan and Plumlee (2005). Leverage and *ROE* do not have any effect on the cost of debt.

Table 2 The effect of ESG and its component scores (E, S, and G) on cost of debt (*RD*)

Variables	*Cost of debt*	*Cost of debt*	*Cost of debt*	*Cost of debt*
	Model 1	Model 1a	Model 1b	Model 1c
ESG	–0.008***			
	(–4.599)			
E		–0.012***		
		(–8.415)		
S			–0.017***	
			(–9.902)	
G				–0.002
				(–1.288)
PB	0.001	0.001	0.001	0.001
	(–0.5)	(–0.698)	(–0.616)	(–0.705)
MC	–0.668***	–0.575***	–0.548***	–0.717***
	(–14.087)	(–11.807)	(–11.313)	(–15.387)
WD	–0.334	–0.125	–0.113	–0.344
	(–1.164)	(–0.440)	(–0.399)	(–1.194)
ROE	0.004	0.002	0.004	0.002
	(–0.573)	(–0.382)	(–0.677)	(–0.364)
N	2679	2679	2679	2679
R^2	0.111	0.129	0.14	0.103
Adjusted R^2	–0.054	–0.032	–0.02	–0.064
AIC	5980.4	5922.7	5891.6	6003.4
BIC	6015.8	5958.1	5926.9	6038.8
RMSE	0.74	0.73	0.72	0.74
Hausman's *p*-value	0.000	0.000	0.000	0.000
F test's *p*-value	0.000	0.000	0.000	0.000
Durbin Watson	1.746	1.758	1.775	1.736
Breusch-Pagan's *p*-value	0.000	0.000	0.000	0.000

Table 2 presents the regression output for the effect of ESG and its components of cost of debt (*RD*). The dependent variable is Cost of debt (*RD*) and the independent variables are *ESG*, *E*, *S*, and *G* in models 1, 1a, 1b, and 1c respectively. The control variables are market capitalisation (*MC*), price-to-book ratio (*PB*), weight of debt (*WD*), and return on equity (*ROE*). Variable definitions are detailed in Appendix 1. Estimates in parentheses are t-statistics and *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

4.2 The effect of ESG and its component scores (E, S, and G) on cost of equity (RE)

Table 3 shows the findings regarding hypotheses H_2, H_{2a}, H_{2b}, and H_{2c}. The finding indicates that similar to cost of debt, cost of equity is negatively correlated to the overall ESG score as well as the E and the S component scores. We find that firms with higher G scores have lower cost of equity, although the relationship is less significant compared to

that with E and S scores. Firms with higher ESG score, E component score, S component score, and G component score have lower cost of equity. However, while the G component has no effect of cost of debt, the relationship with cost of equity is negative and statistically significant.

Table 3 The effect of ESG and its component scores (E, S, G) on cost of equity (*RE*)

Variables	*Cost of equity*	*Cost of equity*	*Cost of equity*	*Cost of equity*
	Model 2	Model 2a	Model 2b	Model 2c
ESG	–0.031***			
	(–5.589)			
E		–0.055***		
		(–12.260)		
S			–0.065***	
			(–11.901)	
G				–0.009*
				(–1.907)
PB	–0.011**	–0.010**	–0.010**	–0.009**
	(–2.454)	(–2.286)	(–2.382)	(–2.190)
MC	–2.143***	–1.670***	–1.685***	–2.323***
	(–14.025)	(–10.804)	(–10.873)	(–15.462)
WD	5.942***	6.932***	6.788***	5.922***
	(–6.442)	(–7.67)	(–7.505)	(–6.369)
ROE	–0.021	–0.026	–0.019	–0.026
	(–1.084)	(–1.358)	(–1.002)	(–1.333)
N	2679	2679	2679	2679
R^2	0.155	0.196	0.194	0.144
Adjusted R^2	–0.002	0.047	0.044	–0.014
AIC	12246.2	12110.4	12120.1	12278.7
BIC	12281.6	12145.8	12155.4	12314
RMSE	2.37	2.31	2.32	2.39
Hausman's *p*- value	0.000	0.000	0.000	0.000
F test's *p*-value	0.000	0.000	0.000	0.000
Durbin Watson	2.153	2.089	2.089	2.184
Breusch-Pagan's *p*-value	0.000	0.000	0.000	0.000

Table 3 presents the regression output for the effect of ESG and its components of cost of equity (*RE*). The dependent variable is cost of equity (*RE*) and the independent variables are *ESG*, *E*, *S*, and *G* in models 2, 2a, 2b, and 2c respectively. The control variables are market capitalisation (*MC*), price-to-book ratio (*PB*), weight of debt (*WD*), and return on equity (*ROE*). Variable definitions are detailed in Appendix 1. Estimates in parentheses are t-statistics and *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Our results regarding ESG combined score, and cost of equity is consistent with Goncalves et al. (2022) who use the same ESG combined score measure and with

