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# State ownership and governance

## Propriedade estatal e governança

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**Abstract**
Considering the challenges for governance arising from the presence of the state as a shareholder in Brazilian companies, this study sought to investigate the effect of state ownership on corporate governance, using data from a sample of 234 Brazilian public companies between 2010 and 2016. Two governance indices were created (ratio and factorial), contemplating 12 aspects of governance for each company for each year, which is the innovation offered by this paper. The data were obtained from the Brazilian Securities and Exchange Commission (CVM) and regression analysis with unbalanced panel data using the GMM-Sys model was adopted. We found that the presence of the state as a shareholder had a negative effect on the Corporate Governance Index (IGC) of public companies, that is, state ownership was associated with a lower quality of governance.
**Keywords:** Corporate governance; State ownership; Corporate Governance Index (IGC)

**Resumo**
A presença do estado como acionista nas empresas brasileiras impõe desafios para a governança, por esse motivo, o presente estudo analisou o efeito da propriedade do estado sobre a governança corporativa, utilizando os dados de 234 empresas públicas brasileiras entre os anos de 2010 e 2016. Dois índices de governança foram criados (razão e fatorial), contemplando 12 aspectos de governança para cada empresa para cada ano, sendo o diferencial do artigo. Os dados foram obtidos a partir da Comissão de Valores Mobiliários (CVM) e foi utilizada a análise de regressão com dados em painel não balanceados através do modelo GMM-Sys. Como principal descoberta, a presença do estado como acionista tem um efeito negativo sobre o Índice de Governança Corporativa (IGC) das empresas públicas, ou seja, a propriedade estatal está associada a uma menor qualidade de governança.
**Palavras-chave**: Governança corporativa; Propriedade do estado; Índice de Governança Corporativa (IGC)

**Resumen**
La presencia del estado como accionista en las empresas brasileñas plantea desafíos para la gobernanza, por esto, el estudio investigó el efecto de la propiedad estatal sobre la gobernanza corporativa, utilizando datos de 234 empresas públicas brasileñas entre los años 2010 y 2016. Se crearon dos índices de gobernanza (razón y factorial), contemplando 12 aspectos de la gobernanza de cada empresa para cada año, siendo la innovación del estudio. Los datos se obtuvieron de la Comisión de Valores y Bolsa (CVM) y se utilizó el análisis de regresión con datos de panel no balanceados utilizando el modelo GMM-Sys. Como resultado principal, la presencia del estado como accionista tiene un efecto negativo en el Índice de Gobernanza Corporativa (IGC) de las empresas públicas, es decir, la propiedad estatal está asociada con una menor calidad de gobernanza.
**Palabras clave**: Gobernanza corporativa; Propiedad estatal; Índice de Gobernanza Corporativa (IGC)

## 1 Introduction

Scandals involving companies raise attention to problems surrounding the country's corporate governance system and overcoming corruption requires more than the establishment of strong accounting and control systems (Garcia & Teodósio, 2020). As this problem is related to information confidentiality, illegal acts and information asymmetry, the legitimation of good corporate governance mechanisms (transparency, accountability, equality and responsibility) has a significant impact on the combat of corruption (Wu, 2005).

Corporate governance includes mechanisms, both internal and external, adopted by a company to direct and control its actions. In this context, it is a challenge to maximize the value of the company and increase the return to shareholders while simultaneously having to combine efforts to minimize potential conflicts of interest that involve countless agents. Taking into consideration these potential conflicts and the fact that such conflicts have had international repercussions in recent decades, mechanisms have been created to improve monitoring systems and restructure laws, such as Sarbanes-Oxley (or SOX), with the aim of proposing limits to the actions of executives after the occurrence of corporate scandals, such as Enron, Parmalat and Worldcom (Silva, 2006).

Sarbanes-Oxley has emphasized the role of the state as a regulatory agent in the face of corporate governance. According to Matías-Pereira (2010), the state is an important market support agent, responsible for mediating, stimulating and promoting interventions and regulations. Discussions around the role of the state, its size and form of action, and the best configuration of the state apparatus to fulfill this role, are recurrent in the literature in several fields of knowledge, particularly economics, political science and public administration (Fontes Filho & Picolin, 2008).

Boubakri et al. (2020) noted that poor governance is commonly related to one of the main causes of the 2007-2008 financial crisis. During this crisis, governments implemented aid programs for companies under strain, raising the level of state ownership worldwide. However, there is a gap in the studies on state interference in the governance of companies in which the state holds shares.

Investigating the impact government decisions have on companies can be of primordial importance both for companies in which the government participates and for the society that grants decision-making power over social welfare. The way the state interacts with companies creates uncertainties about the return on investments and opens the door for some groups to be benefited and protected (Lazzarini, 2014) and, thus, shareholders, regulators, analysts and investors are interested in the way the state participates in companies.

Particularly in Brazil, in view of the history of Brazilian state-owned companies and in the face of periods of uncertainty, such companies may adopt discrepant practices in relation to private companies. According to Lazzarini, Musacchio and Pardengler (2013), the presence of the state as a shareholder in Brazilian companies imposes several challenges from the point of view of corporate governance, mainly due to the problems of agency, which can be substantially amplified. Musacchio and Lazzarini (2014) point out that in companies with participation of the state, it is more common to see conflicts between public and private shareholders, election of directors based on political criteria and goals that are not linked to maximization of the value of the company.

In view of this problem and based on the fact that Brazil has been working to improve its governance practices and that state participation is a recurring topic of debate, this study aims to answer the question: “How does the common shareholding of the state affect the corporate governance of Brazilian companies traded on B3?” Based on the internal mechanisms of ownership structure, this article's main objective is to analyze the impact of the state control structure on the corporate governance of publicly traded Brazilian companies.

