Revista Catarinense da CIÊNCIA CONTÁBIL

ISSN 2237-7662, Florianópolis, SC, v. 24, 1-24, e3546, 2025

https://doi.org/10.16930/2237-7662202535462

Available at http://revista.crcsc.org.br

EXECUTIVE COMPENSATION AND INTANGIBLE ASSETS: A STUDY OF BRAZILIAN PUBLICLY TRADED COMPANIES

DIEGO CARVALHO[1]
Federal University of Uberlândia, School of Management, Graduate Studies Department, Uberlândia, MG, Brazil
https://orcid.org/0000-0001-5781-7327
professordiegoc@gmail.com

LUCIANA CARVALHO
Federal University of Uberlândia, School of Management, Graduate Studies Department, Uberlândia, MG, Brazil
https://orcid.org/0000-0001-9645-8718
lucarvalho@ufu.br

ABSTRACT

This study investigates the relationship between corporate governance mechanisms, focusing on executive compensation, and intangibility in Brazilian publicly traded companies. The sample comprises 377 firms listed on B3 between 2010 and 2020. The analysis includes three distinct metrics for measuring intangible assets: Intangible Asset Representativeness (IAR), Degree of Intangibility (DI), and Tobin's Q. Using panel data regression models, the results indicate a statistically significant and positive association between CEO compensation and firms' intangibility levels. Conversely, board of directors' compensation showed a significant negative relationship with some of the metrics analyzed. The findings contribute to the advancement of the literature by proposing different approaches to measuring intangibility and suggest that executive compensation practices are associated with investment in intangible assets, carrying relevant implications for corporate governance, information transparency, and firms' market value.

Keywords: Intangible Assets. Executive Compensation. Corporate Governance.

Edited in Portuguese and English. Original version in Portuguese.

[1] **Correspondence address:** Av. João Naves de Ávila, 2121 | bloco 1f sala 216 | Santa Mônica | 38400-902 | Uberlândia/MG | Brasil.

Received on October 9, 2024. Revised on April 6, 2025. **Accepted on** August 4, 2025, by Prof. Dr. Rogério João Lunkes (Editor-in-Chief). **Published on** November 7, 2025.

1 INTRODUCTION

In recent decades, the global corporate landscape has been shaped by the rise of the knowledge economy, characterized by the growing relevance of intangible assets as key determinants of organizational value and performance. Resources such as human capital, organizational knowledge, innovation, and reputation have come to play a central role in creating sustainable competitive advantages (Bontis et al., 2000; Dumay & Guthrie, 2017; Faria et al., 2020).

The literature has indicated that intangible assets exert a significant influence on firms' valuation, especially in developed economies, where institutional frameworks are more structured and accounting practices more standardized (Curea, 2023; Barajas et al., 2017). However, in developing countries such as Brazil, empirical results remain inconclusive and often contradictory regarding the impact of intangibility on financial performance (Carvalho et al., 2010), revealing important gaps to be explored.

At the same time, corporate governance mechanisms particularly executive compensation have been studied as key instruments for mitigating agency conflicts between managers and shareholders (Jensen & Meckling, 1976). The performance of these high-ranking managers is strategic for corporate success. They play vital roles in resolving conflicts of interest between decision-makers and residual risk bearers (Chen et al., 2019). In this context, the seminal study by Jensen and Meckling (1976) argues that agency conflicts arise from the separation between ownership and control within organizations. One of the solutions proposed by the authors is to make the manager a direct participant in the firm's results, aligning managerial interests with those of shareholders. This can be achieved through performance-based compensation systems, such as the granting of shares or stock options, which encourage managers to pursue decisions that maximize firm value by allowing them to benefit from a portion of the gains, particularly in high-performance scenarios.

The relationship between executive compensation and investment in intangible assets has become especially relevant amid transformations in corporate competitiveness standards. Ye (2014) shows that a variable compensation structure may create conflicts of interest between managers and shareholders, as it can incentivize executives to engage in earnings management practices. However, according to Alkebsee et al. (2022), the association between compensation and the quality of reported accounting information remains unclear in the financial literature. The authors argue that the way executives are compensated plays a crucial role in determining how corporate earnings are managed. Curea (2023), in turn, emphasizes that decisions on allocating resources to intangible assets are influenced by corporate governance characteristics, such as the separation between the CEO and the board chair, as well as the firm's leverage level. When it comes to board compensation, however, the literature provides even scarcer evidence (Ye, 2014).

Corporate governance (CG) serves as a mechanism to ensure effective control over what is expected from a company and what managers actually do, based on the premise that individuals especially those in management positions may act primarily in their own interests, to the detriment of shareholders and of the firm's market value and operational efficiency (Sonza & Kloechner, 2014). One characteristic that can be influenced by managerial decisions and is increasingly regarded as a source of value creation is corporate intangibility. This is reflected in intangible assets, which derive from organizational practices and attitudes, employees' knowledge and skills, and other non-physical elements that enhance the company's value alongside its tangible, physical assets (Kayo et al., 2006).

Despite theoretical advances, there remains a limited body of empirical research simultaneously examining the effects of executive compensation on different measures of corporate intangibility. This gap is particularly evident in the Brazilian context, which is characterized by high ownership concentration and hybrid governance structures (Dias et al., 2021;

Albuquerque Filho et al., 2018). Therefore, this study identified an opportunity to investigate the relationship between executive compensation as a corporate governance mechanism, considering not only managers but also the board of directors of Brazilian publicly traded companies listed on B3. The guiding question of this research is: "**What is the relationship between executive compensation, as a corporate governance mechanism, and the intangibility of publicly traded companies in Brazil?**" Accordingly, this study aims to analyze the relationship between executive compensation, as a corporate governance mechanism, and the intangibility of Brazilian publicly traded companies.