Dhaliwal et al. (2014) who uses CSR report to study the impact of non-financial information on cost of equity. In addition, Plumlee et al. (2015), who constructed an environmental disclosure index, also find that higher disclosure is associated with lower cost of equity and our finding on the relationship between cost of equity and the E score is consistent with this study. We also find that the effect of ESG and each of its component scores on cost of equity is higher than that on cost of debt, evidenced by more negative coefficients in Table 3 compared to Table 2. This evidence shows that the effect of ESG on equity holders is stronger than on debtholders, indicating that equity holders are more concerned about ESG disclosure than debtholders. This finding also partly explains the insignificant relationship between cost of debt and the G scores and the less significant relation between cost of equity and the G scores, compared to the E and the S scores.

The models also indicate consistent relationship of ESG and other control variables. Consistent with the notation of existing literature (El Ghoul et al., 2011), price-to-book ratio has a significant negative impact on cost of equity, suggesting that higher stock price reflects investors' optimism on stronger future earnings growth that in turn, translates into lower cost of equity. This is different with its impact on cost of debt in Table 2. In terms of the size effect, *MC* has a significant negative impact on cost of equity, thus, larger companies have lower cost of equity. This finding is consistent with Rajan and Zingales (1995) and Fama and French (2002) given that larger firms are perceived less risky and therefore tend to benefit from lower default probability. Firms with higher leverage (higher *WD*) have higher cost of equity and the effect of leverage on cost of equity is also higher than that of cost of debt, evidenced by larger coefficient in Table 3 compared to Table 2. One plausible explanation of this finding is that highly geared firms are more likely to induce higher financial distress risks (Gode and Mohanram, 2003). *ROE* is found to not affect the cost of equity.

4.3 Robustness tests

A lead-lag regression design has been used in Ng and Rezaee (2015) and Ferreira and Laux (2007) to mitigate the problem of endogeneity. The authors argue that other financial performance factors could jointly affect sustainability performance measures and cost of equity. To control the lagging effects (if any) of the independent variable on cost of debt and cost of equity, we conducted a robust analysis on lag independent variables. As a robustness check, in this study, the dependent variables (e.g., cost of debt and cost of equity at time t) are studied against one-year lagged independent variables (e.g., at time t-1).

Regression analysis is conducted for Models 1, 1a, 1b, 1c and 2, 2a, 2b, 2c using the lagged values of ESG and its components. Tables 4 and 5 report the estimates. In Table 4, the dependent variable is cost of debt (*RD*). The independent variables are one-year lagged *ESG*, and its components *E*, *S*, and *G*. The control variables include market capitalisation (*MC*), price-to-book ratio (*PB*), weight of debt (*WD*), and return on equity (*ROE*). Table 5 shows comparable results for cost of equity (*RE*). The results indicate that both the cost of debt and cost of equity are negatively correlated with the previous year's *ESG* disclosure. For component scores, both cost of debt and cost of equity are negatively correlated with the previous year's *E*, *S*, and *G* component scores. This evidence indicates that the lagged *G* variable has a negative effect on cost of debt. This relationship also implies the predictive power with *G* known one year in advance. Overall, the results

using lagged independent variables are very consistent with the main results for both cost of debt and cost of equity, except in the case of cost of debt that shows a negative relationship with the lagged *G* component which is statistically significant unlike in the main analysis where the G component has no effect. We conjecture that shareholders are more responsive to actual changes related to the G disclosures. In other words, the G component seems to be accompanied by higher information asymmetry and this leads to different assessments from debtholders and shareholders. We ran Durbin-Watson (DW) test to detect the possible presence of autocorrelation in the residuals of our regression analysis, The DW values indicate that autocorrelation is not a concern in all our models, as shown in Tables 2–5. We also acknowledge the low R^2 values in our results, which is not an uncommon in social science research. According to Cohen and Cohen (1983), low R^2 values do not undermine the valuable insights that can be drawn from regression models, provided that the results demonstrate statistically significant explanatory variables. Also, consistent with the main findings in sections 4.1 and 4.2, we also find that the effect of ESG and each of its component score on cost of equity is higher than that on cost of debt, as evidenced by a higher magnitude of negative coefficients in Table 5 compared to Table 4. Again, this evidences that shareholders are more concerned about ESG performance than debtholders. In addition, the cost of debt is negatively associated with the lagged *G* scores, unlike in Table 2 where the estimate of the G score is negative but not statistically significant. This robustness test further clarifies the main findings. In this paper, we only examine 1-year lagged scores. Future studies may examine how long it takes for the effect of ESG and its component scores to affect cost of capital.