This study is an attempt to expand the knowledge of the governance role played by state actors. Denis and McConnell (2003) identified this aspect of corporate governance as an area that is especially underdeveloped in the literature. Addressing this relative void is even more important in the context of crises and the concomitant increase in government ownership. Regional or country-specific studies can also demonstrate that government ownership has significant effects on corporate policy (Borisova, Brockman, Salas & Zagorchev, 2012). Through the use of regressions with unbalanced panel data by GMM-Sys, it was found that the presence of the state as a shareholder had a negative effect on the Corporate Governance Index (IGC) of public companies, that is, state ownership is associated to a lower quality of governance.

## 2 Agency theory, ownership structure and governance

This section is divided into two parts to better describe the literature review in the light of the theory: (i) agency theory and ownership structure; and, (ii) mechanisms of agency control.

### 2.1 Agency theory and ownership structure

Agency theory plays a central role in the corporate governance literature, pointing to the existence of a conflicting relationship between the principal and the agent. Jensen and Meckling (1976) were the first to formalize this theory in a more explicit model about the behavior of those involved in the coordination of a

corporation. For Jensen and Meckling (1976), the owners of a company (the main ones) hire the administrators (the agents) to carry out the control tasks and, as both seek to maximize their own interests, conflicts arise, since the administrators have the effective control of the company and have the incentive and the ability to consume benefits at the expense of the owners.

This mismatch of interests generates agency costs, which are created whenever the administrator manages the interests of shareholders. Jensen and Meckling (1976) formulated a theory of the ownership structure based on this agency problem. For them, due to the conflict of interests between managers and external shareholders, the company's performance is not independent of the ownership structure and agency costs increase as the maximization of the amounts invested by the managers decreases and the property becomes more dispersed.

This theory led to the development of a corporate governance research line (Saito & Silveira, 2008), which has provided growing empirical evidence that corporate governance arrangements can substantially affect shareholders (Bebchuk, Cohen & Ferrell, 2009). However, this development depended on the creation of a theory of the firm that ceased to analyze companies as “black boxes” and began to explain how the allocation of capital among shareholders and the conflicting objectives of individual participants within companies could lead to certain equilibrium situations. Thus, studies in related areas have broadened the understanding of how companies operate (Saito & Silveira, 2008).

From Jensen and Meckling (1976) until today, studies of agency theory have progressed in their extension and complexity. In a recent multi-country study, Morellec, Nikolov and Schurhoff (2018) point out that conflicts of interest within firms vary substantially from firm to firm and from country to country. The authors also point out that there are significant differences in conflicts of interest when considering the origin of the laws that are prevalent in the country (civil law or common law). As a result, they argue that improving corporate governance to decrease private control benefits has a greater effect than just strengthening investor rights (Morellec, Nikolov & Schurhoff, 2018).

### 2.2 Mechanisms of agency control

While Jensen and Meckling (1976) focused on the ownership structure and the role of administrators, other authors have focused on mechanisms that could mitigate agency problems. These include managerial remuneration based on stock options (for example, Haugen and Senbet 1981), which links managerial remuneration to the performance of stock prices (and guarantees managers a potential shareholding). The corporate control market, that is, the threat of hostile takeovers, was also seen as an implicit incentive to get around agency problems (Manne 1965). Fama (1980), in this context, stated that the managerial job market acts as a control mechanism, as managers have incentives to protect their reputation. A commonality of all these mechanisms is that they align the incentives of managers and owners or limit the discretion of managers.

Demsetz and Lehn (1985), in turn, when studying the concentration of ownership, pointed out that it varies systematically and in a way that is consistent with the maximization of the invested value and, thus, large publicly traded corporations present characteristics of diffuse ownership, that is, they separate ownership and control in business decisions. On the other hand, concentrated ownership has also been seen as impairing the company's performance in the form of private benefits (Bebchuck, 1999), mainly in government structures.

Another model on the effect of concentrated ownership was presented by Shleifer and Vishny (1986), who analyzed how large shareholders can improve the company's performance, by changing the its operational strategy through negotiations with the current management or its replacement. An important element of the Shleifer and Vishny (1986) model is the consideration that managers imperfectly maximize the profits and large shareholders may discover improvements that current management does not know about. However, the large shareholder does not have control of the company and needs to resort to informal negotiation methods, which result in imperfect improvements, or the replacement of the management established in a proxy fight or direct takeover (acquisition of more than 50% of the shares).

Regarding the takeover scenario and negotiations with management, Man and Wong (2013) state that an institutional environment that provides better legal protection serves as a mitigating factor for agency problems. In addition to the institutional environment, Man and Wong (2013) claim that other corporate governance mechanisms can reverse agency problems, such as: (i) board independence, which generates less endogenous decision-making; (ii) Female directors, who may develop trustworthy leadership; (iii) Audit committees, which can supervise internal control and the quality of financial information; and, (iv) Officers with financial experience, who can provide incremental control effects on earning management.

The agency problems presented and ways of mitigating them shed light on central and current themes in corporate governance, such as the definition of the corporate objective function and the supposed “social responsibility” of companies. According to Jensen and Meckling (1976), the company is not an individual, but just a legal fiction that serves as a focus for a complex process in which the conflicting objectives of individuals are brought into balance within a framework of contractual relationships (Saito & Silveira, 2008).

From this perspective, executives and shareholders sign a contract that discriminates what managers must do with the company's resources, allowing the firm to act as a nexus of contracts between customers, workers, executives and suppliers of material and capital (Jensen, 2001). In an ideal world, managers would

sign a complete contract, detailing their exact responsibilities and how the excess of cash should be allocated in each possible contingency (Jensen, 2001). However, as many contract terms are difficult to describe and predict, complete contracts are practically impossible to achieve (Jensen, 2001). According to Zingales (1998), the debate on governance would not be necessary if we were in a world in which all future contingencies could be described ex ante in contracts. In this sense, Klapper and Love (2004) claim that corporate governance in emerging markets is correlated with the extent of asymmetric information and hiring imperfections that companies face and that systems with low legal protection in these markets also have an influence on governance adopted at the firm level.

