RESEARCH ARTICLE

Corporate Social Responsibility and Environmental Management   **WILEY**

Corporate social responsibility performance and the cost of capital in BRICS countries. The problem of selectivity using environmental, social and governance scores

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Abstract

The paper aims to test whether corporate social responsibility (CSR) performance affects the costs of debt, equity, and a weighted average of those two components in BRICS countries. Theoretically, a decline in the cost of capital is linked to a decrease in the firm risk. We measure CSR performance using the environmental, social, and governance (ESG) combined score from the Thomson Reuters EIKON database for non-financial enterprises between 2014 and 2019. A panel regression analysis has been run in order to test whether (1) the inclusion in the ESG combined ranking or (2) the level of the scores for ESG combines is linked to a decline in the cost of capital. Empirical evidence suggests that the level of the ESG combined score does not affect the firm's financial risk. Inclusion in the ESG combined index decreases the cost of equity and the average cost of capital instead. Firms that received an ESG combined score pay lower returns to investors.

KEYWORDS
BRICS, corporate social responsibility, cost of capital, ESG, selectivity, sustainable development

JEL CLASSIFICATION
G32, M14

1 | INTRODUCTION

In the last decades, the role of corporate social responsibility (CSR) in business ethics has been widely investigated in the scientific debate concerning corporate governance (CG).

The CSR concept has been defined in several ways. Generically, we can define CSR as the complex of strategies implemented by enterprises aimed at preventing, identifying, managing and mitigating any possible negative impact that they may cause on society as a whole (namely, human rights, health, environment and so on), including those impacts produced along their global supply chain (European Parliament, 2020; Hsu et al., 2022). Following Korontzis (2013), CSR deals with a new model of firm management with a perspective of long-term investing,

with transparency and continuous dialogue finalised to create synergies related to sustainable development.

Recently, literature focused on the relationship between CSR performances and firm values (Plumlee et al., 2015) and the relationship between CSR and firm performances or firm risk (Friede et al., 2015; Oh et al., 2017; Sassen et al., 2016). According to the so-called 'Stakeholder theory', high results of CSR are associated with less financial risk and better performances. Indeed, enterprises that satisfy the requirements of good CSR have more stable relationships with other financial entities and the government by displaying lower probabilities of running into legal disputes and suffering legal sanctions. In more detail, high performances in CSR are also connected to an elevated company's reputation (Cornell & Shapiro, 1987), which is

supposed to improve the firm's image regarding customers and consumers.

All these arguments support a positive relationship between CSR and firm value, decreasing firm risk and favouring improvements in financial performance.

Nevertheless, pursuing high CSR standards is expensive for a firm. Therefore, an alternative scenario can be presented (Crespi & Migliavacca, 2020): the costs required to implement environmentally or socially responsible activities above the legally-binding minimum standards would reduce firm value.

These two opposite points of view make the sign of the correlation between CSR and firm value uncertain, especially in emerging economies where legal constraints concerning environmental issues and sustainable development are still not corroborated (Boulhaga et al., 2022). In particular, with their fast-growing economies, BRICS Countries are searching for a compromise between the exigence of favouring the expansion of financial markets and the emerging issue of sustainable development.

CSR performances are operationalised with environmental, social and governance (ESG) scores. The ESG scores, currently provided by three leading financial services agencies, namely Bloomberg, MSCI, and Thomson Reuters, are indicators based on ESG aspects and are now the leading measures for company evaluation and risk measurements. These ratings have been developed for investment purposes and to favour comparative decisions by any stakeholder interested in the sustainable development of the firm activity.

Although the role played by ESG scores (as a suitable proxy for CSR) has been deeply investigated in European and US markets (Abate et al., 2021; Lagasio & Cucari, 2019), we have registered a lack of investigation concerning the emerging economies, with a particular reference to the BRICS Countries (Feng et al., 2022).

Hence, the primary research question of this paper focuses on the relationship between ESG scores, and more precisely, the ESG combined score and the cost of capital regarding the corporations operating in BRICS Countries, with a particular focus on monitoring the process of convergence in the attention to sustainable topics with Western economies. Indeed, the cost of capital can be considered a suitable proxy for the financial risk of a corporation: the higher the risk of a firm, the lower the cost of capital. The choice of using an ESG combined score instead of the traditional one has been realised, because it provides a complete evaluation of a firm's ESG performance based on the information of the three original pillars (E, S and G), with ESG controversies overlay captured from global sources media. The peculiarity of the ESG combined score is to discount the ESG performance score based on negative media stories.

Using data from Refinitiv Eikon databases provided by Thomson Reuters for listed corporations in the stock markets of BRICS countries (Brazil, Russia, India, China, and South Africa) in the period between 2014 and 2019, the aim of the study is two-fold. On the one hand, we aim to test the hypothesis that good performances in CSR, measured through the ESG score, help reduce the cost of capital. On the other hand, the study seeks to consider the issue of selectivity. Indeed, the large number of enterprises lacking documentation regarding ESG scores suggests that missing values are not random in this case. When missing information on ESG systematically appears

for specific profiles of enterprises, a selectivity problem may arise because only a biased sample of observations is analysed.

In order to fulfil the two objectives of the analysis, two regression models are run: (1) one for addressing selectivity and (2) one for testing whether the ESG combined score for the firms for which it is observed is connected to a decline in the cost of capital. All the models are implemented in a panel design.

The remainder of the paper is organised as follows: Section 2 will develop the literature background concerning CSR and firm risk relationships. Section 3 presents the formulation of the research hypotheses. Section 4 will introduce the data and the methods used in the study, while Section 5 will present the empirical results. Finally, Section 6 discusses the results and concludes.

