

# Tax Litigation and Corporate Debt: A Brazilian Perspective

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## Abstract

**Objective:** This study examines the impact of tax disputes, particularly those between firms and tax authorities, on corporate debt levels among Brazilian companies. Motivated by the significant prevalence of tax litigations in Brazil and a noticeable gap in academic research exploring the connection between these litigations and corporate debt within the Brazilian economic context.

**Method:** The sample includes non-financial firms listed on the Brazilian stock exchange from 2017 to 2022. Linear regression methodology, utilizing panel data and fixed effects, was employed to analyze the relationship. Tax litigation was quantified by summing tax provisions and contingent liabilities, which were then relativized by the firms' total assets. Data were sourced from Comdinheiro software, with additional information manually gathered from company explanatory notes.

**Results or Discussion:** The study found a positive relationship between tax litigation and firm indebtedness in Brazil. This suggests that companies involved in more tax disputes tend to have higher levels of debt, pointing towards a complex relationship between the two variables in the Brazilian economic landscape.

**Contribuições:** This research provides new insights by examining the effect of tax litigation on Brazilian firms' capital structures, a topic previously underexplored. It offers practical guidance for policymakers on tax dispute implications and aids corporate financial strategy planning by highlighting the relationship between litigation and indebtedness.

**Keywords:** Tax litigiousness; indebtedness; capital structure; Brazilian firms; financial strategies.

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## Introduction

In Brazil, the intersection of tax litigation and corporate finance is crucial, with tax disputes at all three federal levels comprising 75% of Gross domestic product (GDP), which is notably higher than the Organisation for Economic Co-operation and Development (OECD) average of 0.28% (Núcleo de Tributação do Insper, 2020). This not only highlights the significant burden of tax on companies but also the role it plays in corporate decision-making processes (Hanlon & Heitzman, 2010). Addressing a gap in current research, this study aims to decipher the relationship between tax litigation and the capital structure of Brazilian firms, offering insights into how litigation may influence corporate indebtedness.

The practical implications of this research are directed towards policymakers, regulatory authorities, and firms, providing a clearer understanding of the financial strategies necessary in the face of tax disputes. Methodologically, the study employs a linear regression model with panel data to analyze the effects of tax litigiousness on firm leverage, leveraging data from non-financial firms listed on the Brazilian stock exchange between 2017 and 2022.

The findings reveal a positive correlation between tax litigation and firm indebtedness, suggesting that companies engaged in more tax disputes tend to carry higher levels of debt. These results underscore the intricate dynamics of tax litigation and its impact on corporate financing decisions within the Brazilian economic landscape.

The study's contributions are twofold: theoretically, it extends the understanding of the influence of tax disputes on corporate finance; practically, it aids in formulating strategies to manage the consequences of such disputes. These insights are invaluable for firms in planning their financial strategies and for policymakers aiming to improve the economic environment for businesses.

## 2 Theoretical framework

### 2.1 Tax litigation: challenges and strategic implications

Brazil's tax system is renowned for its complexity, significantly impacting the This complexity is underscored by Brazil's ranking in the Doing Business Report (2020) by the World Bank, highlighting the extensive hours companies spend on tax compliance relative to their global counterparts. Brazilian businesses navigate a labyrinth of tax regulations, dedicating an average of 1,501 hours to tax compliance tasks, in stark contrast to the significantly lower averages in Latin American and Caribbean countries (317 hours) and high-income OECD countries (159 hours) [World Bank, 2020].

This intricate legal framework poses multifaceted

challenges for businesses, not just in compliance but also in creating an environment ripe for tax litigations. Disputes arise from these complex legislative frameworks primarily due to differing interpretations of tax laws, often leading to prolonged legal battles between companies and tax authorities (Machado, 2021). Such litigations demand an in-depth exploration of tax provisions, contingent liabilities, and strategic approaches towards tax avoidance and aggressiveness. Despite debates within the academic community, understanding these concepts is crucial for navigating the delicate balance between legal tax minimization strategies and the risk of practices deemed aggressive by tax authorities (Dyreg et al., 2019; Hanlon & Heitzman, 2010).

The fluid legal landscape in Brazil, marked by frequent changes and updates in tax laws, challenges businesses to remain vigilant and adaptable. A study by Veiga and Lima (2016) highlights the financial impacts on businesses due to the migration from the Microempreendedor Individual (MEI) to the Microenterprise tax framework in São Paulo, underscoring the complexities and costs in accounting management control (Veiga & Lima, 2016). This example illustrates the broader challenges faced by companies in navigating Brazil's tax law complexities.

Tax litigation emerges as a critical concern for businesses operating in Brazil, with potential financial liabilities and considerable resource consumption. The proposition of a multi-door model in Brazilian tax law suggests alternative methods of conflict resolution to address these complexities (Machado, 2021). This approach acknowledges the need for nuanced understanding and strategic management in resolving tax disputes.

In summary, the challenges posed by Brazil's complex tax system and subsequent litigations necessitate sophisticated tax planning and risk management practices from businesses. The strategic decisions companies make are informed by a deep understanding of the legal landscape and the broader economic and regulatory environment in which they operate, requiring a multidisciplinary approach that melds insights from law, accounting, and business strategy to effectively navigate the intricacies of tax compliance and litigation.

### 2.2 Integration of capital structure theories with tax litigation insights

This study frames tax litigation within the accounting domain, viewing it as a combination of tax provisions and related contingent liabilities. According to accounting standards, these elements are recognized under certain conditions: a liability resulting from a past event, a likely

resource outflow, and the capability to accurately estimate this outflow. Contingent liabilities represent potential obligations stemming from past events, the realization of which depends on uncertain future occurrences. These liabilities might also pertain to existing responsibilities not recognized due to the low probability of resource expenditure or the inability to measure the debt amount accurately. Unlike direct liabilities, contingent liabilities do not directly impact the balance sheet or income statement but are disclosed in the financial statements' footnotes and other reference documents. This disclosure includes an estimate of the potential expenditure when its occurrence is deemed probable, accompanied by a detailed explanation of the associated process.

