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# *DETERMINANTS OF CORPORATE TAX LITIGATION IN BRAZILIAN COMPANIES: A MULTIFACTORIAL ANALYSIS*

# DETERMINANTES DA LITIGIOSIDADE TRIBUTÁRIA CORPORATIVA EM EMPRESAS BRASILEIRAS: UMA ANÁLISE MULTIFATORIAL

**The article is original and has not been presented at any previous event.**

Abstract
This study identifies and analyzes the main determinants of tax litigation in Brazilian publicly traded companies, focusing on internal factors such as indebtedness, size, growth, profitability, liquidity, and business risk. The sample consisted of 233 non-financial companies listed on the B3 (Brazilian stock exchange), examined from 2017 to 2022. Tax litigation was measured as the sum of tax provisions and tax contingent liabilities divided by total assets. Fixed effects regression results indicate that indebtedness is positively associated with tax litigation, supporting the hypothesis that more indebted companies tend to face more tax disputes. Conversely, firm size showed a significant negative relationship with tax litigation, suggesting that larger firms have more robust governance systems that mitigate tax conflicts. Additionally, companies experiencing growth and with higher liquidity demonstrated lower propensity for tax litigation. These findings offer practical implications for managers in formulating strategies for fiscal risk management and capital structure, as well as contributing to the debate on policies aimed at simplifying the tax system and reducing conflicts between taxpayers and the tax authorities.

**Keywords**: Tax litigation; determinants of tax litigation; corporate governance; corporate indebtedness; Brazilian companies.

***RESUMO***
Este estudo tem como objetivo identificar e analisar os principais determinantes da litigiosidade tributária em empresas brasileiras de capital aberto, focalizando fatores internos como endividamento, tamanho, crescimento, rentabilidade, liquidez e risco do negócio. A amostra compreende 233 empresas não financeiras listadas na B3, examinadas no período de 2017 a 2022. A litigiosidade tributária foi mensurada pela soma das provisões fiscais e dos passivos contingentes fiscais, dividido pelo ativo total. Os resultados das regressões com efeitos fixos indicam que o endividamento está positivamente associado à litigiosidade tributária, corroborando a hipótese de que empresas mais endividadas tendem a enfrentar mais litígios fiscais. Por outro lado, o tamanho da empresa apresentou relação negativa significativa com a litigiosidade, sugerindo que empresas maiores possuem sistemas de governança mais robustos que mitigam conflitos fiscais. Adicionalmente, empresas em crescimento e com maior liquidez demonstraram menor propensão a litígios tributários. Esses achados oferecem implicações práticas para gestores na elaboração de estratégias de gestão de riscos fiscais e estrutura de capital, além de contribuirem para o debate sobre políticas voltadas à simplificação do sistema tributário e à redução de conflitos entre contribuintes e o Fisco.

***Palavras-chave***: Litigiosidade tributária; determinantes da litigiosidade; governança corporativa; endividamento empresarial; empresas brasileiras.

**Antonio Lopo Martinez**
Antonio Lopo Martinez holds a PhD in Law from the University of Coimbra and the University of Salamanca, as well as a PhD in Controllership and Accounting from the University of São Paulo. He has a Master's degree in Administration from the University of California, Berkeley, and is a researcher at the Legal Institute of the Faculty of Law at the University of Coimbra, specializing in Tax Law and Accounting. E-mail: almartinez@fd.uc.pt ORCID iD: 0000-0001-9624-7646 Lattes: http://lattes.cnpq.br/7735660007039816

**Julia Leite Coutinho**
Julia Leite Coutinho holds a Master's degree in Accounting from Fucape Business School and is graduated in Accounting Sciences from Fucape and in Law from the Federal University of Espírito Santo (UFES). She is a Finance specialist with experience in financial and accounting analysis. E-mail: julialeitec@hotmail.com ORCID iD: 0009-0003-3096-0571 Lattes: http://lattes.cnpq.br/5575635161999913

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## 1. INTRODUCTION

Tax litigation, both legal and administrative, is a highly relevant topic in Brazil. The complex Brazilian tax system, characterized by extensive and detailed legislation, significantly impacts corporate actions, influencing the firms' competitiveness and development (Santi, 2021; Torres, 2012). As a result, many companies pursue tax planning strategies, balancing potential tax savings against the risk of penalties arising from divergent interpretations of tax legislation (Martinez, 2017; Hanlon & Heitzman, 2010).

Alarming data highlight the scale of this issue: litigation across the three levels of the Brazilian government accounts for approximately 75% of GDP, totaling BRL 5.44 trillion (Insper, 2019). At the federal level, this figure reaches 15.9% of GDP, far exceeding the average for OECD countries and Latin America (World Bank, 2020). This high level of litigation creates uncertainty and risks for companies, requiring an in-depth understanding of its determinants and impacts on corporate financial health (Barreto, 2020; Coelho, 2020).

The current literature identifies a gap in studying the factors influencing tax litigation in Brazil. While recent research focuses on tax aggressiveness and its effects on companies' capital structures (Dyreng, Hanlon, & Maydew, 2019; Hanlon & Heitzman, 2010; Martinez, 2017), there is a shortage of studies directly investigating the determinants of corporate tax litigation in the Brazilian context. Understanding these factors is crucial for firms to develop effective tax and risk management strategies, and it also contributes to public policy formulation aimed at simplifying and enhancing the transparency of the tax system (Mickiewicz, Rebmann, & Sauka, 2019; Soeiro & Wanderley, 2019).

This study aims to identify and analyze the main determinants of tax litigation in publicly traded Brazilian companies, focusing on internal factors such as debt, size, growth, profitability, liquidity, and business risk. The objective is to understand how these elements influence companies' propensity to engage in tax litigation, taking into account the regulatory environment and prevailing market practices.

