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Women on the Board and the Impacts on Executive Compensation and Performance of Large Brazilian Companies

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Abstract

Goals: This study aims to investigate the influence of gender diversity on the board of directors on the large Brazilian companies' economic-financial performance and executive compensation.
Method: We analyzed 84 non-financial companies from the IBrX 100, using a dynamic panel (2015 to 2019) with GMM System in one and two stages.
Results or Discussion: The main evidence indicated that gender diversity did not provide economic benefits, either by improving economic-financial performance or by reducing managers' excessive compensation, which, therefore, shows that the hypotheses were not answered. Despite the findings, we emphasize that companies must make efforts to ensure that the gender quota policy within the entity is implemented above the minimum, not restricted to the percentage established by law. Such action inspires credibility among stakeholders, as it highlights the institution's commitment to diversity.
Contributions: The gender diversity discussion is pertinent, especially in the Brazilian reality, where female representation in large organizations is small (10%), only with 53% of companies having at least one woman on their boards of directors. In emerging countries like Brazil, discussions regarding diversity are still incipient, notably because there is no consolidated legislation on the subject, other than a bill awaiting voting and deliberation. Then it configures this study's innovation, which is normally found in developed countries.

Keywords: Gender Diversity; Inclusive Companies; Economic-Financial Performance; Executive Compensation.

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Introduction

Discussions in the literature regarding gender diversity in boards of directors and compensation committees have significantly increased in the last two decades. External pressure for the inclusion of women in these bodies comes especially from social groups, shareholders, and legislators (Benkraiem et al., 2017). What needs to be highlighted is that gender balance in supervisory bodies has become a priority, making board diversification a goal to be achieved (Binder, 2018). Ethical arguments emphasize the need for board diversification to meet the needs of stakeholders and the community (Rixom et al., 2023).

Some theoretical frameworks drawn from economics, psychology, and organizational studies underpin the relationship between gender diversity on boards and companies' financial performance (Yarram & Adapa, 2023), such as the Resource Dependence Theory proposed by Pfeffer and Salancik (1978), which addresses the interdependence relationship and uncertainties of the organization with its environment (Hillman et al., 2009). According to this theory, among the possible courses of action that companies can take to minimize their dependence on the environment, one of them is the board of directors, given its competence in managing dependencies and reflecting the environmental needs it has (Hillman et al., 2009). In this sense, different types of directors provide diverse benefits to the company (Carter et al., 2010).

However, as advocated by the Tokenism Theory proposed by Kanter (1977), skewed groups, where there is a preponderance of one category considered dominant (usually men) over another (usually women) who are the tokens (Rixom et al., 2023), representatives of the less predominant category are considered symbols, as phenomena such as visibility, polarization, and assimilation are associated with them in a way that generates pressure for performance, boundaries between groups, and role entrapment (Kanter, 1977).

Two main reasons justify the interest in this topic, namely: (i) the increase in research on gender diversity, especially due to the dissemination of regulations and recommendations by legislators around the world (Chapple & Humphrey, 2014; Lucas-Pérez et al., 2015; Magnanelli & Pirolo, 2021; Rahman et al., 2023; Strobl et al., 2016); and (ii) the lack of consensus in the literature regarding empirical evidence on the impacts of this diversity on organizations (Lee & Thong, 2023; Magnanelli & Pirolo, 2021).

Regarding the first reason, due to the different corporate governance codes existing worldwide, it is known that there are various requirements imposed by national and international legislation, with a common aspect being diversity in terms of independence and gender. While some countries have enacted mandatory gender quotas, others have issued recommendations regarding a minimum proportion, and in these cases, companies can choose to voluntarily comply with the recommendations or not (Magnanelli & Pirolo, 2021).

Regarding countries with mandatory quotas, Norway was the first country to require that 40% of board of directors positions in companies be filled by women in 2003 (Chapple & Humphrey, 2014; Magnanelli & Pirolo, 2021; Rahman et al., 2023; Shukeri & D Alfordy, 2022; Strobl et al., 2016; Yarram & Adapa, 2023). Subsequently, other European countries established mandatory quotas, including Spain (2007), France (2011), Denmark (2005), Iceland (2010), and Italy (2011) (Lucas-Pérez et al., 2015; Magnanelli & Pirolo, 2021; Strobl et al., 2016). In other nations, such as Brazil, India, Nigeria, South Africa, and the United States, legislation recommends that companies voluntarily increase female representation on their boards of directors (Alkalbani et al., 2019; Sarhan et al., 2019; Strobl et al., 2016).

Specifically in the Brazilian context, Bill No. 1246 of 2021 has been drafted and is awaiting voting and deliberation. This bill mandates a minimum obligatory reserve of 30% of board of directors positions for women in publicly traded companies and state-owned enterprises, as well as mixed-economy companies or other federal, state, municipal, and Federal District enterprises (Amaral, 2023). Additionally, in August 2023, the Brazil Stock Exchange (B3) launched the first diversity index focused on gender and race (IDIVERSA B3) with the goal of making diversity indicators visible and tangible in the market (B3, 2023).

As for the second reason, the diversification of human capital on boards allows for different perspectives, experiences, and knowledge (Lee & Thong, 2023). Boards become more effective as they enable better disclosure and reduction of insider information (Yarram & Adapa, 2023), and women are less susceptible to conflicts of interest (Ibrahim et al., 2019), reinforcing that, beyond meeting a legislative requirement, board diversity enhances companies' compliance with good corporate governance practices and improves financial performance (Rahman et al., 2023). In other words, the presence of women on boards of directors also reflects an economic perspective (Lucas-Pérez et al., 2015).

