

## ENVIRONMENTAL AND SOCIAL MODERATING EFFECT ON CORPORATE GOVERNANCE IN BRAZILIAN COMPANIES

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### ABSTRACT

The study aims to analyze the moderating effects of environmental and social performance (pillars of ESG performance) on the relationship between corporate governance mechanisms (board size, CEO duality, board independence, and gender diversity) and company performance. The sample consisted of 96 Brazilian companies organized in an unbalanced panel. The analysis period covered the years 2016-2020 and was conducted using robust panel data regression. The main results revealed that environmental and social performance have a negative moderating effect on the relationship between CEO duality and accounting performance and a positive moderating influence on the relationship between board independence and market performance, while for accounting performance, only environmental moderation shows an effect. A positive moderating effect of social performance was observed in the relationship between board gender diversity and accounting performance. As contributions, this research aimed to incorporate new evidence on the effects of corporate governance mechanisms on performance by exploring the impact of environmental and social performance in this relationship. In practical terms, the study demonstrates that in Brazilian companies, larger boards and CEO duality can enhance organizational performance, challenging the traditional practice of avoiding power concentration. Furthermore, the research contributes by exploring new angles regarding environmental and social practices that have proven essential for moderating the relationship between governance and performance, suggesting that companies should strengthen their ESG initiatives to maximize returns and attract investors.

**Keywords:** Governance. Board of Directors. Environmental Performance. Social Performance. Corporate Performance.

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## 1 INTRODUÇÃO

Agency Theory addresses conflicts between the principal (owner) and the agent (manager) arising from the separation between ownership and management. There is a contractual relationship between the two, whereby the agent is given power by the owner to make decisions. However, the agent may seek to maximize their own utility, potentially prioritizing personal interests, which leads to conflict (Jensen & Meckling, 1976). Aligned with Agency Theory, corporate governance (CG) is a mechanism through which companies are directed, monitored, and incentivized, encompassing the relationship among stakeholders, such as shareholders, the board of directors (BoD), and executives. CG practices are based on core principles: transparency, fairness, accountability, and corporate responsibility, aligning interests to optimize the company's value (Dicuonzo, Palmaccio & Shini, 2024).

The BoD is the body responsible for strategic direction and oversight of the organization concerning financial performance, organizational operations, and executive activities, acting as a link between shareholders, executives, and stakeholders (Chen, Song & Gao, 2023). The BoD performs active monitoring, which involves intervening in management to increase the firm's value for investors (Puni & Anlesinya, 2020). In terms of the environment in which the company operates, organizations use socially responsible investments as an extension of CG mechanisms to voluntarily disclose information, reducing informational asymmetry (Koprowski et al., 2021).

Regarding the disclosure of socially responsible investments, the literature attributes positive effects of ESG scores (environmental, social, and governance scores) on companies due to improved information quality, risk reduction (Ma et al., 2023), minimization of informational asymmetries, enhanced accountability, and increased stakeholder trust (Martínez-Ferrero et al., 2016). Thus, companies with ESG strategies may experience fewer agency conflicts. Strong ESG performance in an organization can foster a healthy business environment and good practices, creating social well-being and mitigating negative externalities, potentially achieving a higher level of corporate governance quality than others (Gillan et al., 2021).

In this context, CG mechanisms, with the BoD as one of them, can influence performance, and ESG aspects may intervene in this relationship. Characteristics of the BoD, such as size, CEO duality, independence, and gender diversity, can affect performance. However, the influence of CG mechanisms on corporate performance has not reached a consensus in the literature (Mastella et al., 2021; Puni & Anlesinya, 2020; Valcanover & Souza, 2021). Regarding ESG aspects influencing the relationship between CG mechanisms and corporate performance, no national or international studies have been identified (Gillan et al., 2021), thus establishing the research gap for this study.

Based on the relevance of this theme, the following research question is proposed: What are the moderating effects of ESG performance (environmental and social pillars) on the relationship between CG mechanisms and the performance of Brazilian companies? To address this question, the study aims to analyze the moderating effects of ESG performance (environmental and social pillars) on the relationship between CG mechanisms (BoD size, CEO duality, independence, and gender diversity) and the performance of Brazilian companies listed on the B3.

This research is justified as it proposes to analyze how CG mechanisms, specifically BoD characteristics (size, CEO duality, independence, and gender diversity), may influence corporate performance, given that this relationship, influenced by environmental and social characteristics, differs from studies found in the national and international literature, thus contributing to a better understanding of aspects related to CG (Puni & Anlesinya, 2020; Gillan et al., 2021; Wahidahwati & Ardini, 2021), ESG, and performance. Another reason for conducting this research is the importance of socially responsible investments in performance (Gillan et al., 2021) and governance quality, as well as the role of the BoD in the strategic direction and oversight of the organization (Dicuonzo; Palmaccio & Shini, 2024).

This research contributes to the literature by providing new evidence on the relationship between corporate governance (CG) mechanisms and both accounting and market performance, as well as examining the influence of environmental and social performance on this proposed relationship. In practical terms, the findings of this research will support Brazilian companies in identifying CG mechanisms that may enhance the effectiveness of the board of directors (BoD) and, consequently, improve corporate performance (Mastella et al., 2021). From a social perspective, the results of this study may highlight the importance of ESG investments, which have a direct impact on the community (Lu, 2021).

## 2 HYPOTHESIS FOUNDATION

For the formulation of the hypotheses, corporate governance (CG) mechanisms were considered, particularly the characteristics of the board of directors (BoD), such as BoD size, CEO duality, BoD independence, and the gender composition of directors (Puni & Anlesinya, 2020). Additionally, evidence from the literature regarding ESG variables, specifically environmental and social factors, was reviewed to assess whether these may influence the relationship between CG mechanisms and corporate performance (Bătae et al., 2021).

### 2.1 Board Size

Agency Theory (Jensen & Meckling, 1976) suggests that a larger number of directors increases agency complexities, thus reducing the board's effectiveness in monitoring managerial conduct (Jensen & Meckling, 1976). This results from inefficiencies in communicating incongruities and coordination problems in managerial activities, ultimately giving CEOs greater control (Bhatia & Gulati, 2021). According to Peng et al. (2021), the low communication and coordination efficiency in large boards, along with the reluctance of board members to raise objections that could disrupt a collaborative atmosphere, diminishes the supervisory function and leads to negative performance outcomes. This perspective suggests that board size has a negative effect on performance.