The significance of this research lies in addressing the gap in the literature concerning the factors driving Brazilian companies to engage in tax disputes. Moreover, by shedding light on organizations' tax challenges, this study offers valuable insights for managers, investors, researchers, and public policymakers. With a better understanding of the determinants of tax litigation, companies can enhance their governance and risk management practices, while regulators can implement initiatives to reduce conflicts and foster a more stable and attractive business environment (Barreto, 2020; Santi, 2021).

This paper analyzes a sample of non-financial companies listed on the Brazilian Stock Exchange B3 (Brasil, Bolsa, Balcão), from 2017 to 2022. A quantitative approach is employed, using econometric models to examine the relationship between tax litigation and the selected variables. Litigation metrics are constructed from a combination of accounting provisions and tax contingencies, identified in the companies' balance sheets and explanatory notes, weighted by total assets.

The results of this research are expected to contribute to the literature by identifying the internal factors associated with higher levels of tax litigation. Consequently, managers can adopt preventive measures and more effective tax management strategies, while public policymakers can focus efforts on areas requiring greater attention, promoting tax system simplification and reducing tax conflicts (Insper, 2019; World Bank, 2020).

The paper is structured as follows: Section 2 presents the theoretical framework, discussing the concepts of tax litigation, its implications, and previous studies on its determinants. Section 3 outlines the methodology, detailing the sample, variables, and econometric models applied. Section 4 analyzes the results, comparing them with existing literature. Finally, Section 5 provides the conclusions, practical implications, and suggestions for future research.

## 2. THEORETICAL FRAMEWORK

### 2.1 Tax Litigation in Brazil

The complexity of the Brazilian tax system is widely recognized as a major obstacle to corporate competitiveness and business development (Barreto, 2020; Coelho, 2020). According to the World Bank's "Doing Business 2020" report, which evaluates the business environment in 190 economies, Brazil ranked 124th globally, highlighting structural challenges for business activities (World Bank, 2020). One critical aspect noted is the time spent by companies on tax compliance: in Brazil, the average is 1,501 hours per year, compared to 317 hours in Latin America and the Caribbean, and 159 hours in high-income OECD countries (World Bank, 2020).

This situation arises from the complex structure of the Brazilian tax system, characterized by extensive and intricate legislation and numerous ancillary obligations (Barreto, 2020). The complexity creates room for different legal interpretations, often leading to legal and administrative disputes between taxpayers and tax authorities (Coelho, 2020). These disagreements frequently result in tax assessments, fines, and penalties, imposing financial burdens on companies and consuming significant human resources in efforts to resolve these conflicts (Santi, 2021; Torres, 2012).

Therefore, tax litigation constitutes risk and uncertainty for the Brazilian business sector. Beyond the direct costs of tax disputes, companies face insecurity about future outcomes and the financial impacts involved (Santi, 2021). This uncertainty can influence strategic decisions, investment plans, and stakeholder relationships, ultimately affecting business performance and long-term sustainability (Torres, 2012).

Understanding the impact of tax litigation on companies and the broader economy is crucial for developing solutions to reduce conflicts and foster a more stable and attractive business environment for both domestic and international investors (World Bank, 2020). Identifying the factors that lead companies into tax litigation can inform public policy aimed at simplifying the tax system and enhancing the business environment (Insper, 2019).

## 2.2 Tax litigation and its accounting

This study defines tax litigation, from an accounting perspective, as the sum of tax provisions and contingent tax liabilities recognized by companies. According to Technical Pronouncement CPC 32 (2009), tax provisions and contingent liabilities arise from ongoing disputes with tax authorities or legislative changes announced after the financial reporting period.

Technical Pronouncement CPC 25 (2006) outlines the criteria for recognizing and measuring provisions and contingent liabilities. A provision is defined as a liability of uncertain timing or amount and is recognized when three conditions are met: (i) the existence of a present obligation resulting from a past event; (ii) the likelihood of an outflow of resources to settle the obligation; and (iii) the ability to reliably estimate the obligation's value (CPC 25, 2006).

On the other hand, contingent liability refers to a potential obligation arising from past events, which will only be confirmed by the occurrence or non-occurrence of one or more uncertain future events beyond the entity's control (CPC 25, 2006). Unlike provisions, contingent liabilities are not recognized in the balance sheet but are disclosed in the explanatory notes, providing information on the nature, estimated value, and probability of future disbursement (CPC 25, 2006).

The accurate classification and disclosure of tax disputes are crucial for financial statement transparency and for the proper risk assessment by investors and other stakeholders (Hanlon & Heitzman, 2010). Additionally, these disclosures reflect the companies' tax management and corporate governance policies (Dunbar et al., 2010).

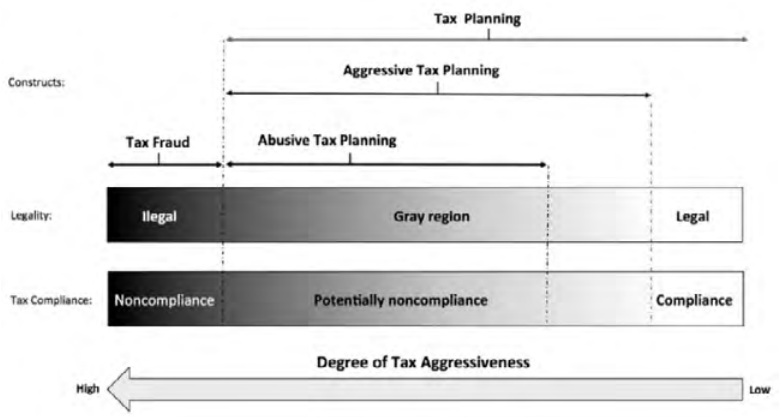
## 2.3 Tax Planning and Tax Aggressiveness

Tax disputes are intrinsically linked to companies' tax planning practices, especially when they involve aggressive strategies. Tax planning encompasses all strategies used by companies to minimize their tax burden, which may include legal (tax avoidance) or illegal (tax evasion) practices (Hanlon & Heitzman, 2010).