2 | LITERATURE REVIEW

The literature widely investigated the link between CSR performance and quantitative measures of firm risk (Eliwa et al., 2021; Ng & Rezaee, 2015; Sassen et al., 2016), firm value (Atan et al., 2018; Azmi et al., 2021) and performance (Atan et al., 2018) for enterprises. The operationalization of CSR performance is linked to ESG scores in the prevalence of the recent literature. In this framework, two approaches are related to the meaning of ESG score, according to the two leading institutions which carry out those ratings (Eliwa et al., 2021). On the one hand, Thomson and Reuters ESG scores are computed to proxy CSR performance and effectiveness across three components covering 10 domains. These pillars are environment (E), which measures the firm performance for the use of the resources, emissions and innovative technology; social (S), which refers to the workforce, respect for human rights, community, and product responsibility; governance (G), which measures optimality characteristics of management, CSR strategy, and shareholders. On the other hand, Bloomberg also computes ESG scores, even if it puts more attention to disclosure quality and transparency of the items related to ESG than to their effectiveness.

This paper will use the ESG scores from Thomson and Reuters Eikon (Sikacz & Wolczek, 2018) by embracing the first approach to measure ESG performance's effect on firms' financial risk in emerging markets. Results provided by the literature do not unanimously recognise a significant relationship between ESG and financial results. Different founding theories lead to different results.

In more detail, two are the most accredited theories: the stakeholder and trade-off. According to the stakeholder theory, dating back to Freeman (1984), a firm has to maximise its values favouring all the stakeholders (customers, debtors, employees, shareholders, and the community where the enterprise works). In this framework, practical ESG activities can reduce the firm's risk by creating a sustainable business model value for investors and other stakeholders. Indeed, high ESG performance is associated with firm strategies oriented to improve stakeholder trust and the social reputation of the corporation. Consequently, investors and shareholders will consider their investments less risky and require lower returns for the invested capital (Alsayegh et al., 2020).

For instance, a study supporting these findings underlined how ESG disclosure favours the decline of the cost of debt (CoD) on a

sample of more than 8000 observations between 2010 and 2019 (Raimo et al., 2021). Furthermore, on European data, Eliwa et al. (2021) support the decline of the CoD for enterprises showing both ESG performance and ESG disclosure by using both sources of data for ESG mentioned before. Also, Mohammad and Wasiuzzaman (2021), with a sample of Malaysian firms, favour an increase in firm performance for those companies with higher values for ESG.

On the contrary, the trade-off theory (Fama & French, 2002; López-Gracia & Sogorb-Mira, 2008) focused on the existence of a trade-off between ESG performance and financial profitability. Although ESG activities produce advantages in the long run, in terms of firm reputability, in the short run, ESG disclosure and transparency also represent a cost source for the enterprise. Consequently, costs may cause a decline in profits for the investors and the shareholders. Indeed, investors have to choose to receive fewer profits in exchange for CSR performance. When investors' exigence of avoiding the loss of profits prevails over the positive view of pursuing CSR performance, we expect a high ESG score connected to an increase in the cost of capital.

Papers supporting the positive effect of ESG score on the cost of capital as a measure of firm risk are that of Gjergji et al. (2021), where ESG activities are considered expensive for Small and Medium Enterprises, and that of Atan et al. (2018), which investigated the relations between ESG and the weighted average cost of capital (WACC) in a sample of Malaysian enterprises.

Even if the last word on the relationship between ESG performance and the risk of a firm, when considering the cost of the capital, has not yet been written, a deep investigation has been conducted concerning the US market and, generally, the other Western economies. Few studies addressed the direction of the relationship in emerging markets. Johnson (2020) focused on South Africa, finding a not monotone relationship between ESG performance and the cost of capital (WACC). While in the services sectors, high ESG performances are negatively correlated with the WACC, which is in line with the sign of the relationship predicted by the Stakeholder theory, in the industrial sector, the empirical evidence shows an opposite pattern, in line with a not clear trade-off for the stakeholders. Recent literature focuses on the case of the Chinese market (Feng et al., 2022; Ruan & Liu, 2021) by investigating ESG rating data respectively from 2015 to 2019 and 2011 to 2020 as samples and finding that corporate ESG activity significantly impacts firm performances.

3 | HYPOTHESIS DEVELOPMENT

Let us also consider the abovementioned paper by Atan et al. (2018), which documents a positive relationship between CSR performance and firm risk value. We can conclude that the literature seems to be sceptical about the benefits of pursuing best practices in ESG in emerging economies. Nevertheless, this first evidence is still insufficient to close the door to the utility of supporting ESG activities to increase firm value and lower the enterprise's capital cost. Indeed, in developing countries (e.g., BRICS), only a few listed enterprises have

received an ESG rating. This means that the results deriving from the mentioned studies may be polluted by selectivity. Hence, if it is essential to measure the level of the ESG score in order to have a good proxy of the quality of CSR performance, it is also important to split the corporations into two groups: those that are monitored with an ESG score and those that do not appear in any database. Some seminal studies (Wong et al., 2021) prefer to focus on the dichotomy of inclusion or exclusion from the ESG rankings, in order to measure the connection with the firm value. In this framework, a possible explanation could be those emerging economies currently lacklustre in attributing an ESG rating to the largest part of listed companies. Hence, before this transition is concluded, a key role in determining a firm's risk or value is played by the condition of receiving a score, regardless of the level attained.

In light of the results currently collected in the literature review, the aim of this investigation is two-fold: on the one hand, we test whether ESG scores are correlated with a decline of firm risk, and specifically with the cost of the capital as a whole (e.g., WACC) and of each of its constituent components (CoD and the cost of equity— CoE). On the other hand, this paper tests whether ESG inclusion (in our case, in the Thomson and Reuters Eikon database) is connected to a decrease in the cost of capital.

