Determinants of a board structure

CARLOS ANDRÉ MARINHO VIEIRA¹
EVALDO JOSÉ DA SILVA¹ ²
WENNER GLAUCIO LOPES LUCENA¹

¹ Universidade Federal da Paraíba (UFPB) / Post-Graduate Program in Accounting, João Pessoa – PB, Brazil
² Universidade Federal do Pará (UFPA) / Institute of Applied Social Sciences, Belém – PA, Brazil

Abstract
This article analyzes the business characteristics that influence the number of members of the board of directors, their independence, and the duality of the chief executive officer (CEO). The study sample consisted of 162 financial and nonfinancial companies listed on the Brazilian stock market B3 between 2010 and 2014. It was noted that larger, less indebted, and growth-oriented companies have more members on their board. Holdings, older, less profitable companies, and companies where the CEO is also a board member, had fewer independent members. More indebted companies, firms where the CEOs serve on the board, and companies with larger boards, presented more external members. Finally, smaller, and more profitable companies with fewer growth opportunities showed CEO duality.

Keywords: Board size. Board independence. CEO duality.
Determinantes da estrutura de um conselho de administração

Resumo
Este artigo analisa as características empresariais que influenciam o número de membros do conselho de administração (CA), sua independência e a dualidade do diretor executivo (chief executive officer [CEO]). A amostra do estudo consiste em 162 empresas financeiras e não financeiras listadas na B3 no período entre 2010 e 2014. Observou-se que empresas maiores, menos endividadas e com perspectiva de crescimento apresentam um conselho formado por mais membros. Holdings, empresas mais antigas, menos lucrativas e com seu CEO compondo o conselho apresentavam menos membros independentes. Empresas mais endividadas, com seu CEO compondo o conselho e com conselhos maiores apresentaram mais membros externos. Por fim, empresas menores, mais lucrativas e com menos oportunidades de crescimento tinham seu CEO também ocupando o cargo de presidente do CA (chairman).

Palavras-chave: Tamanho do conselho. Independência. Dualidade do CEO.

Determinantes de la estructura de una junta directiva

Resumen
Este artículo analiza las características comerciales que influyen en la cantidad de miembros de una junta directiva, su independencia y la dualidad del director ejecutivo (CEO). La muestra del estudio consistió en 162 empresas financieras y no financieras que figuraban en B3 entre 2010 y 2014. Se observó que las empresas más grandes, menos endeudadas y con perspectivas de crecimiento contaban con una junta formada por más miembros. Las participaciones, compañías más antiguas, menos rentables y cuyo CEO componía la junta tenían menos miembros independientes. Las empresas más endeudadas cuyos CEO formaban parte de la junta y con juntas más grandes tenían más miembros externos. Finalmente, en las empresas más pequeñas, rentables y con menos oportunidades de crecimiento su CEO también ocupaba el cargo de presidente de la junta (chairman).

Palabras clave: Tamaño de la junta. Independencia. Dualidad del CEO.
INTRODUCTION

Hiring specialists in management to make decisions in companies causes agency problems due to the divergence of interests between shareholders and company managers. The firm’s owners mostly absorb costs related to agency problems. They are mitigated by establishing internal controls that monitor managerial decisions and align the interests of managers and shareholders. The board of directors (BD) are among the main bodies of internal control. It is responsible for hiring and dismissing the management team, for adopting an appropriate compensation policy, and to supervise and advise on management activities (SILVEIRA, 2010).

Board members may be independent, company employees or professionals not employed but have a connection with the organization. The chief executive officer (CEO) may play a relevant role in the formation of the BD, participating in meetings as an effective member, or even chairing the board (a condition known in the literature as CEO duality). There is a widespread understanding of the importance of BD in the literature on corporate governance. Most studies in the field seek to understand the relationship between the structure of the BD and changes in the firm’s performance and market value. (YERMACK, 1996; EISENBERG, SUNDGREN, and WELLS, 1998; ANDRADE, SALAZAR, CALEGÁRIO, et al., 2009; GONDRIGE, CLEMENTE, and ESPEJO, 2012).

Looking from another angle, characteristics of a company may also influence the BD structure, including the number of board members, the board’s independence, and the presence of the CEO (as an ordinary member or chairperson). In larger, more complex companies, it is expected a higher number of board members to oversee the activities of the management team and offer advice. It is also expected that, in underperforming companies, more members will be added to the BD, seeking more engagement to address the firm’s issues (YERMACK, 1996).

Complex companies may present fewer independent members because of the nature of the company’s activities and industry demand board members with specific knowledge. In this case, a company would prefer board members selected among its personnel and, ultimately, external members who have a non-employment relationship with the company (external affiliated members). The presence of independent/external members can help mitigate agency problems caused by the CEO’s participation in the BD. Firms are expected to pursue a larger proportion of independent members in their BD to reduce CEO influence and likelihood to make decisions that conflict with shareholders’ interests (LEHN, PATRO, and ZHAO, 2009; LINCK, NETTER, and YANG, 2008).