However, the literature on tax accounting lacks a standardized definition for concepts like "tax avoidance" or "tax aggressiveness" (Dyreng, Hanlon, & Maydew, 2019; Hanlon & Heitzman, 2010). This ambiguity extends to administrative regulations, blurring the lines between acceptable and unacceptable practices in the eyes of tax authorities (Martinez, 2017; Schoueri & Galendi Júnior, 2017).

Martinez (2017), adapting Lietz's (2013) framework, proposes a classification of tax planning practices along a continuum, ranging from fully lawful strategies to illicit tax evasion practices. Figure 1 illustrates this classification:

**Figure 1: Scale of Tax Planning and Tax Aggressiveness**




Source: Adapted from Martinez (2017).

Figure 1 shows that:

- Tax Avoidance: Refers to the legitimate use of loopholes or opportunities in legislation to reduce the tax burden without breaking the law.
- Aggressive Tax Planning: Consists of strategies that are not explicitly illegal but are deemed contrary to the spirit of the legislation and may be contested by tax authorities.
- Tax Evasion: Illegal practices that directly violate the legislation, such as the omission of income or the false declaration of expenses.

Legal and administrative disputes, leading to provisions and contingent tax liabilities, may stem from both legal and illegal practices. In cases of aggressive tax planning, companies may face disputes over the interpretation of tax rules, the application of tax rates, or the recognition of certain tax benefits (Martinez, 2017). Adopting such practices increases a company's exposure to tax risks and the likelihood of incurring penalties (Dyreng, Hanlon, & Maydew, 2019).

### 2.4 Determinants of Tax Litigation

Identifying the factors influencing companies' propensity to engage in tax litigation is crucial for understanding corporate behavior regarding tax risk. International studies have examined several determinants, including financial, operational, and governance characteristics (Hanlon & Heitzman, 2010; Dyreng, Hanlon, & Maydew, 2019).

Indebtedness: Companies with high debt levels may face pressure to reduce costs, including their tax burden, which can increase the likelihood of adopting aggressive tax strategies that lead to litigation (Martinez, 2017). Therefore, a positive relationship between debt and tax litigation is expected.

**Hypothesis 1 (H1):** *Company debt is positively related to tax litigation.*

Company Size: Larger companies tend to have more robust corporate governance systems and resources to invest in tax compliance, thus avoiding risky practices that lead to litigation (Hanlon & Heitzman, 2010). On the other hand, large companies may also have more incentives and resources to explore complex tax strategies. However, the expectation of a negative relationship prevails in the literature.

**Hypothesis 2 (H2):** *Company size is negatively related to tax litigation.*

Firm Growth: Fast-growing firms may prioritize maintaining a positive reputation and attracting investment, avoiding tax conflicts that could compromise their image (Mickiewicz, Rebmann, & Sauka, 2019). Thus, growth may be associated with lower litigation.

**Hypothesis 3 (H3):** *Firm growth is negatively related to tax litigation.*

Profitability: The relationship between profitability and tax litigation is ambiguous. Profitable firms may choose conservative tax strategies to preserve their reputation and avoid risks. Alternatively, they may seek to maximize profits through aggressive tax practices.

**Hypothesis 4 (H4):** *Firm profitability influences tax litigation, which may be positive or negative.*

Liquidity: Firms with greater liquidity have the resources to meet their tax obligations, reducing the need to engage in tax disputes (Dunbar et al., 2010). Thus, a negative relationship between liquidity and litigation is expected.

**Hypothesis 5 (H5):** *Firm liquidity is negatively related to tax litigation.*

Business Risk: Firms operating in higher-risk sectors may face greater volatility in earnings and cash flows, encouraging the adoption of aggressive tax practices to offset uncertainties (Hanlon & Heitzman, 2010). This may lead to greater litigation.

**Hypothesis 6 (H6):** *Business risk is positively related to tax litigation.*

The hypotheses formulated direct the research to identify how Brazilian firms' financial and operational characteristics influence their propensity to engage in tax litigation.

### 2.5 Institutional Theories and Organizational Legitimacy

The institutional perspective provides a theoretical framework for understanding how companies respond to pressures from the regulatory and social environment (Soeiro & Wanderley, 2019). According to this approach, organizations seek to legitimize their actions to stakeholders by conforming to institutional norms and expectations. In the tax context, compliance or the adoption of aggressive tax practices can be influenced by factors such as organizational culture, market pressures, and perceptions of the efficiency of tax institutions (Mickiewicz, Rebmann, & Sauka, 2019).

Organizational legitimacy reflects society's acceptance of a company's practices and is crucial for business sustainability (Soeiro & Wanderley, 2019). Companies involved in tax litigation may face challenges to their legitimacy, affecting their reputation and relationships with investors, customers, and regulatory bodies.

The next section outlines the study's methodology, describing the sample, variables, and econometric models used to test the proposed hypotheses.

## 3. METHODOLOGY

### 3.1 Sample, data collection, and description of variables

This study adopts a quantitative approach to investigate the determinants of tax litigation in publicly traded Brazilian companies. The sample consists of 233 companies from 27 non-financial sectors listed on B3 (Brasil, Bolsa, Balcão) as of March 31, 2023. These companies were selected due to their representativeness in the national economic context and the public availability of their financial and accounting information, ensuring transparency and replicability of the research.