Conversely, other studies indicate a positive relationship. Researchers argue that larger boards can more effectively control the decisions of directors, chairs, and CEOs, preventing actions contrary to shareholder interests and thereby reducing agency costs (Ahmadi et al., 2018). Large boards enhance efficiency by incorporating diverse viewpoints, impacting transparency, oversight, and performance (Sheikh & Alom, 2021). In Brazil, Cardoso et al. (2019) advocate that the optimal board size is six members.

Despite these perspectives, the effects of board size on performance remain inconclusive, with studies showing positive (Ahmadi et al., 2018; Bhatia & Gulati, 2021; Lu, 2021; Puni & Anlesinya, 2020), negative (Costa & Martins, 2019 – in Brazil; Jensen & Meckling, 1976; Peng et al., 2021; Valcanover & Sonza, 2021 – the latter in the Brazilian context), and insignificant results (Sheikh & Alom, 2021). Although the findings are mixed, it is presumed that larger boards imply greater complexity, introducing agency costs due to informational asymmetries and moral hazard. Therefore, the first hypothesis is as follows: *H1. The size of the board of directors has a negative effect on performance.*

### 2.2 CEO Duality

CEO duality is defined as the accumulation of the CEO and board chair roles by the same individual (Aktas et al., 2019; Kaur & Singh, 2019). Holding both roles simultaneously increases the executive's authority and control (Kaur & Singh, 2019). Some corporate governance codes recommend the separation of these positions; in Brazil, for instance, there is a clear preference for dividing the CEO and board chair roles (Valcanover & Sonza, 2021). From the perspective of

Agency Theory, CEO duality is undesirable because it grants excessive power to the agent, limiting monitoring policies, hindering transparency, and negatively impacting performance (Puni & Anlesinya, 2020).

The duality arising from the CEO holding both roles on the board, which should monitor and even have the authority to dismiss the CEO, leads to what is known as managerial entrenchment. This occurs when the rights and influence of the owners are reduced due to the strengthening and protection of the CEO's position (Adams & Ferreira, 2009). Furthermore, by holding both roles, the CEO may incur moral hazard, insufficient effort, and private benefit increases, acting in ways that do not align with shareholder interests, thus negatively influencing company performance (Hsu et al., 2021).

Conversely, some literature suggests a positive effect when the CEO concurrently holds the board chair position on organizational performance, indicating a stable organization with strong leadership that instills confidence (Kaur & Singh, 2019). Studies indicate that CEOs aim to be good managers and prioritize their reputation. By holding both roles, they may enhance corporate performance and reduce costs (Peng et al., 2021).

In the Brazilian context, Costa and Martins (2019) highlight a lack of studies on CEO duality in Brazilian companies compared to the international literature. These authors examined the relationship between CEO duality and performance, measured by ROA and ROE, in IBrX100 companies from 2008 to 2013, finding no impact on performance. Studies show mixed results, with positive (Aggarwal et al., 2019; Ahmadi et al., 2018; Kaur & Singh, 2019; Valcanover & Souza, 2021 – in the Brazilian context), negative (Kao et al., 2019), and non-significant findings (Costa & Martins, 2019 – in Brazil; Hsu et al., 2021; Kao et al., 2019; Kaur & Singh, 2019; Peng et al., 2021; Puni & Anlesinya, 2020). Following Agency Theory, the second hypothesis in this study is: *H2. CEO duality has a negative effect on performance.*

### **2.3 Board Independence**

According to agency theorists, independent boards help reduce agency problems by monitoring CEOs' opportunistic behaviors (Jensen & Meckling, 1976). External directors oversee and control managers with autonomy and authority (Ahmadi et al., 2018). Furthermore, the prestige, social connections, and professional expertise that independent directors bring to the board influence deliberations and strategic decision-making, which can enhance corporate performance effectiveness (Peng et al., 2021).

By incorporating external directors, investors may perceive financial and non-financial aspects as superior compared to organizations that lack such members, thereby increasing corporate value (Ahmadi et al., 2018). Independent directors also bring more democracy to the decision-making process (Sheikh & Alom, 2021) and help prevent potential management fraud, as they act neutrally and uphold governance best practices (Chebbi, 2024). Ahmadi et al. (2018) note that external directors contribute intellectual capital, aiding in decision-making and performance.

Conversely, Bhagat and Bolton (2019) argue that independent directors are unable to genuinely control managers. It is inferred that internal directors, who are more familiar with the organization and internal information, enhance company performance more effectively than those companies employing only external directors (Bhatia & Gulati, 2021). Independent directors generally possess less in-depth knowledge of the organization's operations, which can adversely impact results (Chebbi, 2024), and their effectiveness may be limited due to information asymmetries (Jensen & Meckling, 1976). As such, the increase in independent directors is viewed with skepticism in the literature (Lu, 2021).

In the Brazilian context, Cardoso et al. (2019) investigated which board characteristics affected companies during financial difficulties from 2010 to 2016. The findings indicated that

board independence was insufficient to align shareholder interests and inadequate to prevent or mitigate financial distress in companies. Various studies have explored this relationship, presenting mixed effects: positive (Aggarwal et al., 2019; Ahmadi et al., 2018; Lu, 2021; Puni & Anlesinya, 2020), negative (Bhagat & Bolton, 2019; Peng et al., 2021; Valcanover & Souza, 2021 – in the Brazilian context), and insignificant (Sheikh & Alom, 2021).

Based on this context, considering the limited number of national studies compared to international literature, as well as the divergent findings presented, the third hypothesis presumes that organizational complexity will benefit from a significant presence of independent directors. Therefore, the third hypothesis is: *H3. Board independence has a positive effect on performance.*

## 2.4 Board Gender Composition

The gender composition of the board influences its effectiveness, improving the quality of managerial oversight, as female directors tend to act similarly to independent directors, significantly impacting board structure (Adams & Ferreira, 2009). By contributing to board efficiency, agency problems tend to be mitigated, motivating the agent to maximize the principal's wealth, which results in improved performance. The literature highlights several reasons underscoring the importance of women on boards, such as having a better business perspective that enhances board decision quality and the fact that companies with women on boards tend to perform better in the market due to a positive societal reputation (Ali et al., 2020).