CEO duality grants more power to the officer, who will be responsible for preparing the BD meetings and be part of their own performance assessment. Notwithstanding, CEO duality may help to reduce incomplete information when there is information asymmetry between internal and external members. Finally, CEO duality can be explained by ineffective corporate governance practices, company complexity, or as a reward for good corporate performance (BRICKLEY, COLES, and JARRELL, 1997).

Considering the potential connection between characteristics of the company and the formation of the BD, this study analyzed the characteristics of businesses that influence the
number of board members, their independence, and CEO duality. The research evaluated the most significant determinants in the structure of the board of directors of companies listed in the Brazilian stock market B3, between 2010 and 2014.

THEORETICAL FRAMEWORK

Board of Directors

The agency problem involving companies’ managers and shareholders require the use of control mechanisms to ensure that managers act in the best interests of shareholders. The board of directors (BD) is one of the main internal control bodies, focusing particularly on monitoring the activities of the management team, mitigating this agency problem. The BD’s primary duties are to put together a management team and monitor its behavior, which includes activities such as hiring, establishing a compensation plan, advising, and vetoing any decision that may be against the stakeholders’ interests. It is also considered the main body bridging shareholders and managers (SILVEIRA, 2010; CHOU, CHUNG, and YIN, 2013).

According to the Brazilian corporate law, the tasks of the BD are a) to guide the firm’s activities; b) to hire and dismiss directors and establish their duties; c) to supervise the work and decisions of management; d) to call the general meeting; e) form an opinion on management reports, accounts, acts or contracts; f) to deliberate on and authorize the issuance of shares, bonds, or disposal of assets; and g) to manage contracts with independent audit. Given its importance in the overall business context, many studies seek to show how the structure of the BD influence companies’ decisions and performance. In these studies, the key features subject to review are the board’s size, the independence of members, the CEO’s political strength, the frequency of meetings (ordinary or extraordinary general meetings), and the attendance of directors at such meetings.

Yermack (1996) studied the effectiveness of boards according to their size and the firm’s value. The author observed that small BD are more effective by establishing a relationship between board size and firm value, corroborating the assumption that large groups have difficulties in reaching consensus or making timely decisions. Eisenberg, Sundgren, and Wells (1998) and Liang, Xu, and Jiraporn (2013) found that companies with large BD were less profitable. Other studies, however, suggest that large boards may be beneficial to companies since the workload would be divided better among members. Andrade, Salazar, Calegário, et al. (2009) found that companies with larger boards performed better. Gondrige, Clemente, and Espejo (2012) studied the influence of the board size firm value. Different from the results by Eisenberg, Sundgren, and Wells (1998) and Liang, Xu, and Jiraporn (2013), the author observed that firms with large boards had higher market value.

While most studies show how the structure and composition of the BD influence companies’ performance and market value, other research focus on understanding why a BD is formed with more or fewer members, the reason for the presence of more independent members, and the causes of CEO duality. The authors who studied these topics were Hermalin and Weisbach (1988), Mak and Li (2001), Baker and Gompers (2003), Boone, Field, Karpoff, et al. (2007),

**Board size**

As for board size, it is expected that larger groups present a slower and more biased decision-making process due to the difficulty of obtaining unanimity. Also, larger groups imply higher costs to bring together and coordinate more members (YERMACK, 1996; COLES, DANIEL, and NAVEEN, 2008). On the other hand, larger boards may have a greater ability to monitor management team activities and are less likely to make extreme decisions (CHENG, 2008). Andrade, Salazar, Calegário, et al. (2009) state that larger boards have greater monitoring power, and Coles, Daniel, and Naveen (2008) indicate that the optimal number of board members will depend on the characteristics of the company, such as its complexity.

Larger companies and firms operating in complex businesses are more likely to have large boards. Some authors consider “complex companies” as firms with large size and indebtedness, operating for many years in several market segments (YERMACK, 1996; EISENBERG, SUNDGREN, and WELLS, 1998; LINCK, NETTER, and YANG, 2008; COLES, DANIEL, and NAVEEN, 2008).

A characteristic of companies that relates to the increased demand for monitoring and advising is the level of informational asymmetry. Yermack (1996) states that the board size may result from poor past performance, which would lead companies to include more directors on their board to better monitor and advise on management activities. Once the company had recovered from its poor results, the added members would be removed, and the board would return to the same number of components as before.

**Independence of the board of directors**

The literature suggests that board members (internal or external to the company) are considered more independent when performing their monitoring and advisory activities without the aim of benefiting specific agents. The inclusion of internal members can raise questions about their independence, considering the board’s role in monitoring management activities, with a focus on the company’s CEO. Company officers who took a seat on the board would often have to diverge from the CEO’s behavior. Geneen (1984 apud WEISBACH, 1988, p. 433) indicates that “certainly, none of the directors would substantially challenge their boss in the boardroom.”

Byrd and Hickman (1992) classify board members into three groups, a) internal members (employees, retired ex-employees, and other people related to them); b) affiliated external members (those that did not fit in the previous situation, but who have some connections with the company, besides being part of the BD); and c) independent external members, who have no connection to the company other than serving the board. More specifically, Rosenstein and Wyatt (1990) and Cheng (2008) argue that independent members have or had no working relationship with the company, no relationship with their current executives, and
no shares or business relations with the company. A member who is not a current employee of the company and presents any of these characteristics would be considered an external but not independent member.