Financial institutions were excluded due to their unique regulatory and operational characteristics, which could introduce biases in the results and hinder comparisons with companies from other sectors (Hanlon & Heitzman, 2010; Martinez, 2017). Additionally, financial companies have specific balance sheet structures and accounting standards that are not directly comparable to those of non-financial companies.

Companies that did not provide complete data for the analyzed period (2017 to 2022) or did not specify the nature of provisions and contingent tax liabilities in their explanatory notes and reference forms were also excluded. This filtering ensured data consistency and quality.

**Table 1 - Sample selection**

| Selection Criteria | Companies | Total observations |
|---|---|---|
| Companies listed on B3 | 386 | 2.316 |
| Financial companies | -34 | -204 |
| Companies without information on tax contingencies or without specifying the nature of provisions and contingent liabilities | -56 | -336 |
| Absence of other data in the period under analysis | -63 | -378 |
| Final observations | 233 | 1.398 |

Source: Research data, 2023.

The period from 2017 to 2022 was chosen to ensure the timeliness of the information and the availability of the necessary financial data. It is acknowledged that part of this period was affected by the COVID-19 pandemic, which may have influenced the financial results of the companies and, potentially, their levels of tax litigation. Although this impact can be considered a limitation of the study, the data analysis is expected to provide relevant insights into the recent dynamics of tax litigation in Brazil.

The financial data were collected from the accounting statements available in the Comdinheiro® database. Information regarding provisions and contingent tax liabilities was manually extracted from the explanatory notes of the companies' financial statements, ensuring accuracy and reliability in constructing the dependent variable. Data processing and analysis were performed using Stata® statistical software.

To minimize the influence of extreme values (outliers) and ensure the robustness of the analyses, the winsorization technique was applied to the continuous variables at the 1% level at each end of the distribution, as established in the financial literature (Hanlon & Heitzman, 2010; Wooldridge, 2010).

### 3.2 Econometric model and variables

To test the proposed hypotheses and identify the determinants of tax litigation, the following econometric model was estimated:

$$Tax\ litigation_{i,t} = \beta_0 + \beta_1 Indebtedness_{i,t} + \beta_2 Size_{i,t} + \beta_3 Profitability_{i,t} + \beta_4 Growth_{i,t} + \beta_5 Liquidity_{i,t} + \beta_6 Asset\ Structure_{i,t} + \beta_7 Risk + \varepsilon_{i,t} \quad (1)$$

Where:
Tax Litigation $_{i,t}$: Level of tax litigation of company *i* in year *t*.
$\beta_0$: Model's intercept.
$\beta_1$ to $\beta_7$: Coefficients of the independent variables.
$\varepsilon_{i,t}$: Random error term.

**Dependent Variable**

Tax litigation is the dependent Variable. It is operationalized as the sum of tax provisions and contingent tax liabilities divided by the company's total assets. This measure allows us to assess the company's relative exposure to tax litigation concerning its size, following established accounting practices (CPC 25, 2006; CPC 32, 2009; Martinez, 2017).

**Table 2 - Dependent Variables**

| Dependent Variable | Specification |
|---|---|
| Tax Litigation | $\frac{(Tax\ Provision_t + Contingent\ tax\ liabilities_t)}{Total\ Assets_t}$ |
| Tax Litigation – Tax Provision | $\frac{(Tax\ provision_t)}{Total\ Assets_t}$ |
| Tax Litigation – Contingent Tax Liabilities | $\frac{(Contingent\ tax\ liabilities)}{Total\ Assets_t}$ |

**Table 3 - Independent Variables**

| Independent variables | Expected relationship | Specification |
|---|---|---|
| Size | + | $\ln TotalAssets_t$ |
| Asset structure or tangibility | - | $\frac{(Fixed\ Assets_t + Stock_t)}{Total\ Assets_t}$ |
| Growth | - | $\frac{(Net\ op.\ income._t - Net\ op\ income._{t-1})}{Net\ op\ income._{t-1}}$ |
| Profitability | - | $\frac{Net\ Income_t}{Total\ Assets_{t-1}}$ |

| Independent variables | Expected relationship | Specification |
|---|---|---|
| Risk | - | $\frac{\sigma \text{ of 5 year EBIT}}{Total\ Assets_t}$ |
| Current liquidity | - | $\frac{Current\ Assets_t}{Current\ Liabilities_t}$ |

Source: Elaborated by the authors

- Indebtedness: Represents the company's financial leverage. More indebted companies may adopt aggressive tax strategies to reduce costs, which can increase the likelihood of litigation (Martinez, 2017).
- Size: Measured by the natural logarithm of total assets. Larger companies typically have more robust governance structures, potentially reducing their propensity for litigation (Hanlon & Heitzman, 2010)
- Profitability: Defined as the ratio of net income to total assets from the previous period. The relationship with litigation may be ambiguous, as discussed in the hypotheses (Mickiewicz et al., 2019).
- Growth: Reflects the percentage change in net operating revenue. Growing companies may avoid litigation to protect their reputation (Mickiewicz et al., 2019
- Current Liquidity: Measures the company's ability to pay short-term obligations. Greater liquidity may reduce the need for involvement in tax litigation (Dunbar et al., 2010).
- Asset Structure: A control variable representing the tangibility of assets, which influences financing and risk decisions.
- Companies with higher risk may be more inclined to adopt aggressive tax practices (Hanlon & Heitzman, 2010).