Hence, two are different research hypotheses tested in the present manuscript:

> **H1.** ESG inclusion is related to lower values of the following variables: WACC, CoE and CoD.

> **H2.** The level of the ESG score is related to lower values of the following variables: WACC, CoE and CoD.

Given the interest in the relationship between CSR performance and the cost of capital in emerging markets, the analysis considers a sample of listed corporations in BRICS countries: Brazil, Russia, India, China, and South Africa.

4 | DATA, VARIABLES AND METHODS

This section is divided into three sub-sections, focused on the dataset description, the variable introduction, and the model specification. Summary statistics complete the section.

4.1 | Data

In order to test the research hypotheses, the initial sample includes all enterprises belonging to the five relevant emerging countries, which are commonly known as BRICS: Brazil, Russia, India, China, and South Africa. Data were collected from Thomson Reuters Eikon and covered between 2014 and 2019. The choice to collect data for the last 5 years is due to the only recent alignment to the formal procedures for receiving an ESG score and the widespread lack of available

TABLE 1 Sample distribution by country and ESG inclusion

Country	ESG inclusion		ESG exclusion		Total by country	
	n	%	*n*	%	*n*	%
Brazil	80	50.6	78	49.4	158	100
Russia	52	34.7	98	65.3	150	100
India	15	6.8	205	93.2	220	100
China	259	10.3	2249	89.7	2508	100
South Africa	127	70.2	54	29.8	181	100
	533		2684		3217	

Source: Datastream, Thomson and Reuters Eikon (2014–2019).
Abbreviation: ESG, environmental, social and governance.

information. Therefore, the initial sample, which does not consider banks and financial entities, includes all the corporations listed in the stock exchange markets of BRICS in the period of interest, including both enterprises with and without an ESG combined score.

The detail of the geographical distribution of sampled firms is described in Table 1:

As we can see from Table 1, Chinese-listed corporations represent 7.96% of the whole sample. Only 10.3% of listed corporations received an ESG combined score for at least 1 year between 2014 and 2019. India shows the worst sample performance in terms of ESG inclusion, with only 15 firms with an ESG score. Conversely, South Africa displays the most significant proportion of firms with a score from the Thomson and Reuters Eikon database, with a percentage equal to over 70%.

4.2 | Variables

4.2.1 | CSR performance variables

The main explanatory variables of the model measure the CSR performance through the ESG scores as calculated by Thomson and Reuters Eikon. The typology of the ESG score used in the analysis is the ESG combined score (ESGC), which provides a rounded and comprehensive evaluation of a company's ESG performance based on the reported information in the ESG pillars, with ESG controversies (Nirino et al., 2021) captured from global media sources. It includes ESG controversies score, resource use score, emissions score, environmental innovation score, workforce score, human rights score, community score, product responsibility score, management score, shareholders score, and CSR strategy score.

According to the research hypotheses formulated in Section 3, the primary explanatory variable of the model has two alternative specifications:

1. In order to answer H1, an ESGC inclusion (ESGIncl) dummy variable has been introduced, taking value one if the enterprise received an ESGC score in $t - 1$ in the Thomson Reuters database and zero otherwise.

2. In order to answer H2, the ESGC, which corrects traditional ESG score with an ESG controversies score, is used in order to compare firm performances at time t in terms of different levels of disclosure with respect to the average of ESG pillars in $t - 1$.

4.2.2 | Cost of capital

According to the literature discussed in Section 2, we use three different specifications for the cost of capital variable as three alternative dependent variables of the model measured at time t: (a) the CoD, (b) the CoE and (c) the WACC.

The CoD is the actual rate a firm pays on all its bank loans, bonds, and other interest debt capital. In operative terms, the CoD is the yield to maturity on the firm's debt as the capital to be refunded with debt instruments to the investors. The value of CoD has been derived from the Bloomberg database and can be computed as:

$$\text{CoD} = (r_f + \text{credit risk rate})(1 - t)$$

where r_f is the country-specific risk-free rate and the credit risk rate is the average CoD financing that the enterprise has subscribed with external investors. The parameter t represents the marginal corporate tax rate.

The relationship between CoD and ESGC performance has been recently investigated, among others, by Johnson (2020), Azmi et al. (2021), Raimo et al. (2021).

The CoE is the return shareholders require to compensate them for the risk of investing in the enterprise's stock. It represents shareholders' perception of the riskiness of a firm's free cash flows and is calculated using the capital asset pricing model (Sharpe, 1964) according to the following formula:

$$\text{CoE} = r_f + \beta(r_m - r_f)$$

where r_f is the risk free-rate of return, r_m is the return on the market portfolio, $r_m - r_f$ is the market risk premium and β is the asset's sensitivity to returns on the market portfolio well-known as beta.

The relationship between CoD and ESG performance has been recently investigated, among others, by Johnson (2020) and Azmi et al. (2021).

The WACC is the total cost for a firm that acquires debt and equity capital in order to fund its functioning. It represents the weighted average of CoE and CoD, where the weights represent the percentage of each unit of capital to the total amount of capital raised.

The formula is the following:

$$\text{WACC} = \text{CoE} \times \frac{E}{D + E} + \text{CoD} \times \frac{D}{D + E}$$

where $E/(D + E)$ represents the percentage of equity on the total capital, while the $D/(D + E)$ represents the percentage of the external source of financing.

The relationship between CoD and ESG performance has been recently investigated, among others, by Atan et al. (2018), Johnson (2020), Azmi et al. (2021), Wong et al. (2021), and Gjergji et al. (2021).