The participation of external members on a BD reduces the likelihood of board members to expropriate shareholder’s wealth through decisions that favor the individual interests of any agent. External members work as professional mediators, constituting a low-cost corporate governance mechanism (FAMA, 1980). According to Rosenstein and Wyatt (1990), the benefits of having external members on the board are not the same for all companies. A small business, for instance, may benefit more from them than a larger firm due to the information an external member with market experience can provide, contributing to the corporate decision-making process regarding market-related issues.

Among the characteristics that may determine a greater or lesser proportion of external or independent members on the BD, those that stand out are the firm’s size, complexity, growth opportunities, CEO duality (or CEO presence as a board member, even if not as chairperson), and board size. Since agency problems can grow according to the size, larger companies are expected to have a higher proportion of external or independent board members (LEHN, PATRO, and ZHAO, 2009), and more complex companies can benefit from independent members with greater market expertise. However, considering that internal members are likely to have accumulated more knowledge and relevant information about the company’s activities and industry, the entry of external members can lead to decision-making with incomplete information (LINCK, NETTER, and YANG, 2008).

The informational asymmetry observed in growing companies could undermine the work of external members, who would be less informed than their counterparts. However, growing companies may have higher agency costs and conflicts of interest, requiring more independent members to mitigate such issues (LEHN, PATRO, and ZHAO, 2009). Adding members to the board, as a result of periods of poor company performance, could also increase the proportion of external directors, which is negatively related to past performance and positively related to the number of board members. Board’s independence is expected to increase as the CEO becomes more influential, as in the case of CEO duality (YERMACK, 1996; LINCK, NETTER, and YANG, 2008). On the other hand, more powerful CEOs may inhibit the entry of independent members to the board, since these members may curb practices aimed at increasing CEO utility at the expense of shareholder’s wealth (BOONE, FIELD, KARPOFF, et al., 2007).

**CEO duality**

CEO duality occurs when the CEO also serves as the board’s chairperson, and it is a condition that has inspired many studies. Jensen (1993) cites the conflict of interest in CEO duality, pointing out that CEOs accumulating the role of chairpersons would be in charge of monitoring and evaluating their own activities and establishing compensation plans for themselves. In the event of a conflict of interest between the CEO and the shareholders, the CEO would have even more power to make decisions that would benefit themselves over
shareholders’ wealth. The managerial power theory states that the more power the CEO has, the more income they could extract from the company in the form of compensation and benefits above what would be considered “fair,” thus damaging business performance (BEBCHUK and FRIED, 2003).

Despite the disadvantages mentioned above, studies also point out the benefits of CEO duality. Brickley, Coles, and Jarrell (1997) argue that because the CEO has specific and relevant information about the company’s activities, it would be beneficial for them to serve as the board’s chairperson in order to reduce the costs of transferring information from management to the BD, leading to better decision making.

Contrary to the literature on the determinants of other characteristics related to BD, there are few fact-orientated theories that can influence the CEO’s appointment as chairperson. The study by Brickley, Coles, and Jarrell (1997) stands out, arguing that the CEO’s success may grant them a position (even as chairperson) on the company’s board, during or after their mandate as an officer. Thus, a positive link is expected between CEO duality and company performance. The complexity of operations and informational asymmetry may also require specialized knowledge about the business and the operating sector, and may influence the appointment of the CEO as a member of the board or as chairperson.

**METHODOLOGY**

**Description of variables**

This section shows how the study defined proxies to represent the board size and independence, as well as CEO duality and the variables that determine which are the characteristics of the firm influencing the board of directors’ (BD) structure. Board size was measured by the number of full members (BoardSize). Board independence was assessed by the proportion of independent (% Indep) and external (% Ext) members on the total number of directors. As for CEO duality, the research adopted a dummy variable of value 1 for duality and 0 otherwise (CEOChairperson). Another alternative measure was the variable assessing the CEO’s power, because they serve as a regular board member, also using a dummy (CEOonBoard).

Proxies for the firm’s size, indebtedness, the complexity of the control, and age were used to measure the characteristics that influence a firm’s complexity. The size was measured by the logarithm of the company’s total assets (LogAssets). Indebtedness was measured by the ratio between debt and total assets (Debt/Assets). Values greater than 1 for this variable indicate a debt greater than the total value of assets. Control complexity was measured by a dummy variable of value 1 when the controlling party is a holding and 0 otherwise (Holding). The age of the company was measured from its founding year to the year of the researched period (FirmAge). It was considered in its quadratic form, since the relationships between the firm’s age and the characteristics of the board may not be linear (FirmAge²).

The Market-to-Book Index (MTB) was used to measure the company’s growth opportunities. The MTB was calculated by the relation between the market value and the book value of the firm’s asset. Finally, company performance was measured by assessing profitability. Consistent
with most previous studies, the profitability of the companies in the sample was obtained using the return on assets (ROA) as a proxy. In some models, temporal dummy variables were included to represent macroeconomic or regulatory characteristics observed in each year of the sample. Box 1 summarizes the adopted variables, the calculation formula, and the main studies that used the variables.

