CEO compensation in Brazilian public companies: does the Government matter?

Martha Regina Meira Bianchi[†, a]
F. Henrique Castro[‡, b]

[a]Escola Paulista de Política, Economia e Negócios, UNIFESP EPPEN
[b]Escola de Economia de São Paulo, FGV EESP

Abstract: The role of the State in the economy is a recurrent debate, especially in Brazil, where state intervention in publicly traded companies is linked to controlling inefficiencies in business activities. This study examines how government ownership influences CEO compensation in Brazilian companies. Analyzing data from 1,495 firm-year observations between 2010 and 2019, we found that government ownership is negatively associated with CEO compensation, potentially due to social and media pressure or non-monetary benefits, such as political visibility when the government is a shareholder. Financial crises impact this relationship differently based on ownership type: direct government ownership intensifies the negative effect on executive compensation, while indirect ownership has a positive and significant relationship. Political crises negatively affect CEO compensation only when the government holds indirect or total shares. These findings contribute to discussing managerial incentives when the government is a shareholder.

Keywords: Corporate Governance; Government ownership, State-owned enterprises
JEL codes: E3, C41, C43.

1. Introduction

There is no consensus in the recent literature about the government's interference in the capital market that fits all the different markets or economic situations. Even in developed markets, where State interference would be seen as a threat to economic liberalism, it is possible that shareholders benefit from the State presence in the financial crisis, regarding the cost of debt (Borisova et al., 2015) or market value (Beuselinck et al., 2017). Even the CEO compensation and corporate governance mechanisms are affected by the State presence in public companies (Borisova et al., 2019; Pargendler, 2011; Borisova et al., 2012). There are few studies that examine government ownership in publicly traded companies in Brazil related to corporate governance structure, firm performance or CEO compensation. Nevertheless, this is a current subject due to

[†]martha.bianchi@unifesp.br
[‡]henrique.castro@fgv.br

corruption problems surrounding government influence and/or its participation as owner.

To fill this gap and better understand the State's influence on firms and capital market, we propose to discuss the effects of government ownership of publicly traded companies in the Brazilian institutional and economic context. This study intends to investigate if the Brazilian Government ownership on publicly traded companies in Brazil affects CEO compensation. There are two main hypothesis: corporate governance could be weaker in the presence of government ownership, allowing managers to increase their own salaries. On the other hand, public firms' CEOs whose one of the shareholders is the Brazilian government may accept lower compensation in return of non-pecuniary benefits, or due to media pressure limiting compensation.

This paper is structured as follows. Section 2 presents a literature review about CEO compensation and government influence. Section 3 brings the research question and hypothesis development. Methodology and main results are presented in section 4 and 5. Section 6 concludes with a discussion of the results, contributions, and limitations.

2. Literature Review

Asymmetric information is a market failure relevant to the capital market, especially when there is separation of ownership and control, as in publicly traded companies. The conflicts between shareholders and managers are the typical agency problems introduced by Jensen and Meckling (1976, p. 308), when there is dispersed ownership: "(i)f both parties to the relationship are utility maximizers there is good reason to believe that the agent will not always act in the best interests of the principal".

Since the manager has more information than the owners, the shareholders appeal to the monitoring expenditures in order to ensure that the manager's actions are on their behalf. The manager also resorts to bonding expenditures to guarantee that he will not take certain actions that would harm the owners (and his job). These two costs, *bonding* and *monitoring*, plus the *residual loss* (monetary equivalent loss of welfare) are the agency costs inherent due to this relationship (Jensen and Meckling, 1976).

Several corporate governance mechanisms may mitigate this agency problem. Executive compensation is one of these recognized mechanisms for aligning managerial interests to investors, once there should be a link between compensation and firm performance (Becht et al., 2003). However, there is a different approach that points out executive compensation as an *agency problem itself*: some features of this compensation could reflect managerial

rent-seeking rather than efficient incentives. (Bebchuk and Fried, 2003) mention that to the extent that executive compensation moves away from optimal contracting, the more powerful is the CEO. The CEO's pay could be higher or less sensitive to performance in firms in which managers have relatively more power.

In fact, Bebchuk et al. (2011) offer a new proxy to measure CEO power a the fraction of the aggregate compensation of the firm's top-five executive team captured by the CEO: the CEO pay slice. They argue that the higher the CEO pay slice is, the higher should be the CEO's managerial power. They find a statistical association between higher CEO pay slices and lower firm value, accounting profitability, quality of acquisition decisions, CEO turnover and higher odds of opportunistically timed option grants to the CEO. These findings justify the managerial power hypothesis and the perception the compensation arrangement is far away from optimal contracting.

Therefore, there are two distinct alternatives with theoretical explanations this issue: CEO compensation as a corporate governance mechanism and CEO compensation as a managerial power expression and hence an agency problem.

However, Bugeja et al. (2017) analyze a sample of 9948 U.S. listed firm-year observations and do not find evidence that supports managerial power's approach based on CEO pay slices and excessive compensation. This result suggests CEO compensation is consistent with an efficient contracting explanation. Murphy (2012), on the other hand, says these two approaches are not mutually exclusive. He argues that political factors and government influence through disclosure requirements, tax policies, accounting rules, legislation, and the general political climate also have a substantial impact on compensation policy.

In his article, Murphy (2012) conducts a remarkable historical survey about the changes in US legislation that has influenced executive compensation since the Great Depression. He also offers a new approach to the influence of executive compensation: government intervention. He explains that the government can influence through the legislative process and it can distort the compensation arrangement, as seen in the stock option explosion[1].

However, the main focus concentrates on government indirect intervention in the form of securities laws, accounting rules, tax policies and other mechanisms that can influence CEO pay. Borisova et al. (2019), on the other hand, study the direct impact of government intervention: their research compares

[1] Murphy (2012) cites executive and director's preferences in the 1990s but also highlights change in tax accounting rules and disclosure as responsible for large quantities of stock options being granted to executives.

the level of CEO compensation and its structure in private and privatized firms.

Using a sample of 677 EU firms from 2003 to 2008, Borisova et al. (2019) compare CEO compensation in publicly traded firms that have never been under government control (referred to as *de novo* private firms) and privatized firms, including those still partially owned by governments. They argue that even if government relinquishes ownership in privatized firms, there is still the government's influence on those firms. The authors show that CEOs of privatized firms have lower total pay compared to those of *de novo* private firms. They also found the larger is the government ownership in privatized firms, the lower the total compensation.

These findings are consistent with political and media pressure limiting compensation in privatized firms. In their sample, privatized firms also have lower equity pay components of compensation, suggesting government-owned companies are less risk-taking than *de novo* private firms.

However, in an environment in which the government still controls most resources and has a significant influence on the economy, such as China, even the compensation of private firms could be affected by it. Wu et al. (2018) find that the presence of politically connected CEOs is positively related to CEO compensation and even firm performance. In countries with weak institutions and low shareholder protection, state involvement can be vital to the success of the company.

In Brazil, mandatory disclosure about CEO compensation is relatively new. Brazil's Security and Exchange Commission - CVM - imposed the mandatory executive compensation disclosure through 480 Instruction (Comissão de Valores Mobiliários, 2009). All the public Brazilian companies were supposed to provide details about compensation of the Executive Board and the Board of Directors from the 2010 Reference Form.