Brahma et al. (2020) found that the effects on company performance are highly amplified when three or more women are appointed to the board. Adams and Ferreira (2009) discuss that gender diversity has a positive effect on performance when the company has weak governance. The opposite occurs when there is strong governance, resulting in lower shareholder value. One possible reason is that a high level of gender diversity may lead to excessive organizational monitoring (Lu, 2021).

Silva Júnior and Martins (2017) analyzed the influence of female participation on boards in terms of performance (ROA and Tobin's Q) in Brazilian companies from 2010 to 2013. Their findings revealed a positive effect on performance. They observed that most companies (63%) had no women on the board, and when they did, the percentage was low (5.6%). Mastella et al. (2021) conducted research with 150 publicly traded Brazilian companies from 2010 to 2018 and found a positive effect of board gender diversity on different performance measures (ROA, ROE, and Tobin's Q). Notably, they found that the proportion of women had a more significant effect at lower levels of ROE and higher levels of Tobin's Q.

Valcanover and Souza (2021) analyzed the effects of gender diversity on performance (ROA, ROE, Tobin's Q, and Market-to-Book) in 228 Brazilian companies from 2010 to 2017. Their findings showed a positive influence on ROA. They highlighted that women occupied a minority (less than 8%) of board and executive positions, a result similar to that of Silva Júnior and Martins (2017), who noted the low female participation on boards (average of 5.6%). Based on the findings, there is a need for further investigation on this topic, especially in the Brazilian context, as few studies have explored this relationship (Mastella et al., 2021).

The relationship between gender diversity and company performance tends to be positive, particularly in the Brazilian context; however, the literature presents divergent results (Dalloccchio et al., 2024), including positive conclusions (Ahmadi et al., 2018; Brahma et al., 2020; Mastella et al., 2021; Valcanover & Souza, 2021 – in the Brazilian context), negative (Adams & Ferreira, 2009; Kaur & Singh, 2019), and non-significant findings (Dalloccchio et al., 2024; Valcanover & Souza, 2021). Therefore, the fourth hypothesis is defined as: *H4. Gender diversity on the board has a positive effect on performance.*

## 2.5 Environmental and Social Moderating Effects on the Relationship between Corporate Governance and Performance

Companies with strong environmental, social, and governance (ESG) performance invest in environmental policies focused on resource efficiency and pollutant reduction, and they are dedicated to environmental innovation. These companies also invest in social aspects related to their workforce, valuing diversity, and engaging with the community on issues such as corruption, business ethics, stakeholder involvement, and product responsibility, prioritizing customer satisfaction. Beyond environmental and social policies, they also invest in governance, addressing topics like board independence, diversity, organizational committees, and executive compensation, while also emphasizing transparency and shareholder care (Chebbi, 2024).

ESG-oriented companies (those concerned with environmental, social, and governance issues) prioritize transparency, which strengthens the monitoring system. The monitoring policies enacted by the board of directors (BoD) enhance the efficiency of the corporate governance (CG) system, potentially leading to better performance (Ali et al., 2020). ESG disclosures can influence investments, as some investors tend to avoid companies in sectors with weak sustainability characteristics (Baker et al., 2021). Superior ESG performance may result in better organizational performance (Liang & Renneboog, 2017), maximizing the principal's wealth (Jensen & Meckling, 1976).

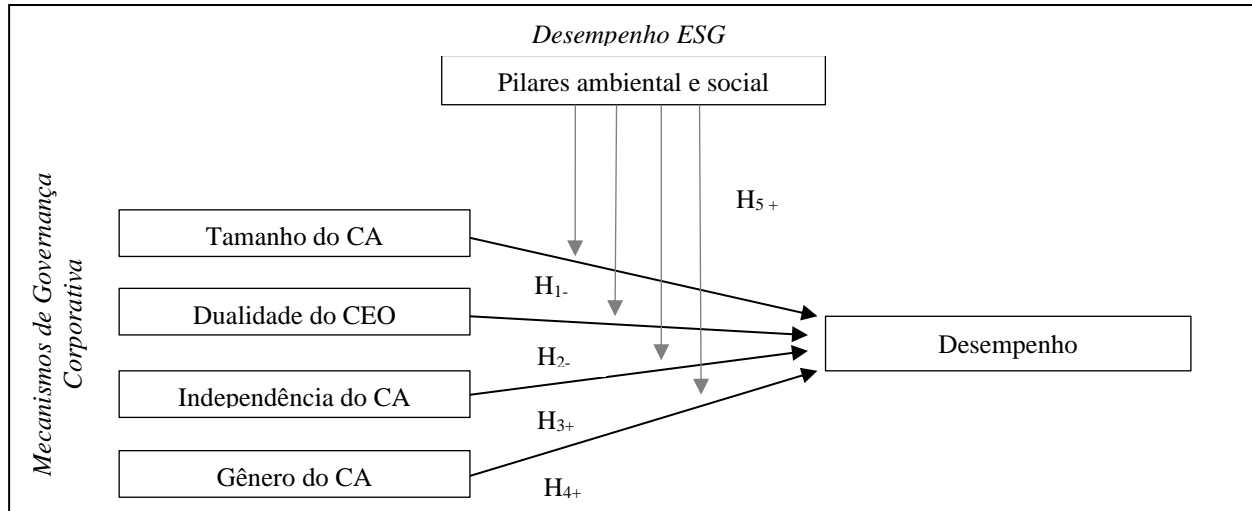
Companies that engage in environmental, social, and governance practices create a healthy and favorable environment for good organizational practices, fostering social well-being—a focus of many organizational sectors—which mitigates the negative impacts of their operations (Gillan et al., 2021). Companies attentive to such practices tend to exhibit efficient CG, as they prioritize environmental sustainability, show less volatile results, and access funds at lower costs (Mohammad & Wasiuzzaman, 2021). Superior ESG performance may be associated with higher disclosure levels, better quality, and lower risks (Ma et al., 2023). Increased disclosures enhance company transparency and strengthen stakeholder trust, thus mitigating informational asymmetries and acting as a form of assurance that reduces volatility and risks, maintaining market efficiency (Wahidahwati & Ardini, 2021).

