DEMYSTIFYING TAXES AS A CAUSE OF INDEBTEDNESS LEVEL: EMPIRICAL EVIDENCE FROM COMPANIES LISTED ON B3

Crislainy Fabris [1]
Mayane Moura Silva [2]
Vagner Antônio Marques [3]
Patrícia Pain [4]
Maurílio Arruda de Araújo [5]

ABSTRACT

The aim of this study was to examine the relationship between tax burden and the level of indebtedness among Brazilian companies. Annual data from 270 non-financial firms listed on the B3 stock exchange for the period from 2010 to 2019 were analyzed. The methodology included descriptive statistics, mean difference testing, correlation and independence analysis, as well as panel data regression. The findings indicated a positive and significant association between the tax burden and the companies' general debt level. Additionally, companies with a higher tax burden tend to have a higher proportion of tax debts. However, the increase in the tax burden was not identified as a factor associated with either general debt or tax debt. These findings have implications for managers, tax professionals, creditors, and regulators, suggesting that the effects of taxation on indebtedness vary according to different types of debt, and that changes in tax burden do not significantly impact short-term levels of corporate indebtedness.

Keywords: Tax Burden. Indebtedness Level. Tax Debt.

[1] Bachelor's degree in Accounting from UFES, 514 Fernando Ferrari Avenue, Goiabeiras University Campus, Vitória, Espírito Santo – ZIP Code 29075710, crislainyfabris01@gmail.com. https://orcid.org/0009-0008-6219-0694

[2] Bachelor's degree in Accounting from UFES, 514 Fernando Ferrari Avenue, Goiabeiras University Campus, Vitória, Espírito Santo – ZIP Code 29075710, mayanemoura@gmail.com. https://orcid.org/0000-0000-0000-0000

[3] Doctor of Administration from UFMG, faculty member of PPGCON/UFES, 514 Fernando Ferrari Avenue, Goiabeiras University Campus, Vitória, Espírito Santo – ZIP Code 29075710, vagner.marques@ufes.br. https://orcid.org/0000-0001-7210-4552

[4] Master's degree in Controllership and Accounting from UFRGS, doctoral student in Accounting at PPGCON/UFES, 514 Fernando Ferrari Avenue, Goiabeiras University Campus, Vitória, Espírito Santo – ZIP Code 29075710, patricia.pain@edu.ufes.br. https://orcid.org/0000-0002-0660-226X

[5] Master's degree in Administration and Rural Development from UFRPE, doctoral student in Accounting at PPGCON/UFES, 514 Fernando Ferrari Avenue, Goiabeiras University Campus, Vitória, Espírito Santo – ZIP Code 29075710, maurilio.araujo@edu.ufes.br. https://orcid.org/0000-0003-0175-6072

Crislainy Fabris, Mayane Moura Silva, Vagner Antônio Marques, Patrícia Pain and Maurílio A. de Araújo

DESMISTIFICANDO OS TRIBUTOS COMO CAUSA DO ENDIVIDAMENTO: EVIDÊNCIAS EMPÍRICAS DE EMPRESAS LISTADAS NA B3

RESUMO

O presente estudo teve como objetivo analisar a associação entre a carga tributária e o nível de endividamento das empresas brasileiras. Foram utilizados dados anuais de 270 empresas não financeiras listadas na B3, no período de 2010 a 2019. A análise incluiu estatística descritiva, teste de diferença entre as médias, análise de correlação e independência, além de regressão com dados em painel. Os resultados revelaram uma associação positiva e significativa entre a carga tributária e o nível de endividamento geral das empresas. Adicionalmente, empresas com maior carga tributária tendem a ter uma proporção maior de dívidas tributárias. No entanto, o aumento da carga tributária não foi identificado como fator associado tanto ao endividamento geral quanto ao endividamento tributário. Esses achados têm implicações para gestores, profissionais da área tributária, credores e reguladores, evidenciando que os efeitos da tributação variam de acordo com os diferentes tipos de endividamento, e que sua variação não impacta significativamente, no curto prazo, os níveis de endividamento das empresas.

Palavras-Chave: Carga Tributária. Nível de Endividamento. Endividamento Tributário.

1 INTRODUCTION

This article aimed to analyze the association between the tax burden and the level of indebtedness of Brazilian companies. According to Kluzek and Schmidt-Jessa (2022), there is a recurring interest in understanding the effect that taxes have on economic activity, as they are considered a relevant factor in analyzing the drivers of firm value.

In Brazil, the tax burden is calculated based on the ratio between taxes collected at the federal, state, and municipal levels and the Gross Domestic Product (GDP). In recent years, it has been increasing, especially since 2014, when its percentage rose from 31.84% to 32.10% in 2015, 32.29% in 2016, and represented 32.43% of GDP in 2017 (Federal Revenue of Brazil, 2018).

This increase in the tax burden leads to externalities that hinder economic growth by reducing purchasing power, production levels, investment levels, and the overall growth of companies (Stoilova, 2017). As a consequence, economic agents seek to minimize these effects through tax planning practices (Balakrishnan et al., 2019), especially those companies with a higher risk of bankruptcy (Dhawan et al., 2020).

In the context of accounting and finance literature, taxes are associated with a higher level of indebtedness (Schepens, 2016), lower cost of capital (Goh et al., 2016), and greater value generation (Brooks et al., 2016). In certain cases, the

effective tax rate may be inversely proportional to the volume of debt in the capital structure (Anindita et al., 2022; Kubick & Lockhart, 2017; Richardson et al., 2014).

According to Jacob (2018), empirical studies on taxation in Brazil should seek to understand the reality and specificities of the country, which is often regarded as having a complex tax environment. Most research focuses on analyzing tax aggressiveness and its causes and implications (Araújo & Filho, 2019; Araújo et al., 2018; Chiachio & Martinez, 2019; Costa & Amorim Júnior, 2020; Martinez & Dalfior, 2017). However, there is an ongoing debate about the tax implications on firms' levels of indebtedness. On one hand, companies exposed to a higher tax burden have incentives to be more aggressive in their tax strategies and to increase their operational cash flow, leading them to tend to have lower levels of debt, all else being equal (Jin, 2021; Lin et al., 2014). On the other hand, previous literature suggests that a higher tax burden reduces the firm's available cash resources, making them more susceptible to increasing their indebtedness to finance operational activities (Devereux et al., 2018; Platikanova, 2017).

In this context, the present study sought to address the following research question: What is the association between the tax burden and the level of indebtedness of publicly traded Brazilian companies? Thus, the research analyzed data from 2010 to 2019 for 270 non-financial companies listed on Brasil, Bolsa, Balcão (B3, the Brazilian stock exchange) using descriptive statistics, mean difference tests, correlation analysis, and panel data regression analysis. The data were collected from the ComDinheiro database, and to supplement this, missing information was obtained from the website of the Securities and Exchange Commission (CVM).

The aim is to contribute by highlighting that the tax burden is not the primary factor associated with the indebtedness of companies. As demonstrated by Mankiw et al. (2009), taxes are incorporated into the selling price of products, influencing both demand and supply. Therefore, the tax burden is predominantly passed on to the final consumer. In this context, it is up to the company to adopt a strategic position regarding the management of its taxes.

