REVISTA CONTABILIDADE, GESTÃO E GOVERNANÇA
E-ISSN 1984-3925 JOURNAL OF ACCOUNTING, MANAGEMENT AND GOVERNANCE

OPEN ACCESS

Responsible Editor: Rodrigo de Souza Gonçalves
Andrea de Oliveira Gonçalves
Associate Editor: Pedro Guilherme Ribeiro Piccoli
Evaluation Process: Double Blind Review pelo SEER/OJS

The ESG Impact on Companies' Value and Cost of Capital

ABSTRACT

Objective: This study analyzes the impact of adopting ESG practices on companies' value and cost of capital.
Method: The hypotheses are tested using descriptive statistics, correlation analysis, and regression models with panel data. The sample consists of 163 Brazilian companies with data obtained between 2010 and 2020.
Originality/Relevance: This study stands out for analyzing not only the relationship between the adoption of ESG practices and the creation of market value, but also for verifying whether this implies a reduction in these companies' cost of capital.
Results: The positive relationship between the ESG score and the company's value is confirmed. However, contrary to expectations, the increase in ESG scores also rise the companies' cost of capital.
Theoretical/Methodological contributions: The study proposes the use of different metrics to calculate the cost of equity, measuring the cost of capital based on two country risk indices, and manually collecting data to calculate the beta.
Social/Management contributions: The practical implication of this research refers to the need for companies to continue analyzing the financial impacts of investments made in ESG actions in the long term. In addition, corporate and public policy makers can enhance the regulatory frameworks of companies and government by incorporating ESG into investment activities – for value creation – and financing – to reduce firms' cost of capital.

Keywords: ESG. Value. Cost of capital. Country risk. Brazil

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Received: December 14, 2021
Revised: May 26, 2022
Accepted: May 27, 2022
Published: Novembro 30, 2022

How to Cite (APA)
Macedo, P.S., Rocha, P.S., Rocha E.T., Tavares, G.F., & Jucá, M.N. (2022). The ESG Impact on Companies' Value and Cost of Capital. *Revista Contabilidade, Gestão e Governança*, *25*(2), 159-175. http://dx.doi.org/10.51341/cgg.v25i2.2802

1 INTRODUCTION

In today's socially conscious market, sustainability trends change the way companies carry out their operations (Gillan, Koch, & Starks, 2021; Nizam, Ng, Dewandaru, Nagayev, & Nkoba, 2019). Sustainable practices are supported by international organizations such as the United Nations (UN), Global Reporting Initiative (GRI), Sustainability Accounting Standards Board (SASB), World Business Council for Sustainable Development (WBCSD), and Principles for Responsible Investment (PRI). These organizations define principles, guidelines, and best practices for companies to manage their operations and assets more sustainably with their stakeholders (Nizan *et al.*, 2019).

Environmental, social, and governance (ESG) practices are receiving worldwide attention since they are associated with stakeholder-oriented business, low cost of capital, and better resilience against risks associated with climate and sustainability (Breuer, Muller, Rosenbach, & Salzmann, 2018; Chauhan & Kumar, 2018; Dhaliwal, Oliver, Tsang, & Yong, 2014; Eliwa, Aboud, & Saleh, 2019; Ghoul, Guedhami, Kim, & Park, 2018; Ghoul, Guedhami, Kwok, & Mishra, 2011). Advocates of ESG-related reporting argue that such information can help investors assess the downside of companies' risks and their growth prospects. Companies that disclose information related to ESG practices are better evaluated, face fewer financial constraints, and have a lower cost of capital (Chauhan & Kumar, 2018; Cheng, Ioannou, & Serafeim, 2014; Dhaliwal *et al.*, 2014; Nizam *et al.*, 2019).

For Wong *et al.* (2021), the growing number of companies rated by ESG rating certifying bodies – such as Morgan Stanley Capital International (MSCI) ESG Research, Sustainalytics Company ESG Reports, Bloomberg ESG Data Services – suggests that these ratings are valuable to investors. About a quarter of the professionally managed investment funds in the world pay for their invested company's certification. Therefore, reducing certification costs may stimulate the demand for shares of companies adopting ESG practices, increasing their value. Other benefits related to adopting ESG practices include increased revenues and reduced expenses, contributing to more significant cash flow generation for companies (Kotler & Lee, 2005; Lo & Kwan, 2017).

In emerging countries, the interest in ESG can be verified through the creation of specific sustainability indices. The Brazilian stock exchange *Brasil, Bolsa, Balcão* (B3), for example, created the *Índice de Sustentabilidade Empresarial* (ISE) [Corporate Sustainability Index] and the *Índice Carbono Eficiente* (ICO2) [Carbon Efficient Index]. The ISE is the fourth sustainability index in the world, created in 2005. It seeks to assess economic efficiency, environmental balance, social justice, and governance, expanding the understanding of companies and groups committed to sustainability. ICO2 was created in 2010 to induce climate change discussions in Brazil. The creation of these indices is evidence of the development of the country's capital market (Cunha, Meira, Orsato, Klotzle, & Lucena, 2021; Garcia, Mendes-Da-Silva, & Orsato, 2017; Rehman *et al.*, 2021).