In line with accounting principles, the recognition of these provisions and liabilities is warranted when facing obligations of uncertain value or duration. Identifying these obligations necessitates meeting three simultaneous criteria: the identification of a current responsibility from a past event, the anticipation of resource outflow to address this responsibility, and the precise estimation of the outflow's magnitude.

Contingent liabilities, therefore, encompass potential or existing responsibilities linked to past events, with their impact determined by future developments of uncertain outcomes. Although these liabilities do not alter the figures presented in the balance sheet or income statement, their disclosure in footnotes and supplementary documents provides essential insights into potential financial impacts, ensuring transparency and aiding in the comprehensive understanding of a company's financial health and risk exposure.

Considering the likelihood of resource outflow and other recognition criteria, a business must classify a tax dispute as either a provision or a contingent liability. This classification is recorded in the liabilities section or noted in supplementary materials, depending on the event's probability. If an event is considered remote, there is no obligation to recognize or disclose any provision.

Regarding aggressive tax planning, strategies aimed at minimizing a company's tax burden are considered legally permissible, including assertive tactics that might face scrutiny from tax authorities (Martinez, 2017). Tax litigation is often an extension of such aggressive tax planning, involving disputes over tax credits through administrative or judicial proceedings between taxpayers and tax authorities. In the domain of tax accounting research, a consensus on defining key concepts like tax avoidance or aggressiveness has yet to be established (Dyreng et al., 2019; Hanlon & Heitzman, 2010).

Smoothly transitioning into capital structure theories, we find that the foundational propositions by Modigliani and Miller (1958), which argued that a firm's value is unaffected

by its capital structure in a perfect market, set the stage for understanding corporate financing. These theories are crucial for analyzing the impact of tax litigation on corporate indebtedness. Subsequent developments, such as Modigliani and Miller's acknowledgment of the influence of taxes and bankruptcy risk on firm value in 1963, highlight the importance of tax considerations in capital structure decisions. The Static Tradeoff Theory advocates for a balance between the tax advantages of debt and the potential costs of bankruptcy, whereas the Pecking Order Theory suggests a preference for internal over external financing, emphasizing the role of informational asymmetries.

Building upon Modigliani and Miller's groundbreaking work, later theories incorporate additional factors like taxes, bankruptcy risks, and information asymmetry, all of which profoundly affect corporate financing strategies. The Static Tradeoff and Pecking Order Theories, enriched by empirical findings from both Brazilian and international contexts (Bastos & Nakamura, 2009; Medeiros & Daher, 2008; Perobelli & Famá, 2002), provide insights into how firms navigate tax litigation's complexities and its influence on leverage decisions.

This comprehensive analysis underscores the strategic equilibrium firms must maintain between capitalizing on tax benefits to optimize their capital structure and managing the risks of potential tax disputes and litigation. The complex interplay between tax planning, litigation risk, and decisions regarding capital allocation highlights the vital importance of an overarching tax strategy in sculpting a firm's financial framework.

### 2.3 Determinants of capital structure in light of tax litigation

The impact of tax litigation on a firm's capital structure is multifaceted, intersecting with various determinants that traditionally influence corporate finance decisions.

*Firm Size and Tax Litigation:* The link between a firm's size and its debt inclination is well-documented; larger firms typically enjoy lower default risks and enhanced access to capital markets, thanks to their solid reputations and diversified operations (Rajan & Zingales, 1995). However, tax litigation poses distinct challenges for smaller firms, disrupting their traditional debt strategies as they contend with the complexities of tax disputes. Such challenges may disproportionately affect smaller firms, pushing them towards alternative financing routes (Titman & Wessels, 1988).

*Profitability, Liquidity, and the Shadow of Tax Disputes:* Companies with strong profitability and liquidity usually prefer internal financing over external sources, benefiting from the lower costs and greater flexibility of using internally generated funds (Hall et al., 2004). The presence of tax

litigation, however, complicates this preference. Financially sound firms might reassess their approach to external financing as a strategic or precautionary response to the uncertainties introduced by tax disputes (Nakamura et al., 2007; Perobelli & Famá, 2002).

*Growth Opportunities Amidst Tax Challenges:* The relationship between a firm's growth prospects and its level of debt is complex. Firms aiming for expansion often seek external financing (Jensen, 1986; Myers, 1984). Tax litigation can serve both as an obstacle and a motivator, leading firms to reevaluate their financing strategies in response to the constraints of ongoing or potential tax disputes.

*Asset Tangibility as a Financing Lever in Tax Litigious Contexts:* The role of tangible assets as collateral, thus facilitating access to loans, is well recognized (Michaelas et al., 1999; Rajan & Zingales, 1995). Tax litigation adds complexity to this dynamic, influencing firms' utilization or valuation of their tangible assets for securing long-term financing, particularly when litigation risk alters risk assessments.

*Business Risk in the Shadow of Tax Litigation:* Traditionally, higher business risk leads to a more cautious leveraging approach, as firms seek to minimize financial vulnerabilities (Damodaran, 2004; Myers, 1984). The emergence of tax litigation adds a layer of risk, prompting firms to reassess their leverage strategies in consideration of potential legal ramifications and their impact on operational and financial stability.

The determinants of debt within a firm—encompassing company size, profitability, growth opportunities, liquidity, and asset tangibility—are significantly shaped by how firms handle tax litigations and obligations. For example, large companies may use their scale to more effectively navigate tax complexities, influencing their debt levels. Conversely, firms eyeing growth opportunities may see their financing strategies limited or dictated by existing or looming tax disputes.