Table 4 The effect of lagged ESG and its component scores (E, S, G) on cost of debt (*RD*)

Variables	*Cost of debt*	*Cost of debt*	*Cost of debt*	*Cost of debt*
Lag (*ESG*)	–0.010***			
	(–7.054)			
Lag (*E*)		–0.006***		
		(–6.468)		
Lag (*S*)			–0.009***	
			(–6.978)	
Lag (*G*)				–0.005***
				(–3.839)
PB	0.001	0.001	0.001	0.001
	(–0.742)	(–0.951)	(–0.724)	(–0.735)
MC	–0.665***	–0.678***	–0.675***	–0.671***
	(–15.131)	(–15.420)	(–15.371)	(–15.163)
WD	–0.208	–0.232	–0.297	–0.242
	(–0.732)	(–0.817)	(–1.045)	(0.846)
ROE	0.001	0.002	0.003	0.002
	(–0.187)	(–0.298)	(–0.471)	(–0.312)

Table 4 The effect of lagged ESG and its component scores (E, S, G) on cost of debt (*RD*) (continued)

Variables	*Cost of debt*	*Cost of debt*	*Cost of debt*	*Cost of debt*
N	2664	2664	2664	2664
R^2	0.116	0.113	0.115	0.102
Adjusted R^2	–0.049	–0.053	–0.049	–0.065
AIC	5901.6	5910.8	5902.9	5942.6
BIC	5937	5946.2	5938.2	5977.9
RMSE	0.73	0.73	0.73	0.74
Hausman's p- value	0.000	0.000	0.000	0.000
F test's *p*-value	0.000	0.000	0.000	0.000
Durbin Watson	2.236	2.267	2.258	2.211
Breusch-Pagan's *p*-value	0.000	0.000	0.000	0.000

Table 4 presents the regression output for the effect of ESG and its components of cost of debt (RD). The dependent variable is cost of debt (RD) and the independent variables are one-year lagged ESG, E, S, and G. The control variables are market capitalisation (MC), price-to-book ratio (PB), weight of debt (WD), and return on equity (ROE). Variable definitions are detailed in Appendix 1. Estimates in parentheses are t-statistics and *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

Table 5 The effect of lagged ESG and its component scores (E, S, G) on cost of equity(*RE*)

Variables	*Cost of equity*	*Cost of equity*	*Cost of equity*	*Cost of equity*
Lag (*ESG*)	–0.025***			
	(–5.409)			
Lag (*E*)		–0.023***		
		(–7.132)		
Lag (*S*)			–0.025***	
			(–6.131)	
Lag (*G*)				–0.007*
				(–1.847)
PB	–0.008*	–0.007*	–0.008*	–0.009*
	(–1.930)	(–1.662)	(–1.935)	(–1.955)
MC	–2.262***	–2.300***	–2.288***	–2.280***
	(–15.772)	(–16.122)	(–15.993)	(–15.818)
WD	6.117***	6.080***	5.880***	6.020***
	(–6.6)	(–6.592)	(–6.356)	(–6.459)
ROE	–0.027	–0.026	–0.023	–0.025
	(–1.375)	(–1.319)	(–1.148)	(–1.256)
N	2664	2664	2664	2664
R^2	0.153	0.161	0.156	0.143

Table 5 The effect of lagged ESG and its component scores (E, S, G) on cost of equity(*RE*) (continued)

Variables	*Cost of equity*	*Cost of equity*	*Cost of equity*	*Cost of equity*
Adjusted R^2	–0.005	0.004	–0.001	–0.017
AIC	12203.3	12178.1	12193.6	12233.8
BIC	12238.6	12213.4	12228.9	12269.1
RMSE	2.39	2.37	2.38	2.4
Hausman's *p*- value	0.000	0.000	0.000	0.000
F test's *p*-value	0.000	0.000	0.000	0.000
Durbin Watson	1.792	1.793	1.803	1.756
Breusch-Pagan's *p*-value	0.000	0.000	0.000	0.000

Table 5 presents the regression output for the effect of ESG and its components of cost of equity (*RE*). The dependent variable is cost of equity (*RE*) and the independent variables are one-year lagged *ESG*, *E*, *S*, and *G*. The control variables are market capitalisation (*MC*), price- to-book ratio (*PB*), weight of debt (*WD*), and return on equity (*ROE*). Variable definitions are detailed in Appendix 1. Estimates in parentheses are t-statistics and *, **, and *** represent significance at 10%, 5%, and 1% levels respectively.

