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Original Article

The relationship between ESG and binancial performance in brazilian companies

A Relação entre ESG e desempenho financeiro em empresas brasileiras

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ABSTRACT

Purpose: The aim of this research is to analyze the relationships between the environmental, social, and governance (ESG) dimensions and the financial performance of listed companies of the Corporate Sustainability Index (ISE) of the Brasil, Bolsa, Balcão (B3) Stock Exchange.
Design/methodology/approach: The research sample consists of data from 46 companies from 2016 to 2020, resulting in a panel with 159 observations. Panel data regressions with mixed modeling were adopted to analyze the relationships between each ESG dimension and the interaction between the three ESG dimensions and financial performance, measured by ROA, ROE, and market value.
Findings: The findings show a positive and significant relationship between the social dimension and ROE. This study reinforces stakeholder theory as a framework for analyzing ESG performance and its relationship with financial performance.
Practical implications: The managerial contribution presents evidence that the strategic practices for relationship and value creation for stakeholders contribute to financial performance.
Originality/value: This research contributes with evidence of a positive relationship between the social dimension and financial performance, analyzing the relationship between the ESG factors and financial performance in Brazilian ISE companies. It also reinforces the context of emerging markets in analyzing ESG and financial performance. Finally, it provides a structured analysis of ISE/B3 data, which allows the identification of the ESG practices of Brazilian sustainability index companies.

Keywords: Financial performance; Environmental; Social; Governance; Stakeholders

RESUMO

Objetivo: Esta pesquisa tem como objetivo analisar as relações entre as dimensões ambiental, social e de governança (ESG) e o desempenho financeiro de empresas listadas que compõem o Índice de Sustentabilidade Empresarial (ISE) da Bolsa de Valores Brasil, Bolsa, Balcão (B3).
Desenho/Método/Abordagem: A amostra pesquisa é composta por 46 empresas no período de

2016 a 2020, resultando em um painel com 159 observações. Regressões para dados em painel com modelagem mista foram adotadas para analisar as relações entre cada dimensão ESG e a interação entre as três dimensões ESG e o desempenho financeiro, mensurado pelo ROA, ROE e valor de mercado. **Resultados:** Os resultados revelaram uma relação positiva e significante entre a dimensão social e o ROE. Este estudo reforça a teoria dos stakeholders como framework de análise do desempenho ESG e sua relação com o desempenho financeiro.
Implicações práticas: A contribuição gerencial é apresentar evidências de que as práticas estratégicas para relacionamento e criação de valor para *stakeholders* contribuem para o desempenho financeiro.
Originalidade/Valor: A pesquisa contribui apresentando evidências da relação positiva entre a dimensão social e o desempenho financeiro, analisando a relação entre ESG e desempenho financeiro nas empresas brasileiras. Contribui analisando o contexto de países emergentes na relação entre ESG e desempenho financeiro. Por fim, fornece uma análise dos dados do ISE/B3 de forma estruturada, o que permite a identificação das práticas ESG das empresas do ISE.

Palavras-chave: Desempenho financeiro; Ambiental; Social; Governança; Partes interessadas

1 INTRODUCTION

The term ESG (environmental, social, and governance) emerged in 2004, referring to adopting environmental, social, and governance criteria, becoming a strategic part, and directly influencing the results of companies in various sectors (Ungaretti, 2020). The ESG approach aims to integrate the environmental, social, and governance dimensions in the capital market (Wang, Pan, Feng, & Du, 2023). Investors are increasingly interested in companies that demonstrate exemplary performance in these areas, as such factors have become drivers for assessing the sustainability of the global economy (Miroshnychenko, Barontini, & Testa, 2017). Consequently, a growing focus has been on integrating ESG practices within companies (Gangi, Daniele, Varrone, Coscia, & D'Angelo, 2024).

The ESG concept emphasizes that companies can generate profits while creating value for all stakeholders affected by their activities. Therefore, the concept is aligned with stakeholder theory, considering that stakeholders influence organizations to consider economic, social, and environmental aspects in organizational decisions (Cararo & Basso, 2021; Huang, 2021). The ESG indicators could provide a way to create value for stakeholders. Also, stakeholder theory suggests that firms facing higher

implicit costs from socially irresponsible actions will ultimately suffer greater explicit costs, undermining competitiveness, which explains how stakeholder theory supports the ESG concept (Truong, 2024).

ESG indicators were developed to optimize economic gains (Luca Ribeiro & Lima, 2022). In this scenario, there is a need to understand how these dimensions affect companies' financial performance, which can offer valuable insights for investors, managers, and society in general. ESG practices have a market orientation, considering that ESG factors are associated with the competitiveness of companies, leading to increased financial performance through socio-environmental practices (Miroshnychenko et al., 2017) and the creation of competitive advantages by meeting stakeholder demands (Barakat, Mascena, Sarturi, & Takenouchi, 2019). Many studies investigate how ESG factors are related to financial performance (Macedo, Rocha, Rocha, Tavares, & Jucá, 2022), but the synergy between the factors is also relevant, considering that joint performance in ESG dimensions can increase the financial performance of organizations (Xie, Nozawa, Yagi, Fujii, & Managi, 2019; Barko, Cremers, & Renneboog, 2022).