**BOX 1**

**Description of the variables used in the research**

<table>
<thead>
<tr>
<th>Name</th>
<th>Formula</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>% Indep</td>
<td>Independent Members / Total Members</td>
<td>Cheng (2008), Brick and Chidambaran (2010), Liang, Xu, and Jiraporn (2013)</td>
</tr>
<tr>
<td>% Ext</td>
<td>External Members / Total Members</td>
<td>Yermack (1996), Andrade, Salazar, Calegário, et al. (2009)</td>
</tr>
<tr>
<td>CEOChairperson</td>
<td>1 for CEO duality and 0 otherwise</td>
<td>Cheng (2008), Andrade, Salazar, Calegário, et al. (2009), Brick and Chidambaran (2010), Liang, Xu, and Jiraporn (2013)</td>
</tr>
<tr>
<td>CEOonBoard</td>
<td>1 when the CEO is on the board and 0 otherwise</td>
<td>Not used in previous works</td>
</tr>
<tr>
<td>FirmAge</td>
<td>Age of company</td>
<td>Linck, Netter, and Yang (2008)</td>
</tr>
<tr>
<td>FirmAge²</td>
<td>(Age of company)²</td>
<td>Linck, Netter, and Yang (2008)</td>
</tr>
<tr>
<td>Holding</td>
<td>1 when the control is a holding company and 0, otherwise</td>
<td>Not used in previous works</td>
</tr>
</tbody>
</table>

**Source:** Elaborated by the authors.
Model, estimators, econometric assumptions, and sample

Regression models using board size, the proportion of independent and external members, and CEO duality were used to examine the main determinants of the composition of the board of directors (BD) and its leadership structure. For models using BoardSize, %Indep, and %Ext as dependent variables, regressions were calculated using panel estimators, since observations consist of tracking multiple individuals (firms) over multiple periods. The main estimators for panel data consisted of fixed effects (FE) and random effects (RE). The Hausman test was applied to decide between these two estimators. The rejection of the null hypothesis ($H_0$) for this test indicates that FE were more efficient than RE estimators. When $H_0$ was not rejected, estimations were carried out using RE.

When the CEOChairperson was used as a dependent variable, the study adopted the logit model. For all estimated models, the variance inflation factor (VIF) test was used to detect independent variables with high degrees of multicollinearity. For all models, regressions were estimated with and without the presence of temporal dummies to analyze how results could change with their inclusion. A significance level of 5% was considered when statistical tests rejected the null hypotheses. The panel models used the Wald test for intragroup heteroscedasticity (FE) and the Wooldridge test for autocorrelation of residuals (FE and RE). In the presence of heteroscedasticity or residuals autocorrelation, the estimates were made with robust standard errors or White errors. Because the FE model does not allow the estimation of coefficients for time-invariant variables (for example, the sector the firm operates or the identity of the controlling party, which were observed in most of the cases), it was not possible to include variables such as control of state, foreign, and financial sector in the model, which were also considered determinants of the board structure.

The research population consisted of all companies listed on the Brazilian stock market B3 between 2010 and 2014 (the period was adopted based on the availability of data about the firms’ board structure). Companies with no data for any of the variables used in the model and companies with a negative Market-to-book (MTB) index were excluded from the sample since negative values for this index have no theoretical significance. Data on the BD structure were collected in each of the firms’ reference forms, available on the website of the Securities and Exchange Commission of Brazil (CVM). Financial information was collected using Economatica® software. The final sample consisted of 162 financial and non-financial companies, with observations for all periods, resulting in a balanced panel consisting of a total of 810 observations.

RESULTS AND ANALYSIS

Descriptive statistics

Table 1 shows the mean, median, standard deviation, and maximum and minimum values for the variables adopted in the research. The sample companies presented a board of directors
(BD) with seven members on average. There is a significant difference regarding the percentage of independent and external members on the boards of the firms studied. In the companies examined, the BD was formed with an average of 87.20% of external members, and 22.67% of independent members. The definition of external and independent members indicates that this difference (64.53%) refers to board members who were not employed (during the period examined) in the company, and do not meet Rosenstein and Wyatt (1990) and Cheng’s (2008) definition of independent board member.