However, as Schiehll et al. (2013) and Barros et al. (2015) relate, the association of Brazilian publicly traded companies - Abrasca - and the Brazilian Institute of Financial Executives - IBEF - contested this mandatory disclosure, specially about the exposure of minimum, maximum, and average individual compensation. They alleged risks to executive' security due to higher crime rates in Brazil.

Although Barros et al. (2015) argue that it is possible that agency conflicts rather than safety issues motivate this attitude against mandatory disclosure, this issue was the subject of a judicial battle until 2018. Several Brazilian public companies had obtained an injunction from the court in 2010 that allowed them to not disclose all details about executive and board compensation. In 2018, the Brazilian Federal Regional court decided to granted CVM and overturn

the injunction (Schincariol, 2018). On June 13, 2018, the CVM communicated by letter to all the firms protected by the injunction that they must provide compensation data for the last three fiscal years (since 2015) until June 26, 2018 (Comissão de Valores Mobiliários, 2018).

Now, the mandatory disclosure about compensation in Brazil enables new research, including studies about the Brazilian government influence on executive compensation in publicly traded companies. Even when the executive and board compensation in Brazil was not full disclosed, there was previous notable research that approaches this issue, such as Schiehll et al. (2013); Krauter and Sousa (2013); Barros et al. (2015); Ermel and Do Monte (2018).

3. Research question

Borisova et al. (2019) argue that the government can directly affect the level of compensation among public firms through voting power or its significant influence. This can happen due to differences in corporate governance, managerial power, risk taking, nonpecuniary benefits, or media pressure.

From the corporate governance perspective, Jiraporn et al. (2005) found empirical evidence that CEO pay is inversely related to the strength of shareholder rights: when corporate governance mechanisms are weak, the CEO can extract more rents from shareholders. This result is linked to managerial power: in their words, " CEOs enjoy higher levels of compensation when shareholder fights are restricted by corporate governance that tilts the balance of power more in favor of management" (Jiraporn et al., 2005, p. 243).

Borisova et al. (2012) argue that corporate governance is weaker in the presence of government ownership. So, it is reasonable to suggest that firms with government ownership could pay more to the CEO due to weak corporate governance mechanisms, based on evidence from Borisova et al. (2012) and Jiraporn et al. (2005).

However, Borisova et al. (2019) relate that it is possible that CEOs of government-owned firms accept lower compensation in return for non-pecuniary benefits, such as job security and/or political benefits. Even social status is a valuable non-monetary symbol that can substitute for monetary compensation (Siming, 2016). Then, it is possible that CEOs from firms with government ownership have lower levels of compensation. In fact, Borisova et al. (2019) find that CEOs of privatized firms have lower total pay than those of private firms.

In addition to the level of executive pay, the type of compensation can vary

depending on the shareholder: from the agency theory perspective and efficient-contracting hypothesis, linking CEO compensation to firm performance could decrease agency costs and aligning interests between principals and agents (Holmstrom, 1979). Nonetheless, this type of compensation impacts the level of risk: the greater the equity-based pay, the more risk the CEO is willing to take.

Thus, the payoff from stock options or other equity-based pay is riskier than other compensation forms (e.g., restricted options and base salaries). This type of remuneration can indicate the risk level of the firm: when the compensation arrangement includes high stock options payoffs, one can expect the executive members will be more audacious to achieve their goals (e.g., choosing more risky projects) and receive higher compensation from shareholders.

It's important to recognize the government influence on executive pay brings a new dimension to the analysis of CEO compensation, since the government's interests differ from other shareholders (Murphy, 2012). Boubakri et al. (2013) assert that the government's objectives as maximizing employment and wages to ensure re-election and maintain political tenure in power are not necessarily in line with profit or value maximization. In their research, they find empirical evidence that state ownership is negatively related to corporate risk-taking.

Furthermore, Borisova et al. (2019) cite media and political pressure as possible explanations to lower salaries in government-owned firms. Public pay disclosure encourages revolts about CEO pay, and it is highly influenced by the media, labor unions, and political forces operating inside and outside companies (Murphy, 2012).

Thus, according to the theoretical and empirical evidence, the research question on this study is to investigate whether government ownership can induce differences in the compensation level amidst Brazilian publicly traded companies. Related to this main question, we consider whether different types of government ownership (direct and indirect) and control can also affect the CEO's compensation level.

This research differs from other papers published about this subject because it intends to take the Brazilian scenario and all institutional, financial and political characteristics. Borisova et al. (2019)'s sample include several countries from the European Union, and their work does not include potential differences in compensation level during the financial crisis.

Despite the efforts and remarkable work of Anuatti Neto et al. (2003); Inoue et al. (2013); Bandeira-de Mello et al. (2011); Musacchio et al. (2015); Lazzarini and Musacchio (2018), there are few studies that address this issue

in Brazil. Furthermore, the implications of the world financial crisis of 2008-2009 are not the same for all the countries, especially in Brazil. While the world's GDP growth in 2009 was about −1,733%, in Brazil, the GDP growth was −0,126%. On the other hand, the Brazilian GDP dramatically declined in 2015 and 2016 (−3,55% and −3,468%, respectively), whereas the world GDP increased (2,856 and 2,513, respectively)[2]. These data reinforce the Brazilian scenario heterogeneity, and this research allows understanding more about government influence in Brazilian capital markets and its unique set.

Furthermore, it is important to stress that studying government participation in publicly traded companies suffer from potential selection bias. As Borisova et al. (2015) highlight, government ownership is not random; rather, it usually focuses on strategic acquisitions and national champions, and it is not unusual that State-Owned enterprises (SOEs) are the largest publicly traded companies in developing countries (Musacchio and Lazzarini, 2015).

This work also differentiates from others because the individual data about CEO compensation in Brazil have been available to all public companies since 2018. Other studies that used compensation data used only the total (for all the Executive Board) average compensation and data from firms that voluntarily disclosed and/or were not protected by the judicial injunction.

3.1 Hypotheses development

The research question is about CEO compensation and government ownership. Under the managerial power premise and some empirical evidence about weaker corporate governance in public companies with government ownership (Borisova et al., 2012; Shleifer, 1998), one can argue this expected result described below:

$H1_a$: CEO compensation is positively related to government ownership.

However, as Borisova et al. (2019) empirically verify, the compensation level can be lower because there is more social and media pressure, in addition to other non-pecuniary benefits, such as political visibility when the government is a shareholder. This lead us to the next hypothesis:

$H1_b$: CEO compensation is negatively related to government ownership.

In Brazil, following the findings of Borisova et al. (2019)'s work which found a negative and significant relationship between CEO compensation and

[2]The GDP growth data was retrieved from the World Bank, available at https://data.worldbank.org/.

government ownership in EU firms, it's expect that the empirical findings corroborate the hypothesis $\mathbf{H1_b}$. In Brazil, Ermel and Do Monte (2018) found empirical evidence that executive compensation is lower when the government is the controlling shareholder. In this research we intend to extend this analysis by verifying whether the government influences executive compensation even when the Brazilian government does not control the company, but participates in its shareholding structure, directly or indirectly.

In recent years, there has been a lot of media pressure on SOEs due to recent corruption scandals involving them. This also can corroborate the non-pecuniary benefits related to work in public companies partially owned by Brazilian government, such as prestige, lower turnover, and the possibility to work in other SOEs. This prestige hypothesis is in line with Focke et al. (2017)'s empirical findings that CEOs of prestigious firms earn less in American firms.

