



TAX LITIGATION AND ITS IMPACT ON CAPITAL STRUCTURE IN BRAZIL

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Resumo/Abstract

This study examines the impact of tax litigation on the indebtedness levels of Brazilian firms. Recognizing that taxes impose significant costs on companies, there are often incentives to minimize these amounts through aggressive tax planning, including administrative and judicial disputes with tax authorities. The high monetary value of tax disputes in Brazil compared to other countries underscores the importance of investigating the effects of tax litigation on firms' capital structures. While existing literature primarily focuses on the determinants of tax aggressiveness, the relationship between tax litigation and the indebtedness of Brazilian companies remains understudied. The sample for this study comprised non-financial firms listed on the Brazilian stock exchange. A linear regression methodology with panel data and fixed effects was utilized from 2017 to 2022 to analyze the relationship between tax litigation and firm indebtedness. Tax litigation was measured by the sum of tax provisions and contingent liabilities, relativized by the firms' total assets. Data were sourced from the Comdinheiro software, and information related to provisions and contingent tax liabilities was manually gathered from the companies' explanatory notes. The findings from this study suggest a positive relationship between tax litigation and firm indebtedness, offering insights into the complex relationship between tax disputes and capital structures in the Brazilian context.

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Abstract: This study examines the impact of tax litigation on the indebtedness levels of Brazilian firms. Recognizing that taxes impose significant costs on companies, there are often incentives to minimize these amounts through aggressive tax planning, including administrative and judicial disputes with tax authorities. The high monetary value of tax disputes in Brazil compared to other countries underscores the importance of investigating the effects of tax litigation on firms' capital structures. While existing literature primarily focuses on the determinants of tax aggressiveness, the relationship between tax litigation and the indebtedness of Brazilian companies remains understudied. The sample for this study comprised non-financial firms listed on the Brazilian stock exchange. A linear regression methodology with panel data and fixed effects was utilized from 2017 to 2022 to analyze the relationship between tax litigation and firm indebtedness. Tax litigation was measured by the sum of tax provisions and contingent liabilities, relativized by the firms' total assets. Data were sourced from the Comdinheiro software, and information related to provisions and contingent tax liabilities was manually gathered from the companies' explanatory notes. The findings from this study suggest a positive relationship between tax litigation and firm indebtedness, offering insights into the complex relationship between tax disputes and capital structures in the Brazilian context.

Keywords: Tax litigiousness; indebtedness; capital structure.

1 INTRODUCTION

Tax litigation, encompassing judicial and administrative disputes related to tax issues, is a pertinent topic within the Brazilian context. It is considered so due to the significant cost of taxes on companies, making them a key factor in corporate decision-making processes (Graham, 2003; Hanlon & Heitzman, 2010). In Brazil, tax litigation at all three federal levels is so substantial that it constitutes 75% of the GDP (Insper, 2019). This figure is significantly higher than the average of countries within the Organization for Economic Cooperation and Development (OECD), which stood at 0.28% of GDP in 2018 and surpassed the average of Latin American nations, which was 0.19% (Insper, 2018). The high level of tax disputes in Brazil underlines the necessity to study the implications of this phenomenon on the capital structure of Brazilian firms.

The research topic of tax litigation and its impacts on capital structure in Brazil is selected due to an existing gap in this area. Recent literature has mainly concentrated on examining the determinants of tax aggressiveness or the effects of this aggressiveness on a firm's capital structure. However, studies that assess the direct impact of tax litigation on the indebtedness of Brazilian companies are lacking. This research endeavors to bridge this gap, examining the effects of tax litigiousness on firms' capital structure within the Brazilian context.

The primary inquiry of this study is as follows: Does the level of indebtedness of firms correlate with their inclination to engage in tax litigation? Consequently, this



research aims to assess the connection between tax litigiousness and the capital structure of companies in Brazil.

The contribution of this study lies in incorporating tax litigiousness as a determining factor in a firm's capital structure. Understanding the impact of such litigiousness on a company's capital structure is crucial for comprehending how companies finance their operations, manage tax risks, and make strategic investment and financing decisions.