Although the literature has advanced in understanding the relationship between ESG and financial performance, contextual aspects are still relevant for understanding this relationship in emerging economies (Truong, 2024). Companies in emerging economies may present different results for the ESG-financial performance relationship than companies in the global north (Mishra, Patro, & Tiwari, 2024; Truong, 2024). In general, these countries are characterized by resource constraints that focus stakeholder management on creating value for a greater number of stakeholders rather than maximizing value for the shareholder (Truong, 2024). Considering the challenge of creating value for stakeholders through the relationship between ESG performance and financial performance, this study aims to understand this gap in the Brazilian context.

This article aims to analyze the relationship between the environmental, social, and governance dimensions and the financial performance of listed companies. The research sample consists of 46 companies from different sectors that comprise the Corporate Sustainability Index (ISE) of the Brasil, Bolsa, Balcão (B3) Stock Exchange from 2016 to 2020, resulting in a panel with 159 observations. In Brazil, ISE/B3 highlights companies' ESG actions, demonstrating their commitment to sustainability (Pereira, Stocker, Mascena, & Boaventura, 2020). The companies' responses to the ISE questionnaire were used to obtain companies' ESG performance over time. Panel data regressions with mixed modeling were adopted to analyze the relationships between each ESG dimension and the interaction between the three ESG dimensions and financial performance, measured by ROA, ROE, and market value.

This research provides three contributions. First, it analyzes the relationship between each ESG factor individually and financial performance, finding a positive and significant relationship for the social dimension. This evidence contributes to strengthening stakeholder theory as a framework for analyzing ESG performance in companies from emerging market contexts. Second, it analyzes the relationship between the interaction of ESG factors and financial performance in Brazilian companies and reinforces evidence that this relationship is not statistically significant, reinforcing the contextual factor of emerging markets in the analysis of the integrated relationship of factors. Third, it provides an analysis of ISE/B3 data in a structured way, which allows the identification of the ESG practices of the companies that make up the Brazilian sustainability index.

2 THEORETICAL FRAMEWORK AND HYPOTHESES

Companies' involvement with ESG has been increasingly evident and influenced by external and institutional factors (Kuzey, Al-Shaer, Karaman, & Uyar, 2023). ESG dimensions are considered when evaluating company performance, and their disclosure can be a source of competitive advantage (Xie et al., 2019). Therefore,

companies invest in the development of ESG practices and in monitoring and reporting the performance obtained in each dimension.

The environmental dimension involves the development of policies to conserve energy and natural resources, reduce the use of fossil fuels and pollutant emissions, replace non-renewable products with renewable ones, and increase product efficiency (Pereira, Silva, & Carbonari, 2017). The strategies applied in environmental management aim to reduce or eliminate environmental negative impacts (Melo, Batista, Macedo, & Costa, 2013).

The social dimension covers work policies, diversity, employee engagement, human rights, community relations, and social inclusion (Ungaretti, 2020). This dimension concerns people's well-being and quality of life (Pereira et al., 2017). These factors also measure how companies deal with consumers, considering ethical, legal, and social issues (Redecker & Trindade, 2021).

The governance dimension is associated with practices that bring confidence to the market and related parties through transparency and equal treatment of investors (Brasil, Bauer & Coletti, 2020). Good governance practices and high levels of corporate governance can positively impact corporations' market value (Caixe & Krauter, 2014).

Different types of sustainability reports and ESG rantings could disclose the ESG practices. In Brazil, the ISE is a stock index that measures the average performance of companies listed on B3 regarding corporate sustainability criteria, including environmental, social, and corporate governance issues (B3, 2021). The ISE B3 is used as an indicator for companies that want to improve their reputation and performance on ESG issues and foster a scenario guided by the pursuit of sustainable organizational development (Guimarães, Peixoto, & Carvalho, 2017). The ISE has a dual purpose: to support investors in their decisions and highlight the companies that are part of it, conveying to the market that these companies have more significant social responsibility (Silva & Lucena, 2019). In addition, the ISE drives voluntary environmental initiatives by companies, which align sustainability with their corporate strategies (Orsato,

Garcia, Mendes-Da-Silva, Simonetti, & Monzoni, 2015). In addition, when comparing the performance of companies that are part of the ISE with those that are not, the former performs significantly better, highlighting the importance of being included in the ISE (Castro, 2017). This shows that being part of this index reflects a commitment to social responsibility and can also be a determining factor for a more solid and successful business performance (Silva & Lucena, 2019). The ISE also provides a form of evaluation that encourages sustainability measurement. This measurement is a complex company activity (Kwatra, Kumar, Sharma, & Sharma, 2021).