This section explores how tax litigation influences debt strategies across these determinants, merging theoretical frameworks with empirical evidence to demonstrate how tax dispute management can profoundly affect a firm's capital structure (Hasan et al., 2014). The analysis sheds light on the direct effects of tax-related decisions on corporate financing and delves into the wider implications of these strategies on risk assessment and market perceptions.

## 2.4 Hypothesis development: exploring the impact of tax litigiousness on corporate debt levels

Leveraging insights from the preceding discussion on the complexities of Brazil's tax system, the intricate balance between tax provisions, contingent liabilities,

and aggressive tax planning, this section aims to refine our hypothesis concerning the relationship between tax litigiousness and corporate debt levels.

**Hypothesis (H1):** The degree of tax litigiousness in a firm significantly correlates with its debt levels.

This hypothesis emerges from the recognition that tax litigation and strategic navigation of tax-related uncertainties critically influence a firm's capital structure decisions. It integrates broader financial strategy considerations, such as lenders' risk assessments and the implications of various corporate debt arrangements.

Supporting this hypothesis are theoretical models by Modigliani and Miller, Myers, and others, complemented by empirical evidence highlighting the impact of tax strategies on capital structure in both Brazilian and global contexts (Hasan et al., 2014). It aims to bridge the research gap, offering nuanced insights into how tax-related decisions affect corporate financial strategies.

The literature reveals a significant focus on the roles of tax avoidance and aggressive tax planning in affecting borrowing costs and altering lender risk perceptions (Hasan et al., 2014). Additionally, the interaction between firm-level characteristics—such as size, capital structure, and financial constraints—and tax avoidance behaviors illustrates the complexity of this relationship (Chen & Lai, 2012; Hanlon et al., 2017).

Firms facing financial constraints often resort to aggressive tax planning, with their liquidity levels and cash reserves influencing tax aggressiveness (Hanlon et al., 2017; Edwards et al., 2016; Martinez & Salles, 2018; Martinez & Silva, 2017; Chen & Lai, 2012). Tax planning thus becomes a critical financing tool for these firms, enabling them to reduce taxable income or enhance tax credits as strategies to lower tax liabilities (Edward et al., 2016). However, the legality of these strategies is crucial, as tax authorities may levy penalties and fines for non-compliance, prompting firms to weigh the advantages of tax savings against the risks of regulatory actions.

This study focuses on the singular hypothesis that tax litigiousness impacts debt levels, aiming for a deeper exploration of the strategic considerations firms must address in light of tax disputes. This approach elucidates the intricate connections between tax planning, litigation risk, and capital allocation decisions, emphasizing the critical role of comprehensive tax management in shaping a firm's financial framework.

## 3 Methodology

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

The sample for this study consists of 233 Brazilian

companies from 27 non-financial segments listed on B3, the Brazilian stock exchange, until March 31, 2023. These companies were chosen because they represent the country's economic and business context. In addition, access to publicly available financial and accounting information from these companies allowed for detailed and robust analyses. Firms that did not present data in the period under investigation and did not specify the nature of the provisions and contingent liabilities in the explanatory notes or the reference form were excluded from the sample. Thus, the base was formed by 1,398 final observations in a balanced panel, as shown in Table 1:

Table 1: Sample selection

Sample Selection	Number of firms	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 the provisions and contingent liabilities	-56	-336
Absence of other data in the reporting period	-63	-378
Concluding remarks	233	1.398

Source: Survey data, 2023.

The period was delimited between fiscal years 2017 and 2022 for convenience and access to financial information. In line with the capital structure literature, such as the work of Leary and Roberts (2014), the winsorization technique was applied to the variables in the models at the 1% level to mitigate the influence of outliers. Winsorization is a statistical technique used to limit extreme values in data to reduce the effect of potentially spurious outliers. This approach ensures a more robust estimation by minimizing the impact of extreme data points on the analysis.

The data were extracted from the financial statements of the Comdinheiro® bases, except for information on contingent liabilities and tax provisions, which were manually taken from the companies' explanatory notes.

### 3.2 Econometric model and dependent variable

Equation 1 was proposed to test whether firms that there is a relationship between tax litigiousness and indebtedness:

$$\text{Indebtedness}_{i,t} = \beta_0 \text{Tax litigiousness}_{i,t} + \beta_1 \text{Size}_{i,t} + \beta_2 \text{Profitability}_{i,t} + \beta_3 \text{Growth}_{i,t} + \beta_4 \text{Liquidity}_{i,t} + \beta_5 \text{Asset Structure}_{i,t} + \beta_6 \text{Risk}_{i,t} + \epsilon_{i,t} \quad (1)$$

Where  $\beta_0$  = constant of the straight line;  $\beta_{it}$  = angular coefficient of the variables; and  $\epsilon_{i,t}$  = is the error of the regression. As a proxy for indebtedness, two variables were used, as shown in Table 2:

Table 2: Dependent variables

Dependent Variable	Specification	AUTHORS
Indebtedness	(Current liabilities <sub>i,t</sub> +Noncurrent liabilities <sub>i,t</sub> )/Total asset <sub>i,t</sub>	Bastos & Nakamura, 2009; Brito et al., 2007; Campos & Nakamura, 2015; Medeiros & Daher, 2008; Namura et al., 2007.
Long-term debt	(Noncurrent liabilities <sub>i,t</sub> )/Total assets <sub>i,t</sub>	Bastos & Nakamura, 2009; Brito et al., 2007.

Source: Prepared by the authors

Incorporating the distinction between total indebtedness and long-term debt as dependent variables serves a specific analytical purpose. This methodological choice allows us to dissect the direct impact of tax disputes on a company's short-term liquidity needs and the broader implications for long-term financial planning. Through this dual analysis, our study aims to illuminate the nuanced ways in which tax litigation influences both short-term and long-term aspects of corporate indebtedness, aligning with the goal of exploring debt levels under the lens of tax disputes.