**Justification of the Statistical Techniques Used**

Different statistical techniques were used to analyze the data and test the hypotheses. They were justified by the nature of the variables and the objective of the study:

- Panel Data Models with Fixed Effects: Employed to capture temporal and inter-company variations, controlling for unobserved and constant characteristics that may influence tax litigation (Wooldridge, 2010). This approach isolates the effect of the independent variables on the dependent variable, enhancing the robustness of the results.
- Binary Logistic Regression (Logit): Applied to identify the determinants of companies with high and low levels of tax litigation. Companies were classified into quartiles, with those in the upper quartile considered to have high litigation and those in the lower quartile considered to have low litigation. This technique is well-suited for modeling binary dependent variables and allows for the analysis of the probability of a company belonging to a specific group based on the explanatory variables (Hosmer, Lemeshow & Sturdivant, 2013).
- Quantile Regression: Used to examine the effect of independent variables at different points in the distribution of tax litigation (Koenker & Bassett, 1978). This method is appropriate when the impact of the determinants may differ across companies with low, medium, or high levels of litigation, offering a more nuanced analysis of the phenomenon.

**Treatment of Potential Problems**

- Multicollinearity: Assessed using the Variance Inflation Factor (VIF). VIF values lower than 10 indicated the absence of significant multicollinearity between the independent variables (Gujarati & Porter, 2011).
- Heteroscedasticity: Tested using the Breusch-Pagan/Cook-Weisberg test. When identified, robust corrections were applied to the standard errors to ensure the validity of the statistical inferences.
- Serial Autocorrelation: Considered in panel models, especially in temporal data. Standard errors clustered per company were used to correct for possible correlations between the residuals over time (Wooldridge, 2010).
- Endogeneity: Recognizing that some independent variables may be endogenous, additional analyses and specification tests (such as the Hausman test) were performed to verify the consistency of the estimators. However, limitations in data and adequate instruments prevented the application of instrumental variables models. The results should be interpreted with caution and future research should examine this issue in depth.

Regarding the research protocol, all stages of the research were systematically documented to allow other researchers to replicate the study. Details on data collection, construction of variables, statistical procedures, and codes used in Stata® are available upon request from the authors, respecting ethical and confidentiality standards.

The methodology adopted seeks to respond to the central objective of identifying and analyzing the determinants of tax litigation in listed Brazilian companies. By combining different statistical techniques and controlling for possible biases, the results are expected to be robust and contribute to understanding the phenomenon, providing support for managers, investors, and policymakers.

## 4. RESULTS AND DISCUSSION

In this section, we present and discuss the results obtained from the analysis of the determinants of tax litigation among Brazilian publicly traded companies. The descriptive statistics of the variables used are presented first, followed by the correlation analysis. Next, the results of the linear regressions and robustness tests are provided, with an interpretation of the findings in light of the hypotheses formulated, as well as a comparison with the existing literature.

### 4.1 Descriptive Statistics

**Table 4** presents the descriptive statistics of the variables of interest used in the study.

**Table 4 - Descriptive statistics**

| Variable | Obs | Average | Standard Deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Tax Litigation | 1,398 | 0.149 | 0.433 | 0 | 3.308 |
| Litigation – Tax Provision | 1,398 | 0.011 | 0.030 | 0 | 0.228 |
| Litigation – Contingent Tax Liabilities | 1,398 | 0.136 | 0.421 | 0 | 3.267 |
| Indebtedness | 1,398 | 0.766 | 0.626 | 0.103 | 4.231 |
| Size (BRL million) | 1,398 | 15003.11 | 30795.94 | 23.24 | 208110.6 |
| Profitability | 1,398 | 0.035 | 0.128 | -0.442 | 0.434 |
| Growth | 1,398 | 0.165 | 0.404 | -0.834 | 2.393 |
| Liquidity | 1,398 | 1.939 | 1.988 | 0.026 | 15.384 |
| Asset Structure | 1,398 | 0.333 | 0.235 | 0 | 0.864 |
| Business Risk | 1,398 | 0.065 | 0.106 | 0.005 | 0.795 |

The average tax litigation is 0.149, with a standard deviation of 0.433, indicating significant variation between firms. The maximum value of 3.308 suggests that some firms have very high levels of litigation relative to their total assets. The decomposition of litigation shows that the average tax provision is 0.011, while the average tax contingent liability is 0.136, indicating that most of the litigation is represented by tax contingencies that are not recognized in the balance sheet but are disclosed in the explanatory notes.

The average indebtedness of companies is 76.6%, with a variation between 10.3% and 423.1%, suggesting that some companies are highly leveraged. Firm size, measured by total assets, varies widely, reflecting the diversity of the sample, which includes everything from smaller companies to large corporations. The average profitability is 3.5%, with some companies showing losses (negative profitability). The average revenue growth is 16.5%, but there is considerable dispersion, indicating different stages of development for the companies.

These statistics provide an initial view of the profile of the companies analyzed and the variability of the data, which are important aspects for interpreting the subsequent results.

### 4.2 Correlation Matrix

**Table 5** presents the Pearson correlation matrix between the study variables.

**Table 5 - Pearson Correlation Matriz**

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|---|
| 1. Tax litigation | 1.000 | 1.000 | | | | | | |
| 2. Indebtedness | 0.400*** | 1.000 | | | | | | |
| 3. Size | -0.104*** | -0.241*** | 1.000 | | | | | |
| 4. Profitability | -0.188*** | -0.428*** | 0.108*** | 1.000 | | | | |
| 5. Growth | -0.069*** | -0.056*** | 0.003 | 0.192*** | 1.000 | | | |
| 6. Liquidity | -0.157*** | -0.306*** | -0.170*** | 0.177*** | 0.018 | 1.000 | | |
| 7. Asset Structure | 0.018*** | 0.063 | -0.092*** | -0.056*** | 0.035*** | -0.087*** | 1.000 | |
| 8. Business risk | 0.194*** | 0.503*** | -0.343*** | -0.130*** | -0.009 | -0.001 | -0.045 | 1.000 |