Despite previous studies providing evidence that taxes on profits are a determining variable for companies' indebtedness, this association predicted in trade-off theory and Pecking Order Theory (POT) arises from the effect of taxes on profits on the cost of debt in debt decisions, but not from the tax burden, which encompasses taxes incurred over a specific period (Kluzek & Schmidt-Jessa, 2022). Furthermore, the relationship between the tax burden and overall indebtedness does not refer to a causal effect, as it would position taxes as a production input, when in reality, they are a constraint on demand/supply that only comes into play after sales and profits, and is generally incorporated into the prices of products, goods, and services. In other words, companies that sell more will not incur debt due to taxes; rather, in the absence of self-financing capacity, they will take on new debt to finance their operations, as reported by Bernardo et al. (2018) and Anindita et al. (2022).

In this sense, the findings of this study contribute to managers, tax professionals, creditors, and tax regulators by demonstrating that the tax burden

Revista Contabilidade Vista & Revista, ISSN 0103-734X, Universidade Federal de Minas Gerais, Belo Horizonte, v. 35, n. 2, p. 1-25, mai./ago. 2024.

3

does not significantly influence the overall indebtedness of companies listed on B3. Although firms with a higher tax burden may have a greater likelihood of having a larger volume of such debts, the increase in taxes is not associated with the overall indebtedness of these firms. Additionally, further analysis showed that financial indebtedness is the most relevant variable for explaining overall indebtedness.

2 THEORETICAL FRAMEWORK

2.1 THE DEADWEIGHT LOSS OF TAXES AND ITS IMPLICATIONS

The deadweight loss of taxes, also known as loss of efficiency, refers to the decrease in total surplus generated by an economic transaction due to government intervention through taxation (Arnott & Petrova, 2006). This loss occurs when the tax distorts economic incentives and leads to an inefficient allocation of resources, resulting in production and consumption below the optimal level (Hanousek & Palda, 2009). In other words, deadweight loss represents the difference between total surplus without taxation and total surplus with taxation, caused by the reduction in the quantity transacted due to the imposition of the tax (Oates & Schwab, 2015). The implications of the deadweight loss of taxes include reduced economic efficiency, increased compliance and administrative costs, as well as discouragement of investment, production, and consumption, negatively impacting economic growth and social welfare (Hines Jr. & Keen, 2021). Therefore, minimizing the deadweight loss of taxes is a crucial challenge for policymakers aimed at promoting a more efficient and equitable taxation system (Schächtele, 2020).

The tax burden in Brazil is characterized by a trend of continuous and moderate growth since the 1990s (Gentil & Hermann, 2017). Orair and Gobetti (2018) observe that taxes on income and property represent the main source of funding for the state in Brazil, with more than 40% of tax revenue coming from taxes on goods and services. Gassen et al. (2013) add that the tax burden incorporated into the prices of products, goods, and services becomes an additional cost to the consumer. Thus, the supplier assumes the role of the passive subject, responsible for passing the taxes on to the competent authorities.

In this regard, Carvalho Filho and Bueno (2018) emphasize that the increase in the tax burden tends to reduce profits, cash flows, and the competitiveness of companies, while also discouraging production and investment and increasing unemployment. It can be understood that the tax burden pressures companies to take measures in an attempt to reduce costs or postpone tax payments.

Stoilova (2017) and Jha and Gozgor (2019) highlight that the profits of private companies are influenced by capital accumulation, technological progress, and market expansion. When taxes are incorporated into this context, they represent a cost for the entity, as they reduce the available cash flow and compromise economic growth. Therefore, large corporate groups consider the weight of the tax burden as a significant variable when making their growth projections; otherwise, it could lead to increased costs, agency problems, opportunistic behaviors, and information asymmetry.

In this context, it is observed that there is a contradiction regarding the impact of the tax burden on companies' indebtedness. Despite being cited by business owners as one of the main factors discouraging business growth, increasing indebtedness and the risk of bankruptcy, the amount of taxes typically arises from the generation of revenue and/or profit and is generally passed on to the final prices of products, goods, and services (Lin et al., 2014). Furthermore, the recurring tax debt refinancing programs have proven to be an alternative source of financing, which may encourage companies to forgo paying taxes in order to later renegotiate them at a lower cost than bank financing and with a longer repayment period (Federal Revenue of Brazil, 2018).

2.2 TAX BURDEN AND CORPORATE INDEBTEDNESS

Companies tend to follow a hierarchy when choosing their sources of financing, prioritizing internal resources, followed by loans and financing, and ultimately resorting to issuing new shares as a last option (Bernardo et al., 2018). In light of this ongoing discussion, one alternative for companies to be relieved of the tax burden and potentially offer lower product prices or even higher contribution margins is tax planning. Martinez and Dalfior (2017) observed that firms adopt tax planning as a strategy to reduce fiscal impact and explore new financing options.

The capital structure essentially refers to how a company finances its entire operation and progress using different sources of funding; that is, it represents a mix of equity and debt that companies use to finance their operations (Stoiljković et al., 2023). In the Latin American context, Bernardo et al. (2018) documented that, while both internal and external factors influence companies' capital structures, it is the firm-level variables that have the greatest potential to explain leverage.

In this sense, deciding on the capital structure is one of the most important issues, as the capital structure plays a crucial role in determining a company's performance and significantly contributes to its ability to adapt to a competitive and rapidly changing economic environment. Deciding on the capital structure is a highly complex process, and existing theories can only explain certain aspects of the diversity and complexity of these choices (Stoiljković et al., 2023).

In another approach, Lin et al. (2014) and Richardson et al. (2014) found that greater tax aggressiveness is associated with lower indebtedness. This finding is supported by the study of Kubick and Lockhart (2017), which verified that creditors view tax aggressiveness as a risky activity and, therefore, restrict the maturity structure of debt to provide a monitoring mechanism for debt contracts with borrowers engaged in aggressive taxation.

By analyzing 565 firms across 8 different sectors over a 14-year period, Santos et al. (2013) found a significant association between indebtedness and taxation, with the latter being a relevant aspect for Brazilian companies regarding their capital structure decisions. Mendes and Oliveira (2016) focused on studying the influence of profit taxation on indebtedness and, consequently, on the capital structure of the largest financial institutions in Brazil. Their findings indicated a negative relationship between taxation and the indebtedness of these firms.

Revista Contabilidade Vista & Revista, ISSN 0103-734X, Universidade Federal de Minas Gerais, Belo Horizonte, v. 35, n. 2, p. 1-25, mai./ago. 2024.

5

However, Kluzek and Schmidt-Jessa (2022) did not observe an impact of the tax burden on capital structure, but rather on the determinants of indebtedness. In light of such discrepancies in the previous literature, the following hypothesis (H_1) was evaluated.

H_1: Companies with a higher tax burden tend to be more indebted.

Regarding the relationship between the tax burden and companies' tax debt, data from the Federal Attorney General's Office (PGFN) demonstrated that companies' indebtedness to the government has seen significant growth in recent years, even though the stock of the Union's Active Debt increased by about 84% between 2013 and early 2019.

One of these tax installment programs is the Fiscal Recovery Program (REFIS), which came into effect in 2000 with the aim of reducing companies' debts with the Union. Since then, Brazil has adopted a policy of refinancing tax debts as a strategy to reduce tax evasion and stimulate the economic environment (Federal Revenue of Brazil, 2018).