In this regard, it is understood that corporate boards need to be more diverse not only for ethical reasons but also to create value for shareholders (Carter et al., 2003). Furthermore, in cases where women are independent members of boards, it is confirmed that they are more effective, as it is more challenging for them to reach such positions in companies (Benkraiem et al., 2017).

The presence of women on boards of directors is still limited (Fraga & Silva, 2012). However, according to a survey conducted by Deloitte (2022), from a global perspective, the percentage of women on boards of directors increased

from 15% in 2016 to 19.7% in 2021. With a focus on Brazil, there was an increase to 10.4% in 2021 (compared to 7.7% in 2016), which reinforces that efforts to promote female representation on boards have yielded tangible results (Deloitte, 2022). Considering the conflicts of interest between managers and shareholders, a significant mechanism to incentivize managers to maximize shareholder returns is executive compensation (Jensen & Meckling, 1976; Jensen & Murphy, 1990). Especially in situations where executives continue to receive high salaries regardless of company performance, corporate governance is essential, particularly concerning the role of managers (Lucas-Pérez et al., 2015), as companies with weak governance mechanisms experience high agency conflicts, executives receive high salaries, and companies perform poorly (Basu et al., 2007).

However, an effective board composition can mitigate agency problems by structuring executive compensation aligned with the interests of both executives and shareholders (Pathak & Chandani, 2023). Furthermore, recent financial crises and scandals have raised general concerns about the need for reforms in executive compensation policies (Alkalbani et al., 2019).

In light of this, it is understood that boards of directors have an influence on executive compensation, and therefore, it is important to investigate whether the presence of women on boards affects the determination of executive compensation (Gilley et al., 2019). Women not only ensure greater effectiveness on boards of directors but also influence the decision-making process, particularly in executive compensation (Lucas-Pérez et al., 2015). Therefore, given the Brazilian reality, it becomes relevant to understand the relationship between gender diversity on boards of directors and executive compensation, considering the agency problem and value generation for shareholders.

In addition to this, the 6th edition of the Corporate Governance Best Practices Code, released in August 2023, emphasizes equity as one of the principles that, in the practice of composing boards of directors, translates into considering diversity of knowledge, experiences, age, gender, ethnicity, among other aspects, in accordance with the reality in which organizations and stakeholders are embedded (IBGC, 2023).

Given the above, the research problem of this study is presented as follows: What is the influence of gender diversity on the board of directors on the economic-financial performance and executive compensation of large Brazilian companies? The general objective is, therefore, to understand the influence of gender diversity on the board of directors on the economic-financial performance and executive compensation of large Brazilian companies. Specifically, the aim is to investigate the participation of women on the boards of directors of large Brazilian companies from 2015 to 2019, understand the relationship between corporate governance and gender diversity, and assess the association of female presence on boards with shareholder value creation. Despite gender quotas introduced with the aim of addressing ethical concerns related to the underrepresentation of women on boards and realizing the gains predicted by the Resource Dependence Theory, such positive outcomes are not always achieved (Rixom et al., 2023). In the literature, there is no consensus regarding the relationship between gender diversity and company performance. There is evidence of a negative association between company performance and gender diversity on the board (Adams & Ferreira, 2009), as well as relationships that lack significance (Carter et al., 2010; Chapple & Humphrey, 2014; Shukeri & D Alfordy, 2022; Yarram & Adapa, 2023).

On the other hand, studies in the context of developed countries have identified that greater female representation on boards and/or on compensation committees adds value to shareholders (Carter et al., 2003) and enhances performance (Terjesen et al., 2016), either through a positive relationship with Tobin's Q (Campbell & Mínguez-Vera, 2008) or through an association with corporate profits (Binder, 2018). This positive relationship is also observed in the context of emerging countries, such as Brazil (Dani et al., 2019), Malaysia (Khan et al., 2017; Rahman et al., 2023), Egypt, Jordan, Oman, Saudi Arabia, and the United Arab Emirates (Sarhan et al., 2019), the Middle East and North Africa (Arayssi & Jizi, 2019), and Kenya (Ibrahim et al., 2019). Thus, the first research hypothesis is presented as follows:

H1: The presence of women on the board of directors is positively associated with the financial performance of the company.

According to Usman et al. (2020), due to the increasing focus on the presence of women in management positions by legislators, several studies have explored this topic, but there is limited evidence regarding the relationship between gender diversity in compensation committees and the compensation of top executives. Concerning the effectiveness of boards of directors, gender diversity in committees and on the board enables less excessive executive pay, as negative relationships have been identified with total executive compensation (Patnaik & Suar, 2020; Usman et al., 2019) and a positive relationship with performance-based compensation (Gilley et al., 2019; Lucas-Pérez et al., 2015; Pathak & Chandani, 2023; Sarhan et al., 2019; Usman et al., 2019) and stock-based compensation (Adams & Ferreira, 2009).

Furthermore, in situations where female representation is at least 30%, there is less dissent among shareholders regarding executive compensation plans (Alkalbani et al., 2019). Furthermore, Usman et al. (2020) emphasizes that the presence of women on the compensation committee has a considerable influence not only in limiting the total compensation of top executives but also in strengthening the link between executive compensation and company performance. Given these pieces of evidence, here is the second research hypothesis:

H2: The presence of women on boards of directors is negatively associated with executive compensation.

Greater interest in investigating gender diversity in companies has been observed in the literature in recent years (Lucas-Pérez et al., 2015), especially with regard to corporate governance reforms (Adams & Ferreira, 2009). However, the approach to the impacts of gender diversity is still in its infancy (Adams & Ferreira, 2009). Furthermore, it is worth investigating the intermediary mechanisms, such as characteristics of the board of directors, that influence the relationship between gender diversity and the value of companies (Lucas-Pérez et al., 2015).