*** p<0.01. ** p<0.05. * p<0.1.

The correlation matrix reveals remarkable relationships:

- **Tax Litigation and Indebtedness:** Positive and significant correlation (0.400***), indicating that more indebted companies tend to have higher levels of tax litigation. This finding aligns with **Hypothesis 1 (H1)**, which proposes a positive relationship between indebtedness and litigation.
- **Tax Litigation and Size:** Negative and significant correlation (-0.104***), suggesting that larger companies tend to have lower tax litigation, supporting **Hypothesis 2 (H2)**.
- **Tax Litigation and Profitability:** Negative and significant correlation (-0.188***), indicating that more profitable companies may be less prone to tax litigation. This result will be explored later, given the ambiguity predicted in **Hypothesis 4 (H4)**.
- **Tax Litigation and Current Liquidity:** Negative and significant correlation (-0.157***), consistent with **Hypothesis 5 (H5)**, which suggests that companies with greater liquidity have less litigation.
- **Tax Litigation and Business Risk:** Positive and significant correlation (0.194***), indicating that companies with greater risk tend to have greater litigation, in line with **Hypothesis 6 (H6)**.

The correlations between the independent variables are also relevant. For example, there is a strong negative correlation between indebtedness and profitability (-0.428***) and a strong positive correlation between indebtedness and business risk (0.503***). These relationships indicate the need to pay attention to potential multicollinearity problems, which will be addressed in the diagnostic tests of the regression models.

### 4.3 Linear Regression Analysis

To test the proposed hypotheses and identify the determinants of tax litigation, linear regression models were estimated with panel data, including fixed and pooled effects. **Table 6** presents the results.

**Table 6 - Results of Linear Regressions – Fixed and Pooled Effects**

| | Fixed Effect | Pooled Effect |
|---|---|---|
| | Tax Litigation | Tax Litigation |
| Indebtedness | 0.222** | 0.243*** |
| Size | -0.062*** | -0.020*** |
| Profitability | 0.154 | -0.060 |
| Growth | -0.019** | -0.056** |
| Liquidity | 0.001 | -0.016*** |
| Asset Structure | 0.036 | -0.025 |
| Business risk | 0.131 | -0.095 |

| | Fixed Effect | Pooled Effect |
|---|---|---|
| | Tax Litigation | Tax Litigation |
| Constant | 0.435** | 0.069 |
| R-Squared Within | 0.247 | 0.242 |
| Observations | 1,398 | 1,398 |
| Groups | 233 | 233 |

*p < 0,1 **p < 0,05 ***p < 0,01

The results indicate that:

- **Indebtedness:** In both models, the indebtedness coefficient is positive and significant (0.222** in the fixed effects model and 0.243*** in the pooled model), supporting **Hypothesis H1**. This suggests that more financially leveraged companies have greater tax litigation. One possible interpretation is that these companies seek to reduce costs, including the tax burden, through strategies that may increase the likelihood of tax litigation (Martinez, 2017).
- **Size:** The size coefficient is negative and significant in both models (-0.062*** and -0.020***), supporting **Hypothesis H2**. Larger companies tend to have less tax litigation, possibly due to more structured governance systems and greater investment in tax compliance (Hanlon & Heitzman, 2010).
- **Growth:** This variable presents negative and significant coefficients (-0.019** and -0.056**), indicating that growing firms are less likely to engage in tax disputes, which aligns with **Hypothesis H3**. This may reflect a concern of these companies in maintaining a good reputation and attracting investors (Mickiewicz et al., 2019).
- **Current Liquidity:** Current liquidity has a negative and significant coefficient (-0.016***) in the pooled model, supporting **Hypothesis H5**. Companies with greater liquidity appear to have less need to engage in tax disputes, as they have resources to meet their obligations.
- **Profitability:** In the fixed effects model, profitability is not statistically significant, and in the pooled model, the coefficient is negative but not significant. This result reflects the ambiguity predicted in **Hypothesis H4**, suggesting that the relationship between profitability and litigation may depend on other factors not captured by the model.
- **Business Risk and Asset Structure:** They did not present significant coefficients in any of the models, which may indicate that these factors are not direct determinants of tax litigation in the sample analyzed or that their influence is indirect or conditioned by other variables.

**Diagnostic Tests and Model Selection**

Diagnostic tests were performed to verify the adequacy of the estimated models. **Table 7** shows the results.

**Table 7 - Diagnostic Tests and Model Selection**

| Robustness tests | Statistics | P-Value | Result |
|---|---|---|---|
| Multicollinearity | Average VIF = 1.18 | - | There is no significant multicollinearity between variables |
| Variable omission (Ramsey RESET test) | F(3,1162) = 1.02 | 0.382 | There is no evidence of omission of relevant variables |
| Heteroscedasticity | Breusch Pagan Test | <5% | There is no heteroscedasticity |

Source: Elaborated by the authors

The Hausman test was applied to choose between fixed and random effects models. The result ($\chi^2 = 29.87$; $p < 0.001$) indicated that the fixed effects model is preferable. Therefore, the fixed effects model is considered more appropriate for the analysis, as it controls for unobserved and unchangeable characteristics of companies that may affect tax litigation.

### 4.4 Additional Robustness Tests

Additional tests were performed using binary logistic regression and quantile regression in order to verify the robustness of the results and explore possible non-linearities,

#### 4.4.1 Binary Logistic Regression

Companies were classified into quartiles of tax litigation, and logistic regressions were estimated to identify the determinants of companies in the upper quartile (high litigation) and in the lower quartile (low litigation). Table 8 presents the results.