This study adopts three measurement perspectives of intangible resources, jointly portrayed in the literature: (1) Intangible Asset Representativeness, (2) Degree of Intangibility, and (3) Tobin's Q, in order to analyze the relationship between executive compensation measured through managers' remuneration and board members' compensation and intangibility.

This research is justified by the relative scarcity of studies examining this relationship in Brazil, making it relevant for presenting empirical evidence within the national context. It contributes to the literature by empirically exploring a seldom-addressed intersection: corporate governance, through executive compensation, and corporate intangibility in emerging economies. It also offers practical implications by demonstrating how compensation structures can affect the valuation of strategic assets and informational transparency fundamental aspects for boards of directors, investors, and policymakers.

2 THEORETICAL FRAMEWORK

2.1 Intangible Assets: concept, measurement, and disclosure

In recent decades, interest in intangibility has grown due to its impact on creativity and value creation within organizations (Wu & Lai, 2020). Despite this growth, its role in influencing stock prices and financial market stability remains underexplored. Intangibility can be viewed from different perspectives, such as intangible investments, intangible assets, or intangible capital (Zéghal & Maaloul, 2011). These assets are essential to achieving organizational goals, even though they are not physical, as their value lies in the legal rights held by their owners (Viceconti & Neves, 2013).

The management of intangible assets reflects an emerging economy based on intangible products and services created through intellectual effort (Ferreira & Oliveira, 2020). Demonstrating the existence of such assets is important to provide data that support organizational decision-making (Dionízio, 2016), reducing information asymmetry and increasing managerial confidence as well as the firm's market valuation (Meneses et al., 2013). Intangible assets hold great potential to generate competitive advantage and high returns for investors (Perez & Famá, 2006), but their quality and management determine their actual impact (Albuquerque Filho et al., 2018). The strategic management of these assets, without neglecting others, is essential to achieving a sustainable competitive advantage (Carabel et al., 2021).

Although strategic, intangible assets face considerable challenges in terms of measurement and accounting recognition. Due to their subjectivity, low verifiability, and the difficulty of assigning a reliable value, many of these assets are not recorded in financial statements, especially when they are internally generated (Zéghal & Maaloul, 2011; Dumay & Guthrie, 2017). This results in significant informational asymmetries that negatively affect market efficiency and firm valuation (Curea, 2023).

In this context, the literature has proposed the use of proxies and alternative indicators that seek to capture intangibility more broadly and indirectly. Among these indicators are the accounting representativeness of intangible assets (Intangible Asset Representativeness – IAR),

the Degree of Intangibility (DI), and Tobin's Q, each offering distinct perspectives on value, market perception, and asset structure (Faria et al., 2020; Barajas et al., 2017; Oliveira et al., 2010).

Given the limitations of traditional accounting recognition, voluntary disclosure has become increasingly important as a transparency mechanism. Strategies for disclosing intangible information through integrated reporting or digital platforms have been adopted by organizations to better communicate their intellectual capital to the market (Herli & Tjahjadi, 2022). This is particularly relevant in contexts where relational capital and reputation are competitive differentiators. Dumay and Guthrie (2017) emphasize the importance of expanding intangible disclosure to mitigate informational deficits.

Vogt et al. (2016) highlight the importance of analyzing the degree of intangibility to understand its impact on economic performance. In a study of Brazilian electricity companies, Moura et al. (2013) found increasing relevance of intangible assets compared to tangible ones. However, Santos et al. (2016), when analyzing the impact of innovation on the performance of Brazilian firms, found that although value was created, intangible assets related to innovation and R&D showed a negative relationship with performance revealing that the contribution of intangibles may depend on the nature of the asset, the sector, and the evaluation horizon.

2.2 Executive compensation and its implications for investments in intangibles

Understanding the relationship between executive compensation and its potential influence on investments in intangible assets can be crucial for organizations. The way managers are compensated tends to directly affect their propensity to adopt long-term strategies, such as those related to innovation, reputation, human capital, and other forms of intellectual capital (Alkebsee et al., 2022; Curea, 2023).

When managerial power is excessively concentrated for instance, when the CEO also serves as the chair of the board of directors, acting simultaneously as both the decision-maker and the overseer of corporate decisions shareholders' interests can be easily diverted (Chiu et al., 2022). This duality undermines the system of checks and balances that characterizes sound corporate governance and may lead to decisions contrary to sustainable value creation.

The actions that enhance the importance of executive managers are not necessarily the same as those that strengthen shareholder value; therefore, it is necessary to establish legal frameworks that align the interests of both parties (Alves & Krauter, 2014). In this context, the structure of compensation can serve as a mechanism to reduce conflicts, particularly when it is linked to performance-based goals. Executive compensation thus emerges as a tool to minimize agency conflicts and encourage decisions that enhance firm value, including those related to investments in intangible assets (Amzaleg et al., 2014).

Moreover, the strategic selection of a CEO has a greater impact on an organization's reputation than efforts to build reputation solely through performance improvement (Weng & Chen, 2017). This reputation, in turn, constitutes part of the company's relational capital—one of the pillars of intangible capital. Just as the CEO plays a strategic role, characteristics related to the board of directors also directly influence the levels of risk-taking, innovation, and transparency in management (Berger et al., 2014; Minton et al., 2014). CEOs (executive management) typically assimilate the benefits granted to them by the board of directors and may, based on these incentives, strive either to increase firm value or to pursue their own interests (Cooper et al., 2016).