### 3.3 Independent variables

#### 3.3.1 Tax Litigation

In the context of tax litigation, the tax litigiousness variable is measured by aggregating tax provisions and contingent liabilities relative to a company's total assets. It is posited that the relationship between tax litigiousness and indebtedness is positive. This expectation stems from the understanding that tax litigation, as highlighted earlier, is perceived as an aspect of aggressive tax planning. Such planning can act as a financing mechanism for firms, aiding in the strategic management of financial resources against impending tax obligations (Edward et al., 2016; Martinez & Silva, 2017).

Furthermore, existing research indicates that companies with high levels of debt might reclassify tax provisions as contingent liabilities to report higher accounting profits (Hanlon & Heitzman, 2010). This reveals a significant link between indebtedness and the reporting of tax contingencies, underscoring the critical role of tax litigation within the broader framework of aggressive tax planning and its impact on a firm's capital structure.

#### 3.3.2 Control Variables

The model's independent variables and anticipated associations were established based on prior research on capital structure. The firm's size is reflected by its total assets; the expected correlation can be positive or

negative. Profitability was determined by the computation of return on assets (ROA), which involves dividing the net income in period *t* by the previous year's total assets. The projected relationship is negative since more profitable companies tend to have lower debt levels as they utilize internally generated revenue to finance their activities and investments. Conversely, less fortunate firms rely more on external capital.

The asset structure, or tangibility, is represented by the sum of fixed assets and inventory divided by total assets, and the anticipated correlation is positive, as companies with higher tangibility are more inclined to borrow money, leading to higher debt levels (Thies & Klock, 1992; Rajan & Zingales, 1995). Growth is determined by subtracting the net

operating revenue of the current year from that of the previous year and dividing it by the net active income of the last year. The expected ratio can either be positive or negative. The risk variable is represented by dividing the standard deviation of operating income before interest and taxes (EBIT) for the past five years by the total assets, and the anticipated relationship is negative. The current liquidity variable is determined by dividing current assets by current liabilities, and the expected correlation is negative.

Table 3 presents the specifications of the independent variables, the anticipated correlations according to the existing literature for the regression model, and some authors who have previously provided evidence of these relationships.

Table 3: Independent variables

Independent variables	Expected ratio	Specification	AUTHORS
Tax Litigation	+	$(\text{Tax provisions}_{t-1} + \text{Contingent tax provisions}_{t-1}) / \text{Total assets}_t$	International literature: Campello et al., 2010. Frank & Goyal, 2009; Brazilian literature: Bastos & Nakamura, 2009.
Size	- / +	Total assets <sub>t</sub>	
Structure or tangibility of assets	+	$(\text{Fixed Assets}_t + \text{Stocks}_t) / \text{Total Assets}_t$	International literature: Rajan & Zingales, 1995; Thies & Klock, 1992; Titman & Wessels, 1988. Brazilian literature: Brito & Lima, 2005.
Growth	-	$(\text{Net op. revenue}_{t-1} - \text{Net op. revenue}_{t-2}) / \text{Net op. revenue}_{t-1}$	International literature: Talberg et al., 2008. Brazilian literature: Gonçalves & Bispo, 2012; Perobelli & Famá, 2002.
Profitability	-	$\text{Net Income}_t / \text{Total Assets}_{t-1}$	International literature: Titman & Wessels, 1988; Rajan & Zingales, 1995.
Risk	-	$\sigma \text{ do EBIT of 5 years} / \text{Total Assets}_t$	International literature: Damodaran, 2004; Thies & Klock, 1992; Titman & Wessels, 1988; Myers, 1984; Bradley et al., 1984; Ferri & Jones, 1979. Brazilian literature: Brito & Lima, 2005.
Current Liquidity	-	$\text{Current asset}_t / \text{Current liability}_t$	Brazilian literature: Bastos & Nakamura, 2009.

Source: Prepared by the authors

## 4 Results

### 4.1 Tax litigation

This topic presents an analysis of the largest tax-related contingencies by industry. It is worth

noting that the consumer goods and retail, biofuels, gas and oil, energy and basic services, petrochemicals, metallurgy, and steel sectors had the highest levels of tax litigation. Table 4 illustrates the progression of industry-related tax disputes during the past five years.

Table 4: Tax Litigation by Sector

Sector	NO.	2017	2018	2019	2020	2021	2022
Consumer Goods and Retail	13	45%	48%	39%	41%	38%	39%
Biofuels, Gas, and Oil	10	29%	7%	29%	31%	29%	31%
Energy and Utilities	33	29%	31%	34%	29%	26%	30%
Petrochemical	4	14%	13%	10%	14%	19%	21%
Metallurgy and Steelmaking	11	17%	18%	15%	14%	15%	18%
Textiles, Clothing, and Footwear	12	19%	19%	17%	17%	11%	16%
Health	14	19%	19%	18%	16%	13%	13%
Trade	12	10%	12%	11%	13%	12%	12%
Telephony and Communications	4	7%	7%	6%	5%	5%	9%
Industry	8	10%	11%	10%	8%	7%	9%
Transportation	13	19%	25%	27%	16%	7%	8%
Processed Foods	10	9%	9%	8%	8%	7%	7%
Services	12	7%	5%	9%	9%	6%	6%
Construction and Real Estate	25	5%	5%	4%	6%	5%	6%
Industry - Machines and Equip.	7	6%	11%	8%	8%	7%	5%
Pulp, Paper, and Wood	6	5%	4%	4%	4%	6%	5%
Holding	8	6%	5%	6%	4%	4%	5%
Mining	2	9%	12%	9%	6%	4%	4%
Industry - Road Equipment	7	1%	2%	3%	3%	4%	4%
Educational Services	4	3%	2%	3%	3%	2%	2%
Computing	2	2%	2%	2%	2%	2%	2%
Agribusiness	3	0%	6%	5%	2%	3%	2%
Water and Sanitation	4	2%	2%	2%	2%	2%	2%
Industry - Building Materials	2	2%	0%	2%	2%	1%	1%
Household Utilities	2	0%	1%	1%	1%	1%	1%
Participations	1	0%	0%	0%	0%	0%	0%
Information Technology	1	0%	0%	0%	0%	0%	0%