CEO duality was found in 18.64% of observations. CEOs were also board members, regardless if as chairpersons, in more than half of the observations (54.57%). Regarding financial information, the companies presented, on average, total assets of R$ 25 billion, ranging from companies with only R$ 15 million in assets to companies with assets in the trillions. High values for this variable are mainly related to the inclusion of financial companies in the sample. The indebtedness level of the sample companies corresponds to around 57%, which is the percentage of assets financed by third-party capital.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>Median</th>
<th>Standard deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>BoardSize</td>
<td>7.2790</td>
<td>7.0000</td>
<td>2.6010</td>
<td>17.0000</td>
<td>2.0000</td>
</tr>
<tr>
<td>% Indep</td>
<td>0.2267</td>
<td>0.2000</td>
<td>0.2103</td>
<td>1.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>% Ext</td>
<td>0.8720</td>
<td>0.8750</td>
<td>0.1229</td>
<td>1.0000</td>
<td>0.3333</td>
</tr>
<tr>
<td>CEOChairperson</td>
<td>0.1864</td>
<td>0.0000</td>
<td>0.3897</td>
<td>1.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>CEOonBoard</td>
<td>0.5457</td>
<td>1.0000</td>
<td>0.4982</td>
<td>1.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>Assets (millions R$)</td>
<td>25.019.5176</td>
<td>3.357.5690</td>
<td>117.543.91111</td>
<td>1.437.485.5120</td>
<td>15.3480</td>
</tr>
<tr>
<td>Debt/Assets</td>
<td>0.5698</td>
<td>0.5855</td>
<td>0.2056</td>
<td>0.9890</td>
<td>0.0050</td>
</tr>
<tr>
<td>FirmAge</td>
<td>40.5247</td>
<td>38.0000</td>
<td>27.3697</td>
<td>143.0000</td>
<td>3.0000</td>
</tr>
<tr>
<td>Holding</td>
<td>0.3062</td>
<td>0.0000</td>
<td>0.4612</td>
<td>1.0000</td>
<td>0.0000</td>
</tr>
<tr>
<td>MTB</td>
<td>2.1970</td>
<td>1.4475</td>
<td>2.9812</td>
<td>39.6265</td>
<td>0.0331</td>
</tr>
<tr>
<td>ROA</td>
<td>0.0483</td>
<td>0.0408</td>
<td>0.1277</td>
<td>1.9931</td>
<td>-1.2396</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.

As for the firms’ age, the companies studied were established, on average, 40 years ago. The sample consisted of centenary companies to companies with only three years of existence. On average, 30.62% of the companies were controlled by holding companies. MTB index values greater than 1 indicate that companies had their net worth higher than their book value. The
study considered that companies with a high MTB index had high expectations of growing their cash flows not captured by accounting. The average ROA of the companies was 4.83%, which indicates net income generated in each period corresponding to 4.83% of the total assets value. Values greater than 1 or less than -1, respectively, indicate that the company obtained net income above the value of its assets, or obtained a result so negative that it consumed a large part of its total assets.

**Result of estimations**

This section presents the results obtained for the panel data and logistic regression models, which aimed to analyze the determinants of board size and independence, and CEO duality. Table 2 shows the result of the estimates for the model, which used the number of board members as the dependent variable. The four models estimated in this table rejected the hypothesis that all coefficients of the model were null (F test).

The positive and statistically significant coefficient for the LogAssets variable suggested that larger companies have a larger BD. The variable Debt/Assets was statistically significant and negative, indicating that more indebted companies have fewer members on their BD. When considering firm size as a proxy for complexity as well as debt, there is evidence that larger firms have more board members (YERMACK, 1996; EISENBERG, SUNDGREN, and WELLS, 1998; LINCK, NETTER, and YANG, COLES, DANIEL, and NAVEEN, 2008).

However, other characteristics of complexity were not related to board size, such as the fact that the controlling party was a holding company, and the firm's age (as well as its quadratic relationship) was not statistically significant in any of the estimated models. On the other hand, the positive and statistically significant coefficient for the MTB index indicated that growing companies (higher MTB) form their boards with the largest number of members, as proposed by Linck, Netter, and Yang (2008). No relationship was found between profitability and board size, rejecting the hypothesis that less profitable companies have more board members, as a result of the inclusion of new directors to improve company performance.

**TABLE 2**

**Determinants of board size**

<table>
<thead>
<tr>
<th></th>
<th>Model 1</th>
<th>Model 2</th>
<th>Model 3</th>
<th>Model 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>LogAssets</td>
<td>1.7444</td>
<td>1.7426</td>
<td>1.7779</td>
<td>1.7848</td>
</tr>
<tr>
<td></td>
<td>(0.2239)</td>
<td>(0.2240)</td>
<td>(0.2298)</td>
<td>(0.2300)</td>
</tr>
<tr>
<td>Debt/Assets</td>
<td>-1.3180</td>
<td>-1.3332</td>
<td>-1.3525</td>
<td>-1.3712</td>
</tr>
<tr>
<td></td>
<td>(0.5202)</td>
<td>(0.5218)</td>
<td>(0.5237)</td>
<td>(0.5254)</td>
</tr>
<tr>
<td>Holding</td>
<td>0.0703</td>
<td>0.0994</td>
<td>0.0546</td>
<td>0.0787</td>
</tr>
<tr>
<td></td>
<td>(0.4604)</td>
<td>(0.4613)</td>
<td>(0.4595)</td>
<td>(0.4603)</td>
</tr>
<tr>
<td>FirmAge</td>
<td>-0.0042</td>
<td>–</td>
<td>-0.0029</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>(0.0064)</td>
<td>–</td>
<td>(0.0063)</td>
<td>–</td>
</tr>
<tr>
<td>FirmAge²</td>
<td>–</td>
<td>0.0000</td>
<td>–</td>
<td>0.0000</td>
</tr>
<tr>
<td></td>
<td>–</td>
<td>(0.0001)</td>
<td>–</td>
<td>(0.0001)</td>
</tr>
</tbody>
</table>

*Continue*
Table 3 shows the result of the estimates for the model, which used the proportion of independent members as the dependent variable. Again, the misspecification hypothesis of the model is rejected through the statistical significance of the F tests. The results for proxies that represent the firm’s size (LogAssets) and its debt level (Debt/Assets) do not relate to the proportion of independent board members. On the other hand, other characteristics related to business complexity had a statistically significant relationship with the BD’s level of independence.