2.1 Environmental Dimension and Financial Performance

The environmental dimensions, with an emphasis on sustainability, cover policies for conserving energy and natural resources, reducing the use of fossil fuels and pollutant emissions, replacing non-renewable products with renewable ones, and improving efficiency in the use of products (Pereira et al., 2017). Environmental disasters have highlighted the importance of these dimensions for sustainability, economic performance, and the well-being of society (Prudêncio, Forte, De Luca, & de Vasconcelos, 2019).

The environmental dimension of the ISE involves assessing the company's environmental management, including sustainability policies, processes, and practices. Also considered are greenhouse gas (GHG) emissions and strategies to reduce them, such as energy efficiency, the use of renewable energies and low-carbon technologies (B3, 2021). In addition, waste management, conservation of natural resources, mitigation of significant environmental impacts, and transparency in the information disclosed about environmental practices, such as sustainability reports and environmental performance indicators, are analyzed (Moura, 2023).

Incorporating the environmental dimension into corporate sustainability results in significant performance benefits. Companies with proven environmental practices can access loans with lower interest rates than those without such proof (Shabbir &

Wisdom, 2020). This adaptation of the criteria allows for a more accurate and relevant assessment of the environmental performance of companies in their respective sectors (B3, 2021).

Financial indicators such as ROA (return on assets), ROE (return on equity), market value, and Tobin's Q are used to assess the financial performance of companies (Boaventura, Silva, & Bandeira-de-Mello, 2012). Therefore, by adopting ESG practices, a company values issues beyond profit and is also concerned with maintaining a more sustainable economic performance that is increasingly relevant to the market value of companies (Redecker & Trindade, 2021). Therefore, companies that commit to these factors can be considered more valuable (Ungaretti, 2020). In this sense, it is relevant to analyze this relationship in the Brazilian context in the long term, defining the first hypothesis:

H1: The environmental dimension positively influences the financial performance of companies listed on the Brazilian stock exchange's ISE.

2.2 Social Dimension and Financial Performance

The social dimension covers evaluating policies, practices, and processes related to the company's social responsibility and sustainability (Ungaretti, 2020). In this context, initiatives to promote equity, diversity, and inclusion within the organization are considered, primarily focusing on human well-being and the quality of life of the community and employees (Pereira et al., 2017).

The criteria applied in the social dimension of the ISE can vary according to each sector, considering the specific impacts and challenges related to social responsibility and sustainability (B3, 2021). For example, companies in the manufacturing sector are evaluated based on their social responsibility policies, such as corporate responsibility programs and engagement with local communities. On the other hand, companies in the service sector can be assessed for their practices to promote diversity and inclusion in the workplace (Taliento, Favino, & Netti, 2019).

This adapted approach to the criteria allows for a more precise and contextualized assessment of companies' social performance in their respective sectors, encouraging them to adopt socially responsible practices and positively contribute to society (B3, 2021).

Social practices generate value for stakeholders. The literature shows that stakeholder management positively relates to financial performance (Cintra, Ribeiro, Fava, & Costa, 2023). Studies indicate that 68% of consumers expect the brands they engage with to have values that contribute to solving problems related to the social dimension (Barometer-Edelman, 2019). Companies that adopt corporate social responsibility practices are more likely to attract and retain talent, bringing financial benefits, and corporate values related to the social dimension are essential to the success of organizations (Acharyya & Agarwala, 2022). Companies that demonstrate corporate responsibility, social commitment, and sustainable practices are recognized externally, which generates a positive financial impact (Taliento et al., 2019). Based on this, it is relevant to analyze this relationship in the Brazilian context in the long term, defining the second hypothesis:

H2: The social dimension positively influences the financial performance of companies listed on the Brazilian stock exchange's ISE.

2.3 Governance Dimension and Financial Performance

Corporate governance is a system that guides, supervises, and motivates companies. It establishes relationships between shareholders, the board of directors, managers, supervisory bodies, and other related parties and seeks to create value for shareholders and stakeholders (Aureli, Del Baldo, Lombardi, & Nappo, 2020). The quality of corporate governance is becoming increasingly important, leading countries to improve their regulations and laws to ensure that companies comply with governance standards (Almeyda & Darmansyah, 2019).

The governance dimension of the ISE covers the assessment of the company's corporate management, including policies, processes, and practices related to corporate governance and business ethics (Beber & Rangel, 2020). Factors such as the company's governance structure, the independence of the board of directors, transparency in financial disclosures, and respect for shareholders' rights are considered (B3, 2021). In addition, risk management, fiscal responsibility, and the promotion of legal and regulatory compliance are analyzed (Almeyda & Darmansyah, 2019).