Several studies have examined the relationship between board composition and risk-taking, drawing on directors' experience within specific industries, and have found that effective governance is vital for overseeing risk management in organizations (Berger et al., 2014; García-Sánchez et al., 2017; Kutubi et al., 2018; Minton et al., 2014). However, empirical evidence remains scarce regarding whether and how board incentives such as compensation affect the orientation toward intangible investments, even though existing studies acknowledge the board's

role in supervising risk and strategic decision-making (Unda & Ranasinghe, 2021). This gap reinforces the need to explore compensation not only for executive management but also for board members, in order to better understand its effects on organizations' intangible capital.

2.3 Managers' (CEOs') compensation and strategic decisions on intangibles

According to Agency Theory, CEO compensation—especially when linked to performance—helps reduce conflicts of interest between managers and shareholders (Wang et al., 2021). These executives hold strategic positions, and their decisions directly affect shareholder interests (Chen et al., 2019). To mitigate the misalignment of interests, compensation structures have been developed that tie firm performance to managerial remuneration, creating incentives for decision-making aimed at maximizing the organization's value (Amzaleg et al., 2014).

The composition of CEO compensation generally consists of a fixed component (base salary) and a variable component determined by achieved results. The variable portion may include performance bonuses and the granting of shares or stock options, which has become an increasing trend in corporate governance policies of large corporations (Sundaram & Yermack, 2007; Edmans et al., 2017). Such mechanisms are considered ways to align the interests of managers with those of shareholders by making executives partial participants in the organization's results. However, this logic can produce ambiguous effects. Although the link between compensation and performance may encourage value-enhancing decisions, it can also stimulate opportunistic practices such as earnings management, aimed at maximizing short-term personal gains (Ye, 2014). The relationship between compensation and strategic risk is particularly sensitive when it involves investments in intangible assets, which entail uncertain and long-term returns, such as innovation, human capital, and brand development (Curea, 2023).

A study conducted by Yang et al. (2014) on U.S. companies between 1992 and 2011 revealed that, prior to the 2008 crisis, CEO compensation showed a positive correlation with stock performance. However, after the crisis, increased monitoring was observed, along with a negative association between compensation and market performance. These results suggest that the institutional environment and the degree of oversight strongly influence the effects of compensation on performance and, consequently, on commitment to intangible assets.

Moreover, recent research, such as that of Alkebsee et al. (2022), shows that executives' cash compensation is sometimes associated with reduced earnings management and increased accounting transparency, which can promote a more efficient allocation of resources including investments in intangible assets. Conversely, compensation policies based exclusively on equity may lead to riskier decisions with less emphasis on organizational sustainability.

These findings underscore the importance of analyzing not only whether there is a link between compensation and intangibility but also how different compensation structures can either promote or inhibit investments in intangible assets an issue still underexplored in the Brazilian context and representing a significant gap in the national literature.

2.4 Board of directors' compensation and its influence on strategic decisions

The function of a company's board of directors is strategic in the context of corporate governance, as it is responsible for overseeing executive management, representing shareholders' interests, and deliberating on organizational guidelines. Over the years, its responsibilities have expanded to include more complex domains such as risk management, sustainability, and performance evaluation (Dah & Frye, 2017).

Board members play a crucial role in formulating corporate strategies and representing shareholders' interests, acting as impartial regulatory guardians of managerial actions (Collin et al., 2017; Hermalin & Weisbach, 2003). The board's composition is vital to the success of its

activities. Factors such as increasing or reducing board size can be perceived as forms of earnings management (Ribeiro & Colauto, 2016), influencing how managerial oversight is conducted. In this regard, the duality of roles—when the same individual serves as both CEO and board chair—negatively affects management efficiency and board effectiveness, as it enables greater violations of accounting principles (Chen et al., 2015).

According to the literature on corporate governance, the guidelines of the Brazilian Institute of Corporate Governance (IBGC), and the recommendations of the Securities and Exchange Commission of Brazil (CVM), it is essential that the board include independent members to minimize the likelihood of actions contrary to the company's interests (Peixoto & Buccini, 2013). The authors also emphasize the need to determine the optimal board size to ensure effective coordination of responsibilities, as well as to separate the roles of CEO and board chair.

Considering governance failures involving the boards of companies such as Petrobras, Linx, and Totvs (IBGC, 2020), discussions about board effectiveness, director performance, and the relevance of compensation systems have intensified—topics already addressed in the seminal work of Fama and Jensen (1983). Corporate governance is the primary responsibility of the board of directors, granted by legal authority. As this is a strategic function involving a close relationship with the CEO, it is suggested that board member compensation should be determined through negotiation between the board and the CEO. Although less studied than executive compensation, board remuneration can directly affect members' autonomy, engagement, and consequently, their ability to influence strategic decisions including those related to investments in intangible assets (Elnahass et al., 2020; Muravyev, 2017).

Some scholars argue that certain board compensation models effectively resolve agency conflicts and contribute to better organizational performance and higher market value (Guo et al., 2019; Yas et al., 2018). Shareholders, regulators, and the market all expect boards to take an active stance in the organization and to establish effective tools and mechanisms for risk monitoring (Kress, 2018). Therefore, several authors suggest that increasing board independence can help control excessive compensation and prevent loss of shareholder confidence (Andreas et al., 2010; Cheng & Firth, 2005; Conyon & He, 2011; Ryan & Wiggins, 2004).

In addition, it is the board's responsibility to mitigate opportunistic strategies adopted by CEOs, especially those affecting the organization's intangible capital, such as reputation, innovation, and human capital (Weisbach, 1988). Therefore, although still underexplored in the national empirical literature, board compensation may exert an indirect yet significant influence on the company's strategic orientation, including its investments in intangible assets. Analyzing its structure and impact is thus essential to more comprehensively understand the relationship between corporate governance and intangibility.