4.2.3 | Control variables

The set of time-variant control variables included in the model and measured in $t-1$ is listed as follows:

Size: The size has been computed as the natural logarithm of the enterprise's total assets in $t-1$ (Eccles et al., 2014; Fama & French, 2002). According to the literature (Lemmon et al., 2008), the expectation is that the relationship between the cost of capital and size is negative because the larger the company, the larger the capacity of a firm to overcome the potential crisis in a market turmoil (Erragragui, 2018).

Leverage (LEV): The second control variable is leverage, the ratio between total liabilities and total assets (as in Ruan & Liu, 2021). According to Modigliani and Miller (1958), the higher the leverage, the higher the CoE. In addition, the literature also provides evidence that CoD is positively affected by high values of leverage (Van Binsbergen et al., 2010).

Return on asset (ROA): Return on assets is a ratio indicating a company's profitability in relation to its total assets. The expected sign of the relationship with the cost of capital is negative, according to Ge and Liu (2015).

Liquidity ratio (LIQ): Defined as the ratio between the liquid assets and the current liabilities, the liquidity ratio measures the firm's ability to meet the creditor's demands. Hence, it is assumed to decrease the cost of capital, according to Ortiz-Molina and Phillips (2014).

Interest coverage ratio (INT): As a predictor of the CoD and the WACC, it is defined as the ratio between EBIT and the company's interest expenses for the same period. It measures the margin of safety a company has for paying interest on its debt during a given period. It is included in the CoD equation, because it is generally adopted in literature to indicate a firm's specific ability to pay off debts to third parties, according to Lorca et al. (2011). Hence, firms with a higher index value are perceived as less risky. This covariate is also included in the WACC regression because WACC incorporates CoD.

Return on equity (ROE) measures financial performance calculated by dividing net income by shareholders' equity. ROE is considered a measure of a corporation's profitability in relation to stockholders' equity. The assumption is that ROE is negatively correlated with CoE and with WACC.

4.3 | Methods

In light of the presentation of the research hypotheses (H1 and H2) and of the description of the dependent and independent variables, the model can be specified as follows in a panel design:

$$1a)\ \mathrm{CoD}_{it} = \beta_0 + \beta_1\,\mathrm{ESGIncl}_{it} + \beta_2\,\mathrm{Size}_{it} + \beta_3\,\mathrm{LEV}_{it} + \beta_4\,\mathrm{ROA}_{it} + \beta_5\,\mathrm{LIQ}_{it} + \beta_6\,\mathrm{INT}_{it} + \varepsilon_{it}$$

$$1b)\ \mathrm{CoE}_{it} = \beta_0 + \beta_1\,\mathrm{ESGIncl}_{it} + \beta_2\,\mathrm{Size}_{it} + \beta_3\,\mathrm{LEV}_{it} + \beta_4\,\mathrm{ROA}_{it} + \beta_5\,\mathrm{LIQ}_{it} + \beta_6\,\mathrm{ROE}_{it} + \varepsilon_{it}$$

$$1c)\ \mathrm{WACC}_{it} = \beta_0 + \beta_1\,\mathrm{ESGIncl}_{it} + \beta_2\,\mathrm{Size}_{it} + \beta_3\,\mathrm{LEV}_{it} + \beta_4\,\mathrm{ROA}_{it} + \beta_5\,\mathrm{LIQ}_{it} + \beta_6\,\mathrm{INT}_{it} + \beta7\,\mathrm{ROE}_{it} + \varepsilon_{it}$$

$$2a)\ \mathrm{CoD}_{it} = \beta_0 + \beta_1\,\mathrm{ESGC}_{it} + \beta_2\,\mathrm{Size}_{it} + \beta_3\,\mathrm{LEV}_{it} + \beta_4\,\mathrm{ROA}_{it} + \beta_5\,\mathrm{LIQ}_{it} + \beta_6\,\mathrm{INT}_{it} + \gamma_i + \varepsilon_{it}$$

$$2b)\ \mathrm{CoE}_{it} = \beta_0 + \beta_1\,\mathrm{ESGC}_{it} + \beta_2\,\mathrm{Size}_{it} + \beta_3\,\mathrm{LEV}_{it} + \beta_4\,\mathrm{ROA}_{it} + \beta_5\,\mathrm{LIQ}_{it} + \beta_6\,\mathrm{ROE}_{it} + \gamma_i + \varepsilon_{it}$$

$$2c)\ \mathrm{WACC}_{it} = \beta_0 + \beta_1\,\mathrm{ESGC}_{it} + \beta_2\,\mathrm{Size}_{it} + \beta_3\,\mathrm{LEV}_{it} + \beta_4\,\mathrm{ROA}_{it} + \beta_5\,\mathrm{LIQ}_{it} + \beta_6\,\mathrm{INT}_{it} + \beta7\,\mathrm{ROE}_{it} + \gamma_i + \varepsilon_{it}$$

In order to test H1, a pooled OLS regression model (with clustered SEs at the enterprise level) has been adopted. Indeed, the binary variable that marks the enterprise's inclusion in the ESG combined score database is time invariant, not allowing fixed effects estimations. The model's results implemented to verify H1 will be displayed in Table 4.

The model adopted for investigating H2 uses a continuous time-variant indicator to capture the ESG combined score variations. This allows us to take into account a component of error γ_i which can be identified and distinguished from the effect of the main explanatory variable and that has been introduced at the enterprise level.

Hence, results from fixed effects, random effects, and OLS pooled regressions are estimated and compared by performing a Hausman test (for fixed vs. random), an *F* test (fixed vs. OLS), and a Lagrange multiplier test (random vs. OLS). A collinearity check has also been performed through a variance inflation factor (VIF) analysis. Finally, the optimal selected model results are summarised in Section 5, Table 4.

5 | EMPIRICAL RESULTS

The present section displays the empirical results by illustrating descriptive statistics and the results from the model.