The governance dimension seeks to ensure that the company adopts good corporate governance practices, promoting investor confidence and the long-term sustainability of the business (Beber & Rangel, 2020). The criteria applied in the governance dimension of the ISE can also vary according to each sector, considering the specific impacts and challenges related to corporate governance (B3, 2021). Proof of this is that companies in the financial sector are evaluated based on their transparency policies in operations and managing conflicts of interest. In contrast, companies in the technology sector can be evaluated for their data protection and user privacy practices (Almeyda & Darmansyah, 2019).

This adaptation of the criteria allows for a more precise and contextualized assessment of the corporate governance performance of companies in their respective sectors. The governance structure, specifically the board of directors, plays a vital role in meeting the demands of the various stakeholders (Garcia-Torea, Fernandez-Feijoo, Cuesta, 2016). In Brazilian studies, the relationship between governance and companies' financial performance has been examined, with varying results, finding a positive association between financial performance and level of corporate governance (Caixe & Krauter, 2014), while Tavares and Penedo (2018) identified a negative association. This study argues for a positive association in the Brazilian context in the long term, defining the third hypothesis:

H3: The governance dimension positively influences the financial performance of companies listed on the Brazilian stock exchange's ISE.

2.4 Interaction between ESG Dimensions and Financial Performance

In the context of the ESG principle, the interaction between the three dimensions refers to the coordination of the development of the environment, society, and governance (Guimarães & Guimarães Júnior, 2021). In this way, ESG is understood as an integrated framework and a concept encompassing the environmental, social, and governance dimensions, exhibiting an interactive relationship between them (Li, Wang, Sueyoshi, & Wang, 2021).

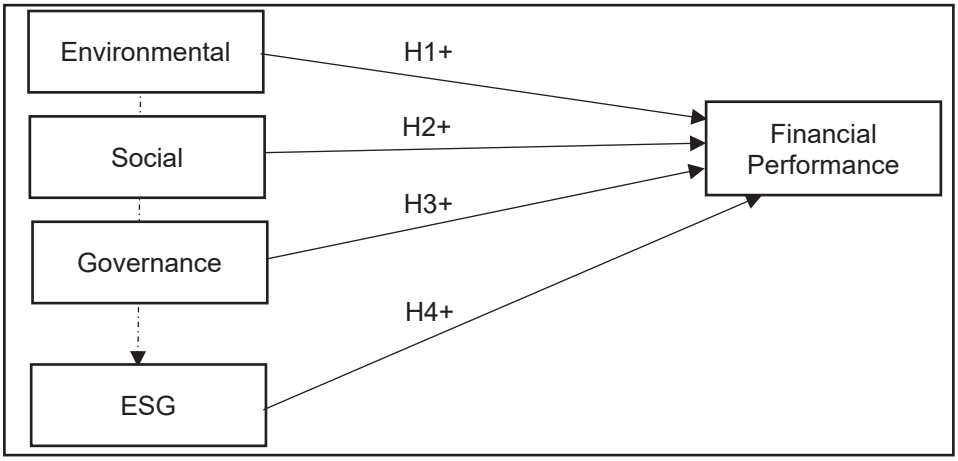
Although financial statements are essential for assessing a company's financial health (Alves & Cardoso, 2021), there is a growing demand for a transparent and sustainable business environment, which has led companies to adopt new non-financial indicators such as ESG (Al-Hiyari, Ismail, Kolsi, & Kehinde, 2023). These indicators go beyond financial data and cover environmental, social, and organizational management performance, making it possible to measure the impact of companies' ESG practices on society (European Commission, 2018).

One of the advantages of using non-financial indicators, such as ESG dimensions, is that they act as control or incentive mechanisms, reducing conflicts of interest between related parties and positively impacting companies' ROE. These impacts lead investors to value the sustainable performance of companies in addition to their economic performance (Amato Neto, Anjos, Cavalcante, & Jukemura, 2022). Finally, the fourth hypothesis suggests that the simultaneous adoption of ESG practices in different dimensions (environmental, social, and governance) can generate synergies and even more significant positive impacts on companies' ROE. Considering how the synergy of ESG could occur in the Brazilian context in the long term, it is defined the fourth hypothesis:

H4: The interaction of the three ESG dimensions (environmental, social, and governance) has a positive influence on the financial performance of companies listed on the Brazilian stock exchange's ISE.

Figure 1 presents the research model proposed.

Figure 1 – Research model



Source: Elaborated by authors

3 METHOD

This study's research sample comprises 46 companies from nine ISE/B3 portfolio segments. We chose to analyze companies that belong to the ISE, as this index is considered a tool for comparative analysis of the performance of companies listed on B3 in terms of sustainability (B3, 2021). Furthermore, it is the most used Brazilian ESG index (Moskovics, Wanke, Tan, & Gerged, 2024). The sample consisted of companies listed on the ISE/B3 between 2016 and 2020, resulting in 159 observations organized in a panel. The sample is described according to industries and observations in Table 1.