It is possible the type of government ownership can affect the CEO's compensation level. Then, hypotheses $\mathbf{H1_a}$ and $\mathbf{H1_b}$ also differ for direct and indirect government ownership. The effective control of Brazilian public companies was also taken into account: if the Brazilian government has 50% or more of the voting rights shares, it would be considered that the State has control.

Additionally, the interaction of Brazilian government ownership with financial crisis or political crisis was taken into account. As seen in Borisova et al. (2015); Beuselinck et al. (2017) and Boubakri et al. (2018), the government's influence in publicly traded companies can be beneficial during financial crises, mainly due to implicit guarantees against default. The main argument of this research is that financial crisis could negatively change the compensation level of the CEO during these years, but the presence of the government as a shareholder could neutralize it.

While fully private firms must adapt and reduce their production, the government can maintain the level of employment and production in times of economic downturn, and thus maintain the CEO's compensation. However, one can argue that the government presence could have a negative on CEO's salary impact due to the economic crisis: the scrutiny and bad publicity around the compensation of SOEs' CEOs can put pressure on salaries. This is consistent with hypothesis $\mathbf{H2_a}$ and $\mathbf{H2_b}$ respectively listed below:

$\mathbf{H2_a}$: CEOs' compensation is positively related to government ownership during financial crisis.

$\mathbf{H2_b}$:CEOs' compensation is negatively related to government ownership during financial crisis.

However, when the government itself is in a crisis with internal political instabilities, corruption scandals and the president' impeachment process, as seen in Brazil in 2016, it is possible that the CEOs' compensation level of firms with government ownership decreases. This could occur due to the media and society's pressure about reducing public spending. The research´s assumption is that CEOs' compensation level can be lower during political crisis for firms with government ownership, as described in hypothesis $\mathbf{H3_b}$:

$H3_b$:CEOs' compensation is negatively related to government ownership during political crisis.

4. Methodology

The sample consists of Brazilian publicly traded companies from 2010 to 2019, resulting in 1,495 firm-year observations. The financial variables were collected through Economatica. Data related to individual maximum, minimum and average compensation are released on the Reference Form and also available at software *COMDINHEIRO* which we used to collect this information.

The main dependent variable is CEO compensation, and it is calculated as the natural logarithm of total pay of CEO in local currency (R$, in thousands). The amount of the highest individual compensation informed in the Reference Form was used as a proxy to the CEO Compensation. CEO compensation is used in the regression as a lead variable because it might take some time to reflect the firm's characteristics, and usually relies on the past performance of the firm.

Table 1 summarizes all the government ownership variables. These variables are presented as a government ownership *quota* - %, a continuous measure of government ownership, similar to the study of Borisova et al. (2015). *Government ownership* is a binary variable assuming a value of one if the Brazilian government had any shares the firm during a specific calendar year and zero otherwise.

Table 1
Government ownership variables

Government ownership variables (%)	Description
dgo_on	direct government ownership through voting rights
igo_on	indirect government ownership through voting rights
tgo_on	total government ownership (both direct and indirect) through voting rights
dgo_pn	direct government ownership through non-voting shares
igo_pn	indirect government ownership through non-voting shares
tgo_pn	total government ownership (both direct and indirect) through non-voting shares
dgo_cf	direct government ownership through cash-flows rights
igo_cf	indirect government ownership through cash-flows rights
tgo_cf	total government ownership (both direct and indirect) through cash-flows rights
government ownership	dummy variable equal to 1 if the government had shares (directly or indirectly) of any kind of voting rights of a firm *i*, and 0 otherwise

We follow (Brey et al., 2014)'s work and classify government ownership as direct or indirect, albeit with some modifications. When the government has shares through the National Treasury, state agencies (municipal, state, and federal levels), public banks, government managed funds, development banks, and public holdings (e.g., BNDESPar or CaixaPar), it would be classified as direct government ownership (*dgo*) . When the pension funds of Brazilian SOEs or other Brazilian SOEs have shares from other companies, we consider this as indirect government ownership (*igo*).

Following the work of Borisova et al. (2015); Beuselinck et al. (2017) and Boubakri et al. (2018), we also investigated if the financial crisis affects the CEO level compensation when the government is a shareholder.

As seen in Borisova et al. (2015)'s research, financial crisis is a dummy variable that takes a value of one for the years 2008, 2009, and 2010 and zero otherwise. However, the world financial crisis affects countries in different ways, especially in Brazil. Thus, we employ the economic downturn as another proxy for financial crises, named *financial crisis*. This proxy follows the work of Lazzarini and Musacchio (2018): an economic downturn in a year t occurs when Brazil exhibits two years of positive GDP growth ($t-1$ and $t-2$) followed by two years of negative GDP growth (t and $t+1$). According to

the authors, private firms can downsize and adjust adjust to new economic conditions, while the government can use the SOEs to avoid layoffs and attenuate political costs. Thus, the *fin. crisis* variable is a dummy that takes a value of one for the 2015 year according to this methodology.

One can argue that use only the 2015 year to consider a financial crisis in Brazil is not appropriate, because the Brazilian economy was in recession from the 2^{nd} quarter of 2014 to 4^{th} quarter of 2016, according to The Brazilian Economic Cycle Dating Committee (CODACE, 2020). So we included the 2016 year as a financial crisis, as well as the 2015 year.

The hypothesis is that the government ownership also influences the CEO compensation during financial crisis: it could attenuate the possible reduction of the CEOs' salaries due to economic downturn, once the Government could maintain or increase the production of its controlled firms as a counter cyclical economic policy. Contrastingly, the effect could be the opposite: it can reduce the CEO's Compensation in companies with government ownership due to media and popular pressure on the state companies.

To understand the effect that government participation as a shareholder has in financial crisis' years, we created an interaction with the *financial crisis* variable and each government ownership variable.

It is possible firms with government influence can be affected by the political crisis in Brazil. In order to test this hypothesis, we used the Economic Policy Uncertainty (EPU) Index for Brazil as a proxy to political uncertainty, using the methodology proposed by (Baker et al., 2016).

The EPU is constructed through a search of 17 words in the Folha de São Paulo newspaper to create an index about policy uncertainty. Then the raw EPU counts were scaled by the number of all articles in the same newspaper and month. Several studies used this methodology as a proxy to measure the political concerns in Brazil, as seen in Barboza and Zilberman (2018); Formiga et al. (2019) and Schwarz and Dalmácio (2021). Once the EPU index data is monthly, we used the annual average of the index to match the data frequency of the other variables. To illustrate how the average of EPU index is similar to the monthly data, we present two graphics: the figure 1 shows the monthly EPU data and the figure 2 shows the annual average of the monthly EPU.