Regarding debt installment programs, which have proven to be a source of financing for companies, Mello and Portulhak (2020) demonstrated in their study that taxpayers also resort to this type of mechanism due to unfavorable financial conditions that prevent them from bearing their tax burden. Data from the Brazilian Institute of Tax Planning indicated in 2017 that, in Brazil, publicly listed companies are the largest creditors of the Federal Attorney General's Office, with 21.40% of them having debts registered in active debt (Fonseca et al., 2021). To analyze the apparent discrepancies on the subject, the following hypothesis (H_2) was evaluated:

H_2: Companies with a higher tax burden tend to have more tax debts.

Additionally, data presented by the National Treasury Secretariat (2022) indicate that, in 2021, Brazil's tax burden reached 33.90% of GDP. In parallel, a study by Econimática revealed that the indebtedness of publicly traded Brazilian companies exceeded 900 billion in 2019, marking a determinant that has been continuously increasing since 2016.

However, in contrast to this finding, David et al. (2009) did not observe an apparent relationship between the increase in the tax burden and the indebtedness of the analyzed companies. In Anindita et al. (2022), the results show that the rules that led to an increase in the tax burden in Indonesia reduced the leverage of both highly and lowly indebted companies. Companies with high indebtedness experienced a decline in leverage 2.3 times greater than that of companies with low indebtedness. Given that these results are divergent, the following hypothesis (H_3) was tested:

H_3: The increase in the tax burden negatively affects the overall level of indebtedness.

3 RESEARCH DESIGN

3.1 CLASSIFICATION, SAMPLE, AND DATA COLLECTION AND ANALYSIS TECHNIQUES

The descriptive, documentary, and quantitative study utilized a sample of 2,752 annual observations from 270 non-financial companies listed on B3 during the period from 2010 to 2019. The data were collected from the ComDinheiro database and analyzed using descriptive statistics, mean difference tests, chi-square tests, correlation analysis, and panel data regression analysis to test the hypotheses (H_1, H_2, and H_3). Additionally, multilevel models (sector, year, and firm) were estimated to control for hierarchical effects at their respective levels. All quantitative variables were winsorized between the 1st and 99th percentiles.

The mean difference test was employed to compare the means between the variables of the groups of companies with a higher tax burden and those of other companies. The decision rule was to reject the null hypothesis and accept the alternative hypothesis of significant differences between companies with a higher tax burden when the p-value was less than 5%. The chi-square test was used to verify the independence between the higher tax burden and higher levels of indebtedness, with the decision rule being to accept the alternative hypothesis of an association between the higher tax burden and greater indebtedness when the p-value was less than 1%.

Correlation and regression analyses were used to test the research hypotheses more consistently. The correlation analysis revealed the types of associations between the variables and additionally diagnosed indications of multicollinearity. The regressions demonstrated the joint effect of the explanatory and control variables in the models. The econometric procedures followed the guidelines of Wooldridge (2011), including the estimation of models using Ordinary Least Squares (OLS), assessment of basic assumptions, identification of the best type of panel, and the use of robust standard errors clustered by firm in the presence of heteroscedasticity or serial correlation.

3.2 MODELS AND VARIABLES

To evaluate the research hypotheses (H_1, H_2, and H_3), it was necessary to use OLS and logistic regression for panel data. Dummy variables were defined to compose the regression and included in the three models adapted from Fonseca et al. (2020), according to equations 1, 2, and 3.

(1)

Revista Contabilidade Vista & Revista, ISSN 0103-734X, Universidade Federal de Minas Gerais, Belo Horizonte, v. 35, n. 2, p. 1-25, mai./ago. 2024.

7

$$End_{it} = \beta_0 + \beta_1 CTrib_{it} + \beta_2 Tam_{it} + \beta_3 CrescRL_{it} + \beta_4 ROE_{it} + \beta_5 MVE_{it}$$
$$+ \sum_{i=1}^{4} D_n ECV_{it} + \sum_{i=1}^{9} D_n SegEcon_{it} + \sum_{i=1}^{10} D_n Ano_{it} + \varepsilon_{it}$$

$$End_{it} = \beta_0 + \beta_1 CTrib_{it} + D_1 MaiorCTrib_{it} + \beta_2 CTrib_{it} * MaiorCTrib_{it}$$
$$+ \beta_3 Tam_{it} + \beta_4 CrescRL_{it} + \beta_5 ROE_{it} + \beta_6 MVE_{it} + \sum_{i=1}^{4} D_n ECV_{it}$$
$$+ \sum_{i=1}^{9} D_n SegEcon_{it} + \sum_{i=1}^{10} D_n Ano_{it} + \varepsilon_{it} \qquad (2)$$

$$End_{it} = \beta_0 + \beta_1 CTrib_{it} + D_1 AumentoCTrib_{it} + \beta_2 CTrib_{it} * AumentoCTrib_{it}$$
$$+ \beta_3 Tam_{it} + \beta_4 CrescRL_{it} + \beta_5 ROE_{it} + \beta_6 MVE_{it} + \sum_{i=1}^{4} D_n ECV_{it}$$
$$+ \sum_{i=1}^{9} D_n SegEcon_{it} + \sum_{i=1}^{10} D_n Ano_{it} + \varepsilon_{it} \qquad (3)$$

Each model utilized four proxies for indebtedness (End_{it}), namely: (1) Overall Indebtedness Level ($NivEnd_{it}$), measured by the ratio of total liabilities to total assets; (2) Higher Overall Indebtedness ($MaiorEnd_{it}$), operationalized as a dummy variable that assumed a value of 1 for companies that had $NivEnd_{it}$ in the upper tercile of overall indebtedness by sector/year and 0 otherwise; (3) Tax Indebtedness Level ($NivEndTrib_{it}$), measured by the ratio of total tax liabilities to total liabilities; and (4) Higher Tax Indebtedness ($MaiorEndTrib_{it}$), operationalized as a dummy variable that assumed a value of 1 for companies that had $NivEndTrib_{it}$ in the upper tercile of tax indebtedness by sector/year and 0 otherwise. The idea is to follow the same reasoning as Devereux et al. (2018), Fonseca et al. (2020), and Ali et al. (2022) in analyzing the relationship between debt/capital (capital structure) and corporate taxation.

To evaluate hypothesis (H_1), the explanatory variable, Tax Burden ($CTrib_{it}$), was measured by the ratio of total taxes to the Distributed Added Value, both derived from the Statement of Added Value (DVA). This choice aims to reduce the idiosyncrasies identified in Brazil that cause tax-related issues and address the omission of taxes on consumption and wealth, which are noticeable in other proxies such as ETR_i and $DifETR_{it}$ (Marques et al., 2022). Given the study's objective, a positive and significant association with the indebtedness proxies is expected. Additionally, to evaluate hypothesis (H_2), the Higher Tax Burden ($MaiorCTrib_{it}$) was used, operationalized as a dummy variable that assumed a value of 1 for companies that had $CTrib_{it}$ in the upper tercile of tax indebtedness by sector/year and 0 otherwise. Furthermore, to assess hypothesis (H_3), the Increase in Tax Burden ($AumentoCTrib_{it}$) was utilized, operationalized as a dummy variable that assumed

a value of 1 for companies that experienced an increase in $CTrib_{it}$ in year t compared to the previous year and 0 otherwise.