2.5 Theoretical Synthesis and Hypothesis Development

The literature on corporate intangibility has shown that assets such as innovation, human capital, reputation, brand, and intellectual property are key elements in generating organizational value, especially in the knowledge economy (Dumay & Guthrie, 2017; Bontis et al., 2000). However, measuring these assets remains a challenge, particularly in institutional contexts with weak frameworks and low accounting standardization, such as in Brazil (Zéghal & Maaloul, 2011; Oliveira et al., 2013).

To address this limitation, recent studies have adopted different metrics of intangibility: the accounting representativeness of intangible assets (IAR), the degree of intangibility (DI), and Tobin's Q (QTOBIN) are commonly used proxies that capture distinct dimensions of intangible assets either accounting-based or market-based (Faria et al., 2020; Curea, 2023; Barajas et al., 2017).

Conversely, corporate governance mechanisms particularly the compensation of top executives and board members have been linked to strategic decisions that directly influence investment levels in intangible assets (Alkebsee et al., 2022; Amzaleg et al., 2014). Agency Theory suggests that a well-designed compensation structure can align the interests of managers and shareholders, encouraging commitment to decisions that create long-term value, such as those related to innovation and intellectual capita (Jensen & Meckling, 1976; Wang et al., 2021).

However, the empirical literature on the relationship between compensation and intangibility remains limited particularly when distinguishing between executive board compensation (CEOPAY) and board of directors' compensation (BOARDPAY), and their respective influences on different proxies of intangibility. This gap is even more evident in the context of Brazilian publicly traded companies, where ownership concentration is high and additional challenges exist regarding transparency and investor protection (Dias et al., 2021; Albuquerque Filho et al., 2018).

Given this scenario, this study seeks to investigate whether CEO and board compensation are significantly related to firms' levels of intangibility, as measured by three distinct dimensions: the accounting representativeness of intangible assets (IAR), the degree of intangibility (DI), and Tobin's Q (QTOBIN). Based on the theoretical framework presented, the following hypotheses are proposed:

Hypotheses associated with the accounting representativeness of intangible assets (IAR):

- **H1a:** There is a positive and significant relationship between the accounting representativeness of intangible assets (IAR) and CEO compensation (CEOPAY).
- **H1b:** There is a positive and significant relationship between the accounting representativeness of intangible assets (IAR) and board of directors' compensation (BOARDPAY).

Hypotheses associated with the degree of intangibility (DI):

- **H2a:** There is a positive and significant relationship between the degree of intangibility (DI) and CEO compensation (CEOPAY).
- **H2b:** There is a positive and significant relationship between the degree of intangibility (DI) and board of directors' compensation (BOARDPAY).

Hypotheses associated with market value (Tobin's Q):

- **H3a:** There is a positive and significant relationship between market value (Tobin's Q) and CEO compensation (CEOPAY).
- **H3b:** There is a positive and significant relationship between market value (Tobin's Q) and board of directors' compensation (BOARDPAY).

The formulation of these hypotheses enables the investigation of an empirical association between governance mechanisms through compensation and the different aspects of intangibility, contributing both to the advancement of the literature and to the improvement of strategic management in companies operating in emerging markets.

3 METHODOLOGICAL PROCEDURES

The study has a descriptive character and is classified as quantitative in nature. It investigates the influence of corporate governance on investment in intangible assets among publicly traded companies listed on B3. Data were analyzed using linear regression models with unbalanced panel data, covering the period from 2010 to 2020. The statistical analyses were performed using Stata® software, version 17. The sample comprises 377 non-financial companies listed on B3 and active with the Brazilian Securities and Exchange Commission (CVM) as of March 2022. Financial information was obtained from the Economática® database, while governance data were manually collected from the CVM Reference Forms—company by company, year by year, and variable by variable.

Corporate governance data were gathered manually, for each firm, each year, and each variable. Only companies with publicly traded shares and active registration with the CVM as of March 2022 were included, with B3 serving as the data source. The statistical technique applied was unbalanced panel data analysis for the years 2010 to 2020. The choice of 2010 as the starting point reflects the mandatory adoption of International Financial Reporting Standards (IFRS) by Brazilian companies beginning that year.

3.1 Study variables

3.1.1 Dependent variables

To measure the level of intangibility, three dependent variables were used, as described below:

1) Intangible Asset Representativeness (IAR): measured by dividing the company's intangible assets by its total assets. This variable is characterized as an accounting measure of intangibility;
2) Degree of Intangibility (DI): measured by dividing the company's market value by its shareholders' equity. This variable is characterized as a market value measure;
3) Tobin's Q (QTOBIN): measured by dividing the sum of the company's market value and total debt by its total assets. This variable is also characterized as a market value measure.

Thus, any of the dependent variables that exhibit an influence from the independent variables will characterize a valid result for this research. In other words, it is not necessary for all three dependent variables to show statistical significance with the independent variables simultaneously.

3.1.2 Independent variables

As independent variables, considering corporate governance aspects and focusing on executive compensation comprising CEO compensation and board of directors' compensation the following variables were used:

BOARDINDEP: collected from items 12.5/6 of the Reference Form (FR) by calculating the percentage of independent members in relation to the total number of effective board members. For companies that did not report the separate number of independent members in certain years, a missing value was assigned for those years.

CEODUALITY: collected from items 12.5/6 of the FR, indicating whether the same person served as both CEO and chair of the board of directors in each year analyzed. This is a dummy variable equal to 1 if the CEO also held the position of board chair, and 0 otherwise.

CEOPAY: collected from item 13.2, representing the total compensation of the executive board for each year of the study. It is expressed as the natural logarithm of the average annual compensation of the executive board. Although the compensation level has limitations as an isolated indicator of governance (Angrist & Pischke, 2009), it reflects the prevailing compensation policy and is relevant within the contractual framework of Agency Theory.

BOARDPAY: collected from item 13.2, representing the total compensation of the board of directors for each year of the study. Only the number of effective and compensated board members was considered. It is expressed as the natural logarithm of the average annual compensation of effective and compensated board members.