The sample obtained considered the public disclosure of responses to the ISE questionnaire authorized by companies and made available by B3. This questionnaire contains many questions that collect data proven by listed companies and, therefore, provides relevant content to analyze the companies' ESG performance. Based on the content collected in the questionnaire, companies are selected to make up the ISE portfolio each year (B3, 2021). However, its content has been publicly disclosed recently, obtaining a sample from 2016.

Table 1 – Sample size by industry

Industry	Observations
Electric Power	42
Banks	24
Commerce (Wholesale and Retail)	19
Transportation and Logistics Services	12
Financial Intermediation	10
Telecommunications	10
Civil Construction, Building Materials, and Decoration	9
Pulp and Paper	8
Pharmaceutical and Hygiene	5
Machinery, Equipment, Vehicles, and Parts	5
Medical Services	5
Petrochemicals and Rubber	4
Food	3
Agriculture (Sugar, Alcohol, and Sugarcane)	1
Oil and Gas	1
Insurance and Brokers	1
Total	159

Source: Elaborated by authors

3.1 Research variables

The independent variables chosen were the three dimensions of ESG sustainability obtained from the environmental, social, and governance dimensions, which use the companies' responses to the ISE questionnaire available in the reports on the B3 website. The reports comprise a set of rules aligned with ESG practices that all companies wishing to participate in the ISE must follow. The ISE index uses questions formulated according to the criteria established by the GRI in its questionnaires. Three dimensions of the ISE were selected: environmental, social, and governance.

The first independent variable related to the environmental dimensions was calculated by the arithmetic mean of the answers to questions AMB01 to AMB18. Next, the social dimension variable was created and calculated by the arithmetic mean of

questions SOC01 to SOC18. Finally, the variable related to the governance dimension was obtained from the arithmetic mean of the answers to questions GOV01 to GOV21.

There is no standardization of the format of the questions in the ISE/B3 questionnaire. Therefore, they cannot be used as a scale or a metric variable, they are considered unstructured or qualitative data. To carry out the research using statistical techniques, it is necessary to generate metric variables from qualitative data, and for this purpose, the following criteria were defined: each question deals with a practice in the ESG dimension analyzed; if the company reports that it has fully carried out the practice, the number 1 is assigned, which indicates high performance in the mentioned practice; If the company does not carry out the practice or carries it out incompletely or partially, the number 0 was assigned, indicating low performance in the ESG practice. After assigning 1 or 0 according to each practice analyzed in the dimensions, the average adoption of practices in each ESG dimension was calculated.

The financial data for the dependent variable ROE, ROA, and market value were obtained from 46 companies selected between 2016 and 2020, using the Economática® database as a proxy, consistent with previous studies (Alves & Cardoso, 2021).

Table 2 – Control variables

Variable	Description	Source
Company Size	Log of total assets	Drempetic, Klein, & Zwergel (2020); Sharma, Panday, & Dangwal (2020)
Debt	Debts/Net Worth	Moura et al. (2020)
Year (Dummie variables that assign a value of 1 to a specific year and 0 to the others)	The annual variables were coded according to their chronological order with 2016 as the reference constant	Feng, Goodell, & Shen (2022); Caixe & Krauter (2014)

Source: Elaborated by authors

The control variables (Table 2) were selected based on previous studies. The following variables were included: company size and indebtedness, also obtained from the Economática® database, as they can influence financial performance. In

addition, the Year variable was included, creating dummy variables for each year of the sample to isolate the macroeconomic effects that affect the set of companies (Caixe & Krauter, 2014).

3.2 Data Analysis Procedures

The Shapiro-Wilk test was performed to verify the data's normality. A p-value below 0.05 indicated that the data was abnormal (González-Estrada & Cosmes, 2019). To normalize the sample, a logarithmic transformation was adopted in the control variable, total assets, and in the dependent variables ROE, ROA, market value, and total assets to ensure adherence to the normal distribution and obtain statistically valid results. The logarithmic transformation could be used due to its application to the entire sample rather than just specific groups (Assis et al., 2023).

After normalizing the sample using the logarithmic transformation, the linear mixed model (LMM) was chosen as the best fit for the data, based on the Akaike's Information Criterion (AIC) test, which considers the quality of fit and complexity of the model, where a lower AIC value indicates a better fit of the model to the data (Gehlenborg, Bücker, Berthold, Miegel, & Moritz, 2021). In addition, the model was strengthened by using the autoregressive process of order one (AR1) to estimate the autocorrelation parameters and the restricted maximum likelihood method (REML) to estimate the variance components. The data was processed using IBM SPSS® version 26.

To meet the mixed modeling criterion (fixed and random effects), the year variable with random effects was included in the model, considering that random effects are helpful when the grouping variable has at least five levels of measurement (Bolker, 2014). In the random effects model, the year variable has covariance parameters for the residual, reflecting the unexplained variation in the model (Garson, 2013). These parameters reflect the different intercepts and slopes for each individual about the change in measurements over time (Parker et al., 2016).