Instead of analyzing the overall ESG indicator and its three pillars separately, this study focuses solely on the environmental and social pillars to assess their moderating effects on the relationship between governance and performance, as these pillars are expected to have different effects on organizational performance (Gillan et al., 2021). Additionally, potential ambiguities in measuring and understanding ESG categories, along with the need to isolate the influences of these ESG dimensions, justify the focus on these pillars (Mohammad & Wasiuzzaman, 2021). The exclusion of the governance pillar aligns with the theoretical model analyzed, which already incorporates variables such as board size, independence, CEO duality, and gender diversity within the governance pillar.

In this context, considering CG aspects, ESG performance (environmental and social pillars), and corporate performance, it is suggested that the negative relationship between board size and CEO duality with corporate performance (H1 and H2) may be mitigated in companies with higher environmental and social pillar performance, thus reducing the negative effect of this relationship. It is also believed that the positive effects of board independence and gender diversity on performance (H3 and H4) may be enhanced in companies with higher environmental and social performance. Therefore, the fifth hypothesis is formulated as follows: *H5. Environmental (H5a) and social (H5b) performance have moderating effects on the relationship between corporate governance mechanisms and performance.*

Figure 1 outlines the theoretical analysis model and the established hypotheses.

**Figure 1**  
*Theoretical Analysis Model*



Source: Prepared by the authors.

### 3 METHODOLOGICAL PROCEDURES

This study conducted a descriptive, documentary, and quantitative approach. The study population consisted of Brazilian companies listed on the B3 stock exchange. The analysis period covered five years, from 2016 to 2020, due to the limited number of companies disclosing ESG scores. Additionally, prior studies have used a similar timeframe for ESG analysis, such as 2016-2020 (Menicucci & Paolucci, 2023; Yang et al., 2024). Menicucci and Paolucci (2023), for instance, analyzed Italian banks during this period and highlighted the importance of maintaining temporal consistency to capture performance trends related to ESG more accurately. Yang et al. (2024) noted that including subsequent years may introduce distortions due to rapid changes in ESG disclosure standards and practices. Peliu (2024) also mentions challenges in incorporating recent data due to delays in database updates. Thus, the choice of 2016-2020 is justified by the greater maturity and consistency of data within this period, helping to avoid atypical impacts from external events (Menicucci & Paolucci, 2023; Peliu, 2024).

In defining the sample, financial sector companies were initially excluded, as they have distinct characteristics (Peliu, 2024; Valcanover & Sonza, 2021). Companies in this sector, such as banks and insurance firms, are subject to specific regulations, unique accounting practices, and a different capital structure compared to other sectors, which could skew results (Menicucci & Paolucci, 2023). Additionally, several studies on ESG and corporate governance acknowledge these peculiarities and exclude the financial sector to avoid bias in results, given the sector's distinct risk-return practices (Mastella et al., 2021; Peliu, 2024; Silva Júnior & Martins, 2017; Valcanover & Sonza, 2021; Yang et al., 2024).

Moreover, companies with negative equity were excluded, as this would impact the profitability index formation; as well as those with incomplete data needed for variable calculations during the study period. An unbalanced sample was chosen due to the limited adoption of ESG and the inconsistent publication of reports within the period analyzed. The final sample included 96 companies.

Table 1 outlines the research construct, which includes the analyzed variables, their operationalization, authors who used these metrics, and the data sources. Data collection was guided by accessibility criteria.

**Table 1**  
*Research Construct*

Variables		Operational Definition and Measurement	Collection	Base Authors	
<b>Variables Dependentes</b>					
Corporate Performance	Market Performance	Q de Tobin (QT)	Economatica®	Adams e Ferreira (2009); Wahidahwati e Ardini (2021); Valcanover e Souza (2021)	
		Market-to-Book (MB)		Dalocchio et al. (2024); Valcanover e Souza (2021)	
	Accounting Performance	Return on Assets (ROA)		Measures the return on total assets of a company. Ratio of Net Income to Total Assets.	Adams e Ferreira (2009); Ahmadi et al. (2018); Valcanover e Souza (2021)
		Return on Equity (ROE)		Measures the return on equity of a company. Ratio of Net Income to Equity	Ahmadi et al. (2018); Valcanover e Souza (2021)
<b>Independent and Moderating Variables</b>					
Governança Corporativa – Board Characteristics	Board Size (TAMCA)	Total number of board members.	Reference Form, item 12.5/6	Ahmadi et al. (2018); Valcanover e Souza (2021)	
	CEO Duality (DUACA)	Accumulation of CEO and board chair roles (dummy variable).		Ahmadi et al. (2018); Valcanover e Souza (2021)	
	Board Independence (INDCA)	Ratio of independent members to total board size.		Ahmadi et al. (2018); Valcanover e Souza (2021)	
	Board Gender Diversity (GENCA)	Ratio of women on the board to total number of directors.		Ahmadi et al. (2018); Valcanover e Souza (2021)	
ESG Performance *	Environmental Performance (AMB)	Refers to the company's environmental performance in resource usage, emissions, and innovation on environmental issues.	Refinitiv Eikon®.	Baker et al. (2021); Liang e Renneboog (2017)	
	Social Performance (SOC)	Refers to the company's social performance in areas such as human rights, workforce, community, and product responsibility		Baker et al. (2021); Liang e Renneboog (2017)	
<b>Control Variables</b>					
Company Size (TAM)	Logarithm of the company's total assets.		Economatica®	Wahidahwati e Ardini (2021); Valcanover e Souza (2021)	
Leverage (ALA)	Ratio of total debt (long-term and short-term) to total equity.			Ahmadi et al. (2018); Wahidahwati e Ardini (2021)	
Fixed Year Effects	Study period: 2016 to 2020.			Not applicable	
Fixed Sector Effects	B3 Classification, with categories: 1. Industrial Goods; 2. Communications; 3. Cyclical Consumption; 4. Non-Cyclical Consumption; 5. Basic Materials; 6. Oil, Gas, and Biofuels; 7. Health; 8. Information Technology; and 9. Public Utilities			Not applicable	

*Note.* \*The ESG scores from Refinitiv Eikon® are based on over 450 publicly disclosed data variables, of which a subset of 186, considered the most comparable and sector-relevant, is used in the evaluation and scoring process. These variables are organized into ten categories that make up the three pillars and the overall ESG score. Values range from 0 to 100, with 100 being the highest score for companies demonstrating the best ESG performance (Refinitiv Eikon, 2022).

