



## Tax aggressiveness of government-controlled corporations in Brazil

Agressividade fiscal em sociedades de economia mista no Brasil

Agresividad fiscal en sociedad de economía mixta en Brasil

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### Abstract

This article examines whether government control of companies is a factor influencing tax aggressiveness, through a comparative analysis of these firms versus privately controlled companies listed on the BM&FBovespa. The analysis covers the period from 2009 through 2013 and aggressiveness is measured by three metrics: effective tax rate (ETR), book-tax difference (BTD) and tax burden disclosed in the statement of value added, which we call the tax rate on added value (TRAV). The results of the regressions confirm the main hypothesis regarding taxation of profit and also of gross revenue, because government-controlled corporations had significantly higher ETR and TRAV, indicating less tax aggressiveness. Although the result for BTD was not conclusive to indicate the aggressiveness profile, based on the other two variables, it can be stated that shareholding control by the government is a factor determining lower tax aggressiveness in Brazil.

**Keywords:** Tax aggressiveness; Political risk; Government-controlled corporations

### Resumo

Este artigo objetivou identificar se o poder executivo no controle das empresas é um determinante de postura fiscal menos agressiva, pela análise comparativa da agressividade fiscal entre as Sociedades de Economia Mista e as empresas com controle privado listadas na BM&FBovespa. A agressividade foi avaliada no período de 2009 a 2013 através de três métricas: a Taxa Efetiva de Tributação (ETR), a Diferença entre Lucro Contábil e Lucro Tributário (BTD), e a carga tributária divulgada na Demonstração do Valor Adicionado (TTVA). Os resultados das regressões confirmaram a hipótese principal na tributação sobre o lucro e também na tributação sobre o faturamento, pois as Sociedades de Economia Mista se apresentaram com valor maior e significativo de ETR e TTVA, indicando menor agressividade fiscal. Apesar do resultado da BTD não ser conclusivo para indicar o perfil de agressividade, pode-se afirmar, pelas outras variáveis, que o controle acionário pelo poder executivo é um determinante de menor agressividade fiscal no mercado brasileiro.

**Palavras-chave:** Agressividade fiscal; Risco político; Sociedades de Economia Mista

### Resumen

Este trabajo objetivó identificar si el Gobierno en el control de las empresas es un determinante de postura fiscal menos agresiva, por el análisis comparativo de la agresividad fiscal entre las Sociedades de Economía Mixta y las empresas con control privado listadas en BM&FBovespa. La agresividad fue evaluada en el período 2009 a 2013 a través de tres métricas: la Tasa Efectiva de Tributación (ETR), la Diferencia entre Ganancia Contable y Ganancia Tributaria (BTD), y la carga tributaria divulgada en la Demostración del Valor Añadido (TTVA). Los resultados de las regresiones confirmaron la hipótesis principal en la tributación sobre el beneficio y también en la tributación sobre la facturación, pues las Sociedades de Economía Mixta se presentaron con un valor mayor y significativo de ETR y TTVA, indicando menor agresividad fiscal. Aunque

el resultado de la BTD no es concluyente para indicar el perfil de agresividad, se puede afirmar, por las otras variables, que el control accionario por el poder ejecutivo es un determinante de menor agresividad fiscal en el mercado brasileño.

**Palabras clave:** Agresividad fiscal; Riesgo político; Sociedades de Economía Mixta

## 1 Introduction

Government-controlled corporations (*sociedades de economia mista*, literally “mixed-economy companies”) are important components of the Brazilian economy. The large ones are concentrated in the areas of banking, public services and infrastructure. According to Article 173, II, of the Federal Constitution of 1988, this type of company is subject to the same tax regime as privately owned firms, meaning that taxes represent significant costs, thus affecting their bottom-line profits and equity value.

Because their ownership structure requires conciliating the interests of the public and private capital, government-controlled corporations are especially subject to agency conflicts, mainly between the controlling shareholder and minority shareholders. Having multiple owners—shareholders and the government—significantly exacerbates what is referred to as the principal-agent problem. This refers to the challenges of aligning the self-interests of the owners of capital (i.e., shareholders) with those of the agents who are employed on behalf of the principals.

The varying self-interests in the multi-principal model of Government-controlled corporations makes it difficult for the agent to act in the interests of both principals when they have potentially competing goals and objectives. In this case, the controlling shareholder can adopt actions to reduce payment of taxes, thus increasing the profits and favoring the interests of the minority owners (PROCIANOY, 1994). On the other hand, the controlling shareholder can pay more heed to political reputation risks and impose a less aggressive tax stance on the company.

In light of these premises, in this study we evaluate the tax aggressiveness of listed corporations controlled by the government in comparison to their privately owned peers. Therefore, we seek to answer the following research question: Are government-controlled corporations in Brazil less tax aggressive in comparison to privately controlled corporations? To the best of our knowledge, this issue has not been addressed previously in the literature, although there a good number of studies can be found examining differences in tax aggressiveness based on other parameters (MARTINEZ, 2017).

Chen et al. (2010), for example, found that family firms tend to be more concerned about family reputation, in detriment to aggressive practices to reduce taxes. This type of preoccupation was previously predicted by Sandford, Godwin and Hardwick (1989) in a study of the psychological costs associated with tax compliance activities, such as stress and anxiety in situations where an honest taxpayer can make mistakes on the tax return, or fear of facing a deficiency assessment of even being prosecuted for tax evasion.

Therefore, in studying the effects of ownership structure with respect to tax issues, consideration should also go to nontax costs arising from agency conflicts, as observed by Chen et al. (2010) and also Martinez and Ramalho (2014). Here we specifically try to identify if the existence of government control is a determining factor for lower tax aggressiveness in listed Brazilian firms. The results are of interest to potential and actual investors seeking guidance for investment decisions, tax authorities for planning audit actions, and society at large to identify the impact of tax costs on the prices goods and services available in the market.

In the rest of the article, the theoretical background will be exposed, discussing and appreciating the main themes associated. In the following, the methodology is presented, discussing the econometric model and tests used to support the results of the research. From this point on, the results and their implications are presented. The research ends with the exposition of the conclusions of the investigation.

## 2 Theoretical Framework

Like in the works of Chen et al. (2010) and Martinez and Ramalho (2014), here we examine tax aggressiveness from the standpoint of cost versus benefit, considering the potential risks of using tax-reduction techniques. Since these techniques to reduce the tax burden of companies do not have a universal definition, we consider tax avoidance to be any action or policy that aims to reduce the tax rate over the long run, both involving strict compliance with the law and those from interpretations falling in the gray area of tax rules (DYRENG et al., 2008).

Therefore, aggressive tax planning inherently involves operating at the limit of the legal and regulatory framework, bringing the risk of penalties as well as the benefits of lower taxes (LIETZ, 2013). In other words, within tax planning, or more precisely, tax avoidance, the controlling shareholder can opt for actions that have little legal support, and hence higher probability of being seen as overly aggressive.

Deciding whether or not to engage in these practices, or in what proportion to do so, is a delicate matter, a high-wire act involving the tradeoff between a lower tax burden and penalization and/or reputational harm. This is particularly true in government-controlled corporations, which tend to have conflicting targets and interests (more tradeoffs), since their managers have less autonomy and are more beholden to political interests (RAINEY et al., 1976). In these companies, the main tradeoff regarding taxation is between adopting

aggressive measures to reduce taxes, to maximize shareholder return, versus a more conservative stance, so as not to harm the political reputation of the current government through exposure in the media.

## 2.1 Tax Aggressiveness and Agency Theory

The ownership structure of firms plays an important role in determining the degree of tax aggressiveness (SHACKELFORD; SHEVLIN, 2001). Managers need to deal with the interests of investors, tax authorities, customers and society in general. A growing body of literature has examined the relationship of agency theory with tax aggressiveness and the determinants of tax avoidance.

Desai and Dharmapala (2006) found that the incentive rewards paid to managers heightens tax avoidance so that it borders on over-aggressiveness. In this case, controlling shareholders will intentionally try to minimize the tax burden. However, corporate governance considerations can act to countervail this tendency, by discouraging these actions. In this respect, Lanis and Richardson (2011) examined the relation of makeup of the board of directors with aggressive tax practices and found that the presence of independent directors has a strong connection with more conservative tax behavior by firms.

The same pattern of more conservative tax aggressiveness was also found in family firms (CHEN et al., 2010). This is tied to the desire to preserve the family's reputation, by reducing the risk of facing prosecution for tax crimes, since the boundary between tax avoidance and evasion is very tenuous (GODOI, 2007, p. 2). The difficulty of identifying the dividing line between legitimate and abusive tax avoidance was also examined by Lietz (2013, p. 9). In other words, aggressive tax avoidance can exceed the limit of legality, bringing a higher cost in the final analysis due to penalties charged on top of the taxes that were illegally avoided, along with litigation expenses and reputational erosion.

## 2.2 Tax Aggressiveness in the Brazilian Context

Just as in other countries, in Brazil companies have two ways of reducing their tax expenses, through avoidance (legal) or evasion (illegal). Lawmakers and administrative authorities have established increasingly stringent antiavoidance mechanisms, classifying as artificial and hence illegal some previously widespread avoidance practices. Nevertheless, it is common to find divergent interpretations of the legal and regulatory rules by the administrative authorities and the courts, as analyzed by Schoueri (2010).

Normally it is harder in countries with code law heritage for lawmakers and tax authorities to classify practices to reduce the tax burden as abusive and artificial, for which purpose it is often necessary to invoke general principles against fraudulent use of the law and abusive exercise of rights. In contrast, in countries with common law systems, judges have more power to establish the line between legal and illegal tax practices by developing case law.

This cost versus benefit tradeoff of tax aggressiveness is more problematic when the tax law and regulations are more complex and bureaucratized, as in Brazil. In analyzing the findings of Chen et al. (2010) in the Brazilian context, Martinez and Ramalho (2014) obtained a different result. In the period studied, family firms were more aggressive than other companies in efforts to reduce the tax burden, indicating a lack of concern over reputational risks. However, the authors did not use a proxy to measure the level of taxation on gross revenue (rather than income), which in most cases accounts for a large part of the tax liability of Brazilian companies. For this purpose, here we include a new measure, the tax burden disclosed in the statement of value added (SVA) in relation to that added value.

In addition, the research is aligned with the theme of tax aggressiveness, which has gained greater visibility in the Brazilian literature due to the increased frequency and volume of publications related to research and investigations of an empirical accounting nature that appreciate the causes and consequences of tax aggressiveness (CHIACHIO; MARTINEZ, 2019; LOPO MARTINEZ; FERREIRA, 2019; LOPO MARTINEZ; SALLES, 2018; LOPO MARTINEZ; SILVA, 2020; MARTINEZ; NOBRE, 2018; MARTINEZ; RODRIGUES, 2020).

## 2.3 Tax Burden on Added Value and Measures of Tax Aggressiveness

Annual publication of the statement of value added (SVA) has been legally required of listed firms in Brazil since 2009, according to Article 176, V, of Law 11,638/2007. Its purpose is to generate information to support estimation of the country's GDP and also to disclose economic and social information, through the so-called "social balance sheet", to reveal to society to what extent the company generates wealth and how it is distributed.

The main informative advantage of the SVA is the possibility of obtaining, in a single item, the total amount expended on taxes, public fees and social contributions by the company (Santos and Hashimoto 2003). This figure is thus a very good proxy for the total tax burden, not only on profit, but also on gross revenue; in the final analysis, the total wealth generated by the company.

By demonstrating how the wealth generated by the firm is distributed, the SVA brings a specific line for the sum of the amounts distributed to the three levels of government, the total tax burden. As such, it is a

metric to ascertain tax avoidance very similar to the effective tax rate (ETR), which in this paper only refers to federal taxes on profits. The “tax rate on added value” (TRAV) is calculated by dividing this line item by the total value added, expressed as a percentage.

A low TRAV rate is a good indication that the company is using actions to reduce its tax burden, so by comparing this metric between companies, it is possible to infer that one is less aggressive than the other when the TRAV is higher.

Along with the ETR, various other tax avoidance measures were tabulated in Hanlon and Heitzman (2010) through review of taxation studies. The majority of works on tax avoidance, earnings management and tax aggressiveness use as the main metrics the ETR and the difference between accounting (or book) income and taxable income, called the book-tax difference (BTD), or variations of these.

The BTD measure was introduced by Mills (1998) in a study that identified that the adjustments proposed by independent auditors are positively correlated with this gap, indicating that BTD is a yardstick that is related to various aspects of firms, in particular earnings management and persistence of earnings (Phillips et al. 2003; Hanlon 2005). The interpretation of BTD is the opposite of ETR (and our TRAV measure): the greater the BTD value, the more aggressive the firm will tend to be in taking actions to avoid taxes, and vice versa.

## 2.4 Government-Controlled Corporations and the Relationship of Government Power with Tax Aggressiveness

In government-controlled corporations, whose ownership structure combines public capital/power and private capital, there is a conflict of interest between the controlling shareholder (government), which besides making a profit, wants to provide often essential services to society (e.g., water/sanitation, energy), and the private owners, who only want to maximize their wealth through dividends and appreciation of the stock value.

The owners of family firms have a psychological incentive to protect the “family name” (CHEN et al. 2010). By analogy, it can be suggested that the same phenomenon operates in government-controlled corporations, whereby the politicians in power are worried about the political impact on their future careers of being labeled tax cheats in the media. This mechanism is supported by the theory of legitimacy. With the development of e-government initiatives, the public has increasing access to information and better ability to monitor the actions of public officials and the companies over which they exert power. But this can trigger policies to diminish the disclosure of accounting information, to reduce exposure to political risk (BEUREN; SOTHE, 2009). In any event, the utilization of resources outside the limits established by law or unproductively can tarnish the reputation and increase the political cost of those in charge of government-controlled corporations.

Besides these political aspects, the division of taxing powers enters the picture. Since the taxing powers of the three levels of government are sharply divided, but there is a degree of top-down revenue sharing, from the federal to state and local governments, and from states to municipalities, it can be very difficult to judge the final result regarding the breakdown of tax revenue among governments depending on a company’s tax strategies. For instance, a state government controlling shareholder might want to reduce the federal tax burden but not the state tax bite, even though some of the federal money later returns in the form of revenue sharing. Throw into his rich cauldron the facts that avoiding certain taxes is easier than others (e.g., taxes on profits are easier to massage than those on service revenues) and that not all companies are subject to taxation by all government levels, and the task of formulating tax strategies becomes truly Herculean. The bottom line, however, is that the lower the overall tax burden, the more will be available to distribute as dividends. In this respect, since a good portion of these dividend payouts by government-controlled companies goes to the private owners instead of the public coffers, the controlling shareholder should have incentives to be less tax aggressive than if the company were privately owned.

Therefore, we expect government-controlled corporations to be more conservative than privately controlled ones, and thus to be less tax aggressive, leading to the following hypothesis to be tested:

**H1:** Government-controlled corporations practice less aggressive tax planning than private run companies.

**H2:** The tax aggressiveness of government-controlled corporations is smaller when they are less dependent on private capital.

**H3:** The BTD of government-controlled corporations is significantly different in relation to earnings management or tax management when compared to the private run companies.

The result of this study can be used by potential investors to choose the type of government-controlled corporations to hold in their portfolios, because no matter how secure the investment may be due to the presence of the government, they may be required to bear a decline in profitability because the controlling shareholder might choose to place the public interest over the bottom line at some moments (COELHO, 2003). Tax authorities can also take advantage of the results to plan oversight actions, and society at large can better identify the behavior of companies and also the impact of tax costs on the services provided by these companies.

### 3 Methodology

#### 3.1 Sample

The sample was limited to corporations that publish the SVA and disclose their tax data according to the requirements of CPC-32 (Accounting Pronouncement on Taxes on Income), from the Accounting Pronouncements Committee. The reason for this is that one of the variables used to measure aggressiveness is the tax burden presented in the SVA. Therefore, we analyzed data on all publicly traded government-controlled corporations, among them 6 controlled by the federal government and 19 by state governments. The base for comparison was composed of all other listed firms without government ownership (291 companies). To facilitate identification, the companies are classified according to business segment in Table 1.

From a legal standpoint, government-controlled corporations are defined by Decree-Law 200/1967 as those where the executive branch (federal, state or municipal) controls all the decisions, with more than 50% and less than 100% of the voting shares. In the mathematical model, they are represented by the dummy variable "Gov-Cont", which assumes value 1 for government-controlled corporations and 0 otherwise.

**Table 1 - Segregation of the sample**

CONTROL TYPES	TOTAL (A+B+C+D)	A	B	C	D
		FINANCIAL CORPORATES	POWER ELECTRIC COMPANIES	WATER TREATMENT COMPANIES	OTHERS (gas and oil, technology, telecommunications)
Private Run Companies	291	13	41	3	234
Government-Controlled Corp.	25	8	8	7	2
<b>Total sample</b>	<b>316</b>	<b>21</b>	<b>49</b>	<b>10</b>	<b>236</b>
Distributios in the Govern-Contr Corp.					
State Government	19	5	7	7	0
Federal Government	6	3	1	0	2

Note: based on data from BM&FBovespa

The sample described in Table 1 led to 1,496 observations, between 2009 and 2013. The former year was chosen because it was when it became obligatory for listed corporations to publish the SVA, according to Law 11,638/2007.

#### 3.2 Procedures and Data Source

The data were obtained from the Economática® database, of all firms listed on the BM&FBovespa, with differentiation between government-controlled and privately controlled firms. The variable TRAV was obtained from the BM&FBovespa database, by using the search tool AIDC (Portuguese abbreviation for Automatic Identification and Capture of Data), because the Economática base does not contain information on whether or not firms publish the SVA. After this procedure, we unified the data in a single base with the companies listed according to their taxpayer number (National Registry of Legal Entities, or CNPJ).

We normalized the BTM variable by total assets in the previous year, to balance the comparison, and eliminated negative ETR values or those above 1.00. We used the STATA® software for treatment of the data.

#### 3.3 Measurement of Tax Aggressiveness

Tax aggressiveness was measured by applying linear regression with three dependent variables. The first was the effective tax rate (ETR), which measures the percentage of taxes on income (as opposed to those on gross revenues from sales of products and/or services). In this case, more tax-aggressive firms tend to have lower ETR values. The second was the difference between book income and taxable income, or book-tax difference (BTD), as proposed by Mills et al. (1998), which indicates greater aggressiveness the more positive its value is. ETR and BTD were also used in the studies of Chen et al. (2010) and Martinez and Ramalho (2014). The third variable, the main contribution of this work, was the tax rate on added value (TRAV), as indicated in the Statement of Value Added. Like the ETR, the more aggressive the company, the lower the TRAV value will be.

The determination of these variables is presented in Table 3. The following model was used:

$$TAX\ AGG = \beta_0 + \beta_1 Gov.\ Cont + \beta_2 (Gov.\ Cont \times Influencedummy) + \sum \beta_n Control.\ Variables + yeardummy + industrydummy + \varepsilon$$

Where:

Gov.Cont – dummy variable, to indicate if the firm is classified as a government-controlled corporation (1) or not (0).

Gov.Cont x Influencedummy – interaction dummy variable, represented by greater or lesser influence of the government (state or federal executive branch) on the company's policies.

Control variables – dependent variables that affect aggressiveness, available in the annual reports, represented by:

ROA – return on assets

LEVERAGE – index of financial leverage (debt to equity)

PPE – value of property, plant and equipment

INTANG – value of intangible assets

SIZE – size

MV – market value

YEARDUMMY – dummy variable for the years covered by the study

INDUSTRYDUMMY – dummy variable for segment of activity

### 3.4 Interaction Variable and other Control Variables

Our central objective is to ascertain whether control of companies by the government is a determinant of aggressiveness. Based on the analogous application of findings in the literature, we expected lower tax aggressiveness in the presence of  $\beta_1$ .

Complementarily, aggressiveness can be present in different forms, according to the level of influence of the private owners in the company's decisions or the company's dependence on private capital. For this reason, we identified the level government equity holdings in the companies, as shown in Table 2.

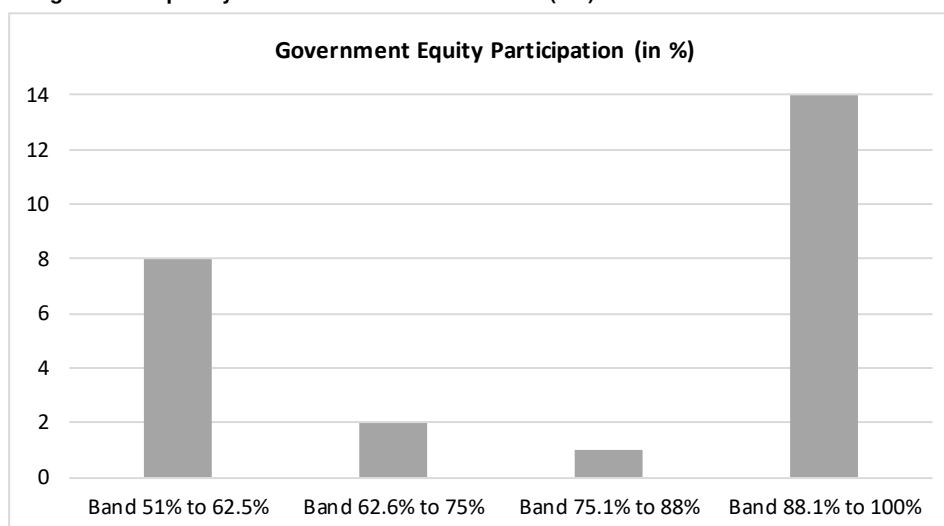
**Table 2 - Government equity participation (%)**

1	Banco de Brasília (BRB)	97%
2	Banestes	92%
3	Banpará	99%
4	Banrisul	99%
5	Banese	93%
6	Banco do Brasil	58%
7	Banco do Nordeste Brasileiro	99%
8	Banco do Amazônia (BASA)	97%
9	Cia Energética de Brasília (CEB)	90%
10	Centrais Elétricas Goiás	99%
11	Centrais Elétricas Minas Gerais	51%
12	Cia Paranaense de Energia	58%
13	Cia Estadual de Distribuição de En. Elétrica	66%
14	Centrais Elétricas de Santa Catarina	51%
15	Cia Energética de São Paulo	95%
16	Eletrobrás	77%
17	Cia Água Esgoto Ceará	88%
18	Saneago	99%
19	Copasa	51%
20	Sanepar	58%
21	Companhia Riograndense de Saneamento	99%
22	Cia Catarinense de Águas e Saneamento	64%
23	Sabesp	51%
24	Petrobras	62%
25	Telebrás	91%

Note: based on data from BM&FBovespa

The distribution of these participation levels is concentrated at the extremes (Figure 1). This means there are basically two types of government-controlled corporations in the sample: the first where the company is highly dependent on private capital (government ownership in the range of 51%), and the other where private capital is negligible (over 90% government ownership). In the first case, it is reasonable to expect management to yield to pressures from private shareholders for reduction of taxes, meaning more tax aggressiveness, while the opposite should apply to the second group of companies, which are not beholden to private investors.

Figure 1. Frequency Distribution in Control Shares (ON)



Source: based on data from BM&FBovespa

To account for this relationship of greater or lesser dependence on private capital, we included a binary variable called “influencedummy” to interact with the other variables regarding government-controlled corporations. The variable assumes the value of 1 when the government holding is greater than the median of 90.00%, and 0 otherwise. We expect with this to identify lower aggressiveness in  $\beta_2$  in relation to  $\beta_1$ .

The “yeardummy” variable acts as an indicator of a relevant event in a particular year that might influence the tax aggressiveness measures, because the possibility exists of an exogenous event (e.g., the crisis in 2008) that reduced the tax liability because of variations in the balance of tax loss carryforwards. Likewise, we included the “industrydummy” variable to capture differentiated behavior in certain economic segments (see Figure 2).

This type of comparison is necessary because companies in different segments do not have the same breakdown of tax costs and do not face the same regulatory pressures. The other control variables were included so that fundamental differences of the private run and government-controlled corporations would not negatively influence the results.

More profitable firms naturally tend to have higher ETR according to Chen et al. (2010), arguing for the inclusion of the variables return on assets (ROA) and leverage (LEV). Likewise, larger companies tend to have a greater cost x benefit relationship of tax aggressiveness and for this should be more motivated to adopt an aggressive stance. They also have greater capacity to invest in assets that have fiscal benefits such as accelerated depreciation, justifying the inclusion of variables measuring the value of intangible assets (INTANG), value of fixed assets (PPE), size (SIZE) and market value (MV). Figure 2 summarizes the form and calculation of the variables.

Figure 2 - Variables summary

VARIABLES	MEANING	EXPECTED SIGN	DETERMINATION
TAX AGG	Measures of tax aggressiveness (ETR, BTD, TRAV): ETR – effective tax rate on income BTD – difference between book income and taxable income TRAV – tax rate on added value		Total income tax expenses/profit before income taxes Book income – income subject to tax on profits/34% Total tax liability / added value
Gov.Cont.	Dummy variable indicating whether or not the firm is a government-controlled corporation	ETR + BTD – TRAV+	(1) for government-controlled corporations; (0) otherwise
Gov.Cont. x Influencedummy	Result of the interaction between government-controlled company (a) and influencedummy (b), which indicates the level of government ownership of government-controlled corporations	ETR + BTD – TRAV+	a: (1) for government-controlled corporations; (0) otherwise; b: (1) for government participation greater than 90%. (0) otherwise
ROA	Return on assets		Operating profit / total assets in the previous year
LEV	Leverage		Long-term debts / total assets in the previous year
INTANG	Value of intangible assets		Natural logarithm of intangible assets / total assets in the previous year
PPE	Value of property, plant and equipment		Natural logarithm of fixed assets / total assets in the previous year

VARIABLES	MEANING	EXPECTED SIGN	DETERMINATION
SIZE	Size of the company		Natural logarithm of market value at the start of the year
MV	Market value		Market value / equity value
Yeardummy	Dummy variable to capture influential events		2009, 2010, 2011, 2012, 2013
Industrydummy	Dummy variable for specific aspects of economic segment		Banking, energy, sanitation, others
$\varepsilon$	Residual factors and error term		

### 3.5 Earnings Management versus Tax Aggressiveness

By itself, the BTM metric is not suitable to identify the level of tax aggressiveness, since this measure is also related to other information about the financial performance of companies. In the case of earnings management, for example, managers use their own judgment in determining discretionary accruals, altering the financial reports to present information in the form most beneficial to their personal interests or in response to pressures from the market to present good accounting results or meet analysts' forecasts, which do not necessarily mean good tax results.

To account for this situation, we also sought to identify differences in the composition of BTM between government-controlled and private run corporations, to verify whether such differences arise from different levels of earnings management, tax management or neither of these factors. For this purpose, we included an additional test, based on the study of Formigoni et al. (2009), where through the equation  $BTM = \beta_0 + \beta_1 EM + \beta_2 TM + \sum \beta_n Control\ Variables + \varepsilon$  we aimed to identify the reasons for a possible difference in BTM between government-controlled and private run corporations. The main objective was to ascertain whether BTM indicates aggressiveness due to tax management (TM), earnings management (EM) or neither of these, hence our third hypothesis (H3).

Because this is just an additional test, we estimated the EM variable by the residual of the model of Jones (1991), with all variables weighted by total assets the previous year, that is, total accruals (TA), given by  $TA = \beta_0 + \beta_1 \Delta REV + \beta_2 PPE + \varepsilon$ , where by definition  $TA = profit - OCF$ . To estimate the variable TM, we used ETR as a proxy, as commonly done, in particular according to the studies of Petroni and Shackelford (1999) and Phillips (2003).

## 4 Analysis of the Results

### 4.1 Analysis of the Regressions (Comparison Between Government-Controlled and Private Run Corporations)

The first analysis involved the regressions without the interaction variable. To facilitate comparison, the results are unified in Table 3.

**Table 3 - Comparison of tax aggressiveness between the two types of companies**

Variable	ETR		BTD		TRAV	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
$\beta_0$	0.447	0.000	-0.121	0.000	0.464	0.000
Gov.Cont.	0.074	0.000	0.003	0.784	0.087	0.002
ROA	0.014	0.555	0.097	0.000	0.220	0.000
LEV	0.000	0.779	0.000	0.707	0.000	0.378
INTANG	0.009	0.000	-0.004	0.003	0.004	0.200
PPE	0.001	0.574	-0.002	0.207	0.000	0.997
SIZE	-0.010	0.000	0.008	0.000	0.000	0.976
MV	0.000	0.901	-0.001	0.001	-0.001	0.445
Industry dummy	Yes		Yes		Yes	
Year dummy	Yes		Yes		Yes	
	Number of obs = 937		Number of obs = 1117		Number of obs = 1117	
	F( 15, 921) = 3.71		F( 15, 1101) = 6.31		F( 15, 1101) = 14.65	
	Prob > F = 0.000		Prob > F = 0.000		Prob > F = 0.000	
	Adj R-squared = 0.042		Adj R-squared = 0.066		Adj R-squared = 0.155	
	Root MSE = 0.137		Root MSE = 0.082		Root MSE = 0.212	

Note: Each column of this table presents the result of the multivariate regression:  $TAX\ AGG = \beta_0 + \beta_1 Gov.Cont. + \beta_2 ROA + \beta_3 LEV + \beta_4 INTANG + \beta_5 PPE + \beta_6 SIZE + \beta_7 MV + industrydummy + yeardummy + \varepsilon$ , where TAX AGG was substituted by the dependent variables (ETR, BTD and TRAV). The coefficient  $\beta_0$  (intercept) represents data on private run corporations while the other coefficients represent the average value of each variable above the intercept. Remark: BTD weighted by total assets the previous year.

The data in Table 3 show that the average ETR value of the government-controlled corporations is higher than the average for privately held corporations, supporting the theoretical framework presented. On average, the government-controlled corporations presented ETR value 0.074 higher than their privately controlled peers, or a 7.4% higher tax burden on profits. This indicates that government-controlled corporations



tend to pay more heed to nontax costs, and are less tax aggressive, because when the ETR value is lower, so is tax aggressiveness.

For BTD we expected a negative and significant value for government-controlled corporations in comparison with the other listed firms, because the higher the BTD, the greater the level of aggressiveness. However, the result (0.003) and low significance indicate a similar level of aggressiveness between the two company types. But we point out that the BTD metric reflects not only the level of tax aggressiveness, but also a set of other factors, such as earnings management, earnings persistence and return on assets (Hanlon 2005). This composition is analyzed in the additional test.

The TRAV metric (0.087) also indicated less aggressiveness of government-controlled corporations. In other words, the overall tax burden is higher in these companies. This result reinforces the finding from ETR, which only indicates the rate of taxes on profits, complementing it with the taxes on gross revenue.

There is a strong similarity between the government-controlled corporations and other firms in the sample regarding size (SIZE), value of fixed assets (PPE) and of intangible assets (INTANG), as well as the average return on assets (ROA). The proximity of these metrics helps to demonstrate that the differences found regarding aggressiveness are strongly explained by the posture of management rather than the differences in fundamentals between the two types of firms.

Therefore, hypothesis H1 is supported by the results obtained for ETR and TRAV. The government-controlled corporations paid on average 7.4% more taxes on profits and 8.7% more in total taxes than the other companies, at a confidence level of 99%.

The results in Table 4 pertain to hypothesis H2, through regressions with the presence of the interaction variable. The robustness test result allows identifying whether there is any difference in the behavior within the group of government-controlled corporations according to level of government versus private capital.

Comparison of the coefficients of  $\beta_1$  and  $\beta_2$  in Table 4 shows no significant differences in the conservative versus aggressive behavior of the government-controlled corporations depending on level of government equity participation.

Although ETR has a significant coefficient (0.091) at 99% confidence, the other variables do not support this result. Both TRAV and BTD have low confidence levels for this group of the sample.

Therefore, hypothesis H2 is not supported by the results of the analysis of the interaction of "Gov.Cont. x influencedummy", because there is no significant demonstration of less aggressiveness in the government-controlled corporations with higher government equity participation (and hence greater government influence). The low need for private capital did not affect the behavior of the controlling shareholder, so there was no change in relation to the agency conflict in the way expected.

**Table 4 - Comparison of the dependent variables with the interaction variable**

Variable	ETR		BTD		TRAV	
	Coeff.	P-value	Coeff.	P-value	Coeff.	P-value
$\beta_0$	0.432	0.000	-0.114	0.000	0.455	0.000
Gov.Cont.	0.032	0.206	-0.002	0.889	0.079	0.028
Gov.Cont. x influencedummy	0.091	0.004	0.010	0.574	0.016	0.724
ROA	0.014	0.565	0.097	0.000	0.220	0.000
LEV	0.000	0.786	0.000	0.712	0.000	0.381
INTANG	0.009	0.000	-0.004	0.003	0.004	0.217
PPE	0.002	0.455	-0.002	0.222	0.000	0.978
SIZE	-0.008	0.006	0.008	0.000	0.000	0.943
MV	0.000	0.835	-0.001	0.001	-0.001	0.440
Industry dummy	Yes		Yes		Yes	
Year dummy	Yes		Yes		Yes	
	Number of obs = 937		Number of obs = 1117		Number of obs = 1117	
	F( 16, 920) = 4.02		F( 16, 1100) = 5.93		F( 16, 1100) = 13.73	
	Prob > F = 0.000		Prob > F = 0.000		Prob > F = 0.000	
	Adj R-squared = 0.049		Adj R-squared = 0.066		Adj R-squared = 0.154	
	Root MSE = 0.167		Root MSE = 0.082		Root MSE = 0.212	

Note: Each column presents the result of the multivariate regression:  $TAX\ AGG = \beta_0 + \beta_1\ Gov.Cont. + \beta_2\ (Gov.Cont.\ x\ Influencedummy) + \beta_3\ ROA + \beta_4\ LEV + \beta_5\ INTANG + \beta_6\ PPE + \beta_7\ SIZE + \beta_8\ MV + yeardummy + industrydummy + \varepsilon$ , where TAX AGG was substituted by the dependent variables (ETR, BTD and TRAV). The coefficient  $\beta_0$  represents data on the privately held corporations while the other coefficients represent the average value of each variable above the intercept. Remark: BTD weighted by total assets the previous year.

## 4.2 Test of Earnings Management versus Tax Aggressiveness

As mentioned, the proxy for earnings management used here (discretionary accruals) was the residual of the model of Jones (1991). The result is presented in Table 5. By definition, total accruals were estimated by the difference between profit for the year and operating cash flow.

**Table 5 - Estimation of abnormal accruals**

TA	Coeff.	Std. Error	T	P-value
$\Delta$ REV	0.284	0.202	1.400	0.161
PPE	554.179	305.934	1.810	0.070
Constant	0.005	0.020	0.240	0.809

Number of obs = 1130

F( 2, 1127) = 1.83

Prob &gt; F = 0.1607

R-squared = 0.1653

Root MSE = 0.21263

**Note:** This table presents the estimate of abnormal accruals using pooled data in the regression suggested by Jones (1991), where  $TA = \beta_0 + \beta_1 \Delta REV + \beta_2 PPE + \varepsilon$ .

$\Delta$ REV means the variation of revenues in the year weighted by total assets in the previous year.

PPE is the natural logarithm of fixed and intangible assets weighted by total assets in the previous year.

Table 6 presents the results of the estimation of BTD using ETR as a measure of earnings management and discretionary accruals (abnormal accruals) as a measure of earnings management:

**Table 6 - Composition of BTD**

BTD	Coeff.	Std. Error	T	P-value
TM (ETR)	0.000	0.000	2.66	0.008
EM (abnormal accruals)	0.284	0.159	1.78	0.075
Cons	0.018	0.003	5.59	0.000

Number of obs = 1129

F( 2, 1126) = 3,72

Prob &gt; F = 0.0246

R-squared = 0.2427

Root MSE = 0.10896

**Note:** This table presents the composition of BTD for all the firms according to Formigoni et al. (2009), where  $BTD = \beta_0 + \beta_1 EM + \beta_2 TM + \varepsilon$ . Abnormal accruals and the regression were calculated with pooled data.

BTD means the difference between book income and taxable income.

EM is the measure of earnings management (abnormal accruals) ascertained from the residual of the regression of Jones (1991) - Table 5. TM is the tax management metric, represented by ETR.

The result in Table 6 indicates that the level of tax management does not explain the BTD value of the companies in the period studied, perhaps due to the lack of a better proxy for this purpose. However, the BTD measure is partly explained ( $R^2=0.2427$ ) by earnings management, with a relevant coefficient ( $\beta=0.284$ ) and high confidence level (90%). This result was previously found by Formigoni et al. (2009) in their study using the KS and PAE models to estimate accruals. It should be noted that a good part of BTD is not explained, which can be the reason it is not aligned with the other tax aggressiveness variables (ETR and TRAV).

The coefficients in Table 6 show there is no significant difference in the level of earnings management between the government-controlled corporations and the other firms, which does not corroborate hypothesis H3. In other words, the government-controlled corporations in the sample had the same behavior as other companies regarding earnings management in the period studied.

## 5 Conclusions

The aim of this study was to identify whether government control of listed corporations is a determinant of less tax aggressiveness in Brazil. To attain this objective, we applied tests to compare the means between government-controlled corporations and other listed corporations with a regression model that used ETR, BTD and TRAV as dependent variables, as well as insertion of dummies (year, economic segment, level of government equity participation and hence influence) and other control variables (ROA, LEV, INTANG, PPE, SIZE and MV).

Additionally, we tested the influence of the composition of BTD according to the model developed by Formigoni et al. (2009), where accruals were estimated by the model of Jones (1991), with the aim of identifying whether a difference in BTD in the sample could be attributed to different levels of earnings management, tax management or nether of them.

The results of the regressions indicate that on average the government-controlled corporations have a more conservative stance regarding taxes, especially taxes on gross revenue, because of the lower aggressiveness represented by TRAV. By itself, this result does would not bring precise conclusions, but the ETR values strengthen this finding for taxes on profit, evidencing a greater tax burden of government-controlled corporations.

The BTD metric presented a different result: there was no significant difference in aggressiveness between the two types of corporations. However, the additional test revealed that BTD for the sample was not significantly correlated with tax management, indicating this variable depends on other social/economic factors. These factors might be related, for example, to greater pressure from the capital market and concern

with generating positive results, since BTD is directly correlated with earnings management. Furthermore, despite having a higher tax burden, the government-controlled corporations showed the same level of earnings management as the privately held peers.

These results indicate behavior influenced by multiple pressures, but allows us to state that in the Brazilian market, government-controlled corporations tend to have a higher tax burden, meaning they are less tax aggressive.

Finally, we point out that some of the government-controlled corporations, such as Petrobras and Banco do Brasil, have private pension funds whose investment portfolios contain voting shares issued by private run listed corporations. Although these holdings do not necessarily mean control, there is the possibility of influence of the pension funds over the management of the investee companies, and indirectly of the respective government-controlled corporations over the tax management policies. However, this influence is not easily measured, but is an interesting topic for further investigation.

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## NOTAS

### AGRADECIMENTOS

Não se aplica.

### CONTRIBUIÇÃO DE AUTORIA

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Revisão e aprovação: A. L. MARTINEZ, F. P. MOTA

### CONJUNTO DE DADOS DE PESQUISA

Não se aplica.

### FINANCIAMENTO

Não se aplica.

### CONSENTIMENTO DE USO DE IMAGEM

Não se aplica.

### APROVAÇÃO DE COMITÊ DE ÉTICA EM PESQUISA

Não se aplica.

### CONFLITO DE INTERESSES

Não se aplica.

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### PUBLISHER

Universidade Federal de Santa Catarina. Curso de Ciências Contábeis e Programa de Pós-graduação em Contabilidade. Publicação no [Portal de Periódicos UFSC](#). As ideias expressadas neste artigo são de responsabilidade de seus autores, não representando, necessariamente, a opinião dos editores ou da universidade.

### EDITORES

Carlos Eduardo Facin Lavarda e Suliani Rover

### HISTÓRICO

Recebido em: 16/11/2017 – Revisado por pares em: 11/05/2020 – Reformulado em: 10/05/2020 – Recomendado para publicação em: 11/06/2020 – Publicado em: 30/06/2020