Figure 1
Brazilian EPU Index - monthly data

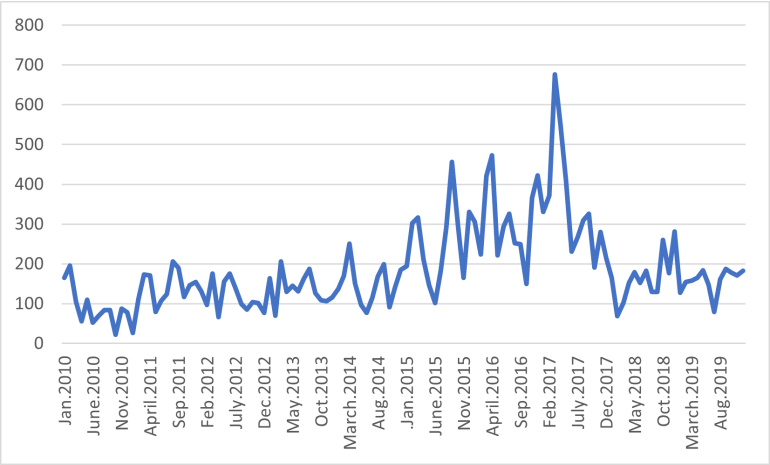
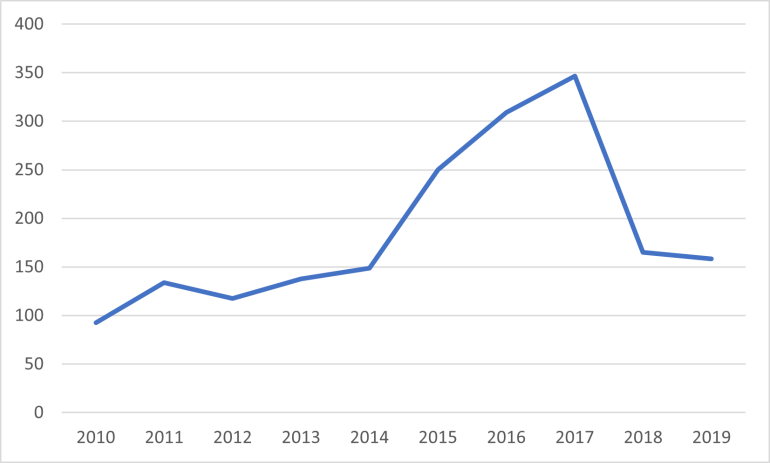


Figure 2
Brazilian EPU Index -annual data (average)



The higher the EPU, the greater the political uncertainty measured by this proxy. As we can see in both figures, the highest index of the Brazilian EPU is around the impeachment of the then president Dilma Rousseff, occurred in 2016, and a political scandal involving the world's biggest meat-packing company, family-run JBS and then president Michel Temer, as known as "Joesley Day" in 2017 (The Guardian, 2019).

Following the treatment as the financial crisis variable, we interact this dummy with the government ownership variable. If it remains significant, it could be argued the effect of government ownership on compensation level is affected by political instability. It is expected the coefficient of this interaction is negative.

Several control variables could be used to avoid the omitted variable problem and to link another firm characteristic with government ownership. The variables are presented in Table 2.

Table 2
Control variables

Variables	Description	References
Total assets	Natural logarithm of the book value of assets	Beuselinck et al. (2017); Zou and Adams (2008)
Leverage	Total of debt to total assets ratio	Shailer and Wang (2015); Nardi and Nakao (2009); Beuselinck et al. (2017)
Investment opportunities	Tobin's Q measure	Inoue et al. (2013)
Duality	Dummy variable, taking a value of one if the CEO is also the chairman of the Board of Directors	Wu et al. (2018); Borisova et al. (2019)
Δ Revenue	Ratio of Revenue_t to Revenue_{t-1}	Borisova et al. (2019)

We used the regression analysis to verify the relationship between the CEO compensation and the interest variables. The Ordinary Least Squares (OLS) estimation was used in the inference. However, the data structure has the form of panel data, i.e., repeated observation on the same cross-section of firms over time (Wooldridge, 2010).

Therefore, we also included the year and firm fixed effects to control for unobserved cross-section heterogeneity and employ firm-clustered robust standard errors[3].

However, Government ownership can suffer from selection bias: generally,

[3]For the matched sample, when we estimate the regression using fixed effects, the errors are clustered by the subclass made by the matching technique.

the government does not choose its investments at random, and it can focus on a specific sector or aim to achieve distinct objectives.

First, we conduct a mean comparison of the main variables concerning eventual differences between those two groups: firms with government in their ownership structure and firms without the Brazilian government as shareholder. All the government ownership was taken into account for this classification: all control types and both direct and indirect participation. Table 3 presents the results: the mean differences of total assets are statistically significant, whereas the t-test doesn't reject the null hypothesis that the Return on assets (ROA) and Leverage mean are the same between the two groups.

The dependent variable of econometric analysis - CEO compensation - indicates there are differences statistically significant between the firms with government ownership and firms without it. Other variables, as Enterprise value, and Tobin's Q also indicates differences between groups, which reinforces the need of the matching techniques. According to Stuart (2010), the matching method aims to equate the distribution of covariates in the treated and the control groups. Therefore, if the distribution of the covariates is equal in the two groups, the results could be considered closer to a random experiment.

We take into consideration this potential bias selection problem through matching techniques, as seen in Borisova et al. (2019) and Lazzarini and Musacchio (2018)' work. The matching techniques are used in order to guarantee firms with government ownership have counterfactual firms without government ownership (Imbens, 2004). For selecting the covariates used to to match among firms with government ownership and firms without government ownership, we prioritized the variables that showed differences between these groups in Table 3. Once the CEO Compensation is the dependent variable that we want to measure the treatment effect, it can't be used as a covariate. Total assets, Enterprise value and Tobin's Q showed statistical differences among the groups, ergo we used Total assets (measured as the natural logarithm of total assets in local currency - R$ thousands), and Tobin's Q as covariates[4]. We also stipulated in the matching method that the matching could occur only in observations with the same year. Thereby, a firm was not combined with itself in different years.

[4]The total assets and Enterprise value are are highly correlated variables. Thence, we chose one of them (Total assets) to perform the matching with the observations.

Table 3
Mean variables - Firms without government ownership X Firms with government ownership

Variables	Firms without government ownership (1)	Firms with government ownership (2)	T-test (3)
CEO compensation	7.33	6.98	3.49***
	(1.52)	(1.70)	
Total assets	14.54	15.54	−9.47***
	(1.49)	(1.79)	
Enterprise Value	13.81	14.60	−6.69***
	(1.99)	(1.93)	
Leverage	0.64	0.65	−0.17
	(0.61)	(0.39)	
ROA	0.02	0.02	0.25
	(0.17)	(0.13)	
Tobin's Q	0.95	0.94	1.83*
	(0.08)	(0.07)	
Observations	1142	354	

*Significance: *p<0.1; **p<0.05; ***p<0.01.*

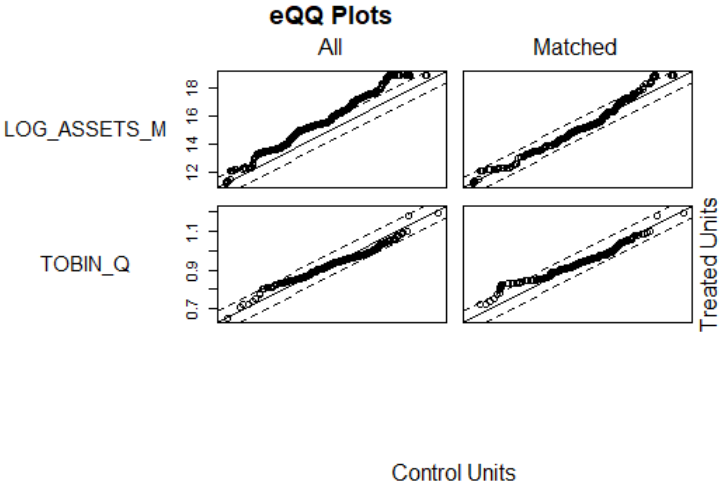
Note: This table presents the mean of CEO Compensation, total assets, enterprise value (all three variables are represented by the natural logarithm in local currency - R$ thousands), leverage, ROA and Tobin's Q for firms without government ownership in their ownership structure (1) and firms with government ownership in their ownership structure (2). The values in parenthesis in column (1) and (2) are the standard deviation.