Finally, based on previous studies (Devereux et al., 2018; Fonseca et al., 2020; Ali et al., 2022), five variables were used to analyze the firm's indebtedness in detail, as well as to conduct an additional test on the effect of the proportions of types of debt on the level of indebtedness. These variables are: Financial Indebtedness Level ($NivEndFin_{it}$), measured by the ratio of financial liabilities to total liabilities; Tax Indebtedness Level ($NivEndTrib_{it}$), measured by the ratio of tax liabilities to total liabilities; Labor Indebtedness Level ($NivEndTrab_{it}$), measured by the ratio of labor liabilities to total liabilities; Indebtedness Level with Suppliers ($NivEndForn_{it}$), measured by the ratio of supplier liabilities to total liabilities; and Indebtedness Level with Other Creditors ($NivEndOutras_{it}$), measured by the ratio of other creditor liabilities to total liabilities.

To reduce the problem of endogeneity due to the omission of representative variables, several control variables identified in the literature as associated with higher levels of indebtedness were used. Initially, the effect of Size (Tam_{it}) was controlled, as firms with larger volumes of assets have greater access to financing sources, given their ability to provide collateral. The Tam_{it} variable was operationalized using the natural logarithm of total assets. Consistent with previous evidence, a positive and significant relationship is expected (Ali et al., 2022; Ricca et al., 2021).

The effect of Revenue Growth ($CrescRL_{it}$) was also controlled. This variable was measured using the logarithm of the ratio of net revenue in the current year (t_0) to net revenue in the previous year (t_{-1}) (Marques et al., 2022). Previous studies have shown that companies experiencing revenue growth have a greater need for financing their operations; moreover, revenue growth serves as a driver of profit, which enhances access to costly financing sources. Therefore, it is expected that the greater the $CrescRL_{it}$, the higher the level of indebtedness will be.

The Return on Equity ((ROE_{it}), calculated by dividing Net Income by Shareholders' Equity, was used to control for the effect of profitability on indebtedness (Marques et al., 2022). On one hand, consistent with the Pecking Order Theory, companies with higher profitability have greater access to costly financing sources, and with the lower cost of third-party capital, it is expected that more profitable companies will have a higher level of indebtedness, within the limits of bankruptcy risk. Therefore, a positive association between ROE and the level of indebtedness is anticipated.

Another control in the models was the market value of the company (MVE_{it}), represented by the natural logarithm of the firm's market value, calculated by multiplying the stock price by the number of shares issued. Previous studies indicate that, similar to ROE_{it} and $CrescRL_{it}$, companies with higher market values have greater access to credit lines. However, issuing shares is one of the options used by firms as a means of financing new projects. Therefore, it was hypothesized that firms with a higher market value would exhibit a lower level of indebtedness.

The effect of Life Cycle Stages (ECV) was also controlled, as per Dickinson (2011). Previous literature supports the association between the level of

Revista Contabilidade Vista & Revista, ISSN 0103-734X, Universidade Federal de Minas Gerais, Belo Horizonte, v. 35, n. 2, p. 1-25, mai./ago. 2024.

9

indebtedness and the stages of the life cycle, as these influence the flow of investments and financing for companies. As firms progress through the stages (Introduction, Growth, Maturity, Turbulence, and Decline), the need for investment increases, leading to an increase in indebtedness, which tends to decrease after reaching maturity. Therefore, it is expected that the coefficients for the life cycle stages will be positive for Growth and Maturity and negative for Turbulence and Decline. It is worth noting that the ECV were included only in the model for the Level of Indebtedness; in the other models, they did not show significance and were therefore excluded.

4 ANALYSIS AND DISCUSSION OF RESULTS

Initially, the descriptive statistics of the variables used in the models were analyzed, grouped between companies with a higher tax burden and the others (Table 1). It is observed that the level of indebtedness ($NivEnd_{it}$) was 56% for companies in the lower tax burden group and 57% for those in the higher tax burden group. The mean difference test for the variables regarding the level of indebtedness shows that there is a weak difference between these groups.

Table 1
Descriptive Statistics of the Variables Analyzed for the Period 2010-2019

	Lower Taxation N=2024				Higher Taxation N=728				Dif
	μ	σ	Min	Max	μ	σ	Min	Max	
$NivEnd_{it}$	0.56	0.20	0.02	1.00	0.57	0.20	0.08	1.00	0.01*
$NivEndFin_{it}$	0.48	0.25	0.00	0.98	0.40	0.24	0.00	0.91	-0.08***
$NivEndTrib_{it}$	0.04	0.08	0.00	0.88	0.06	0.09	0.00	0.66	0.02***
$NivEndTrab_{it}$	0.04	0.07	0.00	0.97	0.04	0.04	0.00	0.49	0.00**
$NivEndForn_{it}$	0.10	0.10	0.00	0.65	0.15	0.15	0.00	0.76	0.05***
$NivEndOutras_{it}$	0.33	0.21	0.00	1.00	0.36	0.22	0.01	1.00	0.03***
$CTrib_{it}$	0.22	0.13	0.00	0.97	0.51	0.15	0.23	0.98	0.29***
$\Delta CTrib_{it}$	-0.11	0.76	-6.85	4.44	0.15	0.59	-1.04	8.05	0.26***
Tam_{it}	21.46	2.22	9.86	27.53	21.38	1.97	14.83	27.55	-0.08
ΔRL_{it}	0.06	0.59	-6.80	7.15	0.03	0.32	-2.15	3.89	-0.03**
ROE_{it}	-0.03	1.96	-6.36	16.05	0.16	3.76	-54.52	75.00	0.19*
MVE_{it}	20.97	2.23	10.98	26.41	20.65	2.56	14.87	27.55	-0.32***

Note: Statistically significant at levels of *** p<0.01, ** p<0.05, * p<0.1. NivEnd: Overall Indebtedness Level. CTrib: Tax Burden measured by the square root of total taxes from the DVA divided by the Distributed Added Value. AumentoCTrib: Increase in tax. MaiorCTrib: Company with a Tax Burden above the tercile. NivEndFin: Financial Indebtedness Level. NivEndTrib: Tax Indebtedness Level. NivEndTrab: Labor Indebtedness Level. NivEndForn: Indebtedness Level with Suppliers. Tam: Firm Size. CrescRL: Revenue Growth. ROE: Return on Equity. MVE: Market Value of the Company.
Source: Prepared by the authors.

It is also observed that the average financial indebtedness level ($NivEndFin_{it}$) was 48% for companies with lower tax burdens and 40% for companies with higher tax burdens, with a statistically significant difference. This evidence is interesting as it suggests that companies paying more taxes assume less debt with financial

institutions. This result makes sense when analyzing the Return on Equity (ROE$_{it}$) jointly, as the average profitability for the group with lower tax burdens was negative at 3%, while the group of companies with higher tax burdens was at 16%. In this context, firms with a higher tax burden, being more profitable, have a greater capacity for self-financing, which is why they utilize debt issuance to a lesser extent. Another explanation arises from the associated bankruptcy costs, which serve as a deterrent or restriction to debt issuance, as predicted by Trade-off Theory.