It is noteworthy that studies on the gender diversity of boards of directors are generally focused on developed countries, with research involving emerging countries being little significant (Patnaik & Suar, 2020; Sarhan et al., 2019). In addition, developed and developing countries have basic structural and institutional differences that prevent the generalization of results from developed economies, therefore, it is crucial to discuss the context of different countries (Usman et al., 2020). Furthermore, investigations into the gender diversity of boards of directors and the impacts on executive remuneration are less common (Sarhan et al., 2019).

The lower female representation on boards of directors is intrinsic to cultural and social issues, and the gender imbalance in favor of men, in addition to reflecting a biased selection of members, reveals a lower guarantee of independence, which may result in worse performance (Terjesen et al., 2016). In emerging countries like Brazil, discussions regarding diversity are still incipient, notably because there is no consolidated legislation on the subject, other than a bill awaiting voting and deliberation. This infers the novelty of the present study, which is normally found in developed countries.

Therefore, gender diversity becomes especially important in countries that have a weak corporate governance structure (Usman et al., 2020). Furthermore, it is urgent to discuss evidence that demonstrates the importance of women in the Brazilian economy (Vaccari & Beuren, 2017). Finally, studies that investigate gender diversity on boards of directors demonstrate the economic effects of this current debate on the need for public policies for greater inclusion of women (Bugeja et al., 2016), given that companies that aim to avoid tokenism need to consider gender quotas as a starting point, with a view to better visibility with investors (Rixom et al., 2023).

2 Methodological Procedures

2.1 Selected samples and variables

To achieve the proposed objectives, this research considered non-financial Brazilian companies listed in the IBrX 100, between the period 2015 and 2019, as in the work of Dani, Picolo and Klann (2019). During this period, as Parente and Machado Filho (2020) present, there was greater interest in investigating boards of directors, with 2019 being the most significant with 14 works published on this topic. Frame 1 describes the research variables, the theoretical framework that supported the collection of each of the variables and the databases used.

2.2 Models

The focus of the article is to assess the influence of gender diversity on the boards of directors on the economic-financial performance and executive compensation of large Brazilian companies. To achieve this, data from 84 companies between 2015 and 2019 are utilized, resulting in a panel data framework. Additionally, the literature cited provides evidence of the need to include lagged dependent variables in models aiming to evaluate the influences on economic-financial performance and executive compensation. Thus, the problem is configured as a dynamic panel, and historically, in the field of economics and finance, models estimated by Difference or System GMM (Generalized Method-of-Moments), one or two-steps, are used to address the issue of correlation between the lagged variable and the error term (Roodman, 2009). However, related literature on capital structure and corporate governance also suggests that there may be endogeneity among other variables considered in Frame 1. Therefore, formally, we have:

$$Y_{it} = \phi Y_{it-1} + \beta X_{it} + \theta Z_{it} + v_i + e_{it} \quad (1)$$

Where,

Y_{it} represents ROA/QTOBIN or REMDIR and Y_{it-1} the out of date values;

X_{it} is the matrix of the exogenous variables IND, CTAM, REMCON, CREM, DCEO, GC and TAM, that do not depend on the current or past e_{it};

Z_{it} represents the matrix of endogenous variables (in addition to Y_{it-1}) ROA/QTOBIN or REMDIR, DIV_PERC/DIV_DUM, ALAV and VOL, potentially correlated to v_i;

e_{it} are the individual specific errors and v_i are the unobserved individual-level effects, assuming that $E(v_i) = E(e_{it}) = E(v_i,e_{it})=0$ and $E(e_{it},e_{js}) = 0$ para cada i, j, t, s, $i \neq j$;

ϕ, β and θ are vectors of estimated parameters, whose process involves taking the first difference of equation (1) and using the lags of the variables Y_{it-1} and Z_{it} como instrumentos nessa equação transformada (diferenciada), conforme proposta Arellano & Bond (1991). Additionally, Arellano & Bover (1995) and Blundell & Bond (1998) indicated including Y_{it-1} and Z_{it} difference lags as additional instruments in the level equation (equation 1).

The procedure above is known as System GMM, which distinguishes itself by removing v_i (fixed effect), and the instruments (lags and differences of variables) in equation 1 and the transformed equation, to control

Frame 1: Description of research variables

Description	Code	Formula	Theoretical basis	Database
Dependent:				
Return on Assets¥	ROA	Net Operating Profit / Total Assets	N; J; D; G; P	(2)
Tobin's Q¥	QTOBIN	Ln (Market Value of Shares + Gross Debt / Total Assets)	E; H; N; G; P	(2)
Average Compensation of Directors¥	REMDIR	Ln (Average total compensation of directors)	N; I; Q; D; G	(1)
Independent:				
Gender Diversity (%)¥	DIV_PERC	Proportion of women on the board of directors	F; E; H; L; O; K; N; A; I; J; Q; D; B; G; C; P	(1)
Gender Diversity¥	DIV_DUM	Dummy variable, takes 1 if a woman is identified on the board of directors and 0 otherwise	F; E; L; O; Q; D; G; P	(1)
Control:				
CEO Duality	DCEO	Dummy variable, takes 1 if the CEO is also the chairman of the board of directors and 0 otherwise	F; L; N; A; D; B; P	(1)
Board Independence	IND	Proportion of independent directors on the board of directors	F; O; A; D; B; G; M	(1)
Board Size	CTAM	Number of Effective Board Members	F; L; O; N; A; I; D; G; P	(1)
Average Compensation of Board Members	REMCON	Ln (Average total compensation of directors)		(1)
COMPENSATION COMMITTEE	CREM	Dummy variable, assumes 1 for the presence of a Remuneration Committee and 0 for its absence	O*; Q; G	(1)
Company Size	TAM	Ln (Total Assets)	F; Q.	(2)
Leverage¥	ALAV	Gross Total Debt / Total Assets	A; Q; D; B; G	(2)
Share Price Volatility %¥	VOL	Average annual share prices considering their highest and lowest values on average in the year (sqrt ((sum ((Si - Sm)^2)) / n * PPA) where Si = Neperian logarithm of (di / di-1) i = 1...n and Sm = average of S1, S2, S3,...,Sn)	A	(2)
Corporate Governance	GC	Dummy variable, takes 1 if the company is listed on the New Market and 0 otherwise		(1)