Firstly, we checked the initial imbalance prior to matching using the R package MatchIt (Ho et al., 2011). After this, several matching methods were tested in order to assess appropriate balance. We used the Nearest Neighbor Matching, Optimal Pair Matching, Optimal Full Matching, Genetic Matching, Coarsened Exact Matching, and Subclassification method. The Optimal Full Matching delivered the best results[5]. The full technique matches every treated unit to at least one control and vice-versa. In this study, the control observations are those whose firm is not owned by the government, and the treated observations are firms in which the Brazilian government has some shares, directly or indirectly.

The figure 3 illustrates the results of the Optimal Full Matching on the Total assets and Tobin's Q variables. Points far from the solid diagonal line are the areas of the covariate distributions that differ between the treatment groups. So, the matching allows a better balance into the treatment and control group.

[5]For the sake of brevity, these results are not reported and they are available under request.

Figure 3
Quantile-quantile plot - Total and Matched variables



After using the matching techniques to obtain a matched sample, we used both the full and matched sample in order to infer the possible influence of government ownership and the CEO Compensation. The functional form of econometric model used to test the hypotheses are described below:

$$\begin{aligned}\text{CEO Compensation}_{it+1} &= \beta_1 \cdot \text{government ownership variable}_{it} \\ &+ \beta_2 \cdot \text{government ownership variable}_{it} \times \text{financial crisis}_{it} \\ &+ \beta_3 \cdot \text{government ownership variable}_{it} \times \text{political crisis}_{it} \\ &+ \mathbf{X_{it}} \cdot \boldsymbol{\beta}_4 + u_{it}.\end{aligned} \tag{1}$$

$\mathbf{X_{it}}$ represent the matrix of control variables . u_{it} is the compound error i.e., a component of error e_{it} and unobserved cross-section heterogeneity. The *government ownership variable* assumes the Government ownership variables.

5. Results

5.1 Descriptive statistics

Tables 4 and 5 synthesize the descriptive statistics for the government ownership variables, management and board variables, firm characteristic and the EPU. From the table, we can see that some variables present extreme values,

specially total assets, enterprise value, CEO Compensation, Leverage, ROA and revenue variation. To reduce the influence of outliers in the regression, we winsorized these variables at 1% and 99% levels. Table 6 shows the statistics of the winsorized variables.

Table 4
Descriptive Statistics - Government ownership variables

Variables	Mean	Median	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
DGO_ON	5.44	0	18.49	0	0	0	100
DGO_PN	1.46	0	7.06	0	0	0	79
DGO_CF	4.38	0	14.03	0	0	0	100
IGO_ON	3.38	0	12.61	0	0	0	100
IGO_PN	2.04	0	8.81	0	0	0	65
IGO_CF	3.96	0	12.92	0	0	0	98.51
TGO_ON	8.81	0	22.26	0	0	0	100
TGO_PN	3.50	0	11.62	0	0	0	82
TGO_CF	8.34	0	19.29	0	0	0	99.69

Note: This table summarises the statistics of the 1495 firm-year observation.

Table 5
Descriptive Statistics

Variables	Mean	Median	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Management and Board							
Manag._members	5	4	2	1	3	6	31
BoD_members	7	7	3	1	5	9	30
CEO Comp	7.25	7.42	1.57	0.00	6.65	8.13	11.34
Firm characteristics							
Total assets	14.78	14.89	1.62	10.82	13.69	15.81	20.62
Enterprise	13.99	14.27	2.01	7.71	12.60	15.45	19.76
Leverage	0.64	0.57	0.56	0.01	0.44	0.72	12.23
ROA	0.02	0.03	0.17	−1.24	−0.004	0.07	2.22
Δ Revenue	26.04	9.57	302.18	−263.10	−1.78	19.86	10,977.11
Tobin's Q	0.95	0.95	0.08	0.59	0.90	1.00	1.21
Economic Policy Uncertainty Index							
EPU (Mean)	0.04	−0.46	1.05	−1.15	−0.64	0.79	1.98

Note: This table summarises the statistics of the 1495 firm-year observation. Total assets, enterprise value (enterprise) and CEO compensation (CEO Comp) are presented as the natural logarithm of the values in local currency (thousands R$). Enterprise value is represented as the market value of firm. Δ Revenue is ratio of $\frac{revenue_t}{revenue_{t-1}}$. The EPU is represented by the normalized mean by year of the monthly index obtained in https://www.policyuncertainty.com/.

Table 6
Descriptive statistics - winsorized variables

Variables	Mean	Median	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
CEO Compensation	7.24	7.42	1.56	0.16	6.65	8.13	10.21
Total assets	14.77	14.89	1.58	11.16	13.69	15.81	18.83
Enterprise value	13.99	14.27	1.97	9.11	12.60	15.45	17.98
Leverage	0.63	0.57	0.39	0.09	0.44	0.72	2.70
ROA	0.02	0.03	0.11	−0.48	−0.004	0.07	0.36
Δ Revenue	14.31	9.57	44.06	−65.47	−1.78	19.86	315.78

The frequency of the dummy variables are presented in Table 7. The existence of dual-class share in the Brazilian capital market is evident: almost half of the firm-year observation had shares with different voting rights. CEO was also the chairman in the Board of Directors in 17.05% of firm-year observations. It's worth noting that the the accumulation of the position of board of directors' Chairman by the CEO was prohibited by the Lei nº 14.195 (26 de agosto de 2021). This law came into force in February 2022, 180 days after its publication.

Table 7
Frequency table - dummy variables

Variables	1 (%)	0 (%)
Dual-class shares	42.31	57.69
CEO Duality	17.05	82.95
SOE	6.28	93.72
Control group	23.66	76.34

5.2 Empirical results

In this section, we present the empirical results of the relations presented in equation 1, using fixed effect panel data. We use all the different measures of Government ownership presented in table 1 to estimate this equation; however, for the sake of brevity, we present only the main results[6].

It's worth noting that, in almost all regressions, the variables total assets, leverage, and Tobin's Q remain positive and significant. Several research reveals a positive association between CEO compensation and firm size (Borisova et al., 2019; Gabaix and Landier, 2008; Ermel and Do Monte, 2018).

About the leverage and CEO Compensation, Ortiz-Molina (2007) says that the pay- performance sensitivity to debt depends on the type of debt. But also

[6]OLS results and all the estimates using different measures of government ownership are available under request.

the agency costs of equity could result in lower sensitivity in more levered firms. That's because the lenders also have a monitoring function in agency theory, reducing the free cash flow available to managers. Following this, the relation would be weak or none, as seen in Borisova et al. (2019)'s research. However, in the Brazilian firms in this sample, the results indicate a positive and significant relationship.