When analyzing the other types of debts, statistically significant differences are observed between the groups for all obligations, except for labor debts (NivEndTrab$_{it}$). The other types of debts were, on average, higher for the group with a greater tax burden. This result constitutes primary evidence reinforcing hypothesis H$_2$, as it suggests that companies with a higher tax burden have a greater proportion of tax debts.

In turn, the analysis of the other variables shows that the tax burden for the group with lower taxation was 22%, while for the group with higher levels of taxation, it was 51%. Furthermore, while companies with lower taxation experienced a negative variation in the tax burden, those with higher taxation saw an increase. It is also noted that companies with a higher tax burden exhibited lower revenue growth and a slightly lower average market value. These results reinforce the evidence from previous literature that taxes can restrict growth and value generation (Anindita et al., 2022; Kluzek & Schmidt-Jessa, 2022). However, it is not justified to assume that this condition arises exclusively from taxes, as, at least for this sample, companies with higher taxation showed higher average profitability.

Subsequently, the association between having Higher Indebtedness and Higher Taxation was analyzed (Table 2). The results of the chi-square (x²) tests for independence between the groups of companies with a higher tax burden and higher overall indebtedness (Table 2 – Panel A) indicated that there is no association between having a higher tax burden and having a higher level of overall indebtedness.

Table 2
Contingency Table and Chi-Square test results for independence

	Panel A MaiorEnd x MaiorCTrib			Panel B MaiorEndTrib x MaiorCTrib		
	$MaiorNivEnd_{it}$			$MaiorNivEndTrib_{it}$		
$MaiorCTrib_{it}$	No	Yes	Total	No	Yees	Total
No	1,521	503	2,024	1,486	538	2,024
Yes	391	337	728	509	219	728
Total	1,912	840	2,752	1995	757	2,752
Pearson x²	116.0512		Pr = 0.000	3.2918		Pr = 0.070
likelihood-ratio x²	111.3113		Pr = 0.000	3.2537		Pr = 0.071
Fisher's exact =			0.000			0.073
1-sided Fisher's exact =			0.000			0.039

Source: Prepared by the authors.

Table 3
Correlation Matrix of the variables used in the models

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
$NivEnd_{it}$	(1)	1								
$NivEndFin_{it}$	(2)	0.3527***	1							
$NivEndTrib_{it}$	(3)	-0.1548***	-0.3928***	1						
$NivEndTrab_{it}$	(4)	-0.2861***	-0.3200***	0.1882***	1					
$NivEndForn_{it}$	(5)	-0.0404**	-0.2450***	-0.0066	0.0825***	1				
$NivEndOutras_{it}$	(6)	-0.2549***	-0.7604***	0.0344*	-0.0053	-0.2535***	1			
$CTrib_{it}$	(7)	0.0135	-0.1750***	0.1281***	-0.1720***	0.1620***	0.1280***	1		
$DifCTrib_{it}$	(8)	0.0192	0.0412*	-0.0106	-0.0394*	0.0116	-0.0515**	0.2729***	1	
$AumentoCTrib_{it}$	(9)	0.0233	-0.0536***	0.0330*	-0.0192	-0.0327*	0.0500**	0.1715***	0.4711***	1
$MaiorCTrib_{it}$	(10)	0.0292	-0.1416***	0.1216***	-0.0343*	0.1901***	0.0622***	0.7098***	0.1671***	0.0216
$MaiorEnd_{it}$	(11)	0.7132***	0.1601***	-0.1109***	-0.1420***	0.0930***	-0.1395***	0.0523*	0.0077	0.0342*
$MaiorEndTrib_{it}$	(12)	-0.2103***	-0.3796***	0.5157***	0.2163***	0.1373***	0.1220***	0.2254***	0.0111	-0.0038
Tam_{it}	(13)	0.1941***	0.3900***	-0.2619***	-0.3654***	0.0413*	-0.2638***	0.0939***	0.0252	-0.1295***
$CrescRL_{it}$	(14)	-0.0306	0.0683***	-0.0587***	-0.0244	0.0511**	-0.0890***	-0.0526**	0.0113	-0.0474**
ROE_{it}	(15)	-0.1520***	0.0234***	0.0337*	0.0026	0.0112	-0.0418**	0.0248	0.0401*	-0.0081
MVE_{it}	(16)	-0.0723***	0.2452***	-0.2197***	-0.2004***	0.1298***	-0.1974***	-0.0171	-0.0003	-0.1192***
ECV_{it}	(17)	-0.1147***	-0.2417***	0.1084***	0.0810***	-0.0304	0.1953***	-0.0191	0.0355	0.0638***
$SegEcon_{it}$	(18)	-0.0659***	0.0092	-0.0706***	-0.1258***	0.0031	0.0276	0.2415***	0.0063	0.0331
Ano_t	(19)	0.0695***	-0.0308	-0.0073	0.0181	0.0217	0.0324	-0.1047***	0.0367	-0.1357***

		(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
$MaiorCTrib_{it}$	(10)	1								
$MaiorEnd_{it}$	(11)	0.0346*	1							
$MaiorEndTrib_{it}$	(12)	0.2054***	-0.1097***	1						
Tam_{it}	(13)	-0.0163	0.1734***	-0.1887***	1					
$CrescRL_{it}$	(14)	-0.0274	0.0169	-0.0327	0.1186***	1				
ROE_{it}	(15)	0.0328*	-0.1070***	0.0303	0.0164	0.0122	1			
MVE_{it}	(16)	-0.0619***	0.0483**	-0.1475***	0.8184***	0.1768***	0.0147	1		
ECV_{it}	(17)	-0.0262	-0.1068***	0.0905***	-0.1980***	-0.1640***	0.0256	-0.1927***	1	
$SegEcon_{it}$	(18)	-0.0480**	-0.0067	-0.0249	0.1269***	0.0477**	-0.0120	0.2323***	0.0304	1
Ano_t	(19)	-0.0080	-0.0303	-0.0025	0.0376**	-0.0389*	0.0080	0.0077	0.1140***	-0.0111

Note: Statistically significant at levels of *** p<0.01, ** p<0.05, * p<0.1.
Source: Prepared by the authors.

However, the association between Higher Taxation and Higher Tax Indebtedness (Table 2 – Panel B) was not statistically significant at the 5% level, which aligns with data from the PGFN (Federal Attorney General's Office), indicating a considerable increase in recent years, with 71% of these debts being tax-related. Nevertheless, it is not possible to assert that there is an association between a higher tax burden and greater tax indebtedness. This result contradicts H_1 and reinforces H_2, aligning with the findings of David et al. (2009), who did not identify a relationship between the increase in the tax burden and the indebtedness of companies.

Next, the correlations (Table 3) between the study variables were analyzed. The evidence shows that there is no significant correlation between the Level of Indebtedness and the Tax Burden ($CTrib_{it}$), the Difference in Tax Burden ($DifCTrib_{it}$), the increase in Tax Burden ($\Delta CTrib_{it}$), and the Higher Tax Burden ($MaiorTrib_{it}$). Additionally, a positive and significant correlation is observed between Overall Indebtedness Level and Financial Indebtedness. The correlations with other types of debt were negative and significant, indicating that the Overall Indebtedness Level may increase due to debts with financial institutions, but not necessarily due to tax debts.