5 Conclusions

This study presents empirical evidence on the impact of ESG performance on two main components of cost of capital: debt and equity. Using a sample of 3,066 firm-year observations of listed firms on S&P 500 from 2015 to 2021, our findings suggest that both cost of debt and cost of equity are negatively associated with ESG performance. In contrast to prior research studies (Goncalves et al., 2022; Magnanelli and Izzo, 2017; Menz, 2010), our study takes a novel approach by decomposing ESG into three distinct dimensions to shed new light on the intricate relationship between ESG factors and their relative impact on the cost of debt and cost of equity. A decomposition of the components of ESG shows that the Environment (E) and Social (S) components are both negatively associated with both cost of debt and cost of equity. The Governance (G) component, however, is only significantly negatively associated with cost of equity. In addition, the lagged-G component is significantly negatively associated with cost of debt. Overall, all 3 components are negatively associated with both cost of debt and cost of equity, however, the effect is more pronounced on the E and S components. Interestingly, we also find that the effect of ESG, and its individual components on the cost of equity is higher than that on the cost of debt. The results show that firms can benefit from increasing the level of ESG performance, especially with focus on the E and the S score performance, which translates into a lower cost of debt and much lower cost of equity. The evidence suggests that environmental and social performance reduces cost of both equity and debt capital with the benefit more pronounced for cost of equity. This indicates that firms that have a higher proportion of equity should pay more attention to their ESG disclosure and the potential impact on the cost of equity and the overall cost of capital. Our findings on ESG contribute to the ongoing debate over whether ESG matters

in businesses, particularly on the impact of ESG achievements on cost of capital. Our findings highlight the significance of signalling ESG achievements as capital providers perceive them as mitigating a firm's risk profile, ultimately leading to decreased costs of equity and debt. In addition, this study provides valuable insights to investors, both domestic and international, as the findings indicate that ESG propositions can effectively address information asymmetries between management and investors, while also enhancing corporate resilience in the face of long-term risks.

Overall, the study confirms that firms pursuing ESG agenda are compensated by a reduction in cost of equity and cost of debt. In this study, we chose to isolate the constituents of ESG, and the findings indicate that strong performance in each of the ESG components corresponds with a reduction in cost of capital. Further studies can extend this research by conducting a comparative analysis between developed and emerging markets as that may provide more nuanced insights due to differences in legal regime, corporate governance framework and culture. Our study has not considered the impact of ESG performance on the cost of other types of capital, such as preferred equity; it would be interesting for future studies to explore other types of capital and further expand on our findings. Finally, keeping in mind the importance of the effects of the drop in cost of debt and cost equity on stock returns and risk levels, we encourage future research to investigate this area and further extend our understanding of ESG effects on stock returns and risk levels.

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Note

[1]According to Refinitiv, RD and RE data items are sourced from Starmine which is proprietary data. It is computed using the Starmine Weighted Average Cost of Capital (WACC) model. RE is the return a firm theoretically pays its equity investors. It is calculated by multiplying equity risk premium of the market with the beta of the stock plus an inflation adjusted risk free rate. Equity risk premium is expected market return minus inflation adjusted risk free rate. RD represents the marginal cost to the company of issuing new short-term debt now and uses the 1-year yield point on the appropriate credit curve.