BOARDSIZE: Collected from item 13.2, representing the total number of board members for each year of the study.

The governance variables were theoretically grounded in the literature that links these characteristics to the organization's capacity for supervision, mitigation of agency conflicts, and

strategic direction, including decisions related to investments in intangible assets (Duru et al., 2016; Alkebsee et al., 2022; Peixoto & Buccini, 2013).

3.1.3 Control variables

Economic and financial variables were used as controls in order to mitigate bias arising from the omission of relevant variables:

ROA: return on assets, a performance indicator (Dal Magro et al., 2019);

FCO: operating cash flow over total assets. Due to limitations in the standardized availability of the Statement of Cash Flows (DFC), this value was extracted from the adjusted Income Statement, following Roychowdhury (2006);

GROWTH: firm growth, measured by the annual percentage change in market value (Silva Júnior et al., 2021);

LEV: financial leverage, measured by the ratio of total debt to total assets (Tristão & Sonza, 2021);

SIZE: firm size, calculated as the natural logarithm of total assets (Sprenger et al., 2017).

LIQCOR: Current liquidity, a measure of short-term solvency (Bomfim et al., 2011);

CAPEX: variation between total assets and total liabilities, used as a proxy for physical capital investment (Gu & Lev, 2011);

The variables are compiled in Table 1, as shown below:

Table 1
Variables of the executive compensation study

	VARIABLE	METRIC	DATA SOURCE	BASIS / AUTHOR
Dependent Variables	RAI (Representatividade Ativo Intangível)	Intangible Assets / Total Assets	Economática	Ritta e Ensslin (2010); Nascimento et al. (2012); Miranda et al. (2013)
	GRI (Grau De Intangibilidade)	Market Value / Shareholders' Equity	Economática	Faria et al. (2020)
	QTOBIN (Q De Tobin)	(Market Value + Total Debt) / Total Assets	Economática	Villalonga (2004); Carvalho, Kayo e Martin (2010)
Independent Variables	BOARDINDEP	Number of independent members on the board of directors	CVM	Duru, Iyengar e Zampelli (2016)
	CEODUALITY	Dummy variable equal to 1 if the CEO is also the chair of the board, and 0 otherwise	CVM	Brandão et al. (2019); Duru, Iyengar e Zampelli (2016)
	CEOPAY	Natural logarithm of the company's average annual Executive Board (CEO) compensation	CVM	Hossain e Monroe (2015); Alkebsee, Alhebry e Tian (2022)
	BOARDPAY	Natural logarithm of the company's average annual Board of Directors' compensation	CVM	Oxelheim e Clarkson (2015); Zittei, De Moura e Hein (2015)
	BOARDSIZE	Number of members on the Board of Directors	CVM	Duru, Iyengar e Zampelli (2016); Guo et al. (2019)
Control Variables	ROA	Net Income / Total Assets	Economática	Dal Magro, Dani e Klann (2019)

	LIQCOR	Current Assets / Current Liabilities	Economática	Bomfim et al. (2011)
	CAPEX	Change in Total Assets – Change in Total Liabilities	Economática	Gu e Lev (2011)
	FCO	Operating Revenue / Total Assets	Economática	Dal Magro, Dani e Klann (2019); Guo et al. (2019), Roychowdhury (2006).
	LEV	Total Debt / Total Assets	Economática	Tristão e Sonza (2021)
	GROWTH	(Current Firm Value – Previous Year Firm Value) / Previous Year Firm Value × 100%	Economática	Silva Junior, Fagundes e Figueiredo (2021)
	SIZE	Natural Logarithm of the Company's Total Assets	Economática	Sprenger et al. (2017)

Source: Research data.

The analysis was conducted using multiple linear regression with panel data, applying the random effects estimator with robust correction, as indicated by the Breusch-Pagan, Chow, and Hausman tests. Wooldridge and Wald tests were also performed, with no evidence of serial autocorrelation or heteroskedasticity.

The general estimated equation can be expressed as follows:

$$INTANGit = \beta^0 + \beta^1 BOARDINDEPit + \beta^2 BOARDPAYit + \beta^3 BOARDSIZEit + \beta^4 CEODUALITYit + \beta^5 CEOPAYit + \sum_{J=6}^{12} BjCONTROLj,it + \varepsilon i$$

Where:

- INTANGit represents each of the three dependent variables (IAR, DI, or QTOBIN), analyzed separately;
- CONTROLj,it represents the set of control variables;
- εit is the idiosyncratic error term.

The multicollinearity test was performed using the Variance Inflation Factor (VIF), and the results showed mean values below 10 in all models, suggesting the absence of severe multicollinearity.

Finally, the decision to formulate specific hypotheses for each intangibility proxy is justified by the distinct nature of each indicator, allowing for the identification of specific significant relationships between governance variables and the different dimensions of organizational intangibility.

The hypotheses defined for this research are presented in Table 2 below:

Tabble 2

Research hypotheses

INTANGIBILITY	HYPOTHESIS	DESCRIPTION
RAI	H1a	There is a positive and significant relationship between the accounting representativeness of intangible assets (IAR) and CEO compensation (CEOPAY)
	H1b	There is a positive and significant relationship between the accounting representativeness of intangible assets (IAR) and board of directors' compensation (BOARDPAY)
GRI	H2a	There is a positive and significant relationship between the degree of intangibility (DI) and CEO compensation (CEOPAY)
	H2b	There is a positive and significant relationship between the degree of intangibility (DI) and board of directors' compensation (BOARDPAY)

QTOBIN	H3a	There is a positive and significant relationship between market value (Tobin's Q) and CEO compensation (CEOPAY)
	H3b	There is a positive and significant relationship between market value (Tobin's Q) and board of directors' compensation (BOARDPAY)

Source: Research data.