Source: Research Data.

The effects of corporate governance mechanisms (board size, CEO duality, board independence, and gender diversity) on accounting performance (ROA and ROE) and market performance (Tobin's Q, Market-to-Book), moderated by ESG performance (environmental and social pillars), were analyzed using Models 1 and 2).

**Environmental Moderating Effect on Accounting and Market Performance (Panel A):**



$$\text{Performance} = \beta_0 + \beta_1 \text{TAMCA} + \beta_2 \text{DUACA} + \beta_3 \text{INDCA} + \beta_4 \text{GENCA} + \beta_5 \text{TAMCA*AMB} + \beta_6 \text{DUACA*AMB} + \beta_7 \text{INDCA*AMB} + \beta_8 \text{GENCA*AMB} + \beta_9 \text{TAM} + \beta_{10} \text{ALA} + \sum \text{Fixed Year Effect} + \sum \text{Fixed Sector Effect} + \varepsilon \quad (1)$$

Social Moderating Effect on Accounting and Market Performance (Panel B):

$$\text{Performance} = \beta_0 + \beta_1 \text{TAMCA} + \beta_2 \text{DUACA} + \beta_3 \text{INDCA} + \beta_4 \text{GENCA} + \beta_5 \text{TAMCA*SOC} + \beta_6 \text{DUACA*SOC} + \beta_7 \text{INDCA*SOC} + \beta_8 \text{GENCA*SOC} + \beta_9 \text{TAM} + \beta_{10} \text{ALA} + \sum \text{Fixed Year Effect} + \sum \text{Fixed Sector Effect} + \varepsilon \quad (2)$$

After the descriptive statistics and correlation analysis, robust regression models were operationalized with fixed sector and year controls, using the Ordinary Least Squares (OLS) method. The choice of OLS is due to this technique's ability to provide unbiased and efficient estimates when the model assumptions are valid, making it suitable for time series data (Peliu, 2024). The Variance Inflation Factor (VIF) test was conducted to identify potential multicollinearity issues (Fávero et al., 2009).

## 4 ANALYSIS AND INTERPRETATION OF RESULTS

### 4.1 Descriptive Statistics and Regression Results

Table 2 presents the descriptive statistics of the variables.

**Table 2**  
*Descriptive Statistics*

Variables	Mean	Median	Standard Deviation	Minimum	Maximum
QT	1.048	1.03	1.015	0.046	5.055
MB	3.199	3.26	3.319	0.183	22.014
ROA	0.073	0.065	0.057	-0.113	0.239
ROE	0.066	0.19	0.314	-1.929	0.83
TAMCA	8.323	5.66	2.110	3	14
INDCA	0.446	0.33	0.208	0.00	1.00
GENCA	0.106	0.11	0.112	0.00	0.402
AMB	0.466	0.36	0.263	0.1	91.2
SOC	0.5227	0.76	0.238	1.0	93.2
TAM	17.56	18.01	18.46	14.14	20.54
ALA	2.956	4.06	5.168	0.143	41.256

Source: Research Data.

In Table 2, regarding the market performance variable, QT has a mean of 1.048, indicating that, in the overall context of the Brazilian market, it is adding value to the organization beyond the asset value. The market performance variable, MB, ranged from 0.18 to 22.014 times the equity value. The average ROE was 0.066, with a standard deviation higher than that of ROA (0.314), suggesting that the analyzed companies have more heterogeneous returns on equity than on assets. When analyzing AMB and SOC performance, the social dimension had the highest mean (52.27), reflecting a greater commitment from companies toward this pillar.

For the CG variables, board size indicated that, on average, companies have approximately 8 directors, ranging from 3 (minimum) to 14 members (maximum). This result is similar to those found by Puni & Anlesinya (2020) in Ghana, with an average of 8.44, and the 8.52 average members in Middle Eastern and North African countries (Sahran et al., 2018). In terms of board independence, an average of 44.63% of the members of Brazilian companies' boards of directors are independent. In the United States, as noted by Lu (2021), independent board members are more prevalent (81% on average). A similarly high percentage is observed in Ghanaian companies, at 64.2% (Puni & Anlesinya, 2020).

Regarding board gender diversity, this ranged from none to 40.2%, with an average of 10.65% of board members in Brazilian companies being women. This result highlights the low representation of women on boards, showing limited gender diversity due to boards with no female members and a maximum percentage not reaching half of the board seats.

After the descriptive statistics, correlation analysis was conducted to examine potential multicollinearity issues among the independent variables. According to the correlation matrix results, no multicollinearity issues were found among the variables, as the correlation results were not equal to or above 0.70, with one exception, as noted by the literature (Hair et al., 2009). Specifically, the SOC variable showed a correlation of 0.76 with the AMB variable. However, these two variables are used in separate regressions, so they do not present multicollinearity issues.

Table 3 presents the estimation results in panels A and B, showing the moderating effects of environmental and social disclosures on the relationship between board characteristics and corporate performance, respectively.