Appendix 1: Descriptions of variables

Variables	*Descriptions by Refinitiv*
Dependent variables	
RD	Cost of debt, multiplied by 100.
	Cost of debt represents the marginal cost to the company of issuing new short-term debt now and uses the 1-year yield point on the appropriate credit curve
RE	Cost of equity, multiplied by 100.
	Cost of equity is the return a firm theoretically pays its equity investors. It is calculated by multiplying equity risk premium of the market with the beta of the stock plus an inflation adjusted risk free rate. Equity risk premium is expected market return minus inflation adjusted risk free rate
ESG	ESG combined scores (ESG) offers the most comprehensive coverage and calculates over 630 different ESG metrics. According to Refinitiv, the pillar weights, under Refinitiv's ESG scoring methodology, are normalised to produce a score between 0 and 100. ESG combined scores from the database offer a transparent and objective measure of a company's relative ESG performance, commitments and effectiveness. The ESG combined scores are constructed based on company- reported data and are discounted for significant ESG controversies. ESG controversies have negative media effects and are contributed to the ESG combined score as a discount
E	The E score (E) includes data on three categories: emission (which reflects themes such as emissions, waste, biodiversity, and environmental management systems), innovation (which reflects themes such as product innovation, green revenues, research and development and capital expenditure), and resource use (which reflects themes such as water, energy, sustainable packaging, and environmental supply chain)
S	The S score (S) includes data on four categories: community, human rights, product responsibility (which reflects themes such as responsible marketing, product quality, and data privacy), and workforce (which reflects themes such as diversity and inclusion, career development and training, working conditions, and health and safety)
G	The G score (G) includes data on three categories: CSR strategy (which reflects two themes: CSR strategy, and ESG reporting and transparency), management (which reflects two themes: structure and compensation), and shareholders (which reflects two themes: shareholder rights and takeover defences)
Control variables	
MC	The natural logarithm of the company market capitalisation. Market capitalisation represents the sum of market value to all relevant instrument level share types. The instrument level market value is calculated by multiplying the requested shares type by latest price. If close price is not yet available, then open price will be used for a trading day. Unlisted shares are included as applicable
PB	Price-to-book ratio (PB) calculated by dividing the company's latest closing price by its book value per share. Book value per share is calculated by dividing total equity from the latest fiscal period by current total shares outstanding
WD	The weight of debt (WD) is the percentage of debt in total capital of a firm. It is calculated by dividing total debt by total capital
ROE	The return on equity (ROE) is the statistical average of all broker estimates determined to be on the major accounting basis. It is the net income available to common shares holders divided by average common shareholder's equity

Appendix 2: Sample composition by year and industry

Industry	*Number of observations*	*Industry*	*Number of observations*
Aerospace & Defense	10	Household Products	5
Air Freight & Logistics	4	Independent Power and Renewable Electricity Producers	1
Airlines	5	Industrial Conglomerates	3
Auto Components	2	Interactive Media & Services	5
Automobiles	3	Internet & Direct Marketing Retail	3
Beverages	6	IT Services	19
Biotechnology	8	Leisure Products	1
Building Products	7	Life Sciences Tools & Services	12
Chemicals	16	Machinery	17
Commercial Services & Supplies	5	Media	10
Communications Equipment	5	Metals & Mining	3
Construction & Engineering	1	Multi-Utilities	10
Construction Materials	2	Multiline Retail	3
Containers & Packaging	7	Oil, Gas & Consumable Fuels	18
Distributors	3	Personal Products	1
Diversified Telecommunication Services	3	Pharmaceuticals	9
Electric Utilities	16	Professional Services	6
Electrical Equipment	5	Real Estate Management & Development	1
Electronic Equipment, Instruments & Components	9	Road & Rail	5
Energy Equipment & Services	3	Semiconductors & Semiconductor Equipment	19
Entertainment	7	Software	18
Equity Real Estate Investment Trusts (REITs)	29	Specialty Retail	12
Food & Staples Retailing	5	Technology Hardware, Storage & Peripherals	6
Food Products	13	Textiles, Apparel & Luxury Goods	7
Gas Utilities	1	Tobacco	2
Health Care Equipment & Supplies	19	Trading Companies & Distributors	3
Health Care Providers & Services	16	Water Utilities	1
Health Care Technology	1	Wireless Telecommunication Services	1
Hotels, Restaurants & Leisure	18		
Household Durables	8		
		Total	438

Appendix 3: Pearson Correlation matrix of variables

	ESG	*E*	*S*	*G*	*RD*	*RE*	*WD*	*PB*	*MC*	*ROE*
ESG		0.735***	0.728***	0.598***	–0.065***	–0.085***	0.109***	–0.005	–0.051***	0.005
E	0.735***		0.718***	0.401***	–0.078***	–0.127***	0.178***	0.018	0.194***	0.037*
S	0.728***	0.718***		0.326***	–0.144***	–0.141***	0.057***	0.029	0.206***	0.021
G	0.598***	0.401***	0.326***		–0.066***	–0.032***	0.127***	0.005	0.111***	0.014
RD	–0.065***	–0.078***	–0.144***	–0.066***		0.213***	0.344***	–0.044**	–0.145***	–0.016
RE	–0.085***	–0.127***	–0.141***	–0.032*	0.213***		0.014	–0.039**	–0.067***	–0.029
WD	0.109***	0.178***	0.057***	0.127***	0.344***	0.014		–0.150***	–0.156***	–0.023
PB	–0.005	0.018	0.029	0.005	–0.044**	–0.039**	–0.150***		0.062***	0.149***
MC	–0.051***	0.194***	0.206***	0.111***	–0.145***	–0.067***	–0.156***	0.062***		0.039**
ROE	0.005	0.037*	0.021	0.014	–0.016	–0.029	–0.023	0.149***	0.039**	

*, **, and *** represent significance at 0.1, 0.5, and 0.01.