Against this backdrop, this study sought to verify the impact of adopting ESG practices on companies' value and cost of capital by examining a sample of 163 listed non-financial Brazilian companies. The firms adopting ESG practices were identified through Bloomberg's ESG disclosure score. The study analyzed data from 2010 to 2020 from the Federal Reserve Bank of St. Louis (FRED), Capital IQ Pro, IPEA Data, and Bloomberg. The hypotheses were tested using regression models with panel data, as follows: H1 – *The higher the ESG score, the higher the company's value*; and H2 – *The higher the ESG score, the lower the company's cost of capital*.

Unlike other studies on Brazilian companies, this one stands out for analyzing the relationship between adopting ESG practices and creating market value and verifying whether

such a relationship leads to a reduction in these companies' cost of capital. Another contribution is related to using different metrics to calculate the cost of equity, considering its book and market value. In addition, the cost of equity was measured using two country risk indices – Emerging Markets Bond Index Plus (EMBI+) and Credit Default Swap (CDS). Finally, data for calculating betas were manually collected for the 60 months before the end of each fiscal year.

Thus, this study contributes to the national debate and research on the impact of an ESG rating on companies' value and cost. The results show that for each increase of 1 ESG score, there is an increase of 0.35% in the company's value. In addition, contrary to expectations, for each increase of 1 ESG score, there is an increase of 0.4% and 0.6% in the companies' cost of capital – with equity calculated at book and market value – respectively.

These findings can call the attention of local and foreign investors – especially in the context of the global economic recession resulting from the Covid-19 pandemic. The relevance of this analysis is related to the economic measurement of the benefits the firms obtain and the verification of the development of Brazil's capital market. The results of this study also help local companies to increase their interest in obtaining ESG scores, seeking greater international insertion (Duque-Grisales & Aguilera-Caracuel, 2021).

2 LITERATURE REVIEW

The academy has debated the issue of capital structure since the 1950s. It refers to how companies finance their investments – by equity or debt. Different currents of thought have developed since the seminal study of Modigliani and Miller (1958, 1963), where the authors define assumptions that point to the irrelevance of the capital structure based on assumptions related to the existence of a perfect market – the absence of taxes, free access to financing sources, symmetry of information, absence of bankruptcy costs, among others.

This capital structure is related to the cost associated with these funding sources – equity and debt. The term cost refers to companies, while the term return refers to investors – shareholders and creditors. The capital asset pricing model (CAPM) allows obtaining the cost of equity. The shareholder's return varies according to the market risk premium. The cost of debt must be obtained, considering the tax benefit of interest received by the company's creditors – debenture holders and financial institutions. The weighted average cost of capital (WACC) indicates the investors' minimum rate of return (Sanvicente, 2012; Savoia, Securato, Bergmann, & Silva, 2019).

The theories that emerged after Modigliani and Miller's (1958) seminal study have pointed to the capital structure's relevance. Thus, some determinants contribute to identifying the company's optimal capital structure. Agency theory, information asymmetry theory, and market signaling (Azmi, Anwer, Mohamad, & Shah, 2019) are some of the theories that emerged later on. Jensen and Meckling's (1976) agency theory states that financing decisions are affected by whether the company's principals or owners delegate the administration or management of the corporation to administrators, managers, i.e., the agents (called insiders). Shareholders and investors who do not participate in the company's management are called outsider agents.

According to the agency theory, the conflict of interests between managers and shareholders stems from information asymmetry. Akerlof (1970) analyzes the reflexes of information asymmetry using the example of the North American market for used cars – the market for lemons. The author states that information tends to be distributed imperfectly among agents, making market equilibrium impossible. The notion of market signaling was developed by Spence (1973) and emerged from the information asymmetry problem faced by

the market. It seeks to clarify the market behavior regarding the signals emitted by companies, explaining the problems arising from information asymmetry and discussing aspects of the relationship between the market and companies.

Managers must seek to maximize the company's wealth and, therefore, the wealth of shareholders, considering a broader vision regarding the firm's stakeholders. However, agency theory states that it is impossible to ensure that the agent always makes the optimal financial decision from the owner's perspective. Thus, companies implement control mechanisms such as corporate governance, performance-based compensation, and indebtedness to reconcile the interests of managers with those of shareholders. This set of actions forms what is called agency costs (Azmi *et al.*, 2019).

Since the end of the 20th century, investors have favored companies that practice corporate social responsibility (CSR), seeking more profitable investments. Investments in sustainable companies generate shareholder value in the long-term, thanks to the concern of these companies to detect and face economic, social, and environmental risks (Yeh, Lin, Wang, and Wu, 2020). Thus, the capital market adherence to sustainability issues has become one of the most important business strategies for managers and investors, considering that adopting ESG practices can increase competitiveness. This movement occurs in line with advances in the socio-economic conditions of the sector in which the company participates, offering greater stability to the institution and profitability to the shareholder (Wong *et al.*, 2021).