Table 2 compares the sample means of the dependent variables (Cost of capital) between firms included and excluded in ESGC rankings by Thomson and Reuters Eikon.

Results are interesting and differentiated: while the CoD is greater in firms with an ESG combined score, the CoE decreases with respect to the CoE and the WACC. This provisional result is not surprising: on the one hand, the satisfaction of the disclosure requirements in order to obtain an ESG combined score is expensive with regard to the magnitude of debt indicators in the

TABLE 2 Difference of means of dependent variables between groups (ESG inclusion or not)

Measures	Abbreviation	Mean ESG inclusion	Mean ESG not inclusion	Difference
Cost of debt	CoD	3.25%	2.93%	+0.32%
Cost of equity	CoE	10.01%	10.61%	−0.60%
Weighted average cost of capital	WACC	8.12%	9.06%	−0.94%

Source: Datastream, Thomson and Reuters Eikon (2014–2019).
Abbreviation: ESG, environmental, social and governance.

TABLE 3 Correlation matrix of the explanatory variables

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) ESGC	1.0000						
(2) Size	0.0573	1.0000					
(3) Leverage	0.0838	0.1754	1.0000				
(4) ROA	0.0061	−0.0196	−0.1874	1.0000			
(5) ROE	0.0171	0.0424	0.0581	0.1411	1.0000		
(6) Interest coverage rate	−0.0785	−0.0327	−0.1109	0.0925	0.0012	1.0000	
(7) Liquidity	−0.0678	−0.2250	−0.2645	0.1942	0.0805	0.1884	1.0000

Abbreviations: ESGC, environmental, social and governance combined score; ROA, return on asset; ROE, return on equity.

TABLE 4 Estimates of the effect of the ESG combined inclusion on CoD, CoE and WACC

Variables	(1) CoD	(2) CoE	(3) WACC
ESGC inclusion $t − 1$	0.154**	−1.730***	−0.985***
	(0.077)	(0.161)	(0.147)
Size $t − 1$	0.111***	0.296***	−0.134***
	(0.019)	(0.041)	(0.051)
Leverage $t − 1$	0.686***	−0.261	−3.253***
	(0.155)	(0.277)	(0.897)
ROA $t − 1$	−0.002	−0.034***	−0.022***
	(0.002)	(0.006)	(0.005)
Liquidity $t − 1$	0.052***	0.051***	0.092***
	(0.012)	(0.019)	(0.0323)
Interest coverage ratio $t − 1$	−0.001		0.001***
	(0.001)		(0.001)
ROE $t − 1$		0.002	0.002***
		(0.001)	(0.001)
Year dummies	Yes	Yes	Yes
VIF < 5	Yes	Yes	Yes
Observations	13,511	14,221	13,844
R^2	0.135	0.113	0.149
Robust SEs in parentheses			

Abbreviations: CoD, cost of debt; CoE, cost of equity; ESGC, environmental, social and governance combined score; ROA, return on asset; ROE, return on equity; WACC, weighted average cost of capital.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

balance sheets. However, on the other hand, the benefits in terms of the risk decline of the firm may reduce the expected returns of shareholders.

Table 3 presents a correlation matrix for the set of explanatory variables included in the model (for the full specification). We can see that the correlation between the explanatory variables is relatively

Variables	(1) CoD	(2) CoE	(3) WACC
ESGC $t-1$	0.003	−0.011	−0.002
	(0.008)	(0.008)	(0.007)
Size $t-1$	0.037	0.046	−0.028
	(0.099)	(0.135)	(0.127)
Leverage $t-1$	0.830	−0.872	−2.479**
	(0.875)	(0.903)	(1.000)
ROA $t-1$	−0.003	−0.002	0.004
	(0.004)	(0.007)	(0.007)
Liquidity $t-1$	0.109*	−0.082	−0.027
	(0.066)	(0.094)	(0.058)
Interest coverage rate $t-1$	0.001***		−0.001
	(0.001)		(0.001)
ROE $t-1$		−0.001*	−0.001***
		(0.001)	(0.001)
Year dummies	Yes	Yes	Yes
VIF < 5	Yes	Yes	Yes
Observations	1248	1285	1274
R^2	0.262	0.089	0.141
Number of firms	478	498	496
F test	2.760	9.010	7.470
p Value (F)	<0.001***	<0.001***	<0.001***
p Hausman	<0.001***	<0.001***	<0.001***
p Lagrange	<0.001***	<0.001***	<0.001***
Robust SEs in parentheses			

TABLE 5 Estimates of the effect of the ESG combined score on CoD, CoE and WACC, for firms included in the ESGC ranking

Abbreviations: CoD, cost of debt; CoE, cost of equity; ESGC, environmental, social and governance combined score; ROA, return on asset; ROE, return on equity; WACC, weighted average cost of capital.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

low, with the benefit of excluding collinearity pathologies for regression results.

Table 4 provides the estimates of a pooled regression model investigating the effect of ESG combined inclusion on the CoD, CoE, and WACC.

Results confirm those obtained in the descriptive statistics: being equal to the other variables, the ESG combined inclusion has opposite effects on CoD with respect to CoE and WACC variables. Having an ESG combined score has little impact on the CoD: CoD increases by about 0.1 in firms rated by Thomson and Reuters Eikon with an ESG combined score. Nevertheless, that result is significantly different from zero.

Suppose the CoE and the average cost of capital is investigated. In that case, the pattern of the results is the opposite: ESGC inclusion decreases by about 2 points of the CoE, equalling all the other control variables.

When we consider WACC as the dependent variable, the results are intermediate between model (1) and model (2): ESGC inclusion decreases WACC, on average, by about 1 point.