Subsequently, panel data regression analyses were conducted to verify the hypotheses (H_1, H_2 and H_3) of this study. Using the overall indebtedness level as a continuous variable (Table 4) to test hypotheses 1 and 3 of this research, it was found that $CTrib_{it}$ had positive and significant effects in the models for equations 1 and 3, confirming hypothesis 1 (H_1).

In models 1 and 2 (Table 4), it can be concluded that the higher the tax burden, the higher the level of indebtedness, which reinforces (H_1). One explanation for this relationship may stem from the fact that the government systematically opens fiscal recovery programs, thereby discouraging companies from paying taxes and increasing overall indebtedness. In model 2, there was no statistical significance found for the variables of interest ($CTrib_{it}$, $MaiorCTrib_{it}$ and $CTrib_{it}*MaiorCTrib_{it}$). In model 3, which sought to assess whether the increase in the tax burden significantly influences the level of indebtedness, it is observed that despite the positive association between the Tax Burden and the Level of Indebtedness, the results indicate that $AumentoCTrib_{it}$ does not significantly affect indebtedness, thus failing to confirm hypothesis 3 of this study, nor the findings of Anindita et al. (2022).

The analysis of the control variables allows us to infer that larger companies (Tam_{it}) tend to have a higher Overall Indebtedness Level. However, those with higher ROE and Market Value of the Company (MVE_{it}) tend to exhibit lower levels of indebtedness. Additionally, consistent with Dickinson (2011), it was found that the Life Cycle Stages (ECV_{it}) have negative associations with the level of indebtedness. These results align with the finance literature, which has provided evidence that companies tend to prioritize internally generated resources for financing projects and that, when faced with the prospect of issuing debt, they are willing to do so up to the point where the costs of bankruptcy equate to the tax benefits of debt.

Table 4

Regressions for Overall Indebtedness

		$NivEnd_{it}$					
		(1)		(2)		(3)	
Intercept	?	0.093	(0.195)	0.095	(0.194)	0.095	(0.193)
$CTrib_{it}$	(H_1)	0.067**	(0.026)	0.050	(0.038)	0.075**	(0.0313)
$MaiorCTrib_{it}$	(H_1)			-0.007	(0.024)		
$CTrib_{it} * MaiorCTrib_{it}$	(H_1)			0.023	(0.050)		
$AumentoCTrib_{it}$	(H_3)					-0.001	(0.00801)
$CTrib_{it} * AumentoCTrib_{it}$	(H_3)					-0.007	(0.0192)
Tam_{it}	(+)	0.070***	(0.012)	0.070***	(0.012)	0.070***	(0.012)
$CrescRL_{it}$	(+)	0.0095	(0.010)	0.010	(0.010)	0.010	(0.010)
ROE_{it}	(+)	-0.046***	(0.009)	-0.046***	(0.009)	-0.046***	(0.009)
MVE_{it}	(+)	-0.009***	(0.003)	-0.009***	(0.003)	-0.010***	(0.003)
$CRESC_{it}$	(-)	-0.022**	(0.010)	-0.021**	(0.010)	-0.022**	(0.010)
MAT_{it}	(-)	-0.035***	(0.011)	-0.035***	(0.011)	-0.035***	(0.011)
$TURB_{it}$	(-)	-0.041***	(0.012)	-0.041***	(0.012)	-0.041***	(0.012)
$DECL_{it}$	(-)	-0.024	(0.019)	-0.024	(0.019)	-0.024	(0.019)
Wald (x^2)		309.26***		310.46***		311.30***	
R² (Between | Within |		0.204 | 0.273 |		0.204 | 0.275 |		0.205 | 0.272 |	
General)		0.296		0.298		0.295	
Observation		1,489		1,489		1,489	
No. of companies		258		258		258	
Panel Type		EA		EA		EA	
Sector Control		Yes		Yes		Yes	
Year Control		Yes		Yes		Yes	
VIF average		1.78		2.87		2.23	
Chow Test		28.20***		27.39***		28.12***	
Breusch-Pagan Test		2355.04***		2277.81***		2348.59***	
Hausman Test		27.41*		52.21***		11.05	
Wooldridge Test		251.83***		251.83***		251.83***	

Note: Clustered robust standard errors. Statistically significant at levels of *** $p<0.01$, ** $p<0.05$, * $p<0.1$. NivEnd: Overall Indebtedness Level.

Source: Prepared by the authors.

Additionally, logistic regression analyses were conducted with panel data to test hypotheses 1 and 3 (H_1 and H_3). In these models, a dummy variable was used for companies classified in the upper tercile of overall indebtedness (Table 5). It was found that the tax burden did not serve as a significant variable to explain the probability of a company having higher indebtedness or not. This result was consistent across all three models, which demonstrates that the tax burden is not associated with a higher probability of a company being more indebted than others. These results reinforce that, in general terms: the Tax Burden; Having a Higher Tax Burden; and Increasing the Tax Burden do not have a significant association with the probability of having a higher level of indebtedness.

Table 5
Logistic regression for the probability of higher overall indebtedness

		$MaiorNivEnd_{it}$					
		(1)		(2)		(3)	
Intercept	?	-22.13***	(4.068)	-22.00***	(4.049)	-22.32***	(4.127)
$CTrib_{it}$	(H_1)	-0.183	(0.870)	-1.533	(1.563)	-0.955	(1.203)
$MaiorCTrib_{it}$	(H_1)			-0.545	(0.955)		
$CTrib_{it} * MaiorCTrib_{it}$	(H_1)			1.989	(2.172)		
$AumentoCTrib_{it}$	(H_3)					0.132	(0.340)
$CTrib_{it} * AumentoCTrib_{it}$	(H_3)					0.522	(0.904)
Tam_{it}	(+)	1.723***	(0.288)	1.722***	(0.285)	1.739***	(0.293)
$CrescRL_{it}$	(+)	0.758**	(0.364)	0.754**	(0.366)	0.745**	(0.366)
ROE_{it}	(+)	-0.821***	(0.187)	-0.812***	(0.184)	-0.825***	(0.189)
MVE_{it}	(+)	-1.773***	(0.613)	-1.744***	(0.607)	-1.763***	(0.612)
Wald (x^2)		56.97***		61.68***		60.62***	
Observations		1,638		1,638		1,638	
No. of companies		270		270		270	
Panel Type		EA		EA		EA	
Sector Control		Yes		Yes		Yes	
Year Control		Yes		Yes		Yes	
VIF average		1.93		2.88		2.14	

Note: Clustered robust standard errors. Statistically significant at levels of *** $p<0.01$, ** $p<0.05$, * $p<0.1$. NivEnd: Overall Indebtedness Level.
Source: Prepared by the authors.