**Table 3**  
*Regression Results*

<b>Panel A - Relationship between Board Variables and Corporate Performance Moderated by Environmental Score</b>				
Variables	QT	MB	ROA	ROE
TAMCA	0.061**	0.077	0.006*	0.002
DUACA	0.293	1.024	0.047	0.414***
INDCA	-0.783*	-1.107	-0.078*	-0.252***
GENCA	1.272	7.411	-0.068	-0.127
TAMCAAMB	-0.022	0.148	-0.003	-0.003
DUACAAMB	-0.917**	-3.276**	-0.049	-0.691***
INDCAAMB	1.306**	1.764	0.095**	0.233
GENCAAMB	-1.518	-12.237	0.102	0.329
TAM	-0.325*	-0.103	-0.025*	-0.031
ALA	-0.008**	0.135*	-0.000	-0.012*
Constante	2.843*	2.312	0.214*	0.294
R <sup>2</sup>	40.67%	45.30%	20.96%	32.56%
ANOVA	0.0000*	0.0000*	0.0000*	0.0000*
VIF médio	≤ 3.03	≤ 3.03	≤ 3.03	≤ 3.03
EF Setor e ano	Yes	Yes	Yes	Yes
N. obs.	377	377	377	377
<b>Panel B - Relationship between Board Variables and Corporate Performance Moderated by Social Score</b>				
Variables	QT	MB	ROA	ROE
TAMCA	0.084**	0.072	0.007*	0.011
DUACA	0.667	2.103	0.120***	0.698
INDCA	-0.850**	-1.090	-0.058***	-0.114
GENCA	0.489	7.215	-0.124**	-0.368
TAMCASOC	-0.058	0.149	-0.004	-0.013
DUACASOC	-1.641**	-5.306***	-0.187***	-1.241
INDCASOC	1.176***	1.402	0.037	-0.073
GENCASOC	0.203	-10.430	0.205**	0.853**
TAM	-0.287*	-0.077	-0.020*	-0.000
ALA	-0.007**	0.135*	-0.000	-0.012*
Constant	2.555*	2.119	0.179*	0.040
R <sup>2</sup>	40.32%	44.80%	20.51%	32.39%
ANOVA	0.0000*	0.0000*	0.0000*	0.0000*
Average VIF	≤ 4.59	≤ 4.59	≤ 4.59	≤ 4.59
Sector and Year FE	Yes	Yes	Yes	Yes
Number of Obs.	377	377	377	377

Note. TAMCAAMB and TAMCASOC: Interactive variables for board size with environmental score and social score  
DUACAAMB and DUACASOC: Interactive variables for CEO duality with environmental score and social score  
INDCAAMB and INDCASOC: Interactive variables for board independence with environmental score and social score GENCAAMB and GENCASOC: Interactive variables for board gender diversity with environmental score and social score  
EF = Fixed Effect VIF = Variance Inflation Factor  
Significance at the levels of \*1%; \*\*5%; \*\*\*10%  
Source: Research Data.

All regression models were found to be significant at the 1% level (ANOVA), allowing for inferences. The  $R^2$  values indicate that the independent variables explain, on average, 40.67% of Tobin's Q, 45.30% of Market-to-Book, 20.96% of ROA, and 32.56% of ROE in Panel A, and 40.32%, 44.80%, 20.51%, and 32.39%, respectively, in Panel B. No multicollinearity issues were observed in the models, as the average VIF remained below 5 (Fávero et al., 2009).

According to the estimation results in Table 3, board size positively and significantly influences performance as measured by Tobin's Q (at the 5% level, Panels A and B) and by ROA (at the 1% level, Panels A and B). Thus, a larger board tends to correlate with higher market growth as measured by Tobin's Q and greater returns on the company's assets.

When examining the environmental and social moderating variables, no significant influence was found in their interaction with board size on any performance measure. CEO duality has positive and significant effects at the 10% level on return on equity (ROE) in Panel A and return on assets (ROA) in Panel B, suggesting that a higher accumulation of CEO and board chair roles results in higher net income on equity and asset profitability.

The interaction between environmental performance (DUACAAMB – Panel A) and social performance (DUACASOC – Panel B) with CEO duality shows a negative and significant influence on Tobin's Q (at the 5% level in Panels A and B) and Market-to-Book (at the 5% and 10% levels in Panels A and B, respectively), as well as on ROA (at the 10% level – Panel B) and ROE (at the 10% level – Panel A).

Board independence negatively affects Tobin's Q (at 1% and 5% significance levels) and ROA (at 1% and 10%) in Panels A and B, respectively, and ROE at the 10% significance level (Panel A). This suggests that the presence of external board members adversely affects these performance measures. The interaction of environmental performance with board independence (INDCAAMB) shows a positive and significant effect at the 5% level on Tobin's Q and ROA (Panel A), while social moderation (INDCASOC) shows a positive and significant effect at the 10% level on Tobin's Q (Panel B).

Gender diversity on the board has a significant direct relationship with ROA (Panel B), with a negative and significant relationship at the 5% level, indicating that the presence of female directors negatively impacts accounting performance (ROA) among the companies in the sample. For the interactive variables, only the interaction between gender diversity and social performance (GENCASOC – Panel B) with ROA and ROE was positive and significant at the 5% level.

The control variable for company size showed a negative and significant effect at the 1% level on Tobin's Q and return on assets (Panels A and B). Conversely, leverage was negative and significant for Tobin's Q (5%) and ROE (1%) in Panels A and B, while it had positive effects on Market-to-Book (1%).

Given the variety of aspects observed in the results of the tested equations, Table 4 presents a summary of the findings from the tested hypotheses.

**Table 4**  
*Summary of Tested Hypothesis Results*

Hypotheses	Findings
<b>H1.</b> Board size (TAMCA) has a negative effect on performance.	<b>Rejected:</b> Positive effects for Tobin's Q and ROA; insignificant for Market-to-Book and ROE (Panels A and B).
<b>H2.</b> CEO duality (DUACA) has a negative effect on performance.	<b>Rejected:</b> Positive effects for ROE (Panel A) and ROA (Panel B); insignificant for Tobin's Q and Market-to-Book (Panels A and B).
<b>H3.</b> Board independence (INDCA) has a positive effect on performance.	<b>Rejected:</b> Negative effects for Tobin's Q and ROA (Panels A and B), and ROE (Panel A); insignificant for Market-to-Book (Panels A and B) and ROE (Panel B).
<b>H4.</b> Board gender diversity (GENCA) has a positive effect on performance.	<b>Rejected:</b> Insignificant effects for Tobin's Q, Market-to-Book, ROA, and ROE (Panel A); insignificant for Tobin's Q, Market-to-Book, and ROE (Panel B), with negative effects on ROA (Panel B).
<b>H5.</b> There are moderating effects of environmental (H5a) and social (H5b) performance on the relationship between CG mechanisms and performance.	<b>H<sub>5a</sub> – Partially accepted.</b> The environmental aspect moderates the relationship between INDCA and Tobin's Q (changing from negative to positive) and between DUACA and ROE (changing from positive to negative).
	<b>H<sub>5b</sub> – Partially accepted:</b> The social aspect moderates the relationship between INDCA and Tobin's Q (changing from negative to positive), DUACA and ROA (changing from positive to negative), and GENCA and ROA (changing from negative to positive).

Source: Prepared by the authors.