This absence of contractual accuracy in the face of contingencies (in the case of Brazil's control structures) reduces the power of monitoring, which may lead to conflicts of interest between owners and managers, resulting in consequences for the company's performance (Caixe & Krauter, 2013). In state ownership, these problems arise through lack of efficiency in the use of available resources (Dos Santos & Rover, 2019).

The ownership structures of state-owned companies have singularities. They are legal entities of private law, organized mostly in the form of publicly traded companies. Among subsidiaries and controlled companies, they can also be civil or limited companies (Ministry of Planning, Development and Management, 2020).

In companies, the presence of the state as a shareholder poses challenges from a corporate governance point of view. The state-owned structure leads to exacerbated agency costs and, if there is government influence, the institution is likely to pursue goals other than maximizing the company's value. These problems can be called “Agency Costs of State Capitalism” (Milhaupt, 2020).

There is evidence of this issue in several countries. In Indonesia, Musallam (2020) reported that agency costs may rise in firms that have government-owned shares, which was in line with Ararat, Black and Yurtoglu (2017), who found a negative relationship between state ownership and governance in Turkey. In China, Cao Cumming and Zhou (2020) found that despite being more innovative, companies with state control structures need to improve their corporate governance.

Brazil has government shareholders in several companies (Musacchio and Lazzarini, 2014) and the issue of privatization and state efficiency has been widely debated. According to the US State Department (2017), the Brazilian government maintains interests in organizations at both the federal and state levels. Brazilian state-owned companies are concentrated in the transportation, banking and energy generation and distribution sectors. Some of these firms are also publicly traded on stock exchanges. As for state participation, the State Companies Coordination and Governance Secretariat Bulletin (2019) reported that the federal entity actively participates in 203 companies, 46 of which are under direct control and 157 are under indirect control of the Union. Overall, the energy, financial and oil, gas and derivatives sectors predominate. This fact corroborates the characteristics pointed out by the North American State Department (2017) in relation to the concentration of companies in the energy sector.

State-owned companies may adopt differing metrics in relation to "good" private governance, and thus private "entrepreneurship" may be more efficient than state "entrepreneurship" (Borcherding, Pommerehne & Schneider 1982). In fact, Cornett, Guo, Khaksari & Tehranian (2010), found in a review few studies that reported that the state offered more benefits to companies, such as those by Abramov et al. (2017) in Russia and Landoni (2020) in Italy. In general, the paradoxical inconsistency in the social objectives of state-owned companies, combined with their extreme inefficiency, hinder them from achieving the same performance as private companies.

The evidence predominantly points to a negative relationship between state participation and corporate governance indexes (showing that governance policy can be conflicting in these companies) and that the government generates weak corporate governance when the political goals and objectives of maximizing the commonwealth (non-profit) outperform best governance practices (Ferreira, 2012; Boycko, Shleifer & Vishny, 1994; Nellis, 1994; Brada, 1996; Shleifer, 1998). Based on these assumptions, the following hypothesis is formed:

*H1: There is a negative relationship between the state control structure and the levels of corporate governance of Brazilian companies traded on B3.*

## 3 Methodology

This chapter presents the methodological procedures adopted in order to achieve the objectives initially proposed. We discuss the research strategy and method, the data collection process and the study sample, the data analysis techniques and, finally, the definition of the variables to be used.

The study sample consists of publicly traded Brazilian firms traded on B3 (Brasil, Bolsa, Balcão) in the period between 2010 and 2016. Financial and ownership structure information was collected in the Economatica database and on the Securities and Exchange Commission Securities (CVM) website. Corporate governance information was manually collected at the CVM. As suggested by Almeida, Campello and Galvão (2010), financial companies with Tobin's Q less (or equal) to zero and greater than 10 (10 ≤ Q> 0) were

excluded. Afterwards, a filter was included to identify companies that had common shares held by the state. Common shares were measured both through the direct and indirect participation of the state and through institutions linked to it, such as the BNDES. The final sample consisted of 234 companies (out of a universe of about 1,390 unbalanced observations).

To define the governance variable, it was necessary to create indices that take into account the real situation of the companies in the sample. For this, the model adapted from Asunción, De Luca and De Vasconcelos (2017) was used as a basis to create the governance checklist. The proposed Corporate Governance Index (IGC) has the differential of assigning a score for the governance value, while in other indices, if the company does not meet any of the proposed criteria, it is immediately excluded, without weighting. Thus, the proposed index is a more flexible method of investigating governance.

The data utilized in the IGC were collected from the Reference Forms (FR) available on the website of the Brazilian Securities and Exchange Commission (CVM). To determine the IGC of each company in the sample, a value of "1" was assigned for each recommendation of good practice of disclosure adopted and a value of "0" otherwise. The IGC of each company was obtained through two variables. In the first, the ratio between the score obtained and the maximum possible value was calculated, that is, 12 points. In the second, a confirmatory factor analysis was applied, in which the adequacy of the data to the model and the internal consistency were verified through the intercorrelation of the variables, using the Kaiser-Meye-Olkin (KMO) and Cronbach's alpha tests, respectively. After the calculation, the sample was divided into quartiles, considering that the companies classified in the first quartile have a low IGC, while those in the second present a regular IGC, those in the third have a good IGC and those in the fourth quartile have a high IGC. The dimensions analyzed are shown in Figure 1.