Garcia *et al.* (2017) show that companies perform better when adopting ESG, mitigating conflicts of interest between owners and managers and increasing market value. Similarly, Chauhan and Kumar (2018) observe a positive relationship between ESG and company value. For the authors, disclosing such practices reduces agency problems between managers and owners and between controlling and minority shareholders. Hopata, Ribeiro, and Gerigk (2020) found a positive association between adherence to environmental values and company profitability. With the adoption of measures to reinforce its legitimacy as fulfilling its environmental duties, the company minimizes exaggerated reactions from the market, thanks to better risk perception. These aspects corroborate hypothesis H1 (*The higher the ESG score, the higher the company's value*).

Furthermore, for Ghoul *et al.* (2018) and Ho, Bai, Lu, and Qin (2021), socially and environmentally responsible companies have a lower cost of capital. For Azmi *et al.* (2019), Bravo-Urquiza and Moreno-Ureba (2021), and Gillan *et al.* (2021), the adoption of corporate governance policies reduces the firm's cost of capital and costs related to financial constraints. Such arguments support hypothesis H2 (*The higher the ESG score, the lower the company's cost of capital*)

Wong *et al.* (2021) state that when companies adopt ESG practices, they send a positive signal to the market, attracting potential investors by mitigating information asymmetry between shareholders and managers, which contributes to reducing agency costs and increasing the company's value. Yeh *et al.* (2020) clarify that ESG practices are effective for potential investors since they reduce information asymmetry and investment risk. Therefore, investors can make better decisions and effectively reduce the cost of capital. Such statements reiterate both hypotheses H1 and H2.

Tables 1 and 2 present a summary of the results of empirical studies related to the topics addressed in this research. The dependent variables in Tables 1 and 2 are company value and cost of capital, respectively. Table 3 presents the description of the variables. Most studies point to a positive relationship between ESG and company value (Table 1). The control variables liquidity (LIQ), leverage (LEV), and return on assets (ROA) also show signs

as expected. On the other hand, the variables size (SIZ) and tangibility (TAN) have signs contrary to expectations or with no significance.

Table 1

Synthesis of results of empirical studies – Value

Variables	ES	Aboud and Diab (2018) (a)		Aouadi and Marsat (2018) (b)		Fatemi, Glaum and Kaise (2018) (c)		Mohammade and Wasiuzzaman (2021) (d)		Wong *et al.* (2021) (e)	
		Signal	Sig	Signal	Sig	Signal	Sig	Signal	Sig	Signal	Sig
ESG	+	+	5%	+	1%	-	1%	+	5%	+	1%
SIZ	+	+	10%	-	1%	-	1%	-	1%	-	s/s
LIQ	-	n/a	n/a	n/a	n/a	n/a	n/a	-	5%	-	s/s
LEV	-	+	s/s	-	1%	-	1%	+	s/s	+	5%
TAN	+	+	s/s	n/a	n/a	n/a	n/a	n/a	n/a	-	10%
ROA	+	+	10%	+	1%	+	1%	+	1%	+	5%

Notes. Expected signals (positive or negative) of control variables are defined from empirical studies, ES = expected signal, Sig = significance level, s/s = no significance, n/a = not applicable. As for the number of companies in the sample and the market in which the research was conducted: (a) 227 Egyptian listed companies, (b) 4,312 listed companies in 58 countries, (c) 403 North American listed companies, (d) 661 Malaysian listed companies, (e) 56 Malaysian listed non-financial companies.

Table 2 indicates a negative relationship between ESG and the cost of capital (of equity, debt, or the weighted average of both). According to most empirical studies, the control variables size (SIZ) and leverage (LEV) have signals in line with expectations. On the other hand, the variables of liquidity (LIQ), tangibility (TAN), and return on assets (ROA) have a signal contrary to that expected or results without significance.

Table 2

Synthesis of results of empirical studies – Cost of capital

Variables	ES	Ghoul *et al.* (2011) (a)		Ng and Rezaee (2015) (b)		Breuer *et al.* (2018) (c)		Eliwa *et al.* (2019) (d)		Wong *et al.* (2021) (e)	
		Signal	Sig	Signal	Sig	Signal	Sig	Signal	Sig	Signal	Sig
ESG	-	-	1%	-	1%	-	10%	-	5%	-	1%
SIZ	-	-	1%	-	1%	+	1%	-	1%	+	1%
LIQ	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	+	s/s
LEV	+	+	1%	+	1%	+	1%	+	1%	-	1%
TAN	-	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	-	s/s
ROA	-	n/a	n/a	n/a	n/a	n/a	n/a	-	s/s	+	s/s

Notes. Expected signal (positive or negative) of control variables are defined from empirical studies, ES = expected signal, Sig = significance level, s/s = not significant, n/a = not applicable. As for the number of companies in the sample and the market in which the research was conducted: (a) 12,915 US-listed non-financial companies, (b) more than 3,000 US-listed companies, (c) 3,660 39 countries, (d) more than 500 listed non-financial companies from 15 European countries, (e) 56 Malaysian-listed non-financial companies.