Similar to the analyses for Overall Indebtedness Level, OLS regression tests were conducted for Tax Indebtedness Level as the dependent variable (Table 6). It was found that the Tax Burden does not have a significant association with the Tax Indebtedness Level. Although positive signs were observed in some cases, statistical significance was not found for this dependent variable. This means that, in general terms, the Tax Burden ($CTrib_{it}$), Higher Tax Burden ($MaiorCTrib_{it}$), or Increase in Tax Burden ($AumentoCTrib_{it}$) are not significantly associated with the Tax Indebtedness Level ($NivEndTrib_{it}$). This result contrasts with what has been found in previous literature; however, it should be noted that studies in finance typically focus only on the tax incentives of debts. In this study, taxation considers all taxes, indicating that a significant portion of the tax burden is not linked to financing decisions. Additionally, decisions regarding capital structure made by management may stem from other internal factors and negotiations with creditor expectations (Bernardo et al., 2018; Kluzek & Schmidt-Jessa, 2022; Kubick & Lockhart, 2017).

Subsequently, the probability of having Higher Tax Indebtedness was analyzed through a logistic regression (Table 7) for hypothesis 2. The results demonstrated that the higher the $CTrib_{it}$, the greater the probability of having Higher Tax Indebtedness. However, having a Higher Tax Burden and increasing the Tax Burden do not significantly explain the probability of having a Higher Level of Tax Indebtedness.

Table 6

Regressions for tax indebtedness

| | | $NivEndTrib_{it}$ | | | | | |
		(1)		(2)		(3)	
Intercept	?	0.248***	(0.084)	0.248***	(0.084)	0.248***	(0.085)
$CTrib_{it}$	(H_2)	0.019	(0.018)	0.015	(0.019)	0.022	(0.021)
$MaiorCTrib_{it}$	(H_2)			0.002	(0.010)		
$CTrib_{it} * MaiorCTrib_{it}$	(H_2)			0.001	(0.020)		
$AumentoCTrib_{it}$	(H_3)					-0.000	(0.002)
$AumentoCTrib_{it} * MaiorCTrib_{it}$	(H_3)					-0.002	(0.008)
Tam_{it}	(+)	-0.008*	(0.005)	-0.008*	(0.005)	-0.008*	(0.005)
$CrescRL_{it}$	(+)	-0.001	(0.002)	-0.002	(0.002)	-0.002	(0.002)
ROE_{it}	(+)	-0.003	(0.003)	-0.003	(0.003)	-0.003	(0.003)
MVE_{it}	(+)	0.001**	(0.000)	0.001**	(0.000)	0.001**	(0.000)
Wald (x²)		45.19***		45.59***		49.89***	
R² (Between | Within | General)		0.048 | 0.119 | 0.117		0.048 | 0.119 | 0.118		0.048 | 0.120 | 0.118	
Observation		1,611		1,611		1,611	
No. of companies		267		267		267	
Panel Type		EA		EA		EA	
Sector Control		Yes		Yes		Yes	
Year Control		Yes		Yes		Yes	
VIF average		1.94		2.85		2.22	
Chow Test		25.16***		24.99***		25.08***	
Breusch-Pagan Test		2170.49***		2153.29***		2169.93***	
Hausman Test		53.83***		59.43***		60.61***	
Wooldridge Test		7.68***		7.68***		7.68***	

Note: Clustered robust standard errors. Statistically significant at levels of *** p<0.01, ** p<0.05, * p<0.1. NivEndTrib: Tax Indebtedness Level. Source: Prepared by the authors.

Table 7

Logistic regression for the probability of higher tax indebtedness

| | | $MaiorNivEndTrib_{it}$ | | | | | |
		(1)		(2)		(3)	
Intercept	?	12.31***	(3.552)	12.37***	(3.579)	12.20***	(3.575)
$CTrib_{it}$	(H_2)	2.794***	(0.776)	2.645**	(1.235)	3.207***	(1.081)
$MaiorCTrib_{it}$	(H_2)			-0.578	(0.812)		
$CTrib_{it} * MaiorCTrib_{it}$	(H_2)			1.020	(1.759)		
$AumentoCTrib_{it}$	(H_3)					0.529	(0.366)
$CTrib_{it} * AumentoCTrib_{it}$	(H_3)					-0.996	(0.937)
Tam_{it}	(+)	-1.015***	(0.228)	-1.015***	(0.230)	-1.025***	(0.229)
$CrescRL_{it}$	(+)	-0.037	(0.173)	-0.0468	(0.173)	-0.0506	(0.175)
ROE_{it}	(+)	0.307**	(0.148)	0.309**	(0.149)	0.313**	(0.149)
MVE_{it}	(+)	0.017	(0.0229)	0.0194	(0.0227)	0.0167	(0.0231)
Wald (x²)		58.98***		59.18***		63.31***	
Observation		1,638		1,638		1,638	
No. of companies		270		270		270	
Panel Type		EA		EA		EA	
Sector Control		Sim		Sim		Sim	
Year Control		Sim		Sim		Sim	
VIF average		1.80		2.88		2.14	

Note: Clustered robust standard errors. Statistically significant at levels of *** p<0.01, ** p<0.05, * p<0.1. NivEndTrib: Tax Indebtedness Level.
Source: Prepared by the authors.

This result partially contradicts the findings of Anindita et al. (2022), which state that an increase in taxes reduces the leverage of both highly and lowly indebted companies. However, this does not imply that taxes are the cause of Higher Tax Indebtedness, as previously noted (Table 1), the proportion of tax debts relative to total liabilities was 6% for companies with higher tax burdens and 4% for others. Despite the companies in the sample reporting figures in the millions and billions of reais, the percentage is relatively small. Furthermore, when examining the effect of tax increases, there is no statistical significance observed to explain the probability of exhibiting a higher level of indebtedness. Thus, based on the results obtained in Table 7, it is possible to confirm H2, which relates the tax burden to higher tax indebtedness.

4.1 ADDITIONAL ANALYSIS

Additional analysis were conducted (Tables 8 and 9) that reinforced the results presented for hypotheses 1 and 2 of this study. In Table 8, it is observed that the greater the proportion of debts with financial institutions, the higher the overall indebtedness; however, the increase in the proportions of other types of debt tends to be associated with a reduction in indebtedness.

Table 8
Additional Test on the effect of debt type proportions on the level of indebtedness

		$NivEnd_{it}$					
		(1)		(2)		(3)	
Intercept	?	0.441**	(0.186)	0.442**	(0.185)	0.443**	(0.185)
$CTrib_{it}$	(H_1)	0.065**	(0.028)	0.0395	(0.037)	0.056*	(0.033)
$MaiorCTrib_{it}$	(H_1)			-0.0132	(0.023)		
$CTrib_{it} * MaiorCTrib_{it}$	(H_1)			0.0432	(0.050)		
$AumentoCTrib_{it}$	(H_3)					-0.004	(0.009)
$CTrib_{it} * AumentoCTrib_{it}$	(H_3)					0.012	(0.021)
$NivEndFin_{it}$	(+)	0.140***	(0.040)	0.140***	(0.040)	0.140***	(0.040)
$NivEndTrib_{it}$	(+)	-0.406**	(0.195)	-0.408**	(0.195)	-0.403**	(0.197)
$NivEndTrab_{it}$	(+)	-0.555**	(0.277)	-0.554**	(0.275)	-0.557**	(0.275)
$NivEndForn_{it}$	(+)	-0.092*	(0.054)	-0.0907*	(0.054)	-0.092*	(0.054)
Wald (x²)		395.86***		398.54***		398.56***	
R² (Between | Within| General)		0.307 | 0.304 | 0.339		0.307 | 0.305 |0.341		0.307 | 0.305 |0.340	
Observations		1,400		1,400		1,400	
No. of companies		249		249		249	
Panel Type		EA		EA		EA	
Controls maintained		Yes		Yes		Yes	
Sector Control		Yes		Yes		Yes	
Year Control		Yes		Yes		Yes	
VIF average		2.00		2.79		2.23	
Chow Test		27.38***		26.66***		27.24***	
Breusch-Pagan Test		1896.75***		1836.46***		1892.62***	
Hausman Test		10.76		13.18		23.70	
Wooldridge Test		196.32***		194.76***		194.76***	

Note: Clustered robust standard errors. Statistically significant at levels of *** p<0.01, ** p<0.05, * p<0.1. NivEnd: Overall Indebtedness Level. Source: Prepared by the authors.