4 RESULTS

4.1 Descriptive Analysis of the Variables

Table 3 presents the means and standard deviations of the variables selected for the study, excluding dummy variables.

Table 3
Descriptive analysis of variables

VARIABLE	OBS	MEAN	STANDARD DEVIATION	MINIMUM	MAXIMUM
CEOPAY	3.022	15.27208	1.71143	0.6931472	17.93339
BOARDPAY	2.720	13.55697	1.759471	-3	16.48734
BOARDINDEP	1.618	2.857849	1.773038	1	9
BOARDSIZE	3.208	6.484055	3.434146	0	17.75
ROA	3.401	0.126108	0.2786317	0.001284	1.836364
FCO	3.390	3.385985	9.524915	0.034890	70.59413
GROWTH	3.158	0.058237	0.1588111	0	6.976224
LEV	3.383	0.633539	0.5775584	0	8.840028
SIZE	3.377	0.397976	2.034448	0	65.1603
LIQCOR	2.532	0.104829	0.631978	-1	2.743657
CAPEX	3.402	14.53666	2.520451	4.546576	18.67634

Source: Research findings.

The results shown in Table 1 indicate that the mean natural logarithm of executive board compensation (CEOs), measured by the independent variable CEOPAY, was 15.27208, and the mean natural logarithm of board of directors' compensation, measured by BOARDPAY, was 13.55697. Both CEOPAY and BOARDPAY were transformed using the natural logarithm, following established practice for normalizing financial data with high dispersion. Absolute remuneration values (in BRL) could not be presented due to the nature of the raw data extracted from standardized reports. However, the original values were retained internally for computation and transformation purposes, and statistical analyses were conducted robustly based on these transformed values.

It is also observed that the average size of corporate boards is 6.4840 members, as measured by BOARDSIZE, and the mean number of independent directors is 2.8578, as measured by BOARDINDEP. This corresponds to approximately 44.18% independent directors relative to the total number of board members, aligning with the principles identified in Peixoto and Buccini's (2013) research.

The variables representing economic performance show an overall ROA mean of 0.12. The current liquidity (LIQCOR), with a mean of 0.1048, indicates a good capacity for companies to assume short-term debt, as the value reflects a current asset level higher than current liabilities.

The CAPEX, expressed as a ratio of total assets, has a mean of 14.53, while the Operating Cash Flow (FCO), also relative to total assets, shows a mean of 3.38. This suggests that, on average, FCO is lower than CAPEX, indicating a certain imbalance, with firms investing more in fixed assets than their operational capacity allows. The leverage variable (LEV) presents a mean of 0.633, below 1, which signals a favorable scenario for investors, indicating the presence of third-party capital.

4.2 Frequency distribution of the Dummy Variable

In this study, the dummy variable represents whether the CEO also holds the position of chair of the board of directors during the analyzed period. In addition to enabling a comparison between the two data sets, the relevance of this variable is highlighted in the study by Chen et al. (2015), which emphasizes that the duality of roles when the same individual serves as both CEO and board chair can affect management efficiency and the functioning of the board of directors, as it increases the likelihood of violations of accounting principles. Table 4 presents the results of the frequency distribution for the dummy variable.

Table 4
Frequency of the dummy variable

VARIABLE	OBS	0		1	
CEODUALITY	2.776	2.081	74.96%	695	25.04%

Source: Research findings.

For the dummy variable CEODUALITY, the value “0” (zero) represents companies in which the CEO and the chair of the board of directors are different individuals, while the value “1” (one) represents companies where both positions are held by the same person. Based on the results, 25.04% of Brazilian publicly traded companies have the same individual occupying both roles simultaneously. The relationship between role duality and intangibility may be linked to the increased decision-making autonomy of the CEO, which, depending on the context, can either enhance or compromise investments in strategic assets such as intangibles. This phenomenon is discussed by authors such as Chen et al. (2015), who warn about the risks of weaker oversight and potential accounting conflicts in contexts characterized by high power concentration.

4.3 Correlation of the variables

Figure 1 presents the results of the Pearson correlation coefficient (R) among the independent and control variables of the study, including the dummy variables.

Figure 1
Correlation of variables

	CEOPAY	BOARDPAY	BOARDINDEP	BOARDSIZE	ROA	FCO	GROWTH	LEV	SIZE	LIQCOR	CAPEX
CEOPAY	1										
BOARDPAY	0,6373*	1									
BOARDINDEP	0,2475*	0,3377*	1								
BOARDSIZE	0,3750*	0,3411*	0,3644*	1							
ROA	-0,1902*	-0,1435*	-0,0582*	-0,2743*	1						
FCO	0,0578*	0,0481*	0,1138*	-0,0057	-0,1244*	1					
GROWTH	0,0070	0,0101	0,0173	-0,036	0,0101	0,0500*	1				
LEV	0,0608*	0,0466*	-0,0579*	-0,0889*	0,1776*	-0,0263	0,0111	1			
SIZE	0,6027*	0,4700*	0,3054*	0,6044*	-0,5782*	0,0214	-0,0004	-0,0742*	1		
LIQCOR	-0,2172*	-0,1251*	-0,0071	-0,1998*	0,3459*	-0,1641*	-0,0307	-0,0455*	-0,3812*	1	
CAPEX	0,0313	-0,0109	-0,0146	0,0324	0,0427*	0,0758*	-0,0236	-0,0108	0,0249	0,0724*	1

Note: a) (*) statistically significant; b) Absence of an asterisk indicates a non-significant coefficient.
Source: Research findings

For this study, the correlation scale proposed by Dancey and Reidy (2007) and applied by Akoglu (2018) was adopted, according to which correlations are classified as follows: weak (0.1 to 0.3), moderate (0.4 to 0.6), and strong (0.7 to 0.9).