The paper is organized into five chapters. The first chapter provides the context of the addressed theme, defines the research question, outlines the general and specific objectives, and elucidates the contribution of this work to the existing literature. The second chapter explores the issue of tax litigiousness in Brazil, the accounting regulations regarding tax provisions and contingent liabilities, and the current body of literature on capital structure. The third chapter presents the variables, explains the methodology employed for data collection, and describes the adopted econometric model. The fourth chapter details the sectors with the highest incidence of tax litigation, followed by tests to verify the robustness and choice of models applied, and concludes with presenting the research hypotheses' results. The final section comprises the concluding remarks, summarizing the findings and conclusions of this research endeavor.

2 THEORETICAL FRAMEWORK

2.1 TAX LITIGATION IN BRAZIL

The competitiveness of Brazil is negatively affected by the intricate nature of its tax system. This hampers the growth of businesses within the country, as indicated by the Doing Business Report (2020) published by the World Bank, which assesses the business environment across various nations. In the most recent report, Brazil ranked 124th. One of the criteria used for evaluation is the number of hours required to fulfill tax obligations. In Brazil, companies spent an average of 1,501 hours fulfilling accessory obligations and making tax payments. In contrast, the average for Latin American and Caribbean countries was 317 hours, and for high-income OECD countries, it was 159 hours (World Bank, 2020).

Consequently, tax litigation holds significant importance in Brazil's economic and business landscape. The country's tax system is renowned for its complexity, encompassing extensive legislation and numerous accessory obligations. This complexity often leads to varying interpretations, resulting in legal and administrative disputes. Consequently, tax authorities may scrutinize companies, leading to fines and penalties arising from differing interpretations of tax laws.

Protracted legal and administrative disputes can consume considerable financial and human resources, causing delays in outcomes and potential future economic consequences. Therefore, comprehending the ramifications of tax litigation on companies is crucial for identifying solutions and enhancing the Brazilian tax system to reduce litigation and cultivate a more stable and appealing business environment for domestic and international enterprises.



2.2 TAX LITIGATION AND ITS ACCOUNTING

In this research, tax litigation within the context of accounting is viewed as the combination of tax provisions and tax-related contingent liabilities. As per the guidance provided in CPC 32 (2009), these provisions and contingent liabilities come into play in unsettled tax disputes with the authorities or in instances where there are amendments in tax rates or laws that were announced after the financial period under review. The guidelines for identifying and quantifying these provisions and contingent liabilities are outlined in Accounting Pronouncement Committee 25 (CPC 25, 2006).

As per the accounting norms, these provisions and liabilities are deemed necessary when an obligation of uncertain value or duration exists. Recognition of these obligations requires three conditions to be met simultaneously: first, the presence of an existing responsibility arising from a past event; second, a probable resource outflow to fulfill this obligation; and third, the ability to estimate this outflow reliably.

Meanwhile, a contingent liability refers to a potential obligation that springs from past events, which future events with uncertain outcomes will determine. Alternatively, it can refer to an existing responsibility arising from past events that are not recognized because it is improbable that resources will be expended to settle the debt or the debt amount cannot be reliably measured (CPC 25, 2006).

Contingent liabilities are not reflected in the balance sheet or income statement. Still, they are disclosed in the footnotes and reference documents, along with an estimate of the possible outlay when the likelihood of occurrence is likely, and a brief explanation of the process involved (CPC 25, 2006).

Upon conclusion of the judicial process, if the tax authority prevails, tax enforcement may be initiated. Should the taxpayer fail to meet the payment obligation or provide adequate guarantees, the law permits the seizure or attachment of assets, with cash being the most preferred (Law no. 6830, 1980). To prevent asset seizure, the taxpayer can deposit the full amount to suspend the enforceability of the tax claim (CTN, 1966; Law No. 6830, 1980).

Given the likelihood of resource outflow and other recognition parameters, an enterprise must categorize a tax dispute as either a provision or a contingent liability. This classification should be logged in liabilities or revealed in a supplementary note based on whether the event is likely or possible. If the event is deemed remote, there's no need to announce or recognize any provision or disclosure.