The fact that the variable Holding was negative indicated that firms where the controlling party is a holding company have boards with the lowest proportion of independent members. This finding may indicate that the complexity of organizations requires more internal members as they have more information about the company’s activities, which is essential to offer good monitoring and advice. A different pattern was observed for the variable FirmAge, where the initial models (5 and 6) resulted that the variable was positive and statistically significant. However, the variable changes to negative in models that included temporal dummy variables (7 and 8), i.e., the results suggest a negative relationship between the firm’s age and the proportion of independent members in its BD.

The MTB index was not statistically significant in the first two models, but in models that include temporal dummies, the coefficient of the variable is statistically significant at the 10% level. Considering a 5% significance for rejecting the null hypotheses of the statistical tests, it is possible to say that the relationship between the firm’s growth expectations and the proportion of independent board members is positive but weak. As for profitability (ROA), statistical significance was observed at the 5% level only in model 5, with a negative coefficient. In the other models, the coefficient persists, but its significance level drops. Profitability, however,
seems to be negatively related to the proportion of independent members in the BD, which rejects the hypothesis that poor performance may lead the company to increase the number of independent board members in order to solve issues that undermine business performance (YERMACK, 1996). As noted, it seems more likely that the company will try to improve its performance by including other types of members already related to the company and, as a result, greater accumulated knowledge about the business and the sector where the company operates. In analyzing the determinants of the proportion of external members related to the board’s structure (CEOChairperson, CEOonBoard, and BoardSize), no statistically significant relationships were observed. This indicates that the board size and agency problems resulting from the CEO’s presence as a board member did not influence the proportion of independent members.

TABLE 3
Determinants of board independence – independent members

<table>
<thead>
<tr>
<th>Variable</th>
<th>Estimate 1</th>
<th>Estimate 2</th>
<th>Estimate 3</th>
<th>Estimate 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>LogAssets</td>
<td>0.0270</td>
<td>0.0329</td>
<td>-0.0052</td>
<td>-0.0022</td>
</tr>
<tr>
<td></td>
<td>(0.0516)</td>
<td>(0.0507)</td>
<td>(0.0222)</td>
<td>(0.0213)</td>
</tr>
<tr>
<td>Debt/Assets</td>
<td>0.0130</td>
<td>-0.0033</td>
<td>0.0344</td>
<td>0.0283</td>
</tr>
<tr>
<td></td>
<td>(0.0647)</td>
<td>(0.0642)</td>
<td>(0.0476)</td>
<td>(0.0484)</td>
</tr>
<tr>
<td>Holding</td>
<td>-0.0374</td>
<td>-0.0409</td>
<td>**-0.0514</td>
<td>**-0.0533</td>
</tr>
<tr>
<td></td>
<td>(0.0414)</td>
<td>(0.0429)</td>
<td>(0.0249)</td>
<td>(0.0255)</td>
</tr>
<tr>
<td>FirmAge</td>
<td>**0.0092</td>
<td>**0.0096</td>
<td>***-0.0015</td>
<td>***-0.0014</td>
</tr>
<tr>
<td></td>
<td>(0.0037)</td>
<td>(0.0038)</td>
<td>(0.0006)</td>
<td>(0.0006)</td>
</tr>
<tr>
<td>Market-to-book</td>
<td>0.0052</td>
<td>0.0050</td>
<td>*0.0068</td>
<td>*0.0066</td>
</tr>
<tr>
<td></td>
<td>(0.0035)</td>
<td>(0.0034)</td>
<td>(0.0038)</td>
<td>(0.0037)</td>
</tr>
<tr>
<td>ROA</td>
<td>**-0.1099</td>
<td>*-0.1050</td>
<td>*-0.0982</td>
<td>*-0.0969</td>
</tr>
<tr>
<td></td>
<td>(0.0548)</td>
<td>(0.0535)</td>
<td>(0.0585)</td>
<td>(0.0569)</td>
</tr>
<tr>
<td>CEOChairperson</td>
<td>-0.0324</td>
<td>–</td>
<td>*-0.0348</td>
<td>–</td>
</tr>
<tr>
<td></td>
<td>(0.0231)</td>
<td></td>
<td>(0.0203)</td>
<td></td>
</tr>
<tr>
<td>CEOonBoard</td>
<td>–</td>
<td>*-0.0470</td>
<td>–</td>
<td>*-0.0370</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0249)</td>
<td></td>
<td>(0.0211)</td>
</tr>
<tr>
<td>BoardSize</td>
<td>0.0081</td>
<td>0.0081</td>
<td>0.0057</td>
<td>0.0057</td>
</tr>
<tr>
<td></td>
<td>(0.0057)</td>
<td>(0.0056)</td>
<td>(0.0046)</td>
<td>(0.0046)</td>
</tr>
<tr>
<td>_Intercept</td>
<td>-0.4588</td>
<td>-0.5029</td>
<td>0.2484</td>
<td>0.2343</td>
</tr>
<tr>
<td></td>
<td>(0.4510)</td>
<td>(0.4435)</td>
<td>(0.1908)</td>
<td>(0.1888)</td>
</tr>
<tr>
<td>TimeDummies</td>
<td>NÃO</td>
<td>NÃO</td>
<td>SIM</td>
<td>SIM</td>
</tr>
<tr>
<td>Hausman Test(c)</td>
<td>***20.76</td>
<td>***24.59</td>
<td>2.57</td>
<td>4.03</td>
</tr>
<tr>
<td>Higher VIF</td>
<td>1.62</td>
<td>1.62</td>
<td>1.66</td>
<td>1.65</td>
</tr>
<tr>
<td>F Test</td>
<td>**2.25</td>
<td>**2.45</td>
<td>***48.83</td>
<td>***47.97</td>
</tr>
</tbody>
</table>