Source: Prepared by the authors

The table reveals the number of companies per sector engaged in tax litigation, with notable persistence in the Consumer Goods and Retail sector, experiencing tax disputes ranging from 39% to 48% across the studied years. This suggests a complex tax environment prone to litigation. Remarkably, the Biofuels, Gas, and Oil sector shows a significant dip in tax disputes, dropping from 29% in 2017 to a mere 7% in 2018, before climbing back to 31% by 2022. This fluctuation could be attributed to changes in tax policy or regulation specifically impacting this sector. On the other hand, sectors like Telephony and Communications, Industry - Machinery and Equipment, and Mining have consistently engaged less in tax litigation, staying below 10% throughout the period. This might indicate a more stable or simpler tax scenario

for these fields.

Overall, the data in Table 4 offers insights into sector-specific tax litigation trends, valuable for academic research aiming to understand the varied tax challenges industries face and their broader economic impact.

#### 4.2 Descriptive statistics

Table 5 presents a comprehensive statistical analysis of the 1,398 data points obtained from a sample set of 233 companies, after the implementation of the winsorization technique with a 1% threshold for all metrics. In terms of descriptive statistics, the variables converted into natural logarithms are displayed in a standard base.

Table 5: Descriptive statistics

Variables	Obs	Average	Standard Deviation	Minimum	Maximum
Indebtedness	1.398	0,766	0,626	0,103	4,231
Long-term debt	1.398	0,427	0,420	0,021	3,019
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
Size	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
Risk	1.398	0,065	0,106	0,005	0,795

Source: Prepared by the authors

The descriptive statistics presented in Table 5 provide significant insights into the financial dynamics of the companies analyzed. The data reveal that the average total indebtedness across these firms is 77%, with long-term debt averaging at 43%. The mean rate of tax litigation faced by these companies stands at approximately 15%. Specifically, when focusing on tax provisions as a proportion of total assets, the average is only 1%, whereas for contingent tax liabilities, it is notably higher at 14%. The companies' average profitability is gauged at 4%. Additionally, their growth rate averages 17%, and the liquidity ratio is reported at 1.94. The mean asset structure, reflecting the tangibility of a company's assets, is valued at 33%. Lastly, the average risk associated with these businesses is calculated to be 7%.

These statistics shed light on several critical aspects of corporate finance in the context of tax litigation. The

substantial average indebtedness underscores a significant reliance on external financing among these companies, while the stark difference between the averages for tax provisions and contingent tax liabilities suggests a prevalence of unacknowledged fiscal uncertainties. The relatively modest profitability, coupled with a moderate growth rate, may indicate challenges in profit generation and business expansion. Furthermore, liquidity and asset structure metrics, along with the calculated business risk, provide insights into the firms' ability to meet their financial obligations and navigate operational or market uncertainties.

### 4.3 Correlation matrix

By assessing Pearson's correlation coefficient, we found that a firm's total and long-term debt variables positively correlate with tax litigation, as evidenced by the results in Tables 6 and 7.

Table 6: Pearson Correlation – Variable Indebtedness

	Indebtedness	Litigation	Size	Renta.	Grow.	Liquidity	Active Str.	Risk
Indebtedness	1,000							
Tax Litigation	0,400***	1,000						
Size	-0,241***	-0,104***	1,000					
Profitability	-0,428***	-0,188***	0,108***	1,000				
Growth	-0,056***	-0,069***	0,003	0,192***	1,000			
Liquidity	-0,306***	-0,157***	-0,170***	0,177***	0,018	1,000		
Asset structure	0,063***	0,018	-0,092***	-0,056***	0,035***	-0,087***	1,000	
Business risk	0,503***	0,194***	-0,343***	-0,130***	-0,009	-0,001	-0,045	1,000

Source: Elaborated by the authors, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.

When considering only total debt, variables such as size, profitability, growth, and liquidity negatively correlate with indebtedness. Conversely, tax litigiousness, asset composition, and business risk manifest a positive correlation, with tax litigiousness being particularly significant with a correlation coefficient of 43%. It is important to note that the variables in the model do not display a substantial correlation, a conclusion that has been substantiated through the execution of the

multicollinearity test.

In the test with long-term debt, the result shows that the variables tax litigiousness and business risk have a positive relationship with indebtedness. On the other hand, size, profitability, growth, liquidity, and tangibility of assets have a negative relationship. For this last variable, the sign of the relationship is different from the analysis with total indebtedness.

Table 7: Pearson correlation – Long Term Indebtedness variable

	Long-term debt	Litigation	Size	Renta.	Grow.	Liquidity	Active Str.	Risk
Indebtedness LP	1,000							
Tax Litigation	0,210***	1,000						
Size	-0,094***	-0,104***	1,000					
Profitability	-0,329***	-0,188***	0,108***	1,000				
Growth	-0,004	-0,069***	0,003	0,192***	1,000			
Liquidity	-0,141***	-0,157***	-0,170***	0,177***	0,018	1,000		
Active Str.	-0,029***	0,018	-0,092***	-0,056***	0,035***	-0,087***	1,000	
Risk	0,517***	0,194***	-0,343***	-0,130***	-0,009	-0,001	0,045	1,000

Source: Elaborated by the authors, \*\*\* p<0.01, \*\* p<0.05, \* p<0.1.



The findings suggest a complex interaction between tax litigation and corporate debt strategies, indicating that tax disputes could significantly impact firms' financial health and decision-making. The correlations observed with total and long-term debt reveal how tax challenges influence corporate financing in nuanced ways. Moreover, the link between business risk and increased indebtedness underscores the influence of the economic and regulatory landscape on financial strategies. These results point towards the critical role of tax litigation in shaping firms' financial planning, highlighting its importance beyond being an isolated factor, but rather as a key component of the broader financial management framework.