| Dimension | Item analyzed | Data source | Theoretical background |
|---|---|---|---|
| **Access and information content** | The company shows operational and/or economic-financial projections. | Item 11.1 of Reference Form | Silveira (2004). |
| **Ownership and control structure** | The company has only common shares. | Items 15.1/2 e 15.3 of Reference Form | Silveira (2004); Silva and Leal (2005); IBGC (2009); Lameira and Ness Jr. (2011). |
| | The percentage of voting shares of the controllers is less than or equal to their participation in the company's total capital. | Item 15.1/2 of Reference Form | Silveira (2004); Silva and Leal (2005); Lameira and Ness Jr. (2011). |
| **Board of directors** | The positions of chairman of the board of directors and CEO are held by different people. | Item 12.6/8 of Reference Form | CVM (2002); Silveira (2004); Silva and Leal (2005); IBGC (2009); Lameira and Ness Jr. (2011). |
| | The board of directors is composed between 5 (five) and 11 (eleven) members. | Items 12.1 e 12.6/8 of Reference Form | CVM (2002); Silveira (2004); Silva and Leal (2005); IBGC (2009); Lameira and Ness Jr. (2011). |
| | The board of directors is composed of at least 50% of independent directors. | Item 12.6/8 of Reference Form | Silveira (2004); Silva and Leal (2005); IBGC (2009); Lameira and Ness Jr. (2011). |
| | The tenure of the board of directors is not more than 2 (two) years. | Item 12.6/8 of Reference Form | CVM (2002); Silveira (2004); Silva and Leal (2005); IBGC (2009). |
| | The company has mechanisms for evaluating the performance of the Board of Directors. | Item 12.1 of Reference Form | IBGC (2009). |
| **Other corporate governance committees and agents.** | The company has an audit committee. | Item 12.7 of Reference Form | CVM (2002); IBGC (2009). |
| | The company has other advisory committees. | Item 12.7 of Reference Form | CVM (2002); IBGC (2009); Lameira and Ness Jr. (2011). |
| | The company's fiscal council is permanent. | Item 12.1 of Reference Form | CVM (2002); Silva and Leal (2005); IBGC (2009); Lameira and Ness Jr. (2011). |
| | The company presents the executive compensation policy. | Item 13.1 of Reference Form | Silveira (2004); IBGC (2009). |

**Figure 1 - Dimensions of corporate governance**
Source: Elaborated by the authors.

According to Januzzi et al. (2015), panel data are observations of n entities for two or more time periods, combining time series characteristics with cross-sectional data. The GMM-Sys approach was developed by Arellano and Bover (1999) and Blundell and Bond (1998) with the aim of improving the efficiency of the GMM model in differences.

With GMM, complete knowledge of data distribution is not necessary. Only specific moments derived from an underlying model are needed for the estimate. According to Hall (1993), GMM offers a convenient method of estimation in certain models that were computationally difficult to estimate by more traditional methods. Hall (1993) further explains that the GMM aims to decrease the sample's endogeneity, as it has a more efficient estimator structure. In this case, it ends up relaxing the condition of homoscedasticity, as it has a more robust assumption.

The GMM-Sys was chosen, as this estimator is able to overcome problems arising from the persistent effects of time series, in addition to accepting available instruments and allowing more accurate estimates. We also employed the dynamic model, where the lagged dependent variable is used as an explanation. Based on the model by Zivot and Wang (2006), Equation (1) is presented below.

$$IGC_{it} = \alpha_i + ECG_{it}\gamma + C_{it}\theta + \sum_i^n EFset_i + \sum_t^n EFtemp_t + \varepsilon_{it} \quad (1)$$

The econometric model was applied using unbalanced panel data by GMM-Sys (Systemic Generalized Method of Models), where $IGC_{it}$ is the dependent variable, representing the participation of companies in the Corporate Governance Index, α is the intercept, γ and θ are the coefficients of the variables, $ECG_{it}$ is the main independent variable represented by the control structure belonging to the government, $C_{it}$ represents the control variables, $EFset_i$ represents the fixed sectoral effects, $EFtemp_t$ the time fixed effects, i represents the companies, t indicates the time and $\varepsilon_t$ shows a random error term. The variables can be seen in Appendix A.

The following tests were applied to the results: (i) correlation, which verifies whether the variables are highly related and, if so, analyzes which variable is less significant to be removed from the model; (ii) Sargan's overidentification; (iii) Chi-square test ( $\chi^2$ ); (iv) Serial autocorrelation by Arellano and Bond (1991); and, (v) multicollinearity test (VIF - Variance Inflation Factor). The variables were corrected according to the IGP-DI, converted into dollars and winsorized at 1%.

## 4 Analysis of results

To present the results of the study, the following section is divided into two parts: (i) correlation and descriptive statistics; and (ii) analysis of the influence of the government control structure.

### 4.1 Correlation and descriptive statistics

Before performing the regression analysis, this subsection presents the characterization of companies through descriptive statistics. According to Table 1, the governance index obtained through the ratio was, on average, 42% (41% median), that is, of the 12 variables, companies meet less than half of the listed governance requirements. In terms of factorial, no variable with a community less than 0.50 was identified (Hair et al., 2006), so they were all maintained in the model, contributing to the creation of the new variable.