In terms of aggressive tax planning, all efforts to decrease the company's tax load are deemed legal, and even assertive tactics that might not withstand if scrutinized by Tax Authorities are considered (Martinez, 2017). Moreover, tax litigation comprises a section of aggressive tax planning as it evaluates tax credits contested in administrative or court proceedings between the taxpayer and the taxation body. In tax accounting research, there is no consensus on defining key constructs such as tax avoidance or aggressiveness (Dyreg; Hanlon & Maydew, 2019; Hanlon & Heitzman, 2010).

2.3.1 Capital Structure Theories

Capital structure pertains to how corporations finance their operations using third-party or internal capital to boost productivity and enhance profitability (Myers, 1984). In their foundational study, Modigliani and Miller (1958) asserted that a firm's



capital structure does not affect its market value. Their assumption was based on the absence of transactional expenses, agency costs, corporate income tax, and information disparity between shareholders and lenders.

However, Modigliani and Miller modified their stance in a subsequent study in 1963. They included income tax and the likelihood of bankruptcy in their model, leading them to a novel conclusion: a firm's value increases with debt. High leverage reduces income tax payments as financial costs can be subtracted from the taxable income. Hence, the method of financing plays a pivotal role in determining capital structure.

Apart from the significant contributions of Modigliani and Miller (1958), it's essential to highlight three theories focused on capital structure: Static Tradeoff Theory (Myers, 1984), Pecking Order Theory (Myers & Majluf, 1984), and Equity Market (Huang & Ritter, 2009). The Static Tradeoff Theory suggests that firms strive to achieve an optimal capital structure by balancing the benefits of debt against the cost implications of potential bankruptcy. Therefore, increased debt has a dual impact: 1) it reduces the taxable income, and 2) it increases bankruptcy risk, thereby escalating the returns demanded by creditors as the involvement of external capital in the business grows (Myers, 1984).

The Pecking Order Theory proposes that market information asymmetry influences the selection of a firm's capital structure, suggesting a preference hierarchy for financing sources. Initially, firms favor internally generated profits over debt issuance or equity due to lower transaction costs. Consequently, companies with higher profitability often carry less debt. Subsequently, they turn to financial institutions and suppliers for financing and, finally, to the public issuance of shares (Myers & Majluf, 1984).

The Equity Market Theory posits that corporate executives assess the costs of issuing shares and debt for efficient capital structure allocation. They opt for equity when equity capital costs less than sourcing funds through third-party financing (Huang & Ritter, 2009). In this study, the Pecking Order Theory will serve as the framework to assess the determinants of capital structure, as local studies have demonstrated its dominant influence on the capital structures of the examined Brazilian firms (Bastos & Nakamura, 2009; Medeiros & Daher, 2008; Perobelli & Famá, 2003).

2.3.2 Determinants of capital structure

Below are the determinants influencing capital structure:

- **Size (positive or negative correlation):** According to the Static Tradeoff Theory, larger companies tend to have more debt due to lower default risk. As a result, they have greater access to third-party capital for financing, which leads to reduced funding costs (Fluck, Holtz-Eakin & Rosen, 2000; Rajan & Zingales, 1995). Conversely, some studies suggest that smaller companies are more likely to be indebted than larger ones. This is because smaller firms face lower costs when financing through third-party capital instead of relying on their capital, indicating an inverse relationship between the variables (Nasimi, 2018; Titman & Wessels, 1988).
- **Profitability (negative correlation):** Highly profitable firms tend to have lower debt levels since they can internally generate operating income to fund their future activities and investments. Conversely, less profitable firms rely more on third-party



capital for financing (Bayrakdaroglu et al., 2013; Hall et al., 2004). Similar negative relationships between these variables have been observed in research conducted with Brazilian companies (Nakamura et al., 2007; Perobelli & Famá, 2002).