#### 4.4 Regression model results

The analysis of the regressions in the fixed effect and pooled models were performed to test the hypothesis that there is a relationship between tax litigiousness and indebtedness. The evidence points out that tax litigiousness exerts a positive relationship on the indebtedness of Brazilian companies, with a significance level of 1% and 5%, suggesting that the postponement of tax payments through tax litigation can serve as a complement in the form of financing for companies. This relationship was observed for both indebtedness proxies in the fixed effect and pooled models in Table 8.

Table 8: Regression – Fixed and Pooled Effect

	Fixed Effect		Pooled	
	Indebtedness	Long-term debt	Indebtedness	Long-term debt
Tax Litigation	0,573***	0,445***	0,297***	0,0485
Size	-0,124**	0,002	-0,047***	0,009
Profitability	-0,483***	-0,204*	-1,464***	-0,907***
Growth	0,0002	-0,004	-0,015	-0,052*
Liquidity	-0,012	0,014	-0,071***	-0,016***
Asset structure	0,420***	0,207**	-0,057	-0,066
Business risk	0,482	0,646	2,205***	1,912***
Constant	1,487***	0,203	1,055***	0,249
R-Squared Within	0,350	0,242	0,527	0,182
Remarks	1,398	1,398	1,398	1,398
Groups	233	233	233	233

\*p < 0.1 \*\*p < 0.05 \*\*\*p < 0.01

Source: Prepared by the authors

The relationship between company size and debt was notably negative and substantial in both analytical frameworks, indicating that smaller firms tend to carry higher debt levels than their larger counterparts. This is because smaller companies often have fewer financial burdens associated with borrowing from external sources versus self-financing (Titman & Wessels, 1988), a finding that contradicts the Static Tradeoff Theory. However, the association between long-term debt and size was not discernible in either model.

In all the examined models, profitability exhibited a notable and adverse relationship with debt levels, implying that businesses that generate more profit prefer to use their internally generated funds before opting for external financing (Hall et al., 2004; Nakamura et al., 2007; Perobelli & Famá, 2002).

On another note, the lack of significant correlation between growth and indebtedness suggests that firm growth may not directly impact leverage as traditionally expected. Factors such as alternative financing options, sector-specific strategies, or a preference for equity financing over debt could contribute to this outcome. As a variable, liquidity revealed no association in the fixed effect model. Nevertheless, the pooled effect model

suggested a meaningful and negative relationship. This indicates that firms with high liquidity have more financial flexibility due to the retention of internally generated profits, thus decreasing their dependency on external capital (De Jong et al., 2011).

The tangibility of assets was positively and significantly correlated with overall indebtedness and long-term debt in the fixed effect model. This suggests that companies can leverage their tangible assets as security for loans, thereby broadening their credit access or minimizing their financial costs (; Rajan & Zingales, 1995; Thies & Klock, 1992). However, in the Pooled model, this relationship was not significant.

The business risk showed no significant relationship in the fixed effect model, and, on the other hand, the pooled effect model showed a positive and meaningful relationship, contrary to what is advocated by the literature. Thus, the greater the variation in firms' operating income relative to assets, the greater the proportion of third-party resources used by companies, which diverges from previous studies in the literature (Damodaran, 2004; Thies & Klock, 1992; Titman & Wessels, 1988; Myers, 1984; Bradley et al., 1984; Ferri & Jones, 1979; Brito & Lima, 2005).

### 4.4.1 Tests for model assumption verification

To evaluate the verification of the assumptions of the panel data models, some tests were performed. Initially, the Variance Inflation Factor (VIF) test was performed, and the result showed no multicollinearity among the variables.

Next, the Ramsey test (Regression Equation Specification Error Test) was performed, and the result showed that no relevant variable was omitted in the models. Finally, Breusch Pagan/Cook Weisberg tests were performed to assess heteroscedasticity and confirmed none

Table 9: Tests for verifying the model assumptions

Robustness Tests	Test performed	VIF Value	Value-p	Result
Multicollinearity among the variables	Variance Inflation Factor (VIF)	1,18		Low multicollinearity
omission of variables in the model	Ramsey Test (RESET)		> 5%	No omission of relevant variables in the model
Heteroscedasticity	Breusch Pagan/Cook		<5%	No heteroscedasticity
Heteroscedasticidade	Weisberg Breusch Pagan/Cook Weisberg		<5%	Sem heteroscedasticidade

Source: Prepared by the authors

Table 10 shows the tests run for the choice of a regression model. The Chow test compared the Pooled model to the fixed effect model, indicating that the latter is more suitable. Next, the Breusch-Pagan test showed that the random effects model is more recommendable than the Pooled model. Finally, the Hausman test showed that the fixed-effect model is more recommended than the random-effect model in all regressions of this study.

Table 10: Test for choosing the Econometric model

Test Type	Test performed	Value-p	Result
Pooled versus fixed effects model	Chow's Test	< 5%	Fixed-effect model is more recommended than the pooled model
Pooled versus random effects model	Breusch-Pagan test	< 5%	Random-effect model is more recommended than pooled
Random versus fixed effects model	Hausman test	< 5%	Fixed-effect model is more recommended than the random-effect model

Source: Prepared by the authors.

### 4.5 Additional tests

Additional tests with high and low debt models were proposed to estimate the distribution extremes, encompassing the firms in the first quartile with low debt and the last with higher debt. To this end, logistic

regressions were used, and the variables were dummy variables, assigning 1 for firms in the first and last quartiles each year.