** Continue **
The results shown in Table 4 were obtained by replacing the proportion of independent members with the proportion of external members. The results of the F test indicate rejection of the hypothesis that the model was poorly specified. The variable LogAssets had no statistical significance (Table 3). The variable that represents the firm's indebtedness was significant in 3 of the 4 models estimated in Table 4. The results may indicate a concern of board members that have a connection with the company (beyond their relationship as directors) with the firm's indebtedness. The inclusion of these members on the BD may be a sign to creditors that a more independent BD will veto decisions that could deteriorate the company's financial health (ANDRADE, SALAZAR, CALEGÁRIO, et al., 2009).

Other characteristics related to the complexity of the company are not connected to the proportion of external members on the BD. No statistically significant relationships were found between the variable and the fact that the company is a holding, the firm's age, MTB index, and profitability. The results differ from those presented in Table 3, showing that the company’s decision to have independent or external members on its BD depends on different characteristics. Although the results in Table 3 indicate that the CEO duality or CEO participation on the board is not related to the proportion of independent board members, the results change when considering the proportion of external members. For the BD, where the CEO is also the chairperson or where they are only participating as a board member, it is expected the presence of fewer independent or external members. The results are consistent with the theory that more powerful CEOs seek to limit the presence of external members in corporate governance structures (BOONE, FIELD, KARPOFF, et al., 2007).

### TABLE 4

Determinants of board independence – external members

<table>
<thead>
<tr>
<th></th>
<th>LogAssets</th>
<th>Debt/Assets</th>
<th>Holding</th>
<th>FirmAge</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>***0.1187</td>
<td>0.0176</td>
<td>-0.0002</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.0373)</td>
<td>(0.0157)</td>
<td>(0.0023)</td>
</tr>
<tr>
<td>LogAssets</td>
<td>-0.0413</td>
<td>-0.0221</td>
<td>0.0176</td>
<td>-0.0002</td>
</tr>
<tr>
<td></td>
<td>(0.0263)</td>
<td>(0.0205)</td>
<td>(0.0157)</td>
<td>(0.0023)</td>
</tr>
<tr>
<td>Debt/Assets</td>
<td>***0.0674</td>
<td>***0.1176</td>
<td>0.0062</td>
<td>0.0002</td>
</tr>
<tr>
<td></td>
<td>(0.0338)</td>
<td>(0.0377)</td>
<td>(0.0135)</td>
<td>(0.0018)</td>
</tr>
<tr>
<td>Holding</td>
<td>0.0183</td>
<td>0.0183</td>
<td>0.0002</td>
<td>0.0002</td>
</tr>
<tr>
<td></td>
<td>(0.0159)</td>
<td>(0.0119)</td>
<td>(0.0024)</td>
<td>(0.0018)</td>
</tr>
<tr>
<td>FirmAge</td>
<td>0.0069</td>
<td>0.0069</td>
<td>0.0003</td>
<td>0.0003</td>
</tr>
<tr>
<td></td>
<td>(0.0137)</td>
<td>(0.0137)</td>
<td>(0.0186)</td>
<td>(0.0186)</td>
</tr>
</tbody>
</table>
However, it is not possible to rule out the hypothesis that the complexity of companies, based on characteristics not measured in the models, is not linked to the appointment of the CEO as a board member. Thus, in more complex companies (where the CEO is on the BD), it would be necessary to include internal members who have more information about the business activities. For the variable BoardSize, statistically significant positive relationships were found in models 6 and 8. These results indicate that larger BD require more external members in their structure.