- Growth (positive or negative correlation): Some studies suggest a positive relationship between growth opportunities and indebtedness (Jensen, 1986). Companies experiencing high growth require additional financial resources to expand their activities, and internally generated profits may be insufficient. Therefore, these firms seek third-party capital for financing (Myers, 1984). Conversely, another viewpoint suggests that companies with high growth rates may not maximize investments, causing creditors to hesitate in providing long-term financing.
- Liquidity (negative correlation): Higher liquidity firms have more financial flexibility due to retained internally generated profits. As a result, their reliance on third-party capital for financing decreases (Proença, 2014; De Jong et al., 2011).
- Asset structure or tangibility (positive correlation): Firms can use tangible assets as collateral for loans, which improves their access to credit and reduces financial costs (Michaelas, Chittenden, & Poutziouris, 1999; Chittenden, Hall, & Hutchinson, 1996; Rajan & Zingales, 1995; Wijst & Thurik, 1993; Thies & Klock, 1992).
- Business risk (negative correlation): High-risk firms tend to have lower debt levels. The uncertainty in their operating results leads to a reduced reliance on third-party resources. Consequently, less volatile companies are less likely to face financial difficulties (Brito & Lima, 2005; Damodaran, 2004; Thies & Klock, 1992; Titman & Wessels, 1988; Myers, 1984; Bradley, Jarrel & Kim, 1984; Ferri & Jones, 1979).

2.3.3 Capital Structure and tax litigation

Throughout the years, there has been considerable interest in examining the factors that influence tax avoidance, initially explored by Shackelford and Shevlin in 2001. Various characteristics at the firm level, including size, capital structure, asset composition, financial constraints, and profitability, have been linked to tax avoidance (Chen and Lai, 2012). Aggressive tax planning practices can increase borrowing costs (Hasan, Hoi, Wu, and Zhang, 2014). Lenders perceive tax avoidance as a risk, resulting in increased interest spreads when providing funds to these more precarious firms (Bharat, Sunder, and Sunder, 2008).

Financially constrained companies tend to engage in more aggressive tax planning activities, with cash reserves and liquidity levels influencing tax aggressiveness (Hanlon, Maydew, and Saavedra, 2017; Edwards, Schwab, and Shevlin, 2016; Martinez and Salles, 2018; Martinez and Silva, 2017; Chen and Lai, 2012). This is because tax planning can serve as a source of financing for financially constrained firms when other avenues are costly or unavailable. To minimize their tax liabilities, firms may employ strategies such as reducing taxable income or increasing tax credits (Edward, Schwab, and Shevlin, 2016). However, depending on the legality of the approach, tax authorities may impose monetary penalties and fines on firms for unpaid taxes. Consequently, firms must carefully assess the benefits of tax savings against the potential risks of facing such assessments.



Building upon existing literature and aiming to address the gap in understanding tax litigiousness and capital structure, the following hypothesis will be adopted:

H1: There is a relationship between tax litigiousness and debt levels.

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. Following the capital structure literature, the *winsorization* technique was applied to the variables in the models at the 1% level to reduce the influence of *outliers*.

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. Regressions were run on Stata® software.

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:



$$\begin{aligned}
 \text{Indebtedness}_{i,t} & & (1) \\
 &= \beta_0 + \beta_1 \text{Tax litigiousness}_{i,t} \\
 &+ \beta_2 \text{Size}_{i,t} + \beta_3 \text{Profitability}_{i,t} + \beta_4 \text{Growth}_{i,t} \\
 &+ \beta_5 \text{Liquidity}_{i,t} + \beta_6 \text{Asset Structure}_{i,t} + \beta_7 \text{Risk} + c_{i,t}
 \end{aligned}$$

Where: β_0 = constant of the straight line; β_{it} = angular coefficient of the variables; and ε_{it} = 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	$\frac{(\text{Current liabilities}_t + \text{Noncurrent liabilities}_t)}{\text{Total asset}_t}$	Bastos & Nakamura, 2009; Brito, Corrar & Batistella, 2007; Campos & Nakamura, 2015; Medeiros & Daher, 2008; Namura <i>et al.</i> , 2007; Silva & Valle, 2008.
Long-term debt	$\frac{(\text{Noncurrent liabilities}_t)}{\text{Total assets}_t}$	Bastos & Nakamura, 2009; Brito <i>et al.</i> , 2007.