**Table 1:**
**Descriptive statistics**

| | Mean | Median | Variance | Min. | Max. | ED | Asymmetry | Kurtosis |
|---|---|---|---|---|---|---|---|---|
| IGC R | 0.42 | 0.41 | 0.03 | 0.00 | 0.91 | 0.18 | -0.07 | 2.34 |
| IGC F | 0.00 | 0.08 | 0.90 | -1.66 | 1.58 | 0.95 | -0.09 | 1.94 |
| ECG | 0.07 | 0.00 | 0.04 | 0.00 | 0.99 | 0.20 | 3.27 | 13.42 |
| N. Dir. | 6.55 | 6.00 | 7.84 | 0.00 | 19.00 | 2.80 | 0.51 | 3.44 |
| Age Exec. | 51.38 | 50.50 | 77.48 | 0.00 | 86.00 | 8.80 | -0.45 | 9.64 |
| Equity* | 1.14 | 0.41 | $6.11x10^6$ | -4.18 | 23.10 | 2.47 | 4.54 | 28.57 |
| CAPEX* | 0.20 | 0.03 | $2.87x10^5$ | 0.00 | 4.06 | 0.53 | 1.97 | 29.94 |
| Revenue* | 1.73 | 0.45 | $1.68x10^7$ | 0.00 | 45.40 | 4.10 | 5.58 | 43.75 |
| Assets* | 3.06 | 0.98 | $3.51x10^7$ | 0.00 | 45.10 | 5.92 | 3.71 | 18.89 |
| Liquidity | 0.12 | 0.00 | 0.14 | 0.00 | 4.26 | 0.37 | 5.93 | 49.26 |
| Dividend* | 0.09 | 0.01 | $9.46x10^4$ | 0.13 | 4.54 | 0.31 | 8.35 | 89.48 |
| ROA | 0.03 | 0.02 | 5.88 | -6.61 | 76.91 | 2.42 | 29.74 | 942.54 |
| Leverage | 2.61 | 1.36 | 1908.52 | -749.17 | 992.25 | 43.68 | 7.21 | 365.47 |
| Ind. Dir. | 0.20 | 0.15 | 0.04 | 0.01 | 1.01 | 0.22 | 0.98 | 3.27 |

* In Billion.
Source: Elaborated by the authors

The Kaiser-Meyer-Olkin test (KMO) showed a value of 0.60 and the Cronbach's alpha showed a value of 0.61, which are considered adequate, according to Hair et al. (2006). For this variable, the mean was 0, with

a median of 8%. The firms that comprised the sample had an average total asset of US $ 3 billion; net worth of $ 1.1 billion and net income of $ 1.7 billion. As for leverage, short and long-term obligations exceed 161% of shareholders' equity, showing that companies are considerably indebted. In the case of ECG, the companies presented, on average, 7% of government control structure.

In addition, capital expenditures (CAPEX) are approximately US $ 200 million. The dividends had an average value of US $ 90 million. In terms of liquidity, the companies' cash represents 12% of total liquidity assets. ROA (Return on Assets) presented an average of 0.03, that is, the average capacity of companies to generate profit from their assets was 3%.

As for the governance variables, we found that about 20% of the directors of the companies are independent. In terms of the executives' age, they are, on average, 51 years old, and as for the average size of the board of directors, the companies have between 6 and 7 directors. Finally, in relation to the control structure, the companies have around 7% of common shares belonging to the government.

Table 1 also presents the data value according to the 50th percentile (median), variance, minimum and maximum values, standard deviation, asymmetry and kurtosis. It should also be considered that the median (p. 50) and the average present large disparities, especially when considering the accounting and size variables, indicating the need to apply the neperian logarithm to the CAPEX, dividends, ROA, ROE, Leverage, Leverage2 and Liquidity, in addition to winsorizing variables.

After descriptive statistics, we observed correlations in the data, shown in Table 2 (APPENDIX B). According to Zou, Tuncali and Silverman (2003), the objective of correlation analysis is to measure and interpret the strength of a linear or non-linear relationship (for example, exponential, polynomial and logistic) between two continuous variables. Values above 0.7 indicate a strong correlation and the need to exclude one of the variables.

From the analysis of the correlation data, the variables of equity and total assets were excluded because they are correlated with revenue. The Governance Index (IGC) and the factorial were also highly correlated, but were used in different regressions. Due to the fact that many variables used to compose the Governance Index (IGC) are correlated as a model control, the Variance Inflation Factor (VIF) test was applied. The VIF result must be less than 5.00. The average of the coefficients was 1.65 and no variable had an average greater than 5.00, thus attesting to the absence of multicollinearity.

### 4.2 Analysis of the influence of the state control structure on corporate governance

The results of the regressions are presented below. Six models were run to verify the robustness of the results - IGC by the Ratio (R) and by the factorial (F) with the variations for decreasing (<) and increasing (>) governmental structure - where each considers the presence of fixed and temporal effects. The applied tests are shown in Table 3.

**Table 3:**
**Tests to verify the model**

| Test | IGC R | IGC R < | IGC R> | IGC F | IGC F< | IGC F> |
|---|---|---|---|---|---|---|
| chi2 | 296.00 *** | 64.68 *** | 280.91 *** | 804.46 *** | 49.10 *** | 397.48 *** |
| chi2p | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Sargan | 9.66 | 23.03 | 31.06 | 49.62 | 5.91 | 8.49 |
| Sarganp | 0.56 | 0.02 | 0.20 | 0.12 | 0.88 | 0.13 |
| ar1 | -2.90 *** | -2.80 *** | -0.80 | -4.75 *** | -2.10 ** | -0.84 |
| ar1p | 0.00 | 0.01 | 0.30 | 0.00 | 0.04 | 0.40 |
| ar2 | -0.10 | 0.18 | -0.54 | -0.60 | 0.01 | 0.31 |
| ar2p | 0.92 | 0.86 | 0.59 | 0.55 | 0.99 | 0.76 |

Note: Chi2 = chi-square test; Sargan = Sargan test; Ar1 and Ar2 = Arellano and Bond test for order 1 and 2 serial correlations; p = p-value.
Source: Elaborated by the authors.