The results of CoD are in contrast with H1, while the results of CoE and WACC fully support the research hypothesis. An explanation

for the result regarding the CoD comprises the high costs related to implementing good governance practices adopted to receive an ESG score. Instead, in the relationship with the shareholder, the benefits of social reputation and the lower level of risk perceived by the investors overcome the costs of adopting good practices related to the three pillars of CSR.

Let us consider the effect of control variables. Results generally align with expectations, even if some variables present signs that contrast with the expectations. ROA is significantly and negatively correlated with CoE and WACC, as expected. This provides further empirical evidence that firms with high asset profitability have lower capital costs. Size is negatively correlated with WACC, demonstrating that the larger the corporation, the lower the firm risk is.

Nevertheless, the result is not confirmed in models (1) and (2). Smaller coefficients concern the relationship between interest cover ratio (and ROE) and capital cost. The result regarding the ROE is the opposite of the expectations, but coefficient estimates may be sensitive to the little collinearity with ROA. Indeed, when only ROE is included in the model, the significantly negative effect disappears.

TABLE 6 Estimates of the effect of the ESG combined inclusion on CoD, CoE and WACC (Extra China subsample)

Variables	(1) CoD	(2) CoE	(3) WACC
ESGC inclusion $t-1$	−1.133***	−2.242***	−1.133***
	(0.133)	(0.313)	(0.225)
Size $t-1$	0.266***	0.712***	0.400***
	(0.030)	(0.078)	(0.057)
Leverage $t-1$	0.115	0.085	−3.752***
	(0.096)	(0.420)	(0.518)
ROA $t-1$	−0.003	−0.022*	−0.002
	(0.002)	(0.012)	(0.009)
Liquidity $t-1$	0.060***	0.053	0.041*
	(0.019)	(0.034)	(0.024)
Interest coverage ratio $t-1$	−0.001		−0.001
	(0.001)		(0.001)
ROE $t-1$		−0.001*	−0.001
		(0.001)	(0.001)
Year dummies	Yes	Yes	Yes
VIF < 5	Yes	Yes	Yes
Observations	2649	2631	1921
R^2	0.155	0.105	0.105
Robust SEs in parentheses			

Abbreviations: CoD, cost of debt; CoE, cost of equity; ESGC, environmental, social and governance combined score; ROA, return on asset; ROE, return on equity; WACC, weighted average cost of capital.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

The following model (Table 5) concentrates on the relationship between the magnitude of the ESCG combined score (when present) and the cost of capital.

The choice of discarding the missing values for the ESGC score decreases the sample size, as we have already seen in Table 1.

As shown in Table 5, the sample size had strongly fallen when ESG combined inclusion was replaced with the score level. Indeed, excluding missing values (coded with a value equal to zero for the explanatory variable in the model displayed in Table 3) reduces the sample only to firms selected regarding the availability of information about their CSR performance.

As resulted in Table 4, this kind of corporation is not representative of the entire population of listed firms in the stock exchange markets of BRICS. Still, they represent the enterprises that show a better degree of disclosure with respect to governance and sustainability issues. Indeed, those corporations are characterised by a lower CoE capital and, consequently, of the WACC.

The results of the empirical analysis led in Table 5 refer to a fixed-effects model, which is the best choice after having run an F test for the joint significance of fixed effects, the Hausman test (for the comparison between fixed effects and random effects specification), and the Lagrange Multiplier test (for the choice between a random-effects model and a pooled OLS regression). Therefore, results reported in the table favour fixed effects estimates, which are consistent and the most efficient.

As we can see from the table, the ESG combined score does not affect the dependent variables considered: CoD, CoE, and WACC. Therefore, the results do not support H2 by excluding the relationship between CSR performance and the cost of capital.

Leverage is negatively correlated with WACC instead. Although significant, the effect of the other variables is not relevant due to the scarce size of the coefficients.

Because of the high percentage of Chinese corporations included in the sample, we performed additional analyses in Tables 6 and 7, in order to investigate the effects of the inclusion in the ESG combined rating and of the score value (for the included firms) in extra-China subsamples, that is considering only enterprises which are active in Russia, India, South Africa and Brazil. As we can see from Table 6, results are totally in line with the satisfaction of H1: firms that obtained the ESGC inclusion are related to lower values of the following variables: WACC, CoE and CoD. Results in the restricted sample improve those obtained for the overall sample, showing a reduction in the CoD. Probably, in Countries where the inclusion in the ESGC ranking is most widespread (China displays a relatively low percentage of firms with ESGC inclusion, as in Table 1), the benefits of giving to the market a signal of compliance to the ESG issues overcome the accounting costs.

Table 7 substantially confirms the results of Table 5, with weak evidence of a reduction of the CoE for enterprises that show high ESGC scores. Although these results go in the direction of partial

TABLE 7 Estimates of the effect of the ESG combined score on CoD, CoE and WACC, for firms included in the ESGC ranking (Extra China subsample)

Variables	(1) CoD	(2) CoE	(3) WACC
ESGC $t-1$	0.008	−0.018*	0.003
	(0.010)	(0.010)	(0.009)
Size $t-1$	0.016	−0.001	−0.079
	(0.101)	(0.142)	(0.139)
Leverage $t-1$	1.297	−1.800*	−2.788**
	(0.996)	(0.970)	(1.159)
ROA $t-1$	−0.001	0.006	0.012
	(0.004)	(0.008)	(0.009)
Liquidity $t-1$	0.151**	−0.079	−0.020
	(0.067)	(0.095)	(0.059)
Interest coverage rate $t-1$	0.001***		−0.001
	(0.000)		(0.001)
ROE $t-1$		−0.001**	−0.001***
		(0.000)	(0.000)
Year dummies	Yes	Yes	Yes
VIF < 5	Yes	Yes	Yes
Observations	730	745	741
R^2	0.299	0.143	0.194
Number of name	238	250	250
F test	2.750	9.370	7.370
p Value (F)	<0.001***	<0.001***	<0.001***
p Hausman	0.016**	<0.001***	<0.001***
p Lagrange	<0.001***	<0.001***	<0.001***
Robust SEs in parentheses			

Abbreviations: CoD, cost of debt; CoE, cost of equity; ESGC, environmental, social and governance combined score; ROA, return on asset; ROE, return on equity; WACC, weighted average cost of capital.
***$p < 0.01$; **$p < 0.05$; *$p < 0.1$.

evidence in favour of H2, they are not enough to state that the level of the ESCG contributes to reducing costs.