3 METHODOLOGY

The final sample comprised 163 listed non-financial Brazilian companies. The exclusion of financial companies from the sample is due to particularities in accounting standards, the concept of debt, calculation of its cost, and specific regulations for this sector. The sample considers the period from 2010 to 2020. The variables (Table 3) were obtained from the following sources: a) Capital IQ Pro – data from accounting items, b) Federal Reserve Bank of St. Louis (FRED) – US Treasury bond yield, c) IPEA Data – EMBI+, d) Bloomberg – ESG and CDS.

The Bloomberg ESG disclosure score variable refers to a weighted average of the scores of the three dimensions, namely: environmental (33.3%), social (33.3%), and

governance (33.3%). In turn, the specific scores for each dimension are formed from a set of topics. For example, the environmental dimension score is constituted by the scores of the following topics, which weights sum 33.3%: air quality (4.78%), climate change (4.70%), ecological & biodiversity impacts (4.79%), energy (4.73%), materials & waste (4.74%), supply chain (4.79%), and water (4.79%).

The score varied between 0 and 100 – the closer to 100, the better. A score above 70 means the company is committed to adopting sustainable policies. A score below 50 associates the company with negative impacts on the environment and society in general (Bloomberg, 2022).

The econometric software used was Stata and the hypotheses were verified through descriptive statistics, correlation analysis, and regression models with panel data, as follows: H1 – *The higher the ESG score, the higher the company's value*, and H2 – *The higher the ESG score, the lower the company's cost of capital.*

Descriptive statistics identified the study variable's central values and dispersions. Correlation analysis verified the existence of a possible high correlation between the dependent and explanatory variables of the regression models and possible high multicollinearity among their explanatory variables (Stock & Watson, 2019).

As for the regression, a test was carried out first to verify the adequate model type. The result points to a model with panel data, not cross-section or pooled data. The panel data regression model analyzed the same group of individuals over time (Baltagi, 2021; Cameron & Trivedi, 2010; Gujarati & Porter, 2008; Stock & Watson, 2019).

Next, the Hausman test was carried out to identify the type of residuals and the fixed effect (Cameron & Trivedi, 2010; Gujarati & Porter, 2008; Wooldridge, 2019). Subsequently, assumption tests were carried out to verify heteroscedasticity problems – Breusch Pagan – and serial autocorrelation – Durbin Watson. After identifying both problems, they were corrected using robust errors (Hoechle, 2007) and Driscoll and Kraay's matrix (1998).

Hypotheses H1 (value) and H2 (cost of capital) were tested using Equations 1 and 2, respectively. Table three describes the variables.

$$TOBQ_{it} = \alpha_0 + \alpha_1 ESG_{it} + \alpha_2 \text{ Control variables}_{it} + \varepsilon_{it} \quad (1)$$

$$WACC_{it} = \alpha_0 + \alpha_1 ESG_{it} + \alpha_2 \text{ Control variables}_{it} + \varepsilon_{it} \quad (2)$$

Where: i = Company; t = Time; ε_{it} = Residuals

The variable weighted average cost of capital (WACC) (Equation 3) was analyzed considering the book and market value of equity. When calculating the CAPM (Equation 4) the rate representing Brazil's country risk was measured using two indicators – Credit Default Swap (CDS) and Emerging Market Bond Index Plus (EMBI+). The after-tax cost of debt was obtained by the ratio between interest expenses and the principal of the company's total debt. From this gross interest rate, the effect of the tax benefit on the debt was discounted (Equation 5).

$$WACC = [(EQ/V) * Ke] + [TD/V) * Ki] \quad (3)$$

$$CAPM = Rf + Beta\ (Rm-Rf) + Country\ risk \quad (4)$$

$$Ki = Kd * (1 – IR) \text{ e } Kd = EI/TD \quad (5)$$

Where: EQ = book value of equity and market value (number * price of shares); TD = total debt; V = Total value of the capital structure (EQ + TD); Ke = Cost of equity or CAPM; Ki = After-tax cost of debt; Rf = US risk free rate livre or Treasury bond yield of 10 years; Rm = US market return or S&P500; Country risk of Brazil, obtained via EMBI+ and CDS

Table 3
Description of variables

Dependent variables				
	Description	Formula	Components	Ref.
TOBQ	Tobin's Q (a)	TQ = (MVE) + TD) / TA	MVE = Market value of equity = number of shares * price of shares TD = Total short and long-term debt TA = Total asset	(f)
WACC	Weighted average cost of capital (e)	WACC = [(EQ/V) * Ke] + [TD/V) * Ki] V = EQ + TD CAPM = Ke = Rf + Beta (Rm-Rf) + country risk Beta = $COV_{Rj,Rm}$/ VAR_{Rm} Ki = Kd * (1-T) Kd = IE/TD	EQ = Book and market value of equity (a) TD = Total short and long-term debt (a) V = Capital structure value Ke = Cost of equity (CAPM) Rf = United States Treasury bond rate with maturity of 10 years, obtained on the last day of each year (b) COV = Covariance VAR = Variance Rj = Stock monthly return in the last 60 months (a) Rm = S&P500 monthly return of the last 60 months (a) Country risk = EMBI+ (c) and CDS (d), obtained on the last day of each year Ki = After-tax cost of debt T = Tax rate (statutory rate of 34%) IE = Interest expense	(g)
Independent variable				
ESG	Environmental, social and corporate governance (d)	ESG disclosure score	The scores varied from 1 to 100	(h)
Control variables				
SIZ	Size (a)	SIZ = Ln TA	Ln = Napierian logarithm TA = Total asset	(i)
LIQ	Liquidity (a)	LIQ = CE/TA	CE = Cash and equivalents TA = Total asset	(j)
LEV	Leverage (a)	LEV = DT/TA	TD = Total short and long-term debt TA = Total asset	(k)
TAN	Tangibility (a)	TAN = NPPE/TA	NPPE = Net property, plant and equipment TA = Total asset	(l)
ROA	Return on assets (a)	ROA = NI/TA	NP = Net income TA = Total asset	(m)