The positive and significant relation between Tobin's Q and CEO Compensation is in line with the findings of Borisova et al. (2019) and Ozkan (2007). So, the greater the investment opportunities, the higher the CEO's salary. In several studies, Tobin's Q is used as a stock-market performance proxy, as in Carpenter and Sanders (2002); Jiang et al. (2009), or proxy for growth options (Ozkan, 2007). These results about growth opportunities and total assets corroborate the findings of Ozkan (2007): larger firms with growth opportunities pay higher salaries to the CEOs.

The government ownership variables, the main focus of this research, show consistent results in all the regressions: the relationship between CEO Compensation and government ownership variables prevails negative and significant for all the types of the Brazilian government ownership. Specifically, there seems to be no distinction between types of control or direct and indirect participation in the firm's ownership structure regarding CEO compensation: when the Brazilian government is a shareholder, CEO compensation would be smaller than fully private firms.

Table 8 shows the results using the government ownership dummy, a variable also used to define the treatment in the matching technique. This result suggests a negative and significant relationship between CEO compensation and government ownership. However, there is no statistically significant relation when we interact the government variable and political or financial crisis, i.e., the government's presence as a shareholder doesn't appear to influence differently in times of political crisis or financial distress. These results are the same when we use some continuous variables for direct government ownership: direct government ownership using only voting shares (*DGO_ON*), total cash flow rights in direct government ownership (*DGO_CF*); indirect government ownership using only voting shares (*IGO_ON*), indirect government ownership using only non-voting shares (*IGO _PN*), total government ownership using voting shares (*TGO_PN*), and total government ownership through cash-flows rights.

Table 8
Government ownership dummy

	Dependent variable: CEO Compensation$_{t+1}$	
Variables	Full sample	Matched sample
Total assets$_t$	0.236	0.381***
	(0.150)	(0.072)
Leverage$_t$	0.413*	1.181***
	(0.250)	(0.406)
Tobin's Q$_t$	2.164**	6.811***
	(1.032)	(1.023)
ΔRevenue$_t$	0.001	0.002*
	(0.001)	(0.001)
Govn. Ownership$_t$	−0.170	−0.561***
	(0.254)	(0.150)
CEO Duality$_t$	0.009	−0.035
	(0.232)	(0.181)
Pol.crisis$_t$	−0.056	−0.087
	(0.089)	(0.109)
Fin. crisis$_t$	0.199	0.194
	(0.188)	(0.266)
Observations	1,495	1,495
R^2	0.604	0.589
Adjusted R^2	0.502	0.466
Residual Std. Error	1.100	1.223
	(df = 1186)	(df = 1148)

Note: Significance:$p<0.1$; **$p<0.05$; ***$p<0.01$.*

Govn. ownership$_t$ is a dummy variable assuming 1 when the Brazilian Government owned any shares of firm i, directly or indirectly, and 0 instead. Pol. crisis is the interaction of EPU with Gov. ownership$_t$. Fin. crisis ownership is the interaction of financial crisis, a dummy variable assuming 1 for year = 2015 or year = 2016, with Gov. ownership$_t$ dummy. The description of the control variables is presented in the table 2.

However, for some different arrangements of government ownership, we have distinct results. Table 9 presents the results of fixed effect panel data estimation for both full and matched sample using a continuous variable for direct government ownership, and when the Brazilian government only had non-voting shares. Despite the relation between CEO compensation and government ownership remains negative and significant, during years of financial crisis CEO compensation is smaller when the Brazilian government has non-voting shares.

Table 9
Government direct ownership - non-voting shares (%)

	Dependent variable: CEO Compensation$_{t+1}$	
	Full sample	Matched sample
Total assets$_t$	0.225	0.349***
	(0.150)	(0.073)
Leverage$_t$	0.392	1.240***
	(0.251)	(0.419)
Tobin's Q$_t$	2.198**	7.038***
	(1.034)	(1.053)
ΔRevenue$_t$	0.001	0.002
	(0.001)	(0.001)
DGO_PN	0.012	0.004
	(0.017)	(0.006)
CEO Duality$_t$	−0.005	0.071
	(0.233)	(0.168)
Pol.Crisis* DGO_PN	0.014***	0.006
	(0.005)	(0.005)
Fin. crisis* DGO_PN	−0.021**	−0.039***
	(0.010)	(0.010)
Observations	1,495	1,495
R^2	0.606	0.576
Adjusted R^2	0.504	0.449
Residual Std. Error	1.097	1.242
	(df = 1186)	(df = 1148)

Note: Significance:**p<0.1;* ***p<0.05;* ****p<0.01.*

DGO_PN$_t$ is a continuous variable representing the % of direct non voting shares owned by the Brazilian government on firm *i*. Pol.Crisis** DGO_PN is the interaction of EPU with DGO_PN$_t$. Fin. crisis* DGO_PN is the interaction of financial crisis, a dummy variable assuming 1 for year = 2015 or year=2016, with DGO_PN$_t$ variable. The description of the control variables is presented in the table 2.

Nevertheless, when the government has indirect shares (both voting and non-voting shares), the presence of the Brazilian government as a shareholder seems to attenuate the the impact of state ownership on CEO compensation: table 10 shows that the relation between CEO compensation and government ownership remains negative and significant, but in years of financial crisis the state presence as a shareholder under indirect participation is attenuated, once the interaction of Financial crisis × indirect government ownership and CEO Compensation is positive e significant.

Table 10
Indirect government ownership - total cash-flows (%)

	Dependent variable: CEO Compensation$_{t+1}$	
	Full sample	Matched sample
Total assets$_t$	0.232	0.358***
	(0.152)	(0.071)
Leverage$_t$	0.424*	1.269***
	(0.253)	(0.411)
Tobin's Q$_t$	2.272**	6.785***
	(1.040)	(1.034)
ΔRevenue$_t$	0.001	0.001
	(0.001)	(0.001)
IGO_CF	0.004	−0.022***
	(0.013)	(0.005)
CEO Duality$_t$	0.014	−0.066
	(0.231)	(0.182)
Pol.Crisis*IGO_CF	−0.004***	−0.001
	(0.001)	(0.003)
Fin.Crisis*IGO_CF	0.010***	0.017**
	(0.004)	(0.008)
Observations	1,495	1,495
R^2	0.605	0.590
Adjusted R^2	0.502	0.466
Residual Std. Error	1.099	1.222
	(df = 1186)	(df = 1148)

Note: Significance:**p<0.1;* ***p<0.05;* ****p<0.01.*

IGO_CF$_t$ is a continuous variable representing the % of indirect voting and non voting shares owned by the Brazilian government on firm *i*. Pol.Crisis** IGO_CF is the interaction of EPU with IGO_CF$_t$. Fin. crisis* IGO_CF is the interaction of financial crisis, a dummy variable assuming 1 for year = 2015 or year=2016, with IGO_CF$_t$ variable.The description of the control variables is presented in the table 2.

Political crisis, according to the results, doesn't appear to influence the CEO's compensation, except for the results presented in Table 11, and Table 12. Only when the government has indirect or total voting shares of firms, political instability is negatively related to CEO compensation.