Notes: ¥ Variables considered endogenous to estimate model parameters.
1) The authors were identified with letters, as follows: A = Alkalbani, Cuomo and Mallin (2019); B = Benkraiem et al (2017); C = Binder (2018); D = Bugeja, Matolcsy and Spiropoulos (2016); E = Campbell and Mínguez-Vera (2008); F = Carter, Simkins and Simpson (2003); G = Dani, Picolo and Klann (2019); H = Fraga and Silva (2012); I = Gilley et al. (2019); J = Ibrahim et al. (2019); K= Khan, Hassan and Marimuthu (2017); L= Lucas-Pérez et al (2015); M = Patnaik and Suar (2020); N = Sarhan, Ntim and Al-Najjar (2019); O = Strobl, Rama and Mishra (2016); P = Terjesen, Couto and Francisco (2016); Q = Usman et al. (2020bj).
2) The bases correspond to: (1) Reference Form; (2) Economática
Source: Research Data (2021).

the correlation between Z_{it}/Y_{it-1} and e_{it}. The expectation that fixed effects models would be more appropriate for the research problem was corroborated in preliminary tests, where Breusch-Pagan, Chow, and Hausman tests were applied to the versions without endogeneity of the estimated models. Additionally, there was also evidence of heteroskedasticity (Wald Test) and the presence of first-order autocorrelation (Wooldridge Test) in models that did not consider the presence of endogeneity.

In all respects, the choice of GMM estimators for the research problem was guided by: i) a dynamic panel model; ii) a small T and large N; iii) independent variables that are not strictly exogenous (endogeneity); iv) the presence of fixed effects; and v) heteroskedastic and correlated idiosyncratic errors (e_{it}) within individuals. However, the choice between the Difference or System GMM estimator was based on recommendations from the literature (Arellano & Bover, 1995; Blundell & Bond, 1998; Bond, 2002; Roodman, 2009), highlighting the better efficiency of the System GMM in i) unbalanced panels, small samples, the presence of heteroskedasticity, and autocorrelation, and ii) the two rules put forth by Bond (2002): 1) use System GMM if the persistence term (ϕ) is "almost" a random walk; or 2) estimate a pooled and fixed effects model and compare the persistence parameters

with the parameter estimated by a Difference GMM model.

In this study, we have an unbalanced panel, a small sample, and indications of heteroskedasticity and autocorrelation. According to the first criterion of Bond (2002), there is no definitive decision. However, as the persistence parameter of the Difference GMM model was much closer to the fixed effects model, by this second criterion, we conclude in favor of using the System GMM estimator.

Additionally, it is also worth noting that the Two-Step System GMM procedure was used due to indications of heteroskedasticity and serial correlation, with a correction for small samples following Windmeijer's (2005) proposal. Furthermore, instead of using first differences to construct instruments in the differenced equation, deviations from past means were used to reduce the impact of missing data, following Roodman (2009). Finally, in terms of estimation procedure, the Kapetanios & Marcellino (2010) proposal was employed to avoid instrument proliferation (number of instruments > N). This approach involves using only the principal components (eigenvalue > 1) of lags and differences of endogenous variables (Y_{it-1} and Z_{it}) to reduce the arbitrary number of instruments (Roodman, 2009).

To assess the models estimated by Two-Step System GMM, the following procedures were employed: i) the Hansen J test for instrument validity (0.60 > p-value > 0.05); ii) the Arellano-Bond AR(2) test to identify signs of second-order autocorrelation (p-value > 0.05); iii) the significance test of the persistence parameter (ϕ) to justify the use of dynamic panel techniques (p-value < 0.05); iv) evaluation to ensure the number of instruments < number of groups (N = number of companies); v) the overall significance test (F-test) of the model (p-value < 0.05); and vi) goodness-of-fit measures: Explained Variance (% > 70%) and Kaiser-Meyer-Olkin (KMO) (> 0.70) for the principal component model estimated to reduce instrument dimensions, as recommended in the literature (Roodman, 2009).

It is important to note that GMM estimators do not solve the endogeneity problem. The model construction itself can address endogeneity, and under certain circumstances, GMM estimators more efficiently control the issue of correlation between explanatory variables and errors with lower computational demands. If this correlation arises from omitted variables that change over time, for example, GMM estimators remain inconsistent.