6 │ CONCLUDING REMARKS

A measure of firm risk widely used in literature is given by the CoD, CoE and a weighted average of those two components, that is, the WACC. This framework consistently associates good corporate governance with lower equity and debt capital costs. The average cost of capital is also assumed to decrease when corporations implement good governance practices. This is particularly true in emerging countries, where fast-growing economies and the fast development of financial markets require increasingly solid guarantees. This explains the growing importance of a firm's CSR activity.

Recent literature focused its attention on the link between CSR performance and the CoD and the CoE capital. Indeed, if high performance in CSR improves a firm's reputation and solvency, then access to capital would be less expensive because the enterprise would be considered less risky. This argument suggests investigating the

relationship between CSR and the CoD and equity capital. In this framework, the development of ESG scores has given the proxy of CSR performance, making investigating this relationship feasible.

While results in the literature are consolidated in displaying a reduction of the cost of capital in firms with a high disclosure rate measured by ESGC pillars, the empirical evidence is not profoundly investigated. It is without definitive results concerning emerging countries. The lack of information in the documents of disclosure and the missing data concerning the ESG has not allowed the ultimate word to be written so far regarding the relationship between CSR and firm risk. Hence, this paper aims to fill the gap in this field by focusing on the enterprises listed in the stock exchange markets of BRICS countries for the period from 2014 to 2019. In addition, panel regressions were run in order to test for the significance of the relationship between CSR performance, measured through ESGC scores, and the CoD, the CoE, and the average cost of capital. The analysis was led in two directions: the first one addressed the impact of each enterprise's inclusion (or less) in the ESG combined score ranking of the Thomson Reuters Eikon database. In other words, we investigated whether having received or not a score does affect the costs of debt and equity.

This analysis is relatively coarse because it dichotomizes corporations into two groups: those with an index and those not included in the rating of ESG combined.

Nevertheless, this approach has the advantage of avoiding the loss of information for corporations without a score in the econometric analysis. The second analysis focused on the relationship between the level of the ESG combined score and the CoD/CoE/WACC. This second approach has the advantage of modulating the effectiveness of CSR performance based on the magnitude of the ESG score. However, it discards the information of enterprises with a missing value in Thomson Reuters Eikon databases.

The findings provided weak evidence of a positive relationship between the inclusion in the ESG combined database and the CoD. Nevertheless, this evidence loses significance if the China sub-sample is excluded from the analysis. Conversely, a negative and fully significant effect has been obtained for the ESG combined inclusion on the decrease of cost of equity and of average cost of capital. On the contrary, ESGC score level is not significant in affecting the cost of capital in the restricted sample of enterprises in the ESGC database.

Those results imply that ESGC score levels, at this stage of their implementation in emerging markets, regard only a small sample of selected enterprises and do not allow firms to differentiate in terms of the relationship between CSR performance and a decrease in the CoD and CoE.

In conclusion, regardless of its magnitude, having or not having a score allows for distinguishing firms that operate a form of disclosure of their internal policy in terms of sustainability. Having an ESCG combined score allows for identifying corporations with a lower CoE capital, characterised by a higher degree of solvency and lower risks for the capital invested by the shareholders.

Limitations of the analysis relate to the small number of enterprises with an ESGC score collected in the Thomson Reuters database and the consequent short time series analysed. However, this limitation could be overcome when more enterprises promote a higher level of disclosure in sustainable financial goals.

ACKNOWLEDGMENT

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REFERENCES

Abate, G., Basile, I., & Ferrari, P. (2021). The level of sustainability and mutual fund performance in Europe: An empirical analysis using ESG ratings. *Corporate Social Responsibility and Environmental Management*, 28(5), 1446–1455.

Alsayegh, M. F., Abdul Rahman, R., & Homayoun, S. (2020). Corporate economic, environmental, and social sustainability performance transformation through ESG disclosure. *Sustainability*, 12(9), 1–20.

Atan, R., Alam, M. M., Said, J., & Zamri, M. (2018). The impacts of environmental, social, and governance factors on firm performance. *Management of Environmental Quality: An International Journal*, 29(2), 182–194.

Azmi, W., Hassan, M. K., Houston, R., & Karim, M. S. (2021). ESG activities and banking performance: International evidence from emerging economies. *Journal of International Financial Markets, Institutions and Money*, 70(101277), 1–18.

Boulhaga, M., Bouri, A., Elamer, A. A., & Ibrahim, B. A. (2022). Environmental, social and governance ratings and firm performance: The moderating role of internal control quality. *Corporate Social Responsibility and Environmental Management*. https://doi.org/10.1002/csr

Cornell, B., & Shapiro, A. C. (1987). Corporate stakeholders and corporate finance. *Financial Management*, 16(1), 5–14.

Crespi, F., & Migliavacca, M. (2020). The determinants of ESG rating in the financial industry: The same old story or a different tale? *Sustainability*, 12(16), 1–20.

Eccles, R. G., Ioannou, I., & Serafeim, G. (2014). The impact of corporate sustainability on organizational processes and performance. *Management Science*, 60(11), 2835–2857.