The proposed models are as follows:

$$High\ Tax\ Litigation_{i,t} = \beta_0 + \beta_1 Indebtedeness_{i,t} + \beta_2 Size_{i,t} + \beta_3 Profitability_{i,t} + \beta_4 Growth_{i,t} + \beta_5 Liquidity_{i,t} + \beta_6 Asset\ Structure_{i,t} + \beta_7 Risk + \varepsilon_{i,t}$$

$$Low\ Tax\ Litigation_{i,t} = \beta_0 + \beta_1 Indebtedeness_{i,t} + \beta_2 Size_{i,t} + \beta_3 Profitability_{i,t} + \beta_4 Growth_{i,t} + \beta_5 Liquidity_{i,t} + \beta_6 Asset\ Structure_{i,t} + \beta_7 Risk + \varepsilon_{i,t}$$

Where:
"High litigation" is the highest quartile in terms of litigation, assigning the value 1, and zero to the others; and
"Low litigation" is the lowest quartile, assigning the value 1, and zero to the others.

**Table 8 - Results of Binary Logistic Regressions**

| Variables | Low tax litigation | High tax litigation |
|---|---|---|
| Indebtedness | -0.044 | 0.496*** |
| Size | -0.400*** | 0.292*** |
| Profitability | -0.348 | -1.097* |
| Growth | 0.293* | -0.253 |
| Liquidity | 0.156*** | -0.335*** |
| Asset Structure | -0.432 | -0.124 |
| Business risk | -2.827** | 2.068*** |
| Constant | 2.027*** | -3.363*** |
| Observations | 1,398 | 1,398 |
| Groups | 233 | 233 |

*p < 0.1 **p < 0.05 ***p < 0.001

Source: Elaborated by the authors

The results in Table 8 offer insights into the determinants of firms with high and low tax litigation through binary regressions.

- **Indebtedness**: This is a significant factor for companies with high litigation (positive coefficient of 0.496***), reinforcing the influence of indebtedness on the propensity for tax litigation.
- **Size**: This presents opposite coefficients in both groups, negative and significant for companies with low litigation (-0.400***) and positive and significant for companies with high litigation (0.292***). This suggests that larger companies with high litigation are more prone to litigation, possibly due to greater exposure and complexity of operations.
- **Liquidity**: Positive and significant for companies with low litigation and negative and significant for companies with high litigation, indicating that liquidity acts as a protective factor, as proposed in Hypothesis H5.

- **Business Risk**: Negative and significant for companies with low litigation and positive and significant for companies with high litigation, reinforcing the idea that risk is associated with greater litigation.

#### 4.4.2 Quantile Regression

Quantile regression allows us to analyze the impact of independent variables at different points in the distribution of tax litigation. The results for the 25th, 50th (median), and 75th percentiles are presented in Table 9.

**Table 9 - Results of Quantile Regressions**

| Group | Variable | 25th Percentile | Median | 75th Percentile |
|---|---|---|---|---|
| Tax litigation | Indebtedness | 0.003 | 0.033*** | 0.218*** |
| | Size | 0.004*** | 0.009*** | 0.009 |
| | Profitability | 0.003 | -0.002 | -0.162 |
| | Growth | -0.001 | -0.006 | -0.011 |
| | Liquidity | -0.001 | -0.0002 | 0.003 |
| | Asset Structure | 0.004 | 0.005 | 0.001 |
| | Business risk | 0.048*** | 0.109*** | 0.235* |
| | Constant | -0.025*** | -0.060*** | -0.099*** |
| | $R^2$ | 0.014 | 0.031 | 0.089 |

Source: Elaborated by the authors

At the 25th percentile of tax litigation, we observe that firm size has a positive effect (0.004***), as does business risk, with a coefficient of 0.048***. This indicates that for firms in the bottom quartile of litigation, an increase in size and business risk is associated with an increase in litigation.

The median shows that indebtedness and business risk play significant roles, with coefficients of 0.033*** and 0.109***, respectively. Firm size continues to have a positive effect, albeit smaller (0.009***). This suggests that an increase in debt and business risk is strongly correlated with an increase in tax litigation for the average firm.

At the 75th percentile – firms with the highest levels of litigation – indebtedness has a significantly positive coefficient of 0.218***, reinforcing the idea that debt is a key determinant of litigation in firms with high levels of litigation. Interestingly, the coefficient for business risk is also positive and significant (0.235*), but its magnitude is more moderate compared to the median.

In summary, the quantile regression results highlight that indebtedness, firm size, and risk are consistent determinants of tax litigation at different points in its distribution. However, the influence of these variables varies as we move from the bottom to the top of the litigation distribution.

#### 4.4.3 Analysis of the Tax Litigation Components

To better understand the nature of litigation, separate regressions were performed for the components of tax provisions and contingent tax liabilities. Tables 10 and 11 present the results.

**Table 10 - Regression for Tax Provision**

| Variables | Fixed effect | Pooled |
|---|---|---|
| Indebtedness | 0.029*** | 0.016*** |
| Size | -0.006*** | 0.000 |
| Profitability | -0.004** | -0.005 |
| Growth | -0.001 | -0.003* |
| Liquidity | 0.0002 | -0.001** |
| Structue of assets | -0.017* | -0.006 |
| Business risk | -0.006 | 0.007 |

| Variables | Fixed effect | Pooled |
|---|---|---|
| Constant | 0.043** | 0.003 |
| Observations | 1,398 | 1,398 |
| Groups | 233 | 233 |

*p < 0.1 **p < 0.05 ***p < 0.001

Source: Elaborated by the authors

The results show that indebtedness positively affects the level of tax provisions. This outcome suggests that more indebted firms anticipate potential tax losses and set aside larger provisions. Firm size is negatively associated with provisions in the fixed effects model, suggesting that larger firms can better manage their tax obligations.