Notes:
(a) Source: Capital IQ Pro
(b) Source: Federal Reserve Bank of St. Louis (FRED)
(c) Source: EMBI+: IPEA Data
(d) Source: CDS and ESG: Bloomberg
(e) The dependent variable WACC is calculated in four different ways: i) WBVEMB – WACC at book value with the country risk being the EMBI+; ii) WBVCDS - WACC at book value with the country risk being the CDS; iii) WMVEMB - WACC at market value with the country risk being the EMBI+; iv) WMVCDS - WACC at market value with the country risk being the CDS.

References:
(f) Aouadi and Marsat (2018); Fatemi, Glaum and Kaiser (2018); Mohammade and Wasiuzzaman (2021); Wong *et al.* (2021)
(g) Kling, Volz, Murinde and Ayas (2021); Wong *et al.* (2021).
(h) Eliwa *et al.* (2019); Gillan *et al.* (2021); Wong *et al.* (2021)
(i) Eliwa *et al.* (2019); Gillan *et al.* (2021); Wong *et al.* (2021)
(j) Wong *et al.* (2021)
(k) Eliwa *et al.* (2019); Mohammade and Wasiuzzaman (2021); Wong *et al.* (2021)
(l) Aboud e Diab (2018); Wong *et al.* (2021)
(m) Eliwa *et al.* (2019); Mohammade and Wasiuzzaman (2021); Wong *et al.* (2021)

4 RESULTS

Table 4 presents the result of the descriptive statistics. The sum of the market value of equity and the book value of debt is greater than the companies' total assets – Tobin's Q (105%). This means a positive perspective on their operating results. As for the dependent variable cost of capital, the average of the WACC at market value (11%) is slightly higher than its book value (10%), which corroborates the appreciation presented by Tobin's Q.

The number of observations of the independent variable ESG score is limited (830), around half of the total observations of the other variables (above 1,700). Of the 163 companies, only 80 have an ESG score. This happened because Brazil is in an early stage regarding the adoption of these practices, and companies still have to develop a better perception of the relevance of measuring and disclosing these data to global markets. Further evidence of this characteristic is the average of the scores – 38.39. On a scale of 1 to 100, the highest score obtained by a Brazilian company was 73.14.

As for the control variables of the companies, the results showed averages of size (USD 5.9 billion of total assets), liquidity (9%), leverage (30%), tangibility (26%), and return on assets (6%). This information indicates the companies' solvency and good performance.

Table 4

Descriptive statistics

Variables	Number of observations	Average	Standard deviation	Minimum	Maximum
TOBQ	1,771	1.0581	0.9068	0.0005	5.8529
WBVEMB	1,793	0.1076	0.0496	0.0001	0.3255
WBVCDS	1,793	0.1041	0.0494	0.0001	0.3199
WMVEMB	1,755	0.1138	0.0570	0.0042	0.4078
WMVCDS	1,755	0.1106	0.0565	0.0042	0.4078
ESG	830	38.3893	16.4934	0.8264	73.1405
SIZ (USD million)	1,793	5,920.40	23,503.52	4.79	326,596.00
LIQ	1,791	0.0940	0.0993	0.0000	0.7907
LEV	1,714	0.3004	0.1732	0.0001	0.8900
TAN	1,715	0.2599	0.2151	0.0000	0.9157
ROA	1,793	0.0633	0.0680	0.0001	1.2395

Table 5 shows the coefficient value and significance level of the correlations between the variables. The ESG score variable presents a negative correlation with the Tobin's Q variable, which was contrary to expectations, and with the WACC, as expected. These results contradict the regression models (Tables 6 and 7). The inversion of signals (positive/negative) occurred because of the combined effect of the other variables of the econometric models (Equations 1 and 2). As for the control variables, there is no evidence of high levels of positive correlations that could indicate the presence of high multicollinearity.