Source: Prepared by the authors

3.3 INDEPENDENT VARIABLES

3.3.1 Tax Litigation

The tax litigiousness variable is determined by combining the tax provisions and contingent liabilities associated with the company's total assets. The anticipated outcome for this correlation is positive. This is because tax litigation, as previously emphasized, is considered a component of aggressive tax planning, which can serve as a means of financing for companies (Edward, Schwab & Shevlin, 2016; Martinez & Silva, 2017). Existing literature also suggests that highly indebted companies may alter the categorization of tax provisions into contingent liabilities to exhibit higher accounting profits (Hanlon & Heitzman, 2010). Consequently, there is a notable connection between debt and the disclosure of tax contingencies.

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	+	$\frac{(Tax\ provisions_t + Contingent\ tax\ provisions_t)}{Total\ assets_t}$	
Tax litigation_1 (tax provision)	+	$\frac{(Tax\ provisions_t)}{Total\ Assets_t}$	
Tax litigation_2 (tax continent liabilities)	+	$\frac{(Contingent\ tax\ provisions_t)}{Total\ assets_t}$	
Size	- / +	$\ln TotalAssets_t$	International literature: Campello, Graham & Harvey, 2010. Frank & Goyal, 2009; Brazilian literature: Bastos, Forte & Nakamura, 2013.
Structure or tangibility of assets	+	$\frac{(FixedAssets_t + Stocks_t)}{TotalAssets_t}$	International literature: Rajan & Zingales, 1995; Thies & Klock, 1992; Titman & Wessels, 1988. Brazilian literature: Brito & Lima, 2005.
Growth	-	$\frac{(Net\ op.\ revenue_t - Net\ op.\ revenue_{t-1})}{Net\ op.\ revenue_{t-1}}$	International literature: Talberg; Winge; Frydenberg & Westgaard, 2008. Brazilian literature: Araujo et al., 2017; Gonçalves & Bispo, 2012; Perobelli & Famá, 2002.



Profitability	-	$\frac{Net\ Income_t}{Total\ Assets_{t-1}}$	International literature: Titman & Wessels, 1988; Rajan & Zingales, 1995. 1996; Nakamura et al., 2007; Perobelli & Famá, 2002.
Risk	-	$\frac{\sigma\ do\ EBIT\ of\ 5\ years}{Ativo\ total_t}$	International literature: Damodaran, 2004; Thies & Klock, 1992; Titman & Wessels, 1988; Myers, 1984; Bradley, Jarrel & Kim, 1984; Ferri & Jones, 1979. Brazilian literature: Brito & Lima, 2005.
Current Liquidity	-	$\frac{Current\ asset_t}{Current\ liability_t}$	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. One column displays the number of companies within each sector.

Notably, the Consumer Goods and Retail industry has consistently encountered substantial tax litigation, ranging from 39% to 48% over the observed period. This could suggest that the tax landscape for companies in this sector is intricate, increasing the likelihood of tax-related conflicts. Similarly, the Biofuels, Gas, and Oil industry demonstrates significant fluctuations in its engagement in tax disputes, with a decrease from 29% in 2017 to only 7% in 2018, followed by a gradual rise to 31% in 2022. These variations might reflect changes in tax policies and regulations about these particular sectors. Conversely, sectors such as Telephony and Communications, Industry - Machinery and Equipment, and Mining exhibit relatively minimal involvement in tax litigation, consistently remaining below 10% throughout the analyzed timeframe. This could suggest a more stable tax environment or reduced complexity for these industries.

In summary, the results in Table 4 provide an overview of tax litigation by sector. This information is relevant for academic research, allowing for a deeper understanding of the tax issues faced by different industries and their economic implications.

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

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. Significantly, the mean total debt across these enterprises is 77%, while the long-term debt average stands at 43%. The average tax litigation for the companies is estimated at around 15%. When assessing litigiousness based only on the proportion of tax provision to total assets, the mean is a mere 1%, in contrast to a mean of 14% for tax contingent liabilities. The average profitability of these companies is gauged at 4%. Moreover, the average growth rate of these companies is estimated at 17%, and the liquidity index stands at 1.94. The mean asset structure, evaluating the tangibility of a company's assets, is measured at 33%. Finally, the average business risk is calculated to be 7%.