Eliwa, Y., Aboud, A., & Saleh, A. (2021). ESG practices and the cost of debt: Evidence from EU countries. *Critical Perspectives on Accounting*, 79, 102097. https://doi.org/10.1016/j.cpa.2019.102097

Erragragui, E. (2018). Do creditors price firms' environmental, social and governance risks? *Research in International Business and Finance*, 45, 197–207.

European Parliament. (2020). Corporate social responsibility (CSR) and its implementation into EU Company law. Policy Department for Citizens' Rights and Constitutional Affairs Directorate-General for Internal Policies PE 658.541, November 2020. Retrieved from. https://www.europarl.europa.eu/RegData/etudes/STUD/2020/658541/IPOL_STU(2020)658541_EN.pdf

Fama, E. F., & French, K. R. (2002). Testing trade-off and pecking order predictions about dividends and debt. *The Review of Financial Studies*, 15(1), 1–33.

Feng, G. F., Long, H., Wang, H. J., & Chang, C. P. (2022). Environmental, social and governance, corporate social responsibility, and stock returns: What are the short-and long-run relationships? *Corporate Social Responsibility and Environmental Management*, 29(5), 1884–1895.

Freeman, R. E. (1984). *Strategic management: A stakeholder approach*. Pitman.

Friede, G., Busch, T., & Bassen, A. (2015). ESG and financial performance: Aggregated evidence from more than 2000 empirical studies. *Journal of Sustainable Finance & Investment*, 5(4), 210–233.

Korontzis, T. C. (2013). Corporate social responsibility: Impact of corporation on our lives. *European Scientific Journal*, 9(22), 301–308.

Ge, W., & Liu, M. (2015). Corporate social responsibility and the cost of corporate bonds. *Journal of Accounting and Public Policy*, 34(6), 597–624.

Gjergji, R., Vena, L., Sciascia, S., & Cortesi, A. (2021). The effects of environmental, social and governance disclosure on the cost of capital in small and medium enterprises: The role of family business status. *Business Strategy and the Environment*, 30(1), 683–693.

Hsu, B. X., Chen, Y. M., & Chen, L. A. L. (2022). Corporate social responsibility and value added in the supply chain: Model and mechanism. *Technological Forecasting and Social Change*, 174, 121302.

Johnson, R. (2020). The link between environmental, social and corporate governance disclosure and the cost of capital in South Africa. *Journal of Economic and Financial Sciences*, 13(1), 1–12.

Lagasio, V., & Cucari, N. (2019). Corporate governance and environmental social governance disclosure: A meta-analytical review. *Corporate Social Responsibility and Environmental Management*, 26(4), 701–711.

Lemmon, M. L., Roberts, M. R., & Zender, J. F. (2008). Back to the beginning: Persistence and the cross-section of corporate capital structure. *The Journal of Finance*, 63(4), 1575–1608.

López-Gracia, J., & Sogorb-Mira, F. (2008). Testing trade-off and pecking order theories financing SMEs. *Small Business Economics*, 31(2), 117–136.

Lorca, C., Sánchez-Ballesta, J. P., & García-Meca, E. (2011). Board effectiveness and cost of debt. *Journal of Business Ethics*, 100(4), 613–631.

Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, *48*(3), 261–297.

Mohammad, W. M. W., & Wasiuzzaman, S. (2021). Environmental, social and governance (ESG) disclosure, competitive advantage and performance of firms in Malaysia. *Cleaner Environmental Systems*, *2*(100015), 1–11.

Ng, A. C., & Rezaee, Z. (2015). Business sustainability performance and cost of equity capital. *Journal of Corporate Finance*, *34*, 128–149.

Nirino, N., Santoro, G., Miglietta, N., & Quaglia, R. (2021). Corporate controversies and company's financial performance: Exploring the moderating role of ESG practices. *Technological Forecasting and Social Change*, *162*, 120341.

Oh, S., Hong, A., & Hwang, J. (2017). An analysis of CSR on firm financial performance in stakeholder perspectives. *Sustainability*, *9*, 1023.

Ortiz-Molina, H., & Phillips, G. M. (2014). Real asset illiquidity and the cost of capital. *Journal of Financial and Quantitative Analysis*, *49*(1), 1–32.

Plumlee, M., Brown, D., Hayes, R. M., & Marshall, R. S. (2015). Voluntary environmental disclosure quality and firm value: Further evidence. *Journal of Accounting and Public Policy*, *34*(4), 336–361.

Raimo, N., Caragnano, A., Zito, M., Vitolla, F., & Mariani, M. (2021). Extending the benefits of ESG disclosure: The effect on the cost of debt financing. *Corporate Social Responsibility and Environmental Management*, *28*, 1412–1421. https://doi.org/10.1002/csr.2134

Ruan, L., & Liu, H. (2021). Environmental, social, governance activities and firm performance: Evidence from China. *Sustainability*, *13*(2), 1–16.

Sassen, R., Hinze, A. K., & Hardeck, I. (2016). Impact of ESG factors on firm risk in Europe. *Journal of Business Economics*, *86*(8), 867–904.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The Journal of Finance*, *19*(3), 425–442.

Sikacz, H., & Wolczek, P. (2018). ESG analysis of companies included in the respect index based on Thomson Reuters Eikon database. *Research Papers of Wrocław University of Economics*, *510*, 115–127.

Van Binsbergen, J. H., Graham, J. R., & Yang, J. (2010). The cost of debt. *The Journal of Finance*, *65*(6), 2089–2136.

Wong, W. C., Batten, J. A., Mohamed-Arshad, S. B., Nordin, S., & Adzis, A. A. (2021). Does ESG certification add firm value? *Finance Research Letters*, *39*(101593), 1–7.