Table 6 shows the confirmation of H1 (*The higher the ESG score, the higher the company's value*), with the dependent variable Tobin's Q. The econometric model is statistically significant (Prob > F = 0.0033). Autocorrelation problems are corrected via the Driscoll and Kraay (1998) matrix. The variable ESG score has a positive and significant coefficient at the level of 10%. For every 1 ESG score increase, there is a 0.35% increase in company value (TOBQ). The statistical significance level of 10% – and the reduced number of observations (774) of the model – result from the data limitation of the ESG score variable. This result corroborates those of Aboud and Diab (2018), Aouadi and Marsat (2018), Mohammade and Wasiuzzaman (2021), and Wong *et al.* (2021) (Table 1), indicating that the adoption of ESG practices adds value to companies.

Table 5
Correlation analysis

	TOBQ	WBVEMB	WBVCDS	WMVEMB	WMVCDS	ESG	SIZ	LIQ	LEV	TAN	ROA
TOBQ	1										
WBVEMB	0.17 0.00	1									
WBVCDS	0.16 0.00	0.99 0.00	1								
WMVEMB	0.22 0.00	0.83 0.00	0.82 0.00	1							
WMVCDS	0.20 0.00	0.82 0.00	0.83 0.00	0.99 0.00	1						
ESG	-0.14 0.00	-0.13 0.00	-0.13 0.00	-0.10 0.00	-0.11 0.00	1					
SIZ	0.00 0.69	-0.09 0.00	-0.08 0.00	-0.07 0.00	-0.07 0.00	0.45 0.00	1				
LIQ	0.07 0.00	-0.02 0.22	-0.03 0.15	0.00 0.88	-0.00 0.86	-0.03 0.35	-0.13 0.00	1			
LEV	-0.03 0.12	-0.30 0.00	-0.27 0.00	-0.25 0.00	-0.23 0.00	0.05 0.14	0.32 0.00	0.00 0.91	1		
TAN	-0.13 0.00	-0.10 0.00	-0.10 0.00	-0.08 0.00	-0.08 0.00	0.13 0.00	0.02 0.27	-0.07 0.00	0.05 0.02	1	
ROA	0.28 0.00	0.07 0.00	0.06 0.00	0.06 0.00	0.05 0.01	-0.12 0.00	-0.17 0.00	0.02 0.21	-0.20 0.00	-0.12 0.00	1

Notes: Higher values correspond to the correlation coefficient, while lower values correspond to the level of significance. The values highlighted in bold have statistical significance at the 1% or 5% level.

Table 6
Regression with panel data – TOBQ

Regression with Driscoll-Kraay standard errors	F(6, 10) = 7.32
Method: Fixed-effects regression	Prob > F = 0.0033
Number of observations = 774	within R^2 = 0.0357
Number of groups = 94	

TOBQ	Coeff	Drisc/Kraay Std. Err.	t	P > |t|	[95% Conf.	Interval]
ESG	0.0035	0.0018	1.94	0.081 *	-0.0005	0.0075
SIZ	0.0225	0.1075	0.21	0.838	-0.2169	0.2621
LIQ	1.0802	0.2800	3.86	0.003 ***	0.4563	1.7041
LEV	-0.3741	0.2723	-1.37	0.199	-0.9808	0.2325
TAN	0.3458	0.2956	1.17	0.269	-0.3128	1.0044
ROA	1.2722	0.8208	1.55	0.152	-0.5566	3.1012
_cons	0.7488	0.9359	0.80	0.442	-1.3364	2.8342

Notes: Statistical significance levels of 1% (***) and 10% (*)
The number of 774 observations differs from that reported in Table 4 – Descriptive statistics. This happens because the software Stata eliminates all observations with a missing value when running the regression tests for any variables considered in the model. The ESG variable has only 830 observations. In addition, 56 observations were excluded due to the lack of values, 15 of leverage, and 41 of tangibility (830 - 15 - 41 = 774 observations).

Table 7 presents the analysis of H2 (*The higher the ESG score, the lower the company's cost of capital*) through 4 models with different WACC dependent variables, namely: a) Model 1 – WACC with a book value of equity and country risk calculated via EMBI+ (wbvemb); b) Model 2 – WACC with a book value of equity and country risk calculated via CDS (wbvcds); c) Model 3 – WACC with a market value of equity and country risk calculated via EMBI+ (wmvemb), and d) Model 4 – WACC with a market value of equity and country risk calculated via CDS (wmvcds). The models are all statistically significant (Prob > F = 0.0000). Heteroscedasticity issues were corrected via robust errors.

Contrary to expectations, there is a positive relationship between adopting ESG practices and the companies' cost of capital. The statistical significance of this relationship is 5% for WACC variables with a book value of equity and 1% for those with a market value of equity. For each increase of 1 ESG score, there is an increase of 0.4% and 0.6% in the companies' cost of capital (WACC), with equity calculated at book and market value, respectively. Therefore, H2 was not confirmed.

Regarding equity values, there is a greater statistical significance of the WACC with a market value of equity (1%) than that calculated at book value (5%). As for the use of country risk indices, there are no significant differences between EMBI+ and CDS, which points to the use of both interchangeably. These analyses are related to the independent variable ESG score.