## 4.2 Discussion of Results

For both models analyzed, H1 is rejected, which posited that board size has a negative effect on performance. Contrary to the hypothesis, positive effects of board size on Tobin's Q and ROA were observed. These findings align with Ahmadi et al. (2018), Bhatia and Gulati (2021), Lu (2021), and Puni and Anlesinya (2020), who also found positive results, but they contradict the findings of Peng et al. (2021), Yeh (2018), and Valcanover and Souza (2021), who observed negative effects, with the latter specifically in the Brazilian context.

The positive results may be justified in the Brazilian context, as larger boards tend to operate more effectively, making decisions that prevent directors, chairs, and CEOs from pursuing actions counter to shareholders' interests, thereby mitigating agency costs (Ahmadi et al., 2018; Jensen & Meckling, 1976). These findings support Cardoso et al. (2019), who recommend boards of 5 to 9 members, with an ideal of 6 members; the average of 8 directors in this study aligns with their recommendations. Furthermore, boards with more members may provide value through diverse perspectives, improved transparency and oversight (Sheikh & Alom, 2021), as well as greater depth and expertise in decision-making (Bhatia & Gulati, 2021), ultimately enhancing organizational performance.

For Model 1, H2 is also rejected, which proposed that CEO duality has a negative effect on performance, as only a positive significance in relation to return on equity was observed. In Model 2, H2 is also rejected, with positive effects observed between CEO duality and return on assets. These findings contradict Agency Theory (Jensen & Meckling, 1976), which posits that CEO duality should be avoided as it grants excessive power, undermining oversight, transparency, and performance (Aktas et al., 2019). CEO duality is also associated with adverse effects of managerial entrenchment (Adams & Ferreira, 2009).

These results diverge from Costa and Martins (2019) in Brazil (2008 to 2013), where no significant relationship was found between CEO duality and ROA or ROE. They also differ from previous studies by Kao et al. (2019) and Valcanover and Souza (2021) in Brazil, while supporting

Aggarwal et al. (2019), Hsu et al. (2021), and Kaur and Singh (2019). The positive effects observed here may be justified by the possible indicators of organizational stability, with strong leadership instilling confidence (Kaur & Singh, 2019). Other possible explanations include CEOs' desire to be reputable managers, as holding both roles may enhance performance and reduce costs (Peng et al., 2021).

In Model 1, **H3** is rejected, as board independence negatively influenced Tobin's Q, ROA, and ROE, contrary to expectations. In Model 2, **H3** is also rejected due to only negative effects observed on Tobin's Q and return on equity. These findings contradict Agency Theory, which suggests that an increase in external directors would reduce opportunistic managerial behaviors (Jensen & Meckling, 1976). Additionally, independent directors were expected to act as autonomous supervisors (Ahmadi et al., 2018), making decision-making more democratic (Sheikh & Alom, 2021) and improving performance efficiency through neutral and integrity-driven action (Chebbi, 2024).

These findings differ from Aggarwal et al. (2019), Ahmadi et al. (2018), Lu (2021), Puni and Anlesinya (2020), and Valcanover and Sonza (2021) in the Brazilian context but align with Bhagat and Bolton (2019) and Peng et al. (2021). External directors often have less information and familiarity with the organization (Bhatia & Gulati, 2021), and their limited knowledge of institutional operations can negatively affect outcomes (Lu, 2021) and hinder board effectiveness due to information asymmetries (Jensen & Meckling, 1976). Therefore, the increase in independent directors is viewed with skepticism in some of the literature (Bhatia & Gulati, 2021).

**H4**, which posits that board gender diversity has a positive effect on performance, was rejected in both models. In Model 1, this variable was insignificant for all performance measures, while in Model 2, it was negatively significant only for return on assets. These findings diverge from expectations in this study but align with previous findings of negative effects from Adams and Ferreira (2009) and Kaur and Singh (2019) and insignificant results from Dallochio et al. (2024). These results also diverge from the positive effects found in the literature (Ahmadi et al., 2018; Brahma et al., 2020; Mastella et al., 2021; Valcanover & Sonza, 2021, in Brazil).

These results likely reflect excessive monitoring, where, in a volatile market like Brazil, delays in decision-making can impact company performance (Adams & Ferreira, 2009). Furthermore, the potential benefits of diversity that improve performance, such as more careful and effective monitoring, agency cost mitigation, and maximizing the principal's wealth, do not seem to apply to the analyzed context (Ali et al., 2020).

The study's **H5**, that environmental (**H5a**) and social (**H5b**) performance have moderating effects on the relationship between CG mechanisms and performance, cannot be fully rejected. In Model 1 (evaluation of environmental moderating effects), environmental impacts were found to moderate the relationships between board independence and Tobin's Q, shifting from negative to positive effects. Additionally, the relationship between CEO duality and return on equity changed to show negative effects when environmental activities were considered.

For Model 2, which tested social performance, it is inferred that social performance moderates three analyzed relationships. Board independence and Tobin's Q exhibit positive moderating effects, whereas they had negative effects in the direct relationship. CEO duality and return on assets show negative moderating effects, reversing their initial positive relationship in the direct interaction. The relationship between board gender diversity and ROA is also moderated by the social pillar, switching from a negative to a positive effect.

This emphasis on environmental and social activities in the relationship between CEO duality and accounting performance (ROA and ROE) likely led organizations to higher levels of transparency (Ma et al., 2023), enhancing stakeholder trust and mitigating informational asymmetries (Wahidahwati & Ardini, 2021). The increased transparency and volume of monitored information might encourage opportunistic behaviors from the agent, who could prioritize personal

interests over maximizing shareholder wealth (Jensen & Meckling, 1976), given that holding both roles amplify the CEO's authority (Kaur & Singh, 2019).

Thus, the influence of environmental and social activities aligns with Agency Theory, which considers CEO duality undesirable due to the excessive power it grants the agent, limiting monitoring policies, reducing transparency and accountability, and negatively impacting performance (Aktas et al., 2019; Puni & Anlesinya, 2020). For their own protection, a CEO holding both positions on the board an entity meant to monitor and even replace the CEO leads to managerial entrenchment, reducing owner rights and influence through strengthened CEO power (Adams & Ferreira, 2009).