For the variable representing executive compensation (CEOPAY), which reflects the specific compensation of executive directors, a moderate positive correlation was found with BOARDPAY and SIZE, as well as a weak positive correlation with BOARDINDEP, BOARDSIZE, FCO, and LEV. The variable also showed a weak negative correlation with ROA and LIQCOR. It is noteworthy that the highest correlation for CEOPAY was with BOARDINDEP, indicating a direct proportionality between executive board compensation and the number of members on the board of directors. The variable BOARDPAY, representing the compensation of board members, which is also used as an indicator of executive remuneration in this study, exhibited a moderate statistically significant correlation only with CEOPAY. However, it also showed weak positive correlations with SIZE, BOARDINDEP, and BOARDSIZE, which respectively represent company size, the number of independent board members, and the overall size of the board of directors.

A noteworthy observation in the correlation table concerns the variable ROA (Return on Assets), used to measure organizational profitability. It displayed a weak but negative significant correlation with all non-dummy dependent variables. Similarly, with the exception of BOARDINDEP, the LIQCOR (Current Liquidity) variable indicating the firms' ability to meet short-term obligations also showed a weak negative significant correlation with all non-dummy dependent variables.

4.4 Relationships between intangibility and the study variables

When performing the statistical evaluation of the results, the study proceeded with a panel data analysis to investigate the influence of ownership concentration and other variables on companies' investment in intangible assets. To assess potential multicollinearity among the variables, the Variance Inflation Factor (VIF) was applied, considering all variables in the model. The results indicated VIF coefficients below 10, suggesting the absence of multicollinearity.

Additionally, the Wald and Wooldridge tests were conducted to verify possible issues of heteroskedasticity and serial autocorrelation. No such problems were detected in either dataset. The Breusch-Pagan and Hausman tests were also applied to determine the appropriate panel data model fixed effects, random effects, or pooled. In both tests, the results supported the use of random effects models. Table 5 presents the results of the relationship between firms' level of intangibility and executive compensation, as well as the other variables included in the study.

Table 5
/ Association between the intangibility of companies and the variables

VARIABLES	IAR	DI	QTOBIN
CEOPAY	0.0030457 (0.0042276)	0.3261669** (0.1558564)	0.05455*** (0.0207585)
BOARDPAY	-0.0080002* (0.0042578)	0.2131321 (0.151328)	0.0068521 (0.0206999)
CEODUALITY	0.0033305 (0.009349)	-0.0634514 (0.4750842)	0.0894365* (0.0529662)
BOARDINDEP	0.0061811***	-0.0446778	-0.0047241

	(0.0022947)	(0.0977231)	(0.0117979)
BOARDSIZE	0.003727** (0.0017957)	0.087994 (0.0652898)	-0.0110522 (0.0093516)
ROA	0.003453 (0.0221067)	-0.3072812 (1.233088)	0.3527452*** (0.1225823)
FCO	-0.0148672 (0.014583)	0.760549** (0.364711)	0.4728701*** (0.0675415)
GROWTH	-0.002337 (0.0041351)	0.768402*** (0.2465144)	0.2837057*** (0.0213486)
LEV	-0.0316251 (0.018275)	0.5456892 (0.7248651)	0.2720317*** (0.0997276)
SIZE	0.0127631 (0.0057625)	-0.2720058** (0.1442358)	-0.0058293 (0.0281127)
LIQCOR	-0.0083221*** (0.0022668)	-0.1908598** (0.1015198)	0.0303722*** (0.0118285)
CAPEX	0.0774416* (0.0424287)	4.008266 (2.433776)	1.088928*** (0.2344778)
Observations	964	1.234	1.234
Number of groups	150	169	169
RHO	0.82586921	0.02095248	0.70351636
Breusch and Pagan Test	0.0000	0.0000	0.0000
Chow Test	0.0000	0.2628	0.0000
Hausman Test	0.0000	0.0000	0.0000
Wald Test	0.0000	0.0000	0.0000
Wooldridge Test	0.0000	0.3546	0.0000

Notes: a) Standard errors are in parentheses; b) (*) statistically significant at the 10% level; (**) statistically significant at the 5% level; (***) statistically significant at the 1% level; c) absence of an asterisk indicates a non-significant variable; d) the VIF test showed coefficients below 10 for all variables, indicating no multicollinearity.
Source: Research findings.

Analyzing the results, it is observed that the Intangible Asset Representativeness (IAR) shows a negative relationship with board of directors' compensation at the 10% significance level. Thus, it can be concluded that an increase in the compensation of board members may lead to a slight decrease in the representativeness of intangible assets.

The Intangible Asset Representativeness (IAR) also showed a positive relationship with the size of the board of directors (BOARDSIZE) at the 5% significance level and with the number of independent directors (BOARDINDEP) at the 1% level. Analyzing the results for the Degree of Intangibility (DI), a positive relationship was observed with executive board compensation at the 5% significance level, indicating that DI tends to increase as CEO compensation rises.

For Tobin's Q, the results indicate a statistically significant relationship at the 1% level with executive board compensation (CEOPAY). It also shows a positive and significant

relationship with ROA, FCO, LEV, LIQCOR, and CAPEX, which supports the findings of Mazzioni et al. (2014), who identified a positive and significant relationship between the degree of intangibility and corporate performance. Accordingly, Table 6 below presents the results of the hypotheses based on the tests performed.