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

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. 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.

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.

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.

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.

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 (Nasimi, 2018; 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 (Bayrakdaroglu et al., 2013; Hall et al., 2004; Nakamura et al., 2007; Perobelli & Famá, 2002).

On another note, growth didn't demonstrate any significant correlation with indebtedness in this research. 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 (Proença, 2014; 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 (Chittenden, Hall, & Hutchinson, 1996; Rajan & Zingales, 1995; Wijst & Thurik, 1993; Thies and 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, Jarrel & Kim, 1984; Ferri & Jones, 1979; Brito & Lima, 2005).



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

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 Weisberg		<5%	No heteroscedasticity

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: TESTS FOR CHOOSING THE ECONOMETRIC MODEL

Test Type	Test performed	Value-p	Result
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<i>Pooled versus fixed effects model</i>	Chow's Test	< 5%	Fixed-effect model is more recommended than the <i>pooled</i> model
<i>Pooled versus random effects model</i>	Breusch-Pagan test	< 5%	Random-effect model is more recommended than <i>pooled</i>
<i>Random versus fixed effects model</i>	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 aimed to assess whether tax litigation has a positive relationship with firms with high and low debt levels since tax planning can be a source of financing for financially constrained firms when other sources are costly and even unavailable (Edward, Schwab & Shevlin, 2016).

$$\begin{aligned}
 \text{High Indebtedness}_{i,t} & & (2) \\
 &= \beta_0 + \beta_1 \text{Tax Litigiousness}_{i,t} + \beta_2 \text{Size} + \beta_3 \text{Profitability}_{i,t} \\
 &+ \beta_4 \text{Growth}_{i,t} + \beta_5 \text{Liquidity}_{i,t} + \beta_6 \text{Asset Structure}_{i,t} \\
 &+ \beta_7 \text{Risk} + c_{i,t}
 \end{aligned}$$

$$\begin{aligned}
 \text{Low Indebtedness}_{i,t} & & (3) \\
 &= \beta_0 + \beta_1 \text{Tax Litigiousness}_{i,t} + \beta_2 \text{Size} + \beta_3 \text{Profitability}_{i,t} \\
 &+ \beta_4 \text{Growth}_{i,t} + \beta_5 \text{Liquidity}_{i,t} + \beta_6 \text{Asset Structure}_{i,t} \\
 &+ \beta_7 \text{Risk} + c_{i,t}
 \end{aligned}$$

Table 11 showcases the outcome of the regression analyses for companies with high and low debt burdens. The findings highlight a noteworthy correlation for businesses with more substantial debt, demonstrating that tax litigation significantly impacts their debt levels. This signifies that delaying tax payments via tax litigation may be a supplemental financing method for businesses grappling with precarious financial positions. Conversely, for companies with minimal debt, the study unveils a statistically significant negative link between tax litigation and their level of debt. This insinuates that tax strategy through litigation can be a financing avenue for financially limited firms, particularly when other financing alternatives are expensive or inaccessible.

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 (Nasimi, 2018; 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 (Bayrakdaroglu et al., 2013; Hall et al., 2004; Nakamura et al., 2007; Perobelli & Famá, 2002; Proença, 2014; 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, 1988).

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

The examination of outcomes derived from the quantile regression displayed in Table 12 revealed a positive correlation between tax litigiousness and indebtedness



across all percentiles. This indicates that companies involved in more tax disputes tend to have higher debt levels. Specifically, in terms of long-term indebtedness, tax litigiousness exhibited a significant positive association at the 50th Percentile.

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, Forte & Nakamura, 2013).

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 (Bayrakdaroglu et al., 2013; Hall et al., 2004; Nakamura et al., 2007; Perobelli & Famá, 2002; Proença, 2014; 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.

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 ²	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 ²	0,148	0,151	0,217

Source: Prepared by the authors

The findings in Table 13 illustrate the outcomes of assessing the level of tax litigation based solely on the tax provision relative to the company's overall assets. Upon scrutinizing the results, it becomes evident that tax litigiousness has a noteworthy impact on debt in both the fixed effect and Pooled models.