Regarding the relationship between board independence and market performance, as measured by Tobin's Q, it appears that environmental and social pillars enhance the advantages of external directors suggested by Agency Theory, supporting the monitoring of CEOs' opportunistic behaviors (Jensen & Meckling, 1976). These activities reinforce the perception among investors that the presence of independent CEOs is a strength compared to organizations lacking them, thereby increasing corporate value (Ahmadi et al., 2018; Peng et al., 2021).

Additionally, external directors act neutrally and with integrity (Chebbi, 2024), and combining these qualities with environmental and social initiatives creates a favorable environment for good governance development. By implementing more detailed practices, companies attract investors, as they project a more positive corporate image (Wahidahwati & Ardini, 2021).

Finally, in Model 2, social performance (SOC) moderated the relationship between board gender diversity and ROA, resulting in a positive effect. This suggests that the unique qualities of women, such as a more empathetic and strategic view on social issues (Ali et al., 2020), can help mitigate agency problems present in the direct relationship (Jensen & Meckling, 1976). This perspective aligns with stakeholder expectations for social practices that improve labor relations, human rights, community engagement, and product responsibility, ultimately generating higher net profits and, consequently, improved ROA (Lu, 2021).

Therefore, it can be inferred that implementing good governance practices can aid in enhancing corporate performance, as well as underscore the contributions and implications of improving a company's environmental and social practices (Wahidahwati & Ardini, 2021). The effects of various corporate governance mechanisms used by companies to improve performance were identified, including board composition concerning the percentage of women, board size, the presence or absence of CEO duality, and the independence of directors (Puni & Anlesinya, 2020), as well as the influence of socio-environmental activities on the proposed relationships (Lu, 2021).

## **5 FINAL CONSIDERATIONS**

This study aimed to analyze the effects of corporate governance (CG) mechanisms, specifically board characteristics (size, CEO duality, independence, and gender diversity of the board of directors), on corporate performance (Tobin's Q, market-to-book, ROA, and ROE), moderated by environmental and social variables (components of ESG performance) in companies listed on the Brazilian stock exchange. Overall, it is concluded that CG mechanisms influence business performance and that this influence is impacted by ESG scores (environmental and social pillars). However, this influence sometimes occurred in ways contrary to those suggested in this study, highlighting the need for further research in this area to enhance understanding of these relationships. The main findings suggest that board size has a positive effect on accounting and market performance (Ahmadi et al., 2018; Bhatia & Gulati, 2021); CEO duality has a positive effect on accounting performance (Aggarwal et al., 2019; Ahmadi et al., 2018); board independence shows negative effects on accounting and market performance (Bhagat & Bolton,

2019; Peng et al., 2021); and board gender diversity has a negative influence on companies' accounting performance (Adams & Ferreira, 2009).

Examining the moderating effect of environmental and social performance on the relationship between governance mechanisms and performance, the evidence suggests that social and environmental scores influence the proposed relationship, albeit with outcomes contrary to expectations (Gillan et al., 2021). Specifically, the findings indicate that environmental scores have a negative moderating effect on the relationship between CEO duality and accounting performance, diminishing the positive effects of CEO duality on performance; they also have a positive influence on the relationship between board independence and both market and accounting performance, mitigating its negative effects. Regarding the moderating effects of social scores, it is concluded that they exert a negative moderating effect on the relationship between CEO duality and accounting performance, weakening the positive effects of direct influence; in the relationship between board independence and market performance, a positive moderating effect was observed, reducing the negative impact of the direct relationship; similarly, a positive effect was found between board gender diversity and accounting performance.

This article contributes to the literature by presenting new evidence on how CG mechanisms impact corporate performance and influence conflicts of interest and shareholder wealth (Jensen & Meckling, 1976). Additionally, the results challenge key assumptions of Agency Theory by revealing that CEO duality and board size, rather than impairing, may positively impact corporate performance. This suggests a need to reevaluate and further investigate classic theories of corporate governance in the Brazilian and emerging markets context, where power and leadership structures may diverge from international norms. Furthermore, the findings enhance understanding of how socio-environmental factors can moderate governance effects, offering a new perspective for the literature on ESG and governance.

As empirical contributions, this research assists organizations in understanding how board characteristics may influence their efficiency and, consequently, impact corporate performance for environmentally and socially responsible companies. For Brazilian companies, the findings indicate that larger boards and CEO duality can enhance performance, challenging the conventional practice of avoiding power concentration (Jensen & Meckling, 1976; Valcanover & Sonza, 2021). Additionally, environmental and social practices play a crucial role in moderating the relationship between governance and performance, suggesting that companies should more robustly integrate ESG initiatives into their strategies to maximize returns and attract investor.

As for social contributions, the findings of this research may incentivize environmental and social investments. By highlighting the low representation of women on boards, as corroborated by recent studies, this research encourages policymakers to consider measures that promote gender equality in companies (Mastella et al., 2021). Moreover, the findings reinforce that companies adopting more aligned ESG practices not only generate positive social impacts but also reap financial benefits. Gender diversity, despite challenges, can contribute to a more inclusive and socially conscious corporate environment, benefiting both internal stakeholders and society at large (Silva Júnior & Martins, 2017).

A key limitation of this study is the sample size, due to limited ESG data disclosure, as identified in the Refinitiv Eikon® database. Another limitation concerns the variables used as CG mechanisms, as CG extends beyond board characteristics alone. Other variables could enhance the relationships tested in this study. However, this limitation does not invalidate the research but highlights opportunities for future studies. For future research, it is recommended to include additional CG variables, such as board member expertise, CEO age, differentiation between family and non-family business contexts, and new ESG approaches, such as using the ESG Controversy Score. Replicating this study with other samples, such as companies listed on the IBrX-100 index of B3 and analyses in other countries, is also suggested.

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### CONFLICT OF INTERESTS

The authors declare no conflict of interest regarding this submitted work.

### AUTHOR CONTRIBUTIONS

Roles	1st Author	2nd Author	3rd Author	4th Author
Conceptualization	♦	♦	♦	♦
Data curation	♦	♦	♦	♦
Formal analysis	♦	♦	♦	♦
Funding acquisition				
Investigation	♦	♦	♦	♦
Methodology	♦	♦	♦	♦
Project administration				
Resources				
Software	♦	♦	♦	♦
Supervision				
Validation	♦	♦	♦	♦
Visualization	♦	♦	♦	♦
Writing – original draft	♦	♦		
Writing – review & editing	♦	♦	♦	♦