In addition, Durbin-Watson tests were carried out to identify autocorrelation in the residuals, the variance inflation factor (VIF) was evaluated to detect possible multicollinearities between the independent variables, and the residuals were examined for outliers using the residual statistics table. The linearity of the variables in the model was checked by constructing a QQ-Plot graph. To carry out this longitudinal study covering the period from 2016 to 2020, the data was organized into a panel, and statistical techniques were used based on secondary data from official surveys (Cooper & Schindler, 2016).

4 RESULTS

Descriptive statistics (Table 3) showed the means and standard deviations of the three ESG dimensions, which presented similar statistical parameters. Thus, a balance in the variation of the independent variables, allowing the use of variance and obtaining more homogeneous results, was characterized.

Table 3 – Descriptive statistics

Variable	N	Min	Max	Average	Standard Deviation
Financial performance (ROE)	159	-0.8500	1.8600	0.96547	0.490854
Financial performance (ROA)	159	-1	1	0.50	0.387875
Financial performance (Market Value)	159	6	10	7.40	0.573238
Company Size	159	0	9	7.44	1.503127
Debt	159	0.17	1.03	0.7282	0.188107
Environmental dimension	159	0.33	1.00	0.7669	0.119643
Social dimension	159	0.42	1.00	0.8077	0.110919
Governance dimension	159	0.48	1.00	0.8161	0.109731

Source: Elaborated by authors

The Pearson correlation matrix (Table 4) was used to examine the associations between the quantitative variables, revealing the absence of autocorrelation between the variables. Pearson's correlation measures the degree of linear association

between two random variables, ranging from 0 to 1. As observed, there is no high correlation between the environmental, social, and governance dimensions and ROE. This result indicates that the sample did not present multicollinearity problems, allowing for unbiased statistical analysis (Lindner et al., 2022).

Table 4 – Pearson correlation

Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) ROE	1							
(2) ROA	0.468**	1						
(3) Market Value	0.056	-0.047	1					
(4) Size	0.314**	0.059	-0.001	1				
(5) Debt	-0.019	-0.521**	0.082	0.196*	1			
(6) Environ-mental	0.030	0.156*	-0.066	0.150	-0.147	1		
(7) Social	0.133	0.224**	0.018	0.098	-0.099	0.248**	1	
(8) Governance	-0.027	0.136	-0.107	-0.048	-0.118	0.231**	0.315**	1

Note: ** p<0.001 *p<0.005

Source: Elaborated by authors

The regression assumptions were tested, and the results indicated independence and absence of autocorrelation in the residuals, with a value of 1.62 in the Durbin-Watson test. The variance inflation factor (VIF) diagnostic test showed a value of 1.52, indicating that the independent variables do not have a correlation that could compromise the statistical analysis. VIF values between 1.5 and 2.5 are acceptable (Bido & Silva, 2019). In addition, the residuals table showed no outliers, with values within ±3 standard deviations of the mean (Yates et al., 2022). The results of the QQ plot confirmed the linearity between the variables.

Table 5 presents the analysis of the LMM linear mixed model results of individual and interaction effects in the relationship between the three ESG dimensions and ROE.

Table 5 – Model results: Dependent variable ROE

Parameters	β	Standard Error	Df	t	p-value	Lower limit	Upper limit
(Intercept)	-3.420552	414.86443	148	-0.008	0.993	-816.5399	809.6988
2017	0.013683	0.118795	148	0.115	0.908	-0.221071	0.248437
2018	-0.137280	0.121396	148	-1.131	0.260	-0.377173	0.102613
2019	-0.073854	0.119255	148	-0.619	0.537	-0.309515	0.161808
2020	0.129150	0.109270	148	1.182	0.239	-0.086782	0.345082
Size	0.106299	0.025879	148	4.107	0.000	0.055158	0.157440
Debt	-0.180351	0.206279	148	-0.874	0.383	-0.587985	0.227282
Environment	2.373737	1.432980	148	1.657	0.100	-0.458007	5.205481
Social	2.836029	1.275030	148	2.224	0.028	0.316415	5.355644
Governance	2.006952	1.266103	148	1.585	0.115	-0.495022	4.508926
ESG Interaction	-3.809676	2.048883	148	-1.859	0.065	-7.858519	0.239168

Note: Dependent Variable: Financial performance (ROE). N = 159. 95% confidence interval

Source: Elaborated by authors

Table 6 shows the analysis of the model results of individual and interaction effects in the relationship between the three ESG Dimensions and ROA.