What is observed in Table 8 is that the higher the Financial Indebtedness (EndFin$_{it}$), the greater the overall indebtedness will be. Conversely, the increase in other sources of financing (wages, taxes, suppliers) is associated with lower overall indebtedness. These results weaken the hypothesis that tax indebtedness is a determinant of overall indebtedness. However, one can find support for the argument made by Silva et al. (2020) that companies with tax deductions for depreciation resort less to indebtedness, as they serve as substitutes for the tax benefits of interest. These results are confirmed in Panel C of Table 9, which considers the results of the estimations of hierarchical linear models (HLM) with 3 levels (time, firm, and sector).

Table 9 addresses, in Panels A, B, and C, the results for the HLM estimations of the models estimated using OLS in Tables 4, 6, and 8, respectively. The methodology followed the guidelines outlined by Fávero and Belfiore (2024). The likelihood ratio tests comparing the estimations of the null HLM model and the null OLS model indicated that the three-level HLM was more suitable for the explained variables. Additionally, the likelihood ratio tests comparing the estimations of models with random intercepts and those with both random intercepts and slopes indicated that the model with random intercepts and slopes was more appropriate for all estimations regarding the adopted variables of interest.

Table 9
Additional test with Hierarchical Linear Models (HLM)

Panel A							
		$NivEnd_{it}$				
		(1)		(2)		(3)	
Intercept	?	-0.350***	(0.110)	-0.340***	(0.110)	-0.349***	(0.110)
$CTrib_{it}$	(H_1)	0.041	(0.051)	0.015	(0.053)	0.039	(0.054)
$MaiorCTrib_{it}$	(H_1)			-0.016	(0.021)		
$CTrib_{it} * MaiorCTrib_{it}$	(H_1)			0.051	(0.049)		
$AumentoCTrib_{it}$	(H_3)					-0.002	(0.008)
$AumentoCTrib_{it} * MaiorCTrib_{it}$	(H_3)					0.005	(0.024)
Tam_{it}	(+)	0.077***	(0.006)	0.077***	(0.006)	0.077***	(0.006)
$CrescRL_{it}$	(+)	0.016**	(0.008)	0.016**	(0.008)	0.016*	(0.008)
ROE_{it}	(+)	-0.010***	(0.001)	-0.010***	(0.001)	-0.010***	(0.001)
MVE_{it}	(+)	-0.038***	(0.003)	-0.038***	(0.003)	-0.038***	(0.003)
Observations		1,396		1,396		1,396	
Level 2 (Company)		249		249		249	
Level 3 (Sector)		10		10		10	
AIC		-2,491		-2,477		-2,472	
BIC		-2,423		-2,398		-2,394	
logLik		1,258		1,253		1,251	

Panel B							
		$NivEndTrib_{it}$				
		(1)		(2)		(3)	
Intercept	?	0.089***	(0.015)	0.090***	(0.015)	0.091***	(0.015)
$CTrib_{it}$	(H_2)	0.022*	(0.013)	0.021	(0.013)	0.016	(0.013)
$MaiorCTrib_{it}$	(H_2)			0.000	(0.003)		
$CTrib_{it} * MaiorCTrib_{it}$	(H_2)			0.001	(0.007)		
$AumentoCTrib_{it}$	(H_3)					0.001	(0.001)

$AumentoCTrib_{it} * MaiorCTrib_{it}$	(H_3)					0,002	(0,003)
Tam_{it}	(+)	-0.004***	(0.001)	-0.004***	(0.001)	-0.004***	(0.001)
$CrescRL_{it}$	(+)	-0.002	(0.001)	-0.002	(0.001)	-0.002*	(0.001)
ROE_{it}	(+)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)
MVE_{it}	(+)	0.000	(0.000)	0.000	(0.000)	0.000	(0.000)

Observations	1,396	1,396	1,396
Level 2 (Company)	249	249	249
Level 3 (Sector)	10	10	10
AIC	-8,109	-8,086	-8,092
BIC	-8,041	-8,007	-8,013
logLik	4,067	4,058	4,061

Panel C

		$NivEnd_{it}$					
		(1)		(2)		(3)	
Intercept	?	0.571***	(0.027)	0.578***	(0.027)	0.574***	(0.028)
$CTrib_{it}$	(H_1)	0.061*	(0.036)	0.022	(0.042)	0.051	(0.040)
$MaiorCTrib_{it}$	(H_1)			-0.016	(0.021)		
$CTrib_{it} * MaiorCTrib_{it}$	(H_1)			0.065	(0.051)		
$AumentoCTrib_{it}$	(H_3)					-0.000	(0.008)
$CTrib_{it} * AumentoCTrib_{it}$	(H_3)					0.008	(0.023)
$NivEndFin_{it}$	(+)	0.125***	(0.022)	0.128***	(0.022)	0.125***	(0.022)
$NivEndTrib_{it}$	(+)	-0.647***	(0.113)	-0.652***	(0.113)	-0.651***	(0.113)
$NivEndTrab_{it}$	(+)	-1.202***	(0.105)	-1.197***	(0.105)	-1.201***	(0.105)
$NivEndForn_{it}$	(+)	-0.127***	(0.042)	-0.123***	(0.042)	-0.128***	(0.042)

Observations	1,396	1,396	1,396
Level 2 (Company)	249	249	249
Level 3 (Sector)	10	10	10
AIC	-2,590	-2,577	-2,572
BIC	-2,522	-2,499	-2,493
logLik	1,308	1,304	1,301

Note: Clustered robust standard errors. Statistically significant at levels of *** p<0.01, ** p<0.05, * p<0.1. NivEnd: Overall Indebtedness Level. NivEndTrib: Tax Indebtedness Level.
Source: Prepared by the authors.

The results from Panel C contribute to confirming hypothesis 1 of this study, which posits that companies with a higher tax burden tend to be more indebted. Thus, statements such as those made by Lin et al. (2014), Richardson et al. (2014), Kubick and Lockhart (2017), and Silva et al. (2020) gain strength, suggesting that greater tax aggressiveness is associated with lower indebtedness. Creditors perceive this practice as risky, limiting the debt repayment structure to monitor loans to borrowers with aggressive tax strategies.

The confirmation of hypothesis 2 in the logistic regression is supported by the results from Panel B (Table 9). It asserts that companies with a higher tax burden tend to have more tax debts. These results complement those in Table 7, reinforcing the importance of analyzing tax indebtedness in the Brazilian context, as the country has adopted programs for