With that said, it is worth noting that, despite the corporate governance literature (Lucas-Pérez et al., 2015; Terjensen et al., 2016; Sarhan et al., 2019; Dani et al., 2019; Patnaik & Suar, 2020; and Usman et al., 2020) indicating that the governance variables collected (IND, CTAM, REMCON, CREM, DCEO, and GC) could be endogenous, they were treated as exogenous in equation 1. First, with only TAM, we would not have identified models. Second, having a dynamic panel with only two years (we have four years, but we lose two years with the differencing process required in System GMM) implies a shorter-term relationship, and thus, it is believed that for the period in question, these variables can be treated as exogenous. In the case of the GC variable, for example, it is believed to be unlikely that any noise in the system (equation 1) would determine whether a company joins the New Market or not during the period in question.

Third and lastly, it is emphasized that in statistical terms, all variables in Frame 1 could be considered exogenous to the system. The C test of endogeneity/exogeneity indicated low correlation between the explanatory variables and the error term. Specifically, the C tests for Z_{it} returned p-values > 0.05 for some models considered, indicating that Z_{it} could be treated as exogenous (X_{it}). However, despite the internal statistical evidence of exogeneity for X_{it} or Z_{it}, as a precaution and to give more weight to previous empirical evidence, it was chosen to segregate these matrices as defined in equation 1, allocating the corporate governance variables to X_{it}, considering that they are more structural (i.e., harder to change in the short term) than the other variables considered in Z_{it}.

3 Results

3.1 Sample profile

Table 1 presents the descriptive statistics of the variables considered in this study. Firstly, it can be observed that, on average, companies have a return on assets (ROA) of 4.47%. Regarding economic performance, expressed by Tobin's Q, the average value was found to be 1.08 ($e^{0.08}$). Regarding executive compensation (REMDIR), the average value was R$ 3,078,645 ($e^{14.94}$).

Table 1: Descriptive statistics

Variable	n	Mean	Deviation	Min	Max
QTOBIN	383	0.08	0.58	-1.80	1.56
ROA	396	4.47	5.63	-26.72	32.85
REMDIR	378	14.94	1.00	8.31	17.16
DIV_PERC	383	0.09	0.10	0.00	0.43
DIV_DUM	383	0.53	0.50	0.00	1.00
ALAV	396	0.31	0.18	0.00	0.77
VOL	360	38.09	13.35	16.95	98.24
IND	383	0.37	0.23	0.00	1.00
CTAM	383	8.34	2.14	3.00	16.00
REMCON	376	12.79	0.96	6.17	15.22
CREM	383	0.25	0.43	0.00	1.00
DCEO	383	0.03	0.17	0.00	1.00
GC	405	0.61	0.49	0.00	1.00
TAM	396	16.61	1.22	13.81	20.65

Source: Research Results (2021).

Regarding gender diversity (DIV_PERC), the average participation of women on the boards of directors of large Brazilian companies is 10%, consistent with the findings of Adams and Ferreira (2009), Lee and Thong (2023), Shukeri and D Alfordy (2022), and Yarram and Adapa (2023), whose percentages were 13.4%, 8.5%, 8.1%, and 12%, respectively. Extreme cases were observed in which there are no women on this management body, or where female representation reaches 43%.

This demonstrates that, at least in larger companies, there is an increase in gender equity in management positions, as studies like Fraga and Silva (2012) and Dani et al. (2019) identified lower representations of 4.4% and 5.1%, respectively. However, it should be noted that this representation is still below what is proposed by Bill No. 1246 of 2021, which reinforces the requirement for a minimum quota of 30% of women on boards of directors, as there are no companies in the investigated sample where the percentage of women on the board exceeds 50%, as also noted by Lee and Thong (2023).

While female representation in executive positions has grown, when analyzing the variable DIV_DUM, it was observed that only 53% of the analyzed companies have at least one woman on their boards of directors. This reality was also depicted by Prudêncio et al. (2021), who highlighted that around 43% of Brazilian companies do not have female board members.

Regarding the other characteristics of the boards of directors, on average, they are composed of 8 or 9 members (CTAM), with boards consisting of up to 16 members or as few as 3 members observed. In 37% of the investigated boards, at least one independent director (IND) was noted, and in 3% of the situations, the chairman of the board of directors also held the position of CEO (DCEO).

Furthermore, approximately 25% of the companies have a remuneration committee (CREM), and 61% are listed on the New Market index of the B3 corporate governance index (GC). Finally, when analyzing leverage (ALAV), it is understood that, on average, the gross debt of the companies represents 31% of the total assets, the average size (TAM) corresponds to R$ 1.6 billion (e16.61), and the annual average price volatility of the shares (VOL) averaged 38%.

Table 2: Binary variables transition matrix

Presence of at least one woman on the board (DIV_DUM)	No	Yes	Total
No	74.19	25.81	100
Yes	10.88	89.12	100
Total	43.38	56.62	100
Presence of compensation committee CREM)	No	Yes	Total
No	93.75	6.25	100
Yes	12.82	87.18	100
Total	72.85	27.15	100
CEO duality (DCEO)	No	Yes	Total
No	98.98	1.02	100
Yes	22.22	77.78	100
Total	96.69	3.31	100
Presence in the New Market (GC)	No	Yes	Total
No	89.39	10.61	100
Yes	1.04	98.96	100
Total	37.04	62.96	100

Source: Research Results (2021).

When considering the transition matrix as a complementary analysis, it is observed that about 74% of the companies that did not have a woman on their boards of directors remained with the same composition from one year to another, while 26% of the organizations introduced female directors. Furthermore, among the companies that already had women on their boards, 89% maintained gender diversity, while 11% no longer had female representation. The absence of a dual CEO position remained in 99% of the cases, and in the situations where it existed, 22% of the companies abandoned this practice.