Table 6 – Model results: Dependent variable ROA

Parameters	β	Standard Error	Df	t	p-value	Lower limit	Upper limit
(Intercept)	-0.264518	1.475949	148	-0.179	0.858	-3.181173	2.652138
2017	-0.115942	0.084277	148	-1.376	0.171	-0.282483	0.050599
2018	-0.065851	0.086122	148	-0.765	0.446	-0.236038	0.104336
2019	-0.097752	0.084603	148	-1.155	0.250	-0.264938	0.069433
2020	-0.050875	0.077520	148	-0.656	0.513	-0.204063	0.102314
Size	0.041171	0.018360	148	2.242	0.026	0.004890	0.077452
Debt	-1.060093	0.146341	148	-7.244	0.000	-1.349280	-0.77091
Environment	0.738071	1.016599	148	0.726	0.469	-1.270852	2.746995
Social	1.100208	0.904544	148	1.216	0.226	-0.687282	2.887699
Governance	0.702960	0.898211	148	0.783	0.435	-1.072015	2.477935
ESG Interaction	-1.027098	1.453539	148	-0.707	0.481	-3.899469	1.845273

Note: Dependent Variable: Financial performance (ROA). N = 159. 95% confidence interval

Source: Elaborated by authors

Table 7 shows the analysis of the model's results of individual and interaction effects in the relationship between the three ESG Dimensions and market value.

Table 7 – Model results: Dependent variable market value

Parameters	β	Standard Error	Df	t	p-value	Lower limit	Upper limit
(Intercept)	7.203887	2.419846	148	2.977	0.003	2.421975	11.985799
2017	-0.017080	0.138174	148	-0.124	0.902	-0.290128	0.255968
2018	-0.149326	0.141198	148	-1.058	0.292	-0.428351	0.129700
2019	-0.251441	0.138708	148	-1.813	0.072	-0.525545	0.022662
2020	-0.164937	0.127095	148	-1.298	0.196	-0.416093	0.086218
Size	0.151106	0.030101	148	5.020	0.000	0.091623	0.210589
Debt	-0.165017	0.239929	148	-0.688	0.493	-0.639145	0.309111
Environment	-0.310200	1.666733	148	-0.186	0.853	-3.603869	2.983469
Social	-0.321092	1.483018	148	-0.217	0.829	-3.251716	2.609532
Governance	0.081885	1.472634	148	0.056	0.956	-2.828221	2.991990
ESG Interaction	0.181786	2.383105	148	0.076	0.939	-4.527521	4.891092

Note: Dependent Variable: Financial performance (Market Value). N = 159. 95% confidence interval

Source: Elaborated by authors

In addition to statistical significance, it is necessary to consider the relevance of the estimates of the predictor variables: environmental dimension, social dimension, and governance dimension, as well as their interaction. The coefficients reflect the balance of the effects of the three ESG dimensions on the dependent variable. The results reveal that only the social dimension showed a statistically significant relationship, while the environmental and governance dimensions and their interaction did not. The hypotheses were not supported for the market value and ROA variables, and Table 8 shows the results considering the ROE variable as financial performance.

Table 8 shows that only the social dimension had a statistically significant influence on the ROE variable but did not impact the other financial performance indicators. Therefore, the relationship between the social dimension and ROE confirmed Hypothesis 2.

Table 8 – Hypothesis results

Relationship	H	β	t	p-value	Supported
Environmental > Financial performance	H1	2.373737	0.100	-0.458	No
Social > Financial performance	H2	2.836029	2.224	0.028	Yes
Governance > Financial performance	H3	2.006952	1.585	0.115	No
ESG Interaction > Financial performance	H4	0.181786	0.076	0.939	No

Note: Dependent Variable: Financial performance (ROE)

Source: Elaborated by authors

5 DISCUSSION

This study tests the relationship between ESG and financial performance, analyzing each dimension of ESG separately and the synergy between the dimensions. The results provide evidence that the interaction between the dimensions is not correlated with financial performance, but by analyzing individually the social dimension it was found the relationship between the social dimension and ROE. The results reinforce the relationship between ESG and financial performance, concluding that each dimension's impact varies according to the context and financial variables (Kim & Li, 2021). Numerous studies have delved into the relationship between ESG factors and financial performance, yielding a spectrum of results. The intricate nature of this relationship has led to inconclusive findings, with some studies indicating a positive correlation between high levels of ESG practices and financial performance, while others suggest a negative or neutral impact. This ambiguity underscores the multifaceted dynamics at play, indicating the need for further research and nuanced analysis to fully comprehend the complex interplay between ESG practices and financial outcomes. This relationship can be understood through the theoretical lens adopted, the context analyzed, and the variables considered to characterize the phenomenon.

The stakeholder theory provides a theoretical foundation to explain the relationship between social factors and firm financial performance. Stakeholder theory

posits that a company's interactions with various stakeholders, including employees, customers, communities, and the environment, significantly impact its long-term success and financial outcomes. Research findings have underscored that organizations that effectively engage with and prioritize the interests of diverse stakeholders are more likely to achieve financial performance over time. Companies can enhance their reputation and competitive advantage by integrating social considerations into strategic decision-making and operations (Mascena, Fischmann, & Boaventura, 2018; Pereira et al., 2020; Santos, Uchôa, Olar, & Boaventura, 2024; Truong, 2024).