Table 11
Indirect government ownership - voting shares (%)

	Dependent variable: CEO Compensation$_{t+1}$	
	Full sample	Matched sample
Total assets$_t$	0.234	0.363***
	(0.151)	(0.073)
Leverage$_t$	0.427*	1.310***
	(0.253)	(0.416)
Tobin's Q$_t$	2.252**	7.049***
	(1.040)	(1.060)
ΔRevenue$_t$	0.001	0.002
	(0.001)	(0.001)
IGO_ON	−0.00001	−0.013***
	(0.012)	(0.003)
CEO Duality$_t$	0.011	0.015
	(0.231)	(0.176)
Pol. crisis*IGO_ON	−0.004***	−0.005**
	(0.002)	(0.002)
Fin. crisis*IGO_ON	0.011***	0.013
	(0.004)	(0.008)
Observations	1,495	1,495
R^2	0.605	0.580
Adjusted R^2	0.503	0.454
Residual Std. Error	1.099	1.236
	(df = 1186)	(df = 1148)

Note: Significance:$^*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.*

IGO_ON$_t$ is a continuous variable representing the % of indirect voting shares owned by the Brazilian government on firm *i*. Pol.Crisis** IGO_ON is the interaction of EPU with IGO_ON$_t$. Fin. crisis* IGO_ON is the interaction of financial crisis, a dummy variable assuming 1 for year = 2015 or year=2016, with IGO_ON$_t$ variable. The description of the control variables is presented in the table 2.

Table 12
Total government ownership - voting shares (%)

	Dependent variable: CEO Compensation$_{t+1}$	
	Full sample	Matched sample
Total assets$_t$	0.240	0.399***
	(0.151)	(0.071)
Leverage$_t$	0.428*	1.243***
	(0.254)	(0.392)
Tobin's Q$_t$	2.223**	6.520***
	(1.040)	(1.024)
ΔRevenue$_t$	0.001	0.002*
	(0.001)	(0.001)
TGO_ON	−0.007	−0.010***
	(0.008)	(0.002)
CEO Duality$_t$	−0.004	−0.030
	(0.232)	(0.179)
Pol.Crisis*TGO_ON	0.0003	−0.004*
	(0.002)	(0.002)
Fin.Crisis*TGO_ON	−0.001	−0.001
	(0.003)	(0.005)
Observations	1,495	1,495
R^2	0.604	0.590
Adjusted R^2	0.501	0.466
Residual Std. Error	1.100	1.222
	(df = 1186)	(df = 1148)

Note: Significance:$^*p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$.*

TGO_ON$_t$ is a continuous variable representing the % of total (direct and indirect) voting shares owned by the Brazilian government on firm *i*. Pol.Crisis** TGO_ON is the interaction of EPU with TGO_ON$_t$. Fin. crisis* TGO_ON is the interaction of financial crisis, a dummy variable assuming 1 for year = 2015 or year=2016, with TGO_ON$_t$ variable. The description of the control variables is presented in the table 2.

6. Discussion and Implications

In this research, we study the influence of Brazilian government ownership on CEO compensation. The negative and significant relationship between these variables remains for all distinct measures of state participation in publicly traded Brazilian companies used in this research.

These results corroborate the findings of Borisova et al. (2019)'s research: firms with government ownership pay less to the CEO. Whereas, for the

authors, this can be related to government risk aversion, for Brazil's scenario it could be argued that it is related to recent corruption scandals involving Brazilian SOEs and media and popular pressure involving them.

However, there is little evidence linking political crises to CEO compensation. Only when the government has indirect or total voting shares of firms, political instability is negatively related to CEO compensation. This could be due to media pressure or the fact the government itself is in a crisis and cannot maintain CEO compensation at higher levels.

Nevertheless, when the Brazilian economy is in an economic recession, the *direct* government ownership in the shareholding structure of companies appears to reduce the salary of the CEOs. The financial crises are often attributed to the government and its inertia in reversing the economic situation. So, it is plausible that there is a pressure to reduce CEO's salaries of companies with state government participation.

But when the Brazilian government owns shares indirectly, the relationship reverses: the econometric results indicate a positive relation between CEO compensation and Financial crisis and government ownership interaction variable. Once the indirect Brazilian government ownership is not easily observable, these CEOs can benefit themselves with the government influence due to implicit guarantees against default (Borisova et al., 2015; Beuselinck et al., 2017) and raise their salaries without attracting media and public attention.

Other variables, although not addressed by this study, may be an interesting path for future research, such as risk taking in firms with government ownership and CEO compensation.

Conflict of interest: The authors declare no conflict of interest.

References

Anuatti Neto, F., Barossi Filho, M., Carvalho, A. G. and Macedo, R. B. M. (2003). Costs and benefits of privatization: evidence from Brazil, Retrieved from http://dx.doi.org/10.2139/ssrn.1814713. IDB Working Paper n. 164.

Baker, S. R., Bloom, N. and Davis, S. J. (2016). Measuring economic policy uncertainty, *The quarterly journal of economics* **131**(4): 1593–1636.

Bandeira-de Mello, R., Marcon, R. and Alberton, A. (2011). Performance effects of stakeholder interaction in emerging economies: evidence from Brazil, *BAR-Brazilian Administration Review* **8**(3): 329–350.

Barboza, R. d. M. and Zilberman, E. (2018). Os efeitos da incerteza sobre a atividade econômica no Brasil, *Revista Brasileira de Economia* **72**: 144–160.

Barros, L. A. B. d. C., Silveira, A. d. M. d., Bortolon, P. M. and Leal, R. P. C. (2015). Facing the regulators: Noncompliance with detailed mandatory compensation disclosure in Brazil, *Emerging Markets Finance and Trade* **51**(sup2): S47–S61.

Bebchuk, L. A., Cremers, K. M. and Peyer, U. C. (2011). The CEO pay slice, *Journal of Financial Economics* **102**(1): 199–221.

Bebchuk, L. A. and Fried, J. M. (2003). Executive compensation as an agency problem, *Journal of economic perspectives* **17**(3): 71–92.

Becht, M., Bolton, P. and Röell, A. (2003). Corporate governance and control, *in* G. M. Constantinides, M. Harris and R. M. Stulz (eds), *Handbook of the Economics of Finance*, Vol. 1, Elsevier, Amsterdam, pp. 1–109.

Beuselinck, C., Cao, L., Deloof, M. and Xia, X. (2017). The value of government ownership during the global financial crisis, *Journal of Corporate Finance* **42**: 481–493.

Borisova, G., Brockman, P., Salas, J. M. and Zagorchev, A. (2012). Government ownership and corporate governance: Evidence from the EU, *Journal of Banking & Finance* **36**(11): 2917–2934.

Borisova, G., Fotak, V., Holland, K. and Megginson, W. L. (2015). Government ownership and the cost of debt: Evidence from government investments in publicly traded firms, *Journal of Financial Economics* **118**(1): 168–191.

Borisova, G., Salas, J. M. and Zagorchev, A. (2019). CEO compensation and government ownership, *Corporate Governance: an International Review* **27**(2): 120–143.

Boubakri, N., Cosset, J.-C. and Saffar, W. (2013). The role of state and foreign owners in corporate risk-taking: Evidence from privatization, *Journal of Financial Economics* **108**(3): 641–658.

Boubakri, N., El Ghoul, S., Guedhami, O. and Megginson, W. L. (2018). The market value of government ownership, *Journal of Corporate Finance* **50**: 44–65.

Brey, N. K., Camilo, S. P. O., Marcon, R. and Bandeira-De-Mello, R. (2014). Conexões políticas em estruturas de propriedade: o governo como acionista em uma análise descritiva, *RAM. Revista de Administração Mackenzie* **15**(1).