The chi-square test indicated the rejection of the null hypothesis, that is, there was an association between the variables used in the model. The Sargan overidentification test showed that the null hypothesis was not rejected, indicating that the instruments are apparently not correlated with the regression error term. Almost all models (with the exception of IGC F>) presented order 1 serial autocorrelation by the Arellano and Bond test (AR1 and AR2), justifying the use of the GMM-Sys and the dynamic model. The results of the regressions are presented below.

As can be seen in Table 4 (APPENDIX C), the dynamic variable was significant at the 1% level in the IGC R, IGC R> and IGC F models, indicating that the governance index in a previous period is positively correlated with the governance index in the next period for these regressions. In the case of government, an increase of 1 percentage point in the government control structure decreased the corporate governance level

by around 0.23 (ratio - R) and 0.53 (factorial - F) percentage points, at a significance level of 5% and 1%, respectively. Confirming the results, for companies that reduced the government structure, this effect was positive by 0.17 (ratio - R) and 0.21 (factorial - F) percentage points, at the significance level of 5% and 1%, respectively. For the companies that increased the government structure, the result was negative, but not significant for either analysis. This pattern of government participation in publicly held companies had already been reported by Borisova et al. (2012), Bernier (2014) and Florio (2013), who pointed out that state participation is generally detrimental, since maximizing company value is not always the government's goal.

In the case of governance control variables, the impact of the number of directors was positive and significant at 5% and 1% for the ratio (R) and factorial (F) models, respectively, where a 1 percentage point increase in the number of directors increased the corporate governance of companies by around 0.26 and 0.75 percentage points. This positive and significant relationship was not expected, but there are some plausible explanations. According to Martín and Herrero (2018), companies with complex operational and financial structures need a greater number of directors in order to provide guidance to companies without impairing the ability to communicate among their members (Lehn, Sukesh & Zhao, 2008). In addition, a larger board of directors can increase corporate governance and even performance as a result of increasing the company's ability to establish external connections with the environment, securing resources and bringing in more exceptionally qualified boards (Dalton, Daily, Johnson & Ellstrand, 1999). For the variables related to the increase and decrease in the government control structure, this relationship was negative and significant (with the exception of the IGC R < regression), ranging from -0.12 to -1.28 percentage points and corroborating with the study of Gurusamy (2017).

The duality variable was negative and significant at 1% and 10% in almost all analyses (with the exception of the IGC R regression), indicating that when the chief executive is also chairman of the board, there is a decrease in corporate governance from 0.18 to 0.84 percentage points. This result is in agreement with Vintila and Duca (2013), who indicate that this form of entrenchment affects the deliberations of the boards, since the executive can induce decision-making aiming at his own benefits, harming corporate governance.

For regressions related to the decrease in government control, the presence of independent directors was positive and significant at the level of 10% and 5%, indicating an influence of 0.17 (R) and 0.90 (F) percentage points in the governance of companies. For regressions related to increased government control, this result was negative and significant at 10% and 1%, with an influence of -0.21 (R) and -3.09 (F) percentage points on governance. However, for the main regressions this variable was not significant, which is in line with Klein (2002), where the existence of independent directors in companies to reduce government dependence causes a greater structuration in terms of governance. The average age of the executive was not significant in any analysis.

In the case of other control variables, revenue was significant only in the IGC F < and > regressions, with controversial results. For the first, it was positive and significant at 10%, where a 1 percentage point increase in size increased governance by 0.22 percentage points, which is in agreement with the study by Clements, Neill and Wertheim (2015). For the second, it was negative and significant at 10%, where a 1 percentage point increase in size decreased governance by 0.15 percentage points, in line with Herciu and Serban (2016). These results can be explained by the fact that companies with less governmental structure are more structured in terms of governance, which does not occur in the second case, because, even though they are larger, these organizations with greater governmental interference end up with less governance efforts. For CAPEX, the result was similar, being positive for the IGC F < regression, following the studies of Harford, Mansi and Maxwell (2008) and Cooper, Gulen and Schill (2008); and negative for the IGC F > regression, following Fama and French (1999). This could be because a reduction in government structure may allow companies to organize their spending on capital investments better, in line with the precepts of governance.

The other variables were significant at 1% in the regressions related to the increase in government structure (with the exception of Leverage, which was not significant for IGC R > and was significant at 5% for IGC F >). A 1 percentage point increase in liquidity increased corporate governance by 0.30 and 2.61 percentage points, in line with Cheung, Chung and Fung (2014). This may be because companies that hold more cash tend to present better governance practices. This result could be associated with existing agency conflicts in Brazilian companies: high levels of agency conflict could lead company directors to accumulate cash reserves. Thus, "holding more cash" might be a protectionist measure that could alleviate these conflicts (Harford, Mansi & Maxwell, 2008). In addition, as Rodrigues (2015) states, companies can increase the retention of resources when there are opportunities and realizations of new investments and, thus, the retention can serve to achieve the goals of the company's shareholders, since the existence of available resources allows the company to take advantage of profitable investment opportunities that may arise.

For dividends, a 1 percentage point increase led to a governance increase by 0.11 and 1.39 percentage points, in line with Setia-Atmaja, Tanewski and Skully (2009) and Zagonel, Terra and Pasuch (2018). The latter associated the dividend policy with an environment in which agency conflicts are under control, claiming that companies that pay more dividends tend to belong to special corporate governance

segments of the stock exchange (which voluntarily adopt best practices with their external shareholders, thereby reducing agency problems).

For leverage, an increase of 1 percentage point led to a governance increase by 0.13 percentage points, following the study of Thomson and Conyon (2012). The positive effect of leverage on governance can be explained in two ways: from the perspective of free cash flow (shareholder cash flow) and from the perspective of better monitoring. From the perspective of free cash flow, greater leverage can help to reduce the amount of free cash flow available to managers (Jensen, 1986). This reduces the risk of inconsistent measures taken by managers: by reducing the amount of free cash flow, debt can prevent managers from investing in negative NPV projects, thereby increasing the company's performance (Jensen, 1986).