Models 2 and 3 investigate the impact of tax litigation on firms' debt levels, focusing on the premise that tax planning, including litigation, may act as a financial strategy, especially when alternative funding is limited or costly (Edward et al., 2016). These models differentiate the effects on firms with high and low indebtedness, highlighting the role of tax litigation in financial structuring and the potential for tax management practices to influence firms' leverage decisions in varying debt contexts.

$$\text{High\_Indebtedness}_{i,t} = \beta_0 + \beta_1 \text{Tax\_Litigiousness}_{i,t} + \beta_2 \text{Size} + \beta_3 \text{Profitability}_{i,t} + \beta_4 \text{Growth}_{i,t} + \beta_5 \text{Liquidity}_{i,t} + \beta_6 \text{Asset Structure}_{i,t} + \beta_7 \text{Risk} + \epsilon_{i,t} \quad (2)$$

$$\text{Low\_Indebtedness}_{i,t} = \beta_0 + \beta_1 \text{Tax\_Litigiousness}_{i,t} + \beta_2 \text{Size} + \beta_3 \text{Profitability}_{i,t} + \beta_4 \text{Growth}_{i,t} + \beta_5 \text{Liquidity}_{i,t} + \beta_6 \text{Asset Structures}_{i,t} + \beta_7 \text{Risk} + \epsilon_{i,t} \quad (3)$$

Table 11 presents the regression analysis outcomes for firms categorized by their levels of indebtedness, revealing distinct effects of tax litigation on high and low indebtedness firms.

Table 11: Logistic Regression

Variables	High Indebtedness	Low Indebtedness
Tax Litigation	0,719***	-0,734***
Size	-0,119**	-0,261***
Profitability	-5,786***	4,195***
Growth	0,149	-0,254
Liquidity	-0,483**	0,461***
Asset structure	0,112	-0,981***
Business risk	7,496***	-4,063***
Constant	-0,000	0,544
Remarks	1.398	1.398
Groups	233	233

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

Source: Prepared by the author

For companies bearing higher debt, the analysis uncovers a positive and statistically significant influence of tax litigation on debt levels, suggesting that engaging in tax disputes could serve as an alternative financing strategy for these firms, particularly under strained financial conditions. This approach may allow them to defer tax payments, thus managing liquidity needs more effectively.

In contrast, for firms with lower debt, a statistically significant negative relationship emerges between tax litigation and indebtedness. This finding implies that, for financially healthier firms or those with minimal leverage, tax litigation does not serve as a strategy for increasing

debt but may reflect a cautious approach to financial management where litigation is less about financing needs and more about strategic tax planning.

These results underline the complex role of tax litigation in corporate finance strategies, indicating that its impact varies significantly across firms with different debt profiles. Additionally, the models display an inverse correlation between a company's size and its level of debt. This suggests that smaller firms are more inclined to acquire debt than their larger counterparts, likely due to the reduced expenses of acquiring capital from third parties instead of equity financing, as asserted in previous research (Titman & Wessels, 1988).

Furthermore, the results show that profitability and liquidity exhibit a negative and statistically significant relationship with debt in the context of high debt. This suggests that more profitable companies with higher liquidity choose to use internal resources generated by profits before seeking external financing with third-party capital (Hall et al., 2004; Nakamura et al., 2007; Perobelli & Famá, 2002; De Jong et al., 2011). Conversely, a noteworthy and positive correlation is observed between profitability and liquidity when examining companies with low debt levels. This implies that companies with stronger profitability and liquidity tend to opt for increased debt when they find minimal debt. The findings also show that the growth variable did not exhibit a significant association with indebtedness in the analyzed models.

Moreover, no notable association was found between the tangibility of assets and indebtedness in highly indebted companies. However, there was a significant and negative correlation among companies with low debt levels. This implies that companies with less debt do not rely on tangible assets as collateral to secure loans and improve their credit accessibility. Furthermore, the study revealed that highly indebted companies displayed a positive and significant relationship with indebtedness regarding business risk. On the other hand, companies with minimal debt exhibited a negative and meaningful relationship. This suggests that firms tend to reduce their reliance on external resources as operational uncertainties increase. These findings support previous research emphasizing the importance of considering business risk when making decisions related to debt (Brito & Lima, 2005; Damodaran, 2004; Thies & Klock, 1992; Titman & Wessels, 1988; Myers, 1984).

The quantile regression results, as shown in Table 12, illuminate the nuanced relationship between tax

litigiousness and firm indebtedness across different levels of the debt distribution.

Table 12: Quantile regression

Group	Variable	25th Percentile	Median	Percentile 75
Indebtedness	Tax Litigation	0,181***	0,1703***	0,560***
	Size	0,230***	0,022***	-0,013
	Profitability	-0,774***	-1,094***	-1,624***
	Growth	0,034	0,062*	0,0474
	Liquidity	-0,062***	-0,065***	-0,050***
	Asset structure	0,082**	-0,044	-0,019
	Business risk	0,986***	2,119***	3,215***
	Constant	0,369***	0,488***	0,897***
	R <sup>2</sup>	0,185	0,214	0,335
Long-term debt	Tax Litigation	-0,003	0,063***	0,011
	Size	0,042***	0,048***	0,049***
	Profitability	-0,596***	-0,735***	-1,003***
	Growth	0,035**	0,043***	0,061**
	Liquidity	-0,013***	-0,008	-0,006
	Asset structure	-0,011	-0,012	-0,066
	Business risk	0,639***	1,301***	2,989***
	Constant	-0,092***	-0,078*	0,011
	R <sup>2</sup>	0,148	0,151	0,217

Source: Prepared by the authors

These findings suggest a consistently positive association between tax litigation and indebtedness, indicating that firms engaged in more tax disputes tend to carry higher levels of debt across the lower, median, and upper quantiles. This pattern is particularly pronounced at the 75th percentile for overall indebtedness, where the correlation is strongest. For long-term debt, however, the impact of tax litigation shows variability; it is notably significant at the median level, suggesting that tax disputes have a more pronounced effect on the debt levels of firms situated around the median of the long-term indebtedness distribution. This could reflect strategic financial management where firms in the middle of the debt distribution leverage tax litigation as a means to navigate or mitigate financial constraints.