Regarding the existence of the remuneration committee, 94% of the organizations that did not have it continued without one, while 13% of those that had a remuneration committee no longer had one. Finally, 89% of the companies that were not part of the New Market index continued to be outside of it, and among those that were part of it, 1% no longer belonged to the index from one year to another

3.2 Estimated models

The eight models estimated to evaluate the two research hypotheses are presented in Tables 3 and 4. Overall, they passed diagnostic tests as follows: i) the coefficients associated with the variable Y_{t-1} (lagged term) were significant, at least at the 10% level, confirming that dynamic panel techniques are appropriate for assessing the problem at hand, except in one of the models for executive director's compensation (Table 4); ii) the F-tests indicated that the coefficients are jointly significant at the 1% level; iii) the number of instruments was less than the number of groups in all models to avoid covariance matrix singularity; iv) the Hansen J tests indicated that the instruments are valid (p-value > 0.05), and there may not be issues related to instrument proliferation (p-value < 0.60); v) the Arellano-Bond AR(2) tests were not significant at the 5% level, indicating that the models do not suffer from second-order serial correlation problems; vi) good fit measures of the principal component models to reduce the dimensionality of instruments constructed from lags and first differences of endogenous variables (% Explained Variance > 75% and KMO > 0.85).

Table 3: Two-Step System GMM for financial performance

Y_t	QTOBIN	QTOBIN	ROA	ROA
Y_{t-1}	0.324**	0.264*	0.296***	0.315*
	(0.130)	(0.139)	(0.096)	(0.166)
DIV_PERC	1.932*	-	-15.692	-
	(1.049)		(15.197)	
DIV_DUM	-	0.478**	-	-0.218
		(0.199)		(5.232)
REMDIR	0.002	-0.11	-0.138	1.262
	(0.086)	(0.071)	(1.336)	(4.774)
ALAV	-0.596	-0.647	3.422	8.975
	(1.088)	(0.874)	(11.428)	(20.528)
VOL	-0.011**	-0.015***	-0.099	-0.08
	(0.004)	(0.005)	(0.061)	(0.111)
IND	-0.054	0.029	1.207	0.979
	(0.146)	(0.144)	(2.414)	(3.468)
CTAM	-0.008	-0.022	0.06	-0.218
	(0.020)	(0.018)	(0.271)	(0.627)
REMCON	0.046	0.093*	-0.094	-1.065
	(0.055)	(0.054)	(1.083)	(3.034)
CREM	-0.109	-0.142	0.347	0.036
	(0.088)	(0.088)	(1.079)	(1.767)
DCEO	0.221	0.276	-1.526	-1.961
	(0.206)	(0.210)	(2.463)	(6.229)
GC	-0.062	-0.014	-0.697	-0.85
	(0.091)	(0.077)	(1.029)	(2.017)
TAM	-0.133***	-0.136***	-0.554	-0.969
	(0.046)	(0.043)	(0.576)	(0.943)
Constant	2.272**	3.510***	19.412**	16.681
	(1.093)	(1.064)	(8.969)	(31.490)
No. of observations	281	281	281	281
No. of groups	75	75	75	75
F-test	10.04***	7.19***	20.79***	5.44***
Hansen's J	0.078	0.249	0.085	0.403
Arellano-Bond AR (2)	0.662	0.215	0.536	0.927
No. of instruments	23	23	25	23
No. of components	15	15	17	15
% explained variance	76.2%	76.0%	78.0%	74.7%
KMO	0.881	0.888	0.895	0.900

Note: *p-value < 0.10, **p-value < 0.05 and ***p-value < 0.01 based on the t-statistic. The values above refer to the regression coefficient estimates, and below, in parentheses, to the standard errors. The values of Hansen's J and Arellano-Bond AR(2) refer to the p-values of the tests. Number of components, % Explained Variance, and KMO are measures of fit for the principal component model to reduce the dimensionality of instruments constructed through differentiation and lags of endogenous variables. Variable code descriptions are provided in Frame 1. The Two-step System GMM model was estimated in Stata v.15 using the routine xtabond2 Y_it Y_(it-1) Z_it X_it, gmm(Y_(it-1) Z_it) iv(X_it) robust twostep orthogonal small nodiffsargan pca, as detailed in Equation 1 and discussed in Section 3.3 of the article.

Source: Research Results (2021).

Table 4: Two-Step System GMM for directors' compensation

Y_t	REMDIR	REMDIR	REMDIR	REMDIR
Y_{t-1}	0.420*	0.672**	0.397	0.705***
	(0.245)	(0.311)	(0.298)	(0.253)
DIV_PERC	-2.44	-	-1.377	-
	(2.186)		(2.573)	
DIV_DUM	-	0.159	-	-0.238
		(0.337)		(0.493)
QTOBIN	0.142	-0.494	-	-
	(0.405)	(0.529)		
ROA	-	-	-0.017	-0.003
			(0.013)	(0.011)
ALAV	-0.707	-0.884	-2.851	0.364
	(1.403)	(1.808)	(1.926)	(1.010)
VOL	-0.007	-0.009	0.001	-0.002
	(0.008)	(0.009)	(0.007)	(0.006)
IND	0.079	-0.074	0.04	-0.1
	(0.268)	(0.225)	(0.338)	(0.220)
CTAM	0.02	-0.01	0.063	0.016
	(0.030)	(0.041)	(0.054)	(0.042)
REMCON	0.216	0.322*	0.363	0.234
	(0.149)	(0.181)	(0.295)	(0.273)
CREM	0.013	-0.089	-0.138	0.021
	(0.127)	(0.123)	(0.187)	(0.147)
DCEO	0.560*	0.65	0.726*	0.233
	(0.335)	(0.412)	(0.370)	(0.327)
GC	0.177	0.002	0.11	0.009
	(0.175)	(0.165)	(0.208)	(0.127)
TAM	0.08	-0.064	0.036	-0.021
	(0.090)	(0.114)	(0.088)	(0.048)
Constante	4.994**	2.601	4.332*	1.898
	(2.141)	(2.963)	(2.228)	(2.853)
No. of observations	280	280	280	280
No. of groups	75	75	75	75
F-test	7136***	9196***	3999***	7913***
Hansen's J	0.329	0.529	0.303	0.548
Arellano-Bond AR(2)	0.434	0.921	0.486	0.671
No. of instrumentos	25	25	26	26
No. of components	17	17	18	18
% explained variance	79.2%	78.9%	78.3%	78.3%
KMO	0.854	0.862	0.886	0.891