TABLE 13: REGRESSION - FISCAL PROVISION - FIXED AND POUNDED EFFECT

Variables	Fixed Effect	Pooled
Tax Litigation - Tax Provision	4,083***	4,112***
Size	-0,137***	-0,054***
Profitability	-0,381**	-1,469***
Growth	-0,007	0,012
Liquidity	-0,012	-0,074***
Asset structure	0,513***	-0,041
Business risk	0,587	2,159***
Remarks	1.398	1.398
Groups	233	233

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

Source: Prepared by the author

Table 14 shows the regression results evaluating tax litigiousness by the contingent tax liability related to the firm's total assets. It can be seen that in both models, tax litigation has a significant effect on the indebtedness of companies.

TABLE 14: REGRESSION - FISCAL CONTINGENT LIABILITIES - FIXED AND POUNDED EFFECT

Variables	Fixed Effect	Pooled
Tax Litigation - Tax Contingent Liabilities	2,323*	0,290***
Size	-0,022	-0,048***
Profitability	-0,140	-1,481***
Growth	-0,003	0,013
Liquidity	0,014	-0,072***
Asset structure	0,278**	-0,060
Business risk	0,7380*	2,230***
Remarks	1.398	1.398
Groups	233	233

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

Source: Prepared by the author



5 FINAL CONSIDERATIONS

Over the years, numerous studies have attempted to understand the factors influencing a corporation's capital structure. These include seminal insights from Modigliani and Miller, the Static Tradeoff Theory, the Pecking Order Theory, and the Equity Market. This investigation distinguishes itself by exploring the impact of tax litigation on a firm's level of debt. It illustrates that companies may utilize tax litigation as a financing method, supplementing debt with third-party capital for high-debt firms or as an alternative to debt for those with lower debt levels.

A significant contribution of this study is assessing the effect of litigation on corporate indebtedness using two distinct types and terms of indebtedness proxies. The first proxy is overall indebtedness, represented by the ratio of total liabilities to assets. The second proxy is long-term indebtedness, computed by dividing non-current liabilities by total assets.

The findings suggest a significant inverse relationship between firm size and debt, indicating that smaller companies carry more debt than their larger counterparts. This is likely due to the reduced costs of third-party capital financing compared to equity financing for smaller firms, contradicting the Static Tradeoff Theory. Both profitability and liquidity have been identified as crucial factors in debt decision-making. More profitable and liquid firms prefer utilizing internally generated resources before seeking external funding. However, a positive relationship was identified between profitability, liquidity, and indebtedness within the context of low indebtedness. This suggests that companies with better profitability and liquidity might increase their debt under such conditions.

The relationship between business growth and debt was inconsistent, showing significance only in certain percentiles and debt proxies. The tangibility of assets presented varied results, with significant associations only in certain scenarios. In the fixed-effect model, the tangibility of assets demonstrated a positive and important link with both overall and long-term debt. This suggests that companies might leverage tangible assets as loan collateral to broaden their access to credit or reduce financial expenditure. Conversely, in the pooled model, no significant relationship was found. For firms with a high level of debt, there was no important link between asset tangibility and debt. However, this relationship was negative and statistically meaningful for low-debt firms, indicating that companies with less debt might not use tangible assets as loan collateral to increase credit accessibility.

The relationship between business risk and debt produced outcomes counter to expectations and previous research. Although the literature implies a negative relationship between business risk and debt, the findings indicated a positive relationship in some instances. This suggests that firms with unpredictable operational outcomes rely more heavily on third-party funding, contradicting the expectation that higher-risk companies would seek to diminish their reliance on debt.

The findings partially validate the applicability of the Pecking Order Theory to the capital structure of firms listed on B3 during the study period. Potential future research areas include exploring the determinants of tax litigiousness and whether tax litigation impacts a firm's financial constraints. This indicates that firms may resort to



administrative and legal litigation as a financing source when other sources are inaccessible or expensive. It could also be worth investigating whether corporate governance moderates this relationship. Lastly, another research proposal could examine whether companies with significant tax litigiousness face higher third-party capital costs due to the increased risk that litigation presents to creditors.

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