As for the control variables, leverage has a negative relationship with WACC, similar to the study by Wong *et al.* (2021) (see Table 2). The negative impact of the indebtedness ratio on the cost of capital contradicts the seminal article by Modigliani and Miller (1958) and confirms the conventional theory on capital structure. One possible explanation for this observation is that due to the unique characteristics of the financial market in Brazil (marked by high interest rates), companies use an optimal capital structure to mitigate their WACC because of the benefit of tax deduction of debts.

The negative relationship between tangibility and return on assets with WACC confirms the trade-off theory. This suggests that companies with a greater volume of tangible assets and more profitable reduce the risk of bankruptcy, lowering the cost of capital. Thus, for every 1% increase in TAN and ROA, there is a reduction of 0.08% and 0.05%, respectively, in the companies' WACC.

Table 7

Regressions with panel data – WACC

Fixed-effects/ Robust std. err.	Number of obs = 774 Number of groups = 94 F(6, 93) = 7.61 Prob > F = 0.0000 within R^2 = 0.1278		Number of obs = 774 Number of groups = 94 F(6, 93) = 7.45 Prob > F = 0.0000 within R^2 = 0.1231		Number of obs = 774 Number of groups = 94 F(6, 93) = 6.17 Prob > F = 0.0000 within R^2 = 0.0888		Number of obs = 774 Number of groups = 94 F(6, 93) = 6.34 Prob > F = 0.0000 within R^2 = 0.0869	
Models/ dependent variables	WACC book value 1 - WACC EMBI+/ WBVEMB		2 - WACC CDS/ WBVCDS		WACC market value 3 - WACC EMBI+/ WMVEMB		4 - WACC CDS/ WMVCDS	
Variables	Coef.	P > |t|	Coef.	P > |t|	Coef.	P > |t|	Coef.	P > |t|
ESG	0.0004	0.011 **	0.0004	0.015 **	0.0006	0.002 ***	0.0006	0.002 ***
SIZ	0.0025	0.740	0.0028	0.691	0.0086	0.184	0.0089	0.144
LIQ	-0.0012	0.971	-0.0064	0.846	0.0096	0.826	0.0023	0.956
LEV	-0.1347	0.000 ***	-0.1281	0.000 ***	-0.1078	0.000 ***	-0.1045	0.000 ***
TAN	-0.0858	0.041 **	-0.0865	0.035 **	-0.0857	0.041 **	-0.0850	0.033 **
ROA	-0.0584	0.023 **	-0.0581	0.022 **	-0.0601	0.005 ***	-0.0589	0.004 ***
_cons	0.1365	0.049 *	0.1297	0.053 *	0.0752	0.195	0.0706	0.194

Notes: Statistical significance levels of 1% (***), 5% (**) and 10% (*)

The number of 774 observations differs from that reported in Table 4 – Descriptive statistics. This happens because the software Stata eliminates all observations with a missing value when running the regression tests for any variables considered in the model. The ESG variable has only 830 observations. In addition, 56 observations were excluded due to the lack of values, 15 of leverage, and 41 of tangibility (830 - 15 - 41 = 774 observations).

5 DISCUSSION OF RESULTS

The confirmation of H1 (Table 6) corroborates the results of Aboud and Diab (2018), Aouadi and Marsat (2018), Mohammade and Wasiuzzaman (2021), and Wong *et al.* (2021), indicating value added for companies adopting ESG practices.

The results show that for each increase of 1 ESG score, there is an increase of 0.35% in the company value (TOBQ). Concerning the results obtained by these other studies, Brazil has the lowest impact on creating value for companies, with: 16.5% (Aboud & Diab, 2018) for Egyptian companies, 4.4% (Mohammade & Wasiuzzaman, 2021), and 31.9% (Wong *et al.*, 2021) for Malaysian firms.

This fact confirms the importance of adopting sustainability practices, showing regulators in the Brazilian market – and in other developing countries – the benefits of measuring ESG scores.

However, the non-confirmation of H2 differs from the results of other empirical studies. Despite the statistical significance of the coefficient, its practical effect is smaller than in samples from other countries. For each increase of 1 ESG score, there is an increase of 0.04% to 0.06% in Brazilian companies' cost of capital (WACC). As for the other studies mentioned in Table 2, an increase of 1 in the ESG score reduces the cost of capital by: 1.2% (Wong *et al.*, 2021) for Malaysian non-financial companies, 5.9% (Ghoul *et al.*, 2011) for US non-financial companies, and 2.4% (Breuer *et al.*, 2018) for companies from 39 countries.

Adopting sustainable practices such as best practices in governance is an alternative to mitigating companies' information asymmetry, especially for more aggressive and risk-taking firms. At a later stage, these companies expect to reduce their cost of capital and increase the net value of their investment projects (Garcia *et al.*, 2017).

According to Cornell and Damodaran (2020), company risk means the uncertainty regarding its future results, which is captured by the cost of capital. However, for the authors, some companies benefit from being socially responsible. However, there are others for which adopting ESG practices creates operational costs without compensating benefits, such as reducing the cost of capital.

Another possible explanation is that there are only 830 observations of the ESG score variable. Brazil is still at an early stage of adopting these practices. Its development depends on increasing companies' perception of the relevance of measuring and disclosing such data to the global markets.