### TABLE 5
Determinants of CEO duality

<table>
<thead>
<tr>
<th></th>
<th>(9)</th>
<th>(10)</th>
<th>(11)</th>
<th>(12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LogAssets</td>
<td>***-0.4922 (0.1451)</td>
<td>***-0.4752 (0.1462)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Debt/Assets</td>
<td>-0.5202 (0.5071)</td>
<td>-0.5918 (0.5134)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Holding</td>
<td>-0.0783 (0.2077)</td>
<td>-0.0990 (0.2090)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.
Notes: Coefficients (standard errors); Statistical significance: 1% ***, 5% **, 10% *; (a) Positive number less than 0.0001; (b) Negative number greater than -0.0001; (c) Hausman test to choose between the FE and RE estimators; (d) Wald test for intragroup heteroscedasticity (FE); (e) Wooldridge test for serial correlation of regression error term.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model (13)</th>
<th>Model (14)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FirmAge</td>
<td>*0.0057</td>
<td>*0.0065</td>
</tr>
<tr>
<td></td>
<td>(0.0034)</td>
<td>(0.0034)</td>
</tr>
<tr>
<td>Market-to-book</td>
<td>**-0.1050</td>
<td>**-0.1071</td>
</tr>
<tr>
<td></td>
<td>(0.0503)</td>
<td>(0.0509)</td>
</tr>
<tr>
<td>ROA</td>
<td>**2.6639</td>
<td>**2.4365</td>
</tr>
<tr>
<td></td>
<td>(1.0734)</td>
<td>(1.0871)</td>
</tr>
<tr>
<td>Intercept</td>
<td>**3.3370</td>
<td>***3.5288</td>
</tr>
<tr>
<td></td>
<td>(1.3211)</td>
<td>(1.3382)</td>
</tr>
<tr>
<td>TimeDummies</td>
<td>NÃO</td>
<td>SIM</td>
</tr>
<tr>
<td>Higher VIF</td>
<td>1.56</td>
<td>1.64</td>
</tr>
<tr>
<td>LR</td>
<td>***34.47</td>
<td>***48.73</td>
</tr>
<tr>
<td>Positive correctly predicted (f)</td>
<td>50.00%</td>
<td>50.00%</td>
</tr>
<tr>
<td>Negative correctly predicted (g)</td>
<td>81.59%</td>
<td>81.59%</td>
</tr>
<tr>
<td>Model</td>
<td>(13)</td>
<td>(14)</td>
</tr>
</tbody>
</table>

Source: Elaborated by the authors.

Notes: Coefficients (standard errors); Statistical significance: 1% ***, 5% **, 10% *; (a) Positive number less than 0.0001; (b) Negative number greater than -0.0001; (f) Percentage of times the model correctly predicted CEO duality; (g) Percentage of times the model correctly predicted that CEO and chairperson positions would be held by different people.

Table 5 shows the logistics models that sought to analyze the relationship between company characteristics and the appointment of the CEO as chairperson. The negative and statistically significant coefficient for the variable LogAssets indicated that in larger companies, the CEO is less likely to be the chairperson. This is at odds with the literature, which indicates that more complex companies may retain the CEO as the BD’s chairperson because of their expertise and knowledge of the company. The fact that larger companies are more closely monitored by the market and tend to have a higher level of governance may influence the decision to avoid CEO duality. For the other variables that measure company complexity (Debt/Assets, Holding, FirmAge), no statistically significant relationships were found between them and the likelihood of CEO duality.

The negative and significant coefficient for the MTB variable indicates that growing companies are less likely to present CEO duality. One explanation may relate to the fact that in growing companies, where information asymmetry is considered greater, there is an increasing demand for more independent internal controls that mitigate the agency problem, reducing the CEO’s power. Finally, profitability is positively related to the likelihood of CEO duality. These results are in line with Brickley, Coles, and Jarrell’s (1997) assumptions that the CEO can remain in the position of chairperson if the company performs well.
CONCLUSION

Many studies consider BD to be so important that characteristics, such as board size, board independence, and CEO duality, can influence business performance. However, research on the relationship between company characteristics and board structure is scarce, motivating the present research. This study aimed to investigate which business characteristics are related to board size, board independence, and CEO duality. A list of the main determinants of board composition was searched in the literature. The variables examined were the firm size, its indebtedness, complexity of its controlling party, age, growth opportunities, performance, and characteristics of the governance.

In line with the results obtained in the literature, it was observed that larger companies had more board members, which is consistent with the hypothesis that larger companies (because they are more complex) need more members to distribute tasks. When analyzing board independence, the percentage of independent and external members was used as proxies, and different results were obtained for each dependent variable. It is observed that in firms controlled by holding companies and those operating for longer, there is a smaller proportion of independent members on their BD. These results may relate to the fact that controllers need board members with more specialized knowledge, sending affiliate internal or external members to their subsidiaries. The negative relationship between profitability and the proportion of independent members indicates that companies can try to improve their results by including affiliate internal or external members who have more company-specific information.

When the proportion of external members was used as a proxy for board independence, a positive relationship between this variable and indebtedness was observed. More indebted companies include more external board members. CEO duality or presence as a board member is negatively related to the proportion of external members. This may be due to the tendency of more powerful CEOs to try to limit the number of independent board members. Finally, it is observed that larger companies are less likely to present CEO duality. More significant monitoring in large companies operating in the financial market may justify the fact that they adopt best practices in governance, which include assigning CEO and chairperson roles to different people. It is also noted that in more profitable companies, the CEO is more likely to also assume the role of chairperson, consistent with Brickley, Coles, and Jarrell (1997).

Future studies may analyze other determinants among the characteristics of the company, such as the way the board is structured and its activities. Characteristics of the board of directors that should be explored further include the number of corporate meetings, the inclusion of foreigners and women on the board, and the role of the CEO, depending on the governance practices the firm adopts.
REFERENCES