Note: *p-value < 0.10, **p-value < 0.05, and ***p-value < 0.01 based on the t-statistic. The values above refer to the coefficient estimates of the regression, and below, in parentheses, to the standard errors. The values of J Hansen and Arellano-Bond AR(2) refer to the p-values of the tests. The number of components, % explained variance, and KMO are measures of fit of the principal component model to reduce the dimensionality of the instruments constructed through differencing and lags of the endogenous variables. The descriptions of the variable codes are presented in Frame 1. The Two-step System GMM model was estimated in Stata v.15 using the xtabond2 routine with the specification: xtabond2 Y_{it} $Y_{(it-1)}$ Z_{it} X_{it}, gmm($Y_{(it-1)}$ Z_{it}) iv(X_{-it}) robust twostep orthogonal small nodiffsargan pca, as detailed in Equation 1 and discussed in Section 3.3 of the article.

Source: Research Results (2021).

3.3 Robustness

The GMM estimators are complex and can undoubtedly produce invalid estimates. They can also be easily manipulated to produce different results, mainly due to sensitivity to the specification of the exogenous variable matrix and the number of instruments (Roodman, 2009). In this sense, no capitalization of chances was made, and the research project was run as initially outlined, guided by the literature review and the availability of timely information. This methodological choice, along with the fact that the models passed diagnostic tests, may be the best test of the robustness of the findings.

Therefore, no univariate outliers were excluded through the winsorization process, as is commonly done in the field of finance and accounting. Boxplot analyses indicated no suspicious outlier values, despite the presence of some

outliers. Multivariate outliers were also not excluded because the current sample is not large, there were no suspicious outlier values beyond those commonly found in finance research, and there is a real risk of increasing internal validity at the expense of external validity.

By concentrating the data mass into a less dispersed cloud around the mean values, through winsorization or any other statistical technique to deal with outliers, internal validity is maximized. However, at the same time, if the sample is not representative of the population, external validity is minimized. Perhaps, this methodological choice contributed to few significant findings.

Subsequently to the analyses listed in the previous section, we considered including control variables for the year and two other collected variables: whether stock options exist for the directors or the board itself. The time dummy variables were not significant in most of the analyses, and the stock options variables had a very large number of zeros. These were the reasons why we did not consider them in a second moment, despite the literature considering the temporal effect and information on variable compensation. Additionally, another reason for not considering the stock options variables initially is that there is already information on compensation in the models (REMDIR and REMCON).

3.4 Results discussion

In Table 3, at a significance level of 10%, the representation of women in the board of directors (DIV_PERC) is noticeable, and at a significance level of 5%, the identification of boards with at least one woman (DIV_DUM) is related to the Tobin's Q variable. These findings support studies that address the situation in developed countries as well as emerging countries and the Brazilian context. However, the lack of persistence in this relationship and the absence of significance with financial performance do not allow us to infer that having at least one woman on the board of directors and the growth of female representation positively impact company performance.

Regarding the variable ROA, which represents financial performance, no statistically significant relationship was identified with female representation on the board of directors. This evidence supports the findings of Carter et al. (2010), Shukeri and D Alfordy (2022), and Yarram and Adapa (2023), but contradicts some studies from emerging countries in the Middle East and Africa (Arayssi & Jizi, 2019; Ibrahim et al., 2019; Sarhan et al., 2019), as it demonstrates that the inclusion of women does not necessarily lead to accounting returns. This can be justified by the specific sample and time period studied, which may offset results and not produce effects (Carter et al., 2010). It may also be due to the need to assess the combined impact of men and women on these boards rather than in isolation when it comes to financial performance (Binder, 2018). Additionally, the limited representation of women on boards and the effects of tokenism (Kanter, 1977; Shukeri & D Alfordy, 2022) could play a role in these results.

Additionally, no other aspect of the board of directors influences the variables Tobin's Q and ROA. It was expected that the variable CEO duality (DCEO) would have a negative impact on organizational performance (Terjensen et al., 2016; Sarhan et al., 2019) as it represents a deviation from good corporate governance practices. However, the lack of significance confirms the findings of Fraga and Silva (2012), indicating that this variable is irrelevant for the analysis of Brazilian companies. Nevertheless, this result should be interpreted with caution, as there are only 3% of observations with this characteristic in the sample.

Furthermore, the size of the board of directors (CTAM), despite representing a negative impact on performance in different countries (Terjensen et al., 2016), was once again found to be insignificant in the analysis for Brazil (Fraga & Silva, 2012). Finally, although national (Fraga & Silva, 2012) and international (Terjensen et al., 2016) literature has shown a negative relationship between board independence (IND) and company performance, no such influence was observed in the findings of this study.