The results for the social dimension of ESG show statistical significance, while the others do not, raising a thought-provoking discussion to understand the reasons for this result. In this context, it is relevant to explore the reasons behind this unusual pattern, especially when compared to other studies (Castilho & Barakat, 2022), which revealed positive and statistically significant relationships between ESG factors and financial performance, and the study by Monteiro et al. (2020), where they found that companies participating in the ISE have superior economic and financial performance (ROA, ROE, and EBITDA) compared to non-participants. On the other hand, some studies have found no significant influence of ESG dimensions on companies' financial performance (Huang, 2021; Gillan et al., 2021). These divergences point to the complexity of the link between ESG and companies' financial performance, with conflicting results and paradoxes. In short, companies seek to engage in ESG activities to obtain greater financial returns. However, the relationship between ESG and financial performance is still not well established due to the different conclusions found in the literature.

Previous studies, such as Silva and Lucena (2019), have identified a relationship between ESG dimensions and companies' return on equity (ROE). Pereira et al. (2020) also found a positive and significant relationship between social responsibility and financial performance (ROA and ROE) in both directions of causality. Danoshana and Ravivathani (2019) observed a significant impact of governance variables on company performance. Although studies have found evidence for a broader range of ESG factors,

this study highlights the social dimension as the most closely related to stakeholders, strengthening its importance for ESG performance and financial performance.

The impact of ESG practices on a company's finances may not be immediate and requires a significant period to manifest itself. The study of Moskovics et al. (2024) indicates that the competition and market concentration experienced by Brazilian publicly traded companies in their respective industries significantly influence their ESG performance and firm efficiency. So, the context of the country and industry is relevant to understanding the relationship. Also, firm internal cultural changes may be necessary for ESG practices to affect financial performance, which also takes time. In addition, external factors such as economic, political, or environmental events can influence a company's financial performance, making identifying the effect of ESG practices more complex. This condition is especially relevant for companies in emerging economies that face challenges regarding resource restrictions and institutional voids.

6 CONCLUSION

This study supports the relationship between the social dimension of ESG and the financial performance evaluated by ROE. This finding supports the stakeholder theory view that the relationship with stakeholders, such as employees, suppliers, community, customers, and others, generates a positive impact on financial performance. The study provides some contributions and presents limitations and suggestions for future research.

6.1 Contributions and Implications

This study contributes to the literature on ESG and financial performance relationships in different ways. First, the study examines the correlation between ESG factors and financial performance, unveiling a positive relationship for the social dimension. This empirical evidence enhances the fit of stakeholder theory

for evaluating ESG performance within emerging market contexts. Second, the analysis explores the combined impact of ESG factors on financial performance among Brazilian firms, underlining that this nexus lacks statistical significance, thus accentuating the differences that emerge in the emerging market's context. Third, the study systematically assesses the ESG practices of companies of the Brazilian sustainability index.

This evidence implies that studies focused on specific contexts can explain the relationship differently and specify the country's or sector's characteristics. Environmental factors are related to these specific contextual issues. Each sector has a different environmental impact and may have different legal and natural conditions in specific countries. At this point, the more heterogeneous the types of practices between companies, the more challenging it is to measure their impacts. The social dimension can deal less with the heterogeneity between practices, which allows for analyzing the differences between companies in implementing these practices and the impacts of superior social performance.

6.2 Limitations and Future Studies

This study has limitations regarding the sample and methods employed. First, the sample comprises companies of the ISE/B3, which select around 40 per year. It was also restricted to the companies that decided to disclose the questionnaire responses. Therefore, it is a non-representative sample of Brazilian companies. Second, the number of variables used in the model is limited, considering that the sample had limitations regarding the number of observations.

The relationship between ESG dimensions and financial performance is complex and varies between companies and sectors. However, as awareness of sustainability and ESG dimensions grows, the influence of ESG dimensions on financial performance may change over time. It is recommended that future studies undertake a meta-analysis to consolidate the empirical results of the relationships between ESG dimensions and

financial performance. Future studies can contribute to understanding this relationship by considering variables that are emerging as high differentiation potential for companies in the future, such as climate risk exposure, diversity, equity, and inclusion (DEI), circular economy practices, digital ethics, and social impact investment.

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1. Definition of research problem	√	√
2. Development of hypotheses or research questions (empirical studies)	√	
3. Development of theoretical propositions (theoretical work)		
4. Theoretical foundation / Literature review	√	√
5. Definition of methodological procedures	√	
6. Data collection	√	
7. Statistical analysis	√	
8. Analysis and interpretation of data	√	√
9. Critical revision of the manuscript		√
10. Manuscript writing	√	√
11. Other (please specify)		

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The authors have stated that there is no conflict of interest.

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