Furthermore, firm size demonstrated a noteworthy positive relationship at the 25th and 50th percentiles when considering total debt. Similarly, firm size displayed a significant positive relationship for long-term debt across all percentiles. These findings suggest that larger companies generally enjoy greater access to credit

markets and can leverage economies of scale, facilitating their access to long-term resources (Frank & Goyal, 2009; Bastos & Nakamura, 2009).

On the other hand, profitability and liquidity exhibited significant negative relationships with both proxies of debt, indicating that more profitable and liquid companies tend to rely less on debt for financing their operations. This implies that companies with higher internal profit generation capacity and greater liquidity are less dependent on external resources (Hall et al., 2004; Nakamura et al., 2007; Perobelli & Famá, 2002; De Jong et al., 2011).

For total debt, growth showed a positive and significant relationship at the 10% level in the 50th Percentile, while no significant association was in the 25th and 75th percentiles. For long-term debt, there was a positive and significant relationship in all percentiles, suggesting that high-growth companies need financial resources to expand their activities and that internally generated profits may not be sufficient. Consequently, these firms seek third-party capital to finance themselves (Myers, 1984; Jensen, 1986).

The relationship between business risk and debt demonstrates a noteworthy and positive connection in both debt measures. This implies that when there is increased uncertainty surrounding a company's operational outcomes, the company tends to rely more on external resources, which goes against the existing literature. Furthermore, the association between asset structure and total debt was statistically significant at the 5% level only during the regression analysis conducted for the 25th Percentile. The model's coefficient of determination ( $R^2$ ) for indebtedness was moderately sized, ranging from 0.185 at the 25th to 0.335 at the 75th Percentile. These findings indicate that the variables examined in the study explain a considerable portion of the variation in the level of indebtedness among companies, depending on the specific Percentile being analyzed. Consequently, these results contribute to our understanding of the factors influencing indebtedness and carry important implications for financial management and strategic decision-making within organizations.

#### 4.6 Supplementary findings in corporate indebtedness

Our analysis uncovered a significant inverse relationship between firm size and debt, revealing that smaller firms tend to have higher debt levels than larger ones. This observation suggests lower costs of debt financing relative to equity financing for smaller firms, posing a challenge to the Static Tradeoff Theory.

Profitability and liquidity emerge as critical determinants in debt decision-making. Firms with higher profitability and liquidity prefer to leverage internally generated funds

over external financing. Interestingly, within contexts of low indebtedness, a positive relationship exists between profitability, liquidity, and debt levels, indicating that financially healthier firms might opt to increase their debt under certain conditions.

The relationship between business growth and debt showed variability, with significance observed only in specific percentiles and debt proxies. Asset tangibility presented mixed results; in the fixed-effect model, a positive association with both overall and long-term debt was noted, suggesting firms might utilize tangible assets as collateral to access credit more readily or to reduce financial costs. However, the pooled model showed no significant relationship, and for high-debt firms, the link between asset tangibility and debt was not significant. In contrast, for low-debt firms, this relationship was negative and statistically significant, suggesting that such firms might not leverage tangible assets to enhance credit accessibility.

Contrary to expectations and prior research, the relationship between business risk and debt occasionally appeared positive, indicating that firms with uncertain operational outcomes might rely more on third-party funding, challenging the presumption that higher-risk companies would reduce their debt reliance.

These findings partially validate the Pecking Order Theory's applicability to the capital structure of firms listed on the B3 during the study period. Future research avenues include exploring the determinants of tax litigiousness and its impact on a firm's financial constraints, investigating whether corporate governance structures moderate the relationship between tax litigation and indebtedness, and examining if companies with significant tax litigiousness face higher costs of third-party capital due to the increased risk litigation presents to creditors.

## 5 Final considerations

Over the years, extensive research has explored the determinants of corporate capital structure, ranging from the foundational theories of Modigliani and Miller to the Static Tradeoff Theory, the Pecking Order Theory, and considerations regarding the Equity Market. Distinguishing itself, this study ventures into a relatively uncharted territory by examining how tax litigation influences corporate debt levels. Our findings illuminate the strategic deployment of tax litigation by firms, either to complement existing financing mechanisms in highly leveraged entities or as an alternative funding strategy for those with lesser debt.

However, it's crucial to clarify that the methodological approach adopted to differentiate between overall and long-term debt as proxies for indebtedness serves not as the core contribution of this work but as a means to uncover the nuanced impacts of tax litigation on

indebtedness. This distinction has allowed us to unearth insights that sometimes challenge traditional frameworks like the Static Tradeoff Theory and prompts a reevaluation of the intricate interplay among factors such as firm size, profitability, liquidity, growth prospects, asset tangibility, and business risk in shaping a firm's capital structure.

The true contribution of this research lies in its pioneering examination of the role tax litigation plays in influencing the debt levels of Brazilian firms listed on the B3 exchange, thereby addressing a notable gap in the existing literature. Prior studies have extensively analyzed various elements affecting capital structure, yet the specific impact of tax litigation remained unexplored until now.

In light of our findings, several promising avenues for future research emerge. First, delving into the determinants of tax litigiousness could enrich our understanding of its utilization as a financing strategy. Second, investigating whether corporate governance structures moderate the relationship between tax litigation and indebtedness could reveal differential approaches to tax litigation based on the robustness of governance mechanisms. Lastly, assessing the impact of tax litigation on a firm's cost of capital presents a valuable area of inquiry. It would be particularly insightful to explore if pronounced engagement in tax litigation elevates borrowing costs due to increased risk perceptions among creditors.

This study, therefore, not only fills a critical void by linking tax litigation to corporate financing strategies but also sets the stage for further exploration into the theoretical and practical implications of indebtedness affected by tax litigation, both in the short and long term.

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