Bugeja, M., Matolcsy, Z. and Spiropoulos, H. (2017). The CEO pay slice: managerial power or efficient contracting? Some indirect evidence, *Journal of Contemporary Accounting & Economics* **13**(1): 69–87.

Carpenter, M. A. and Sanders, W. G. (2002). Top management team compensation: The missing link between CEO pay and firm performance?, *Strategic management journal* **23**(4): 367–375.

CODACE (2020). Brazilian monthly cycles dating announcement - jun/2020, Retrieved from https://portalibre.fgv.br/sites/default/files/2020-06/brazilian-economic-cycle-dating-committee-announcement-on-06_29_2020-1.pdf.

Comissão de Valores Mobiliários (2009). Instrução normativa CVM nº 480, Retrieved from http://www.cvm.gov.br/legislacao/instrucoes/inst480.html. December 07, 2009.

Comissão de Valores Mobiliários (2018). Ofício-Circular nº 4/2018-CVM/SEP, Retrieved from http://www.cvm.gov.br/legislacao/oficios-circulares/sep/oc-sep-0418.html. June 13, 2018.

Ermel, M. D. A. and Do Monte, P. A. (2018). Shareholder control, firm performance and executive compensation: Evidence from Brazilian market, *Brazilian Review of Finance* **16**(3): 455–491.

Focke, F., Maug, E. and Niessen-Ruenzi, A. (2017). The impact of firm prestige on executive compensation, *Journal of Financial Economics* **123**(2): 313–336.

Formiga, M., Barros, C. M. E., Cezário, N. d. J. and Scherer, L. M. (2019). O efeito da incerteza política no desempenho e valoração das companhias abertas brasileiras, *REAd. Revista Eletrônica de Administração (Porto Alegre)* **25**: 96–123.

Gabaix, X. and Landier, A. (2008). Why has CEO pay increased so much?, *The Quarterly Journal of Economics* **123**(1): 49–100.

Ho, D. E., Imai, K., King, G. and Stuart, E. A. (2011). MatchIt: Nonparametric preprocessing for parametric causal inference, *Journal of Statistical Software* **42**(8): 1–28.

Holmstrom, B. (1979). Moral hazard and observability, *Bell journal of Economics* **10**(1): 74–91.

Imbens, G. W. (2004). Nonparametric estimation of average treatment effects under exogeneity: A review, *Review of Economics and statistics* **86**(1): 4–29.

Inoue, C. F. K. V., Lazzarini, S. G. and Musacchio, A. (2013). Leviathan as a minority shareholder: Firm-level implications of state equity purchases, *Academy of Management Journal* **56**(6): 1775–1801.

Jensen, M. C. and Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs, and ownership structure, *Journal of Financial Economics* **3**(4): 305–360.

Jiang, H., Habib, A. and Smallman, C. (2009). The effect of ownership concentration on CEO compensation-firm performance relationship in New Zealand, *Pacific Accounting Review* .

Jiraporn, P., Kim, Y. S. and Davidson, W. N. (2005). CEO compensation, shareholder rights, and corporate governance: An empirical investigation, *Journal of Economics and Finance* **29**(2): 242–258.

Krauter, E. and Sousa, A. F. (2013). Executive compensation and corporate financial performance: Empirical evidences on Brazilian industrial companies, *Journal of Modern Accounting and Auditing* **9**(5): 650.

Lazzarini, S. G. and Musacchio, A. (2018). State ownership reinvented? Explaining performance differences between state-owned and private firms, *Corporate Governance: An International Review* **26**(4): 255–272.

Lei nº 14.195 (26 de agosto de 2021). Dispõe sobre a facilitação para abertura de empresas, sobre a proteção de acionistas minoritários, sobre a facilitação do comércio exterior, sobre o Sistema Integrado de Recuperação de Ativos (Sira), sobre as cobranças realizadas pelos conselhos profissionais, sobre a profissão de tradutor e intérprete público, sobre a obtenção de eletricidade, sobre a desburocratização societária e de atos processuais, Retrieved from http://www.planalto.gov.br/ccivil_03/_ato2019-2022/2021/lei/L14195.htm.

Murphy, K. J. (2012). Executive compensation: Where we are, and how we got there, *in* G. M. Constantinides, M. Harris and R. M. Stulz (eds), *Handbook of the Economics of Finance*, Vol. 2a, Elsevier, pp. 1–175. Retrieved from http://ssrn.com/abstract=2041679.

Musacchio, A. and Lazzarini, S. G. (2015). *Reinventando o Capitalismo de Estado: O Leviatã nos negócios: Brasil e outros países*, Portfolio-Penguin, São Paulo.

Musacchio, A., Lazzarini, S. G. and Aguilera, R. V. (2015). New varieties of state capitalism: Strategic and governance implications, *The Academy of Management Perspectives* **29**(1): 115–131.

Nardi, P. C. C. and Nakao, S. H. (2009). Gerenciamento de resultados e a relação com o custo da dívida das empresas brasileiras abertas, *Revista Contabilidade & Finanças-USP* **20**(51).

Ortiz-Molina, H. (2007). Executive compensation and capital structure: The effects of convertible debt and straight debt on CEO pay, *Journal of Accounting and Economics* **43**(1): 69–93.

Ozkan, N. (2007). Do corporate governance mechanisms influence CEO compensation? An empirical investigation of UK companies, *Journal of multinational financial management* **17**(5): 349–364.

Pargendler, M. (2011). State ownership and corporate governance, *Fordham L. Rev.* **80**: 2917–2973.

Schiehll, E., Terra, P. R. S. and Victor, F. G. (2013). Determinants of voluntary executive stock option disclosure in Brazil, *Journal of Management & Governance* **17**(2): 331–361.

Schincariol, J. (2018). Divulgação de remuneração de executivos revela avanço na governança, *Valor Econômico* . Retrieved from https://www.valor.com.br/empresas/5621151/divulgacao-de-remuneracao-de-executivos-revela-avanco-na-governanca in June 26, 2018.

Schwarz, L. A. D. and Dalmácio, F. Z. (2021). The relationship between economic policy uncertainty and corporate leverage: Evidence from Brazil, *Finance Research Letters* **40**: 101676.

Shailer, G. and Wang, K. (2015). Government ownership and the cost of debt for Chinese listed corporations, *Emerging Markets Review* **22**: 1–17.

Shleifer, A. (1998). State versus private ownership, *Journal of Economic Perspectives* **12**(4): 133–150.

Siming, L. (2016). Orders of merit and CEO compensation: Evidence from a natural experiment, *Corporate Governance: An International Review* **24**(1): 64–78.

Stuart, E. A. (2010). Matching methods for causal inference: A review and a look forward, *Statistical Science* **25**(1): 1.

The Guardian (2019). The swashbuckling meat tycoons who nearly brought down a government, Retrieved from https://www.theguardian.com/environment/2019/jul/02/swashbuckling-meat-tycoons-nearly-brought-down-a-government-brazil. July 02, 2019.

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*, 2nd ed., MIT press, London.

Wu, H., Li, S., Ying, S. X. and Chen, X. (2018). Politically connected CEOs, firm performance, and CEO pay, *Journal of Business Research* **91**: 169–180.

Zou, H. and Adams, M. B. (2008). Corporate ownership, equity risk and returns in the People's Republic of China, *Journal of International Business Studies* **39**(7): 1149–1168.