6 CONCLUSION

ESG practices in Brazil are gaining relevance in companies. One example of this evolution is the creation of sustainability indices in the Brazilian Stock Exchange B3 (ISE and ICO2). Some advantages of adopting these practices are improving the company's image, growth of investor confidence, attraction and retention of talent, and, above all, improvement of financial performance. However, this process is still incipient in Brazil, raising valid questions about its effectiveness in the country.

Therefore, this study aimed to verify the impact of adopting ESG practices on companies' value and cost of capital. A sample of 163 listed non-financial Brazilian companies was examined, gathering 80 companies with ESG scores. Data were obtained from 2010 to 2020 from the databases of the Federal Reserve Bank of St. Louis, Capital IQ Pro, IPEA Data, and Bloomberg and the hypotheses were verified using descriptive statistics, correlation analysis, and regression models with panel data.

The results confirmed H1. On average, for every 1 ESG score increase, there is a 0.35% increase in company value (TOBQ). This corroborates studies on the legitimacy of corporate responsibility, especially for companies in sensitive sectors, which tend to disclose their ESG performance to protect their reputation. For the others, it is an incentive to continue in the process of implementing ESG practices.

However, hypothesis H2 was not confirmed, contrary to expectations. On average, for each increase of 1 ESG score, there is an increase of 0.4% and 0.6% in companies' cost of capital (WACC), with book and market value of equity, respectively. This result may be explained by the fact that for some companies, adopting ESG practices creates operational costs without compensating benefits, initially raising the cost of capital. However, the expectation is that analysis over a more extended period would confirm H2.

Regardless of the results, this study differs from others because it analyzes the impact of adopting ESG practices on the value of shares and the cost of capital of listed non-financial Brazilian companies. Another contribution refers to using different metrics for calculating equity, considering book and market value. In addition, the cost of equity (CAPM) was measured using two country risk indices, the EMBI+ and CDS. Finally, data for calculating betas were manually collected for the 60 months before the end of each fiscal year.

Therefore, the results presented have academic and practical implications. The statistical significance of the relationship between ESG, value, and cost of capital supports the idea that the market plays a vital role in motivating companies to adopt sustainable practices. The sustainability efforts can result in managing resources more efficiently. In addition, they enable companies to manage their businesses better, providing solutions to society's problems.

Another practical implication is the need for companies to continue analyzing the impact of their investment financing policy, carried out in ESG actions in the long term. Furthermore, corporate and public policymakers can improve corporate and government regulatory frameworks by incorporating ESG into investment activities for value creation and financial activities to reduce the cost of capital.

Among the limitations of this study, we highlight the small number of observations of the ESG score variable (830) in Brazil compared to the other variables of the econometric models – above 1,700. The development of this theme may benefit from a) analysis of the impact of the ESG on each type of a company's capital (equity and debt); b) consideration of the three distinct ESG scores – environmental, social, and governance as independent variables; c) review of ESG regulatory issues in small companies; and d) comparison of the financial performance of companies that adopt ESG practices between emerging and developed countries.

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ACKNOWLEDGMENT

This study was partially funded by the *Fundo Mackenzie de Pesquisa e Inovação* [Mackenzie Research and Inovation Fund] – Project 221009 – MACK – 0008306.

O Impacto do ESG no Valor e Custo de Capital das Empresas

RESUMO

***Objetivo**: Este estudo tem por objetivo verificar o impacto da adoção de práticas de ESG no valor e custo de capital das empresas.*

***Método:** As hipóteses são verificadas por meio de estatística descritiva, análise de correlação e modelos de regressão com dados em painel. A amostra é composta por 163 companhias brasileiras com dados obtidos entre 2010 e 2020.*

***Originalidade/Relevância:** Este estudo destaca-se por analisar não apenas a relação entre a adoção de práticas de ESG e a criação de valor de mercado, mas também por verificar se esse fato implica na redução do custo de capital dessas empresas.*

***Resultados:** Confirma-se a relação positiva entre o score de ESG e o valor da empresa. Entretanto, ao contrário do esperado, verifica-se que a melhoria dos scores do ESG também eleva o custo de capital das empresas.*

***Contribuições teóricas/metodológicas**: Uso de métricas distintas para cálculo do custo de capital próprio, mensuração do custo do capital por meio de dois índices de risco país e coleta manual de dados para cálculo do beta.*

***Contribuições sociais/para a gestão**: A implicação prática dessa pesquisa refere-se à necessidade de as companhias brasileiras seguirem analisando os impactos financeiros dos investimentos realizados nas ações de ESG - no longo prazo. Além disso, os formuladores de políticas corporativas e públicas podem aprimorar as estruturas regulatórias das empresas e do governo na incorporação do ESG em atividades de investimento - para criação de valor - e de financiamento – para redução do custo de capital das instituições.*

***Palavras-chave**: ESG. Valor. Custo de capital. Risco país. Brasil.*

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Recebido: Dezembro 14, 2021
Revisado: Maio 26, 2022
Aceito: Maio 27, 2022
Publicado: Novembro 30, 2022