Table 6
Result of hypotheses

INTANGIBILITY	HYPOTHESES	DESCRIPTION	RESULT
IAR	H1a	There is a positive and significant relationship between the representativeness of intangible assets (IAR) and CEO compensation (CEOPAY).	The hypothesis is rejected.
	H1b	There is a positive and significant relationship between the representativeness of intangible assets (IAR) and board of directors' compensation (BOARDPAY).	The hypothesis is rejected.
DI	H2a	There is a positive and significant relationship between the degree of intangibility (DI) and CEO compensation (CEOPAY).	The hypothesis is not rejected.
	H2b	There is a positive and significant relationship between the degree of intangibility (DI) and board of directors' compensation (BOARDPAY).	The hypothesis is rejected.
QTOBIN	H3a	There is a positive and significant relationship between market value (Tobin's Q) and CEO compensation (CEOPAY).	The hypothesis is not rejected.
	H3b	There is a positive and significant relationship between market value (Tobin's Q) and board of directors' compensation (BOARDPAY).	The hypothesis is rejected.

Source: Research findings.

The findings of the study show that higher compensation structures for CEOs are positively associated with firms' intangibility, particularly from the perspectives of market perception and strategic valuation (DI and Tobin's Q). These results suggest that executive board compensation may act as an incentive mechanism for decisions aimed at enhancing the value of non-physical assets. This outcome aligns with Agency Theory, as it promotes the alignment between managers and shareholders in the pursuit of long-term strategies.

On the other hand, board of directors' compensation showed a negative relationship with the Intangible Asset Representativeness (IAR) and no significant relationship with the other measures of intangibility. This may reflect a more conservative approach or a disconnection from decisions related to the management of strategic assets.

Furthermore, the CEODUALITY variable exhibited a positive relationship with Tobin's Q, suggesting that, in certain contexts, the concentration of power may be associated with strategic decisions valued by the market. However, this relationship should be interpreted with caution, given the potential risks of reduced oversight and opportunistic bias, as highlighted in the literature.

Table 7 below presents the main statistically significant findings identified in the study:

Table 7
Summary statistically significant results

INTANGIBILITY MEASURE	INDEPENDENT VARIABLE	COEFFICIENT	SIGN	SIGNIFICANCE
QTOBIN	CEOPAY	0.05455	+	*** (1%)
DI	CEOPAY	0.32617	+	** (5%)
IAR	BOARDPAY	-0.00800	–	* (10%)
QTOBIN	CEODUALITY	0.08944	+	* (10%)
IAR	BOARDINDEP	0.00618	+	*** (1%)
IAR	BOARDSIZE	0.00373	+	** (5%)
QTOBIN	ROA	0.35275	+	*** (1%)
QTOBIN	FCO	0.47287	+	*** (1%)
DI	FCO	0.76055	+	** (5%)
DI	GROWTH	0.76840	+	*** (1%)
QTOBIN	GROWTH	0.28371	+	*** (1%)
QTOBIN	LEV	0.27203	+	*** (1%)
DI	SIZE	-0.27201	–	** (5%)
IAR	LIQCOR	-0.00832	–	*** (1%)
DI	LIQCOR	-0.19086	–	** (5%)
QTOBIN	LIQCOR	0.03037	+	*** (1%)
QTOBIN	CAPEX	1.08893	+	*** (1%)
IAR	CAPEX	0.07744	+	* (10%)

Notes: a) Only coefficients with statistical significance were included; b) Significance levels: * (10%). ** (5%). *** (1%); c) Standard errors are available in Table 5.
Source: Research findings.

5 CONCLUSION

The objective of this study was to analyze the relationship between firms' intangibility and executive compensation, understood as one of the main corporate governance mechanisms, as proposed by Agency Theory. The research used a sample of 377 Brazilian publicly traded companies over the period 2010 to 2020, and contributed empirically by applying three different proxies for measuring intangibility: the accounting representativeness of intangible assets (IAR), the degree of intangibility (DI), and Tobin's Q.

The results showed that executive board compensation (CEOPAY) presented a statistically significant and positive relationship with the market-based indicators (DI and Tobin's Q), suggesting that financial incentives may influence decision-making aimed at enhancing the value of strategic non-physical assets. On the other hand, board of directors' compensation (BOARDPAY) displayed a negative relationship with IAR and no association with the other indicators, indicating asymmetric effects between different governance levels. The findings also revealed that board size and the presence of independent directors are positively associated with accounting-based intangibility.

The hypotheses formulated from the literature were partially confirmed: while CEO compensation showed a positive association with market-perceived intangibility, board compensation produced limited or theoretically contrary results. These findings reinforce the strategic role of corporate governance mechanisms in the valuation of intangible assets, particularly in the context of emerging economies.

Despite the theoretical and methodological advances, this study has some limitations. The data analyzed include only companies listed on B3, which restricts the generalizability of the findings. Moreover, intangibility was measured using secondary and indirect proxies, albeit validated in the literature, and the analysis period (2010–2020) does not capture more recent events that may have influenced the dynamics of corporate governance.

As an agenda for future research, it is suggested to deepen the analysis by economic sector and region, as well as to conduct a longitudinal study of executive compensation in relation to earnings management and the evolution of intangible assets. The use of qualitative or mixed-method approaches is also recommended to explore aspects not captured by quantitative variables.

Finally, the results provide practical contributions for investors, boards of directors, and policymakers, indicating that well-designed executive compensation structures can promote strategic decisions aimed at creating sustainable value through the enhancement of intangible assets.

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CONFLICT OF INTERESTS

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

AUTHOR CONTRIBUTIONS

Roles	1st author	2nd author
Conceptualization	♦	
Data Curation	♦	
Formal Analysis	♦	♦
Funding Acquisition		
Investigation	♦	
Methodology	♦	♦
Project Administration	♦	
Resources		
Software		♦
Supervision		♦
Validation		♦
Visualization	♦	
Writing – Original Draft	♦	
Writing – Review and Editing	♦	♦