Taking into account the characteristics of the investigated companies, the indebtedness of the firms, expressed by leverage (ALAV), did not show a statistically significant relationship with either Tobin's Q or ROA, which corroborates the findings of Terjensen et al. (2016) and Alkalbani et al. (2019). This lack of relationship is contrary to the study by Sarhan et al. (2019), which showed that more highly leveraged companies tend to have worse performance.

Regarding the size of the companies (TAM), the negative and statistically significant relationship at the 1% level with both performance variables was contrary to the indications of the literature (Fraga & Silva, 2012; Terjensen et al., 2016; Sarhan et al., 2019). However, it is believed that this may be a particularity of the analyzed sample, which includes both small and large companies. On the other hand, volatility (VOL), which expresses business risk, had a negative and statistically significant relationship at the 1% level with Tobin's Q, suggesting that under conditions of higher stock price volatility, there is a decrease in performance due to associated risk.

As for the variables related to the existence of a remuneration committee (CREM) and the compensation of the board of directors (REMDIR), as well as the compensation of the board of directors (REMCON), no statistically significant relationships were found between the first two variables and economic-financial performance. However, a positive and significant relationship at the 10% level was observed between REMCON and Tobin's Q. Despite the literature presenting studies on the importance of gender diversity for performance-based compensation (Lucas-Pérez et al., 2015; Sarhan et al.,

2019), the estimated models did not show an association between managerial compensation and organizational performance. However, the positive relationship between a company's financial performance and board members' compensation indicates that better-paid board members generate more value for the companies.

Table 4 presents the estimated models for executive compensation. It was expected to identify a negative relationship between gender diversity on boards and the total compensation of executives, as suggested by the literature (Benkrajem et al., 2017; Usman et al., 2019; Patnaik & Suar, 2020; Usman et al., 2020). However, there was no economic impact of female board representation on executive compensation, as there was no statistical significance observed between the variables DIV_PERC and DIV_DUM with the variable REMDIR. This lack of significance is in line with the studies by Strolb et al. (2016), Sarhan et al. (2019), and Adams and Ferreira (2009), as it shows that gender diversity is less linked to executive compensation due to the limited presence of women in management positions. According to Alkalbani et al. (2019), women enable greater alignment of interests between managers and shareholders only when their representation on boards is at least 30%. Given the Brazilian reality, where the participation of women is, on average, less than 10%, this low representation does not lead to economic benefits in terms of executive salaries, as greater diversity does not imply a reduction in director compensation.

The models that examine the relationship between gender diversity and executive compensation showed few variables that were statistically significant. It is primarily evident in the relationship between board compensation (REMCON) and the duality of CEO (DCEO), which was positively and statistically significant at the 10% level. The first relationship indicates that the higher the compensation of the board members, the higher the total compensation of the executives. This suggests that effective monitoring by board members of opportunistic behavior by executives is not feasible in the reality of the analyzed companies, as even when well compensated, board members do not necessarily lead to a reduction in the excessive compensation granted to executives. Furthermore, in situations where the chairman of the board also holds the position of CEO, higher amounts are paid to the executive team. These situations may violate good corporate governance practices, as they may undermine an ethical climate that promotes greater accountability, trust, and transparency for investors (Patnaik & Suar, 2020).

Just like in the models that examine performance, the other characteristics of the board of directors did not show a statistically significant relationship with executive compensation. This indicates that greater alignment of interests between executives and shareholders does not necessarily occur as a result of the composition of the boards in terms of size, independence, or diversity, nor does it depend on the specific characteristics of organizations such as size, leverage, volatility, or even being part of the New Market category (IGC-NM B3) of the corporate governance index of B3 (Brazilian Stock Exchange).

5 Final Considerations

In this study, we investigated the relationship between gender diversity in the board of directors and the economic-financial performance and compensation of executives of large Brazilian companies. It is worth noting that the Brazilian reality still falls short of expectations, as the low representation of women in the board of directors (around 10%) is far from the mandatory minimum quota of 30% proposed by Bill No. 1246 of 2021. Therefore, even though organizations are only encouraged to promote greater gender diversity in these bodies, large Brazilian companies continue to have an imbalance favoring male participation, especially when considering that 47% of them do not have a single woman in their board of directors.

In light of the proposed objectives, a dynamic panel approach was adopted, and the models were estimated using Two-Step System GMM. It is important to note that although a statistically significant relationship was observed at the 10% level between gender diversity and the economic performance of companies, it cannot be inferred that having at least one woman in the board of directors and the growth of female representation positively impact the performance of companies. Furthermore, the absence of a statistically significant relationship between gender diversity and executive compensation also does not indicate an economic benefit from female participation in terms of reducing the typically high remuneration granted to directors.

Therefore, the evidence from this study does not provide support for hypotheses H1 and H2, indicating that in the reality of large Brazilian companies, low female representation in management positions does not guarantee greater effectiveness of the board of directors, thus corroborating the assumptions of the Tokenism Theory. In other words, companies should make efforts to implement gender diversity policies within the organization above the legal minimum quota, rather than limiting themselves to the percentage mandated by law. Such action inspires credibility among stakeholders, as it demonstrates the institution's commitment to diversity.

This study has limitations regarding the number of companies included in the sample. Due to the sample focus on large non-financial Brazilian companies belonging to the IBrX 100, only 84 organizations were investigated, which may not necessarily reflect the reality of other companies listed on B3. Another limitation is related to the time period examined, as the study covered the years from 2015 to 2019.

Finally, it is suggested that future studies consider longer analysis periods and include other countries, both with and without mandatory gender quotas, in order to enable a comparison between those with higher female representation in governance bodies and those with low representation of women. This would help measure whether there is an influence on alignment of interests and a consequent reduction in executive compensation, as well as an improvement in performance.

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