From the perspective of better monitoring, debt can reduce agency conflict through credit monitoring (especially by banks). By monitoring and controlling managerial behavior, creditors can reduce managers' self-interest behavior and thus, with better monitoring, there are gains in terms of corporate governance (Thomson & Conyon, 2012). Finally, ROA had a negative influence of 1.08 and 6.62 percentage points. This result, indicating that more profitable companies that increase their governmental structure present reduced governance, contradicts the findings of Valenti, Luce and Mayfield (2011).

## 5 Conclusions

As pointed out by several authors (Ferreira, 2012; Boycko et al., 1994; Nellis, 1994; Brada, 1996; Shleifer, 1998), the presence of the state as a regulatory entity in companies imposes challenges from the point of view of corporate governance: certain consequences are foreseen, such as agency problems, conflicts between public and private agents and politically-based elections, among others.

It is too early to say where corporate governance practices will take Brazil after scandals involving state-owned companies. However, we can conjecture recent peculiarities and certain determinants. Based on the effects of state ownership, this study's main objective was to identify the impact of the state control structure on the corporate governance of Brazilian publicly traded companies. To this end, some criteria were considered. Two governance indexes were created (through ratio and factorial techniques) from the existing literature related to best corporate governance practices and publicly traded Brazilian companies that have a state control structure were surveyed to identify and analyze companies that decreased and increased state participation over time.

The government control structure can be said to harm governance. This result does not reject the H1 hypothesis of the study. The lower quality of corporate governance linked to state-owned companies may be related to a lower need (or preference) for monitoring, as it may also be the result of the state's influence in the search for benefits other than profit maximization (Jiang & Wang, 2017; Boycko et al., 1994). Thus, government ownership, while often similar to institutional ownership, appears to produce few benefits for governance.

This result is in line with Borisova et al. (2012), who analyzed the effect of government participation in European Union countries, pointing out that state participation is generally harmful, since maximizing the value of companies is not always the government's goal. In this same context, Bernier (2014) and Florio (2013), reported that the government ownership structure may negatively influence companies when political decisions and objectives pursued are not in line with best governance practices. In addition, a high percentage of government control may lead to conflicts of interest between majority and minority shareholders, and the agency theory suggests that the government's control structure undermines corporate governance due to attempts to intervene in administrative practices, when trying to restrict access to information for other shareholders (Al-Janadi, Rahman & Alazzani, 2016).

In addition, according to Liu, Saidi and Bazaz (2014), state-owned companies, because they have less engagement, are more susceptible to accounting manipulations, negatively affecting companies' financial reports. The government also tends to interfere in the selection of directors, affecting their independence in making the right decisions. Government control also imposes its power on companies and their board of directors, which may affect the size and role of the board and the provision of quality reports.

When governance variables were analyzed, positive and significant relationships were found for the number of directors (in general regressions) and for the presence of independent directors (in regressions with reduced government control) and negative and significant relationships were found for duality, number of directors (for regressions with decrease and increase in government control) and the presence of independent directors (in regressions related to increased government control). In the case of the other control variables, size was positive for the reduction of the government structure and negative for the companies with increased government control in the factorial regressions. For CAPEX, the result was similar. Liquidity, dividends and Leverage (only for factorial regressions) were positive and significant for companies that increased the government structure and ROA showed a negative relationship for these same regressions.

In general, the results contribute to the understanding of the governance role played by government actors. This subject, which has been insufficiently debated in Brazil, is likely to gain more importance, as a consequence of financial crises, such as that of 2008, and in view of the aforementioned scandals involving state-owned companies.

Limitations of this study include the relatively short period of analysis and the fact that the variables composing the indices were obtained through secondary data, which can generate problems in the results. For future studies, it would be relevant to verify aspects of governance in a period before and after the scandals involving state-owned companies, as well as, analyzing the effect of political crises in the country, such as those related to corruption and impeachment, among others.

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**APPENDIX A - Variables: main formulations**

| **Dependent Variable** | | | |
|---|---|---|---|
| **Variable** | **Formula** | **Authors** | |
| IGC – Corporate Governance Index | R - Ratio (percentage) reached by the company in relation to the maximum IGC score.<br>F - Output of the Confirmatory Factor Analysis. | Assunção, De Luca and Vasconcelos (2017) | |
| **Main Independent Variables** | | | |
| **Variable** | **Formula/Description** | **Authors** | **Signal** |
| ECG - State-owned control structure | $\frac{\%\ stated - owned\ common\ shares}{100}$ | Ben-Hassoun, Aloui and Ben-Nasr (2018); Abramov et al. (2017) | - |
| Less ECG (<) | For companies that reduce government control, 1 is assigned from the year on this structure decreases and 0 is assigned for previous periods. | Ben-Hassoun, Aloui and Ben-Nasr (2018). | + |
| More ECG (>) | For companies that increase government control, 1 is assigned from the year on this structure increases and 0 is assigned for previous periods. | Ben-Hassoun, Aloui and Ben-Nasr (2018). | - |
| **Control Variables** | | | |
| CAPEX – Capital investment expenditures | $\frac{Capital\ expenditures}{Total\ Assets}$ | Harford, Mansi and Maxwell (2008); Cooper, Gulen and Schill (2008) | - |
| | | Fama e French (1999) | + |
| Div. – Dividends | $\frac{Dividends\ paid}{Net\ Profit}$ | Setia-Atmaja, Tanewski and Skully (2009) | + |
| ROA – Return on Assets | $\frac{Operational\ Result}{Total\ Assets}$ | Valenti, Luce and Mayfield (2011) | + |

| | | | |
|---|---|---|---|
| AL – Leverage | $\frac{Short\ and\ long\ term\ debt}{Equity}$ | Thomson and Conyon (2012) | + |
| | | Correa, Basso and Nakamura (2013) | - |
| Tamanho:<br>AT – Total Assets<br>R – Net Revenue<br>PL – Equity | - Logarithm of total assets.<br>- Logarithm of Net Revenue.<br>- Logarithm of Equity. | Clements, Neill and Wertheim (2015) | - |
| | | Herciu and Serban (2016) | + |
| Liq - Liquidity | $\frac{Cash\ and\ equivalents}{Total\ Assets}$ | Cheung, Chung and Fung (2014) | + |
| IME – Average age of the executives | Logarithm of average age of the executives | Elsaid and Ursel (2012) | + |
| NC – Number of directors | Logarithm of total number of directors | Gurusamy (2017) | - |
| CI – Independent directors | $\frac{Number\ of\ \|Independent\ directors}{Total\ number\ of\ directors}$ | Klein (2002) | + |
| Duality | Dummy: 1 if the CEO is also the chairman of the board; 0, otherwise. | Vintila and Duca (2013) | - |

Source: Elaborated by the authors.

**APPENDIX B**
**Table 2:**
**Correlation Analysis**

| | IGC R | IGC F | ECG | NE | Dual | IME | PL | CAPEX | Rec. | AT | Liq | Div | ROA | AL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IGC F | **0.94** | | | | | | | | | | | | | |
| ECG | 0.10 | 0.06 | | | | | | | | | | | | |
| NC | 0.47 | 0.45 | 0.25 | | | | | | | | | | | |
| Dual | -0.46 | -0.44 | -0.11 | -0.33 | | | | | | | | | | |
| IME | -0.37 | -0.34 | 0.07 | -0.12 | 0.29 | | | | | | | | | |
| PL | 0.26 | 0.20 | 0.05 | 0.40 | -0.12 | -0.03 | | | | | | | | |
| CAPEX | 0.20 | 0.15 | 0.01 | 0.31 | -0.14 | -0.04 | 0.66 | | | | | | | |
| R | 0.21 | 0.16 | 0.08 | 0.31 | -0.03 | -0.07 | **0.73** | 0.58 | | | | | | |
| AT | 0.25 | 0.19 | 0.05 | 0.43 | -0.13 | -0.08 | **0.87** | 0.68 | **0.85** | | | | | |
| Liq | 0.33 | 0.31 | -0.03 | 0.26 | -0.07 | -0.09 | 0.25 | 0.27 | 0.22 | 0.28 | | | | |
| Div | 0.20 | 0.15 | 0.00 | 0.29 | -0.12 | -0.07 | 0.68 | 0.42 | 0.41 | 0.53 | 0.29 | | | |
| ROA | 0.11 | 0.12 | -0.01 | 0.11 | -0.06 | -0.03 | 0.00 | -0.29 | 0.00 | 0.00 | 0.00 | 0.01 | | |
| AL | 0.02 | 0.00 | 0.06 | 0.02 | 0.02 | 0.01 | -0.01 | 0.01 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | |
| CI | 0.56 | 0.56 | -0.08 | 0.26 | -0.13 | -0.26 | 0.07 | -0.01 | 0.04 | 0.06 | 0.21 | 0.00 | 0.02 | -0.02 |

Source: Elaborated by the authors.

**APPENDIX C**
**Table 4:**
**Influence of state-owned structure on governance**

| Variable | IGC R | | IGC R< | | IGC R> | | IGC F | | IGC F< | | IGC F> | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| IGC (-1) | **0.75** | *** | 0.20 | | **1.06** | *** | **0.66** | *** | -0.08 | | 0.15 | |
| ECG | **-0.23** | ** | **0.17** | ** | -0.01 | | **-0.56** | *** | **0.21** | *** | -0.32 | |
| Number of directors | **0.26** | ** | 0.08 | | **-0.12** | *** | **0.75** | *** | **-0.65** | * | **-1.28** | *** |
| Duality | -0.06 | | **-0.18** | *** | **-0.18** | *** | **-0.29** | * | **-0.76** | * | **-0.84** | *** |
| Age of executives | 0.27 | | -0.05 | | 0.22 | | 0.29 | | 0.61 | | -1.24 | |
| Size | 0.02 | | 0.00 | | 0.01 | | 0.02 | | **0.22** | * | **-0.15** | * |
| CAPEX | -0.06 | | 0.02 | | -0.04 | | -0.04 | | **0.30** | ** | **-0.83** | *** |
| Liquidity | -0.08 | | -0.28 | | **0.30** | *** | -0.21 | | 0.29 | | **2.61** | *** |
| Dividends | -0.05 | | 0.02 | | **0.11** | *** | -0.01 | | 0.15 | | **1.39** | *** |
| ROA | -0.22 | | -0.33 | | **-1.08** | *** | -0.47 | | -0.58 | | **-6.62** | *** |
| Leverage | 0.00 | | 0.00 | | -0.01 | | 0.03 | | 0.05 | | **0.13** | ** |
| Indep. Directors | 0.15 | | **0.17** | * | **-0.21** | * | 0.36 | | **0.90** | ** | **-3.09** | *** |
| Constant | 0.00 | | 0.46 | | -0.75 | | 0.00 | | **-4.36** | * | 0.00 | |
| Temp. FE | Yes | | Yes | | Yes | | Yes | | Yes | | Yes | |
| Set. FE | No | | No | | No | | No | | No | | No | |

*** = 1% of Significance; ** = 5% of significance; * = 10% of significance.
Source: Elaborated by the authors.

## NOTES

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Does not apply.

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**DATASET**
The dataset that supports the results of this study is not publicly available.

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