**Table 11 - Regression for Contingent Tax Liabilities**

| Variables | Fixed effects | Pooled |
|---|---|---|
| Indebtedness | 0.191** | 0.226*** |
| Size | -0.057*** | -0.020*** |
| Profitability | 0.185 | -0.039 |
| Growth | -0.017* | -0.050* |
| Liquidity | 0.002 | -0.015*** |
| Asset Structure | 0.066 | -0.017 |
| Business risk | 0.110 | -0.125 |
| Constant | 0.401** | 0.066 |
| Observations | 1,398 | 1,398 |
| Groups | 233 | 233 |

*p < 0.1 **p < 0.05 ***p < 0.001

Source: Elaborated by the authors

The results confirm that indebtedness is positively related to contingent tax liabilities, indicating greater exposure to unprovisioned tax litigation. Firm size shows a significant negative relationship, reinforcing that larger companies better manage their tax risks.

### 4.5 Discussion of results

The findings largely corroborate the hypotheses formulated and align with the existing literature. **Hypothesis H1**, which proposed a positive relationship between indebtedness and tax litigation, was confirmed. The regressions indicated that companies with higher indebtedness levels tend to have higher levels of tax litigation. This result suggests that leveraged companies may feel greater pressure to reduce costs, including the tax burden, which may lead them to adopt riskier tax strategies and, consequently, increase the propensity for tax litigation (Martinez, 2017; Hanlon & Heitzman, 2010).

**Hypothesis H2**, which predicted a negative relationship between company size and tax litigation, was also supported by the results. Larger companies showed a lower propensity to engage in tax litigation, which can be attributed to more robust corporate governance systems, greater investment in tax compliance, and a heightened concern with maintaining reputation before investors and the market (Hanlon & Heitzman, 2010; Soeiro & Wanderley, 2019).

The negative relationship observed between company growth and tax litigation confirms **Hypothesis H3**. Expanding companies may avoid tax conflicts to preserve a positive image and attract new investments (Mickiewicz, Rebmann & Sauka, 2019). Furthermore, **Hypothesis H5** was corroborated by the inverse relationship between current liquidity and litigation, indicating that companies with greater financial capacity to meet their tax obligations have less need to engage in disputes with the tax authorities (Dunbar et al., 2010).

However, **Hypothesis H4**, regarding the influence of profitability on tax litigation, was not consistently confirmed. This reflects the ambiguity in the literature, where profitable companies can either avoid litigation to preserve their reputation or seek to maximize profits through more aggressive tax practices (Hanlon & Heitzman, 2010).

Business risk was relevant in some analyses, suggesting that companies with greater operational volatility may be more exposed to tax litigation. However, its effects were inconsistent across all regressions, indicating that other factors may moderate this relationship.

The results show the importance of financial and structural characteristics in determining tax litigation. These findings emphasize the need for aligned financial and tax management, highlighting the role of corporate governance in mitigating tax risks.

**Limitations**

Despite efforts to ensure the robustness of the results, the study has some limitations. The possible presence of endogeneity in the relationships analyzed could not be completely eliminated due to the difficulty in identifying appropriate instrumental variables. This may affect the causal interpretation of the results. Future research may use advanced methods, such as instrumental variable models and dynamic panels, to address this issue.

In addition, the analysis period included years affected by the **COVID-19 pandemic**, which may have influenced companies' financial and tax behavior. Future studies could isolate the effects of the pandemic or extend the period investigated to verify the persistence of the findings.

Another limitation refers to the focus on companies listed on B3. Although these companies are representative and provide reliable data, the results may not be generalizable to private or smaller companies. Sectoral and regional factors were also not explored in depth, opening up opportunities for future research considering these variables.

## 5 CONCLUSIONS AND IMPLICATIONS

This study investigated the determinants of tax litigation in Brazilian publicly traded companies, using financial and corporate metrics to understand which factors influence the propensity to engage in tax disputes. The results provide relevant insights into how companies' internal characteristics are associated with tax litigation, contributing to the literature and offering significant practical implications.

A key finding was the positive and significant association between debt and tax litigation, suggesting that highly leveraged companies are more prone to tax conflicts. This indicates the need for such companies to review their tax and risk management strategies to mitigate potential disputes. On the other hand, the negative relationship between company size and litigation confirms that larger companies tend to have fewer tax disputes, possibly due to more solid governance systems and greater investment in tax compliance.

Additionally, companies with greater growth and liquidity demonstrated a lower propensity for tax litigation, suggesting that robust financial health and expansion-oriented strategies can reduce conflicts with tax authorities. The relationship between profitability and litigation was inconclusive, reflecting the literature's ambiguity. While business risk was relevant in some analyses, it was not consistent enough to confirm its direct influence.

The findings have important implications for managers and professionals in the accounting and tax areas. Understanding that debt is associated with higher levels of tax litigation can guide decisions on capital structure and strategies to mitigate tax risks. Smaller companies may benefit from investing in governance and tax compliance, following the example of larger companies, to reduce exposure to litigation. In addition, integrating considerations of tax litigation into strategic planning can help companies avoid costly conflicts and preserve their reputation.

Future research could deepen the analysis of the determinants of tax litigation, considering qualitative aspects such as corporate governance practices, organizational culture, and management profile. Sectoral investigations or international comparisons may reveal specific nuances and identify universal factors. Furthermore, advanced econometric methods that address endogeneity may allow for more robust causal inferences.

In conclusion, this study contributes to understanding the factors influencing tax litigation in publicly traded Brazilian companies. By highlighting the relationship between financial and corporate characteristics and the propensity for tax litigation, it provides valuable support for business management and the formulation of public policies aimed at simplifying the tax system and reducing conflicts between taxpayers and tax authorities. Understanding the determinants of tax litigation is essential to promoting a more stable and predictable business environment, benefiting both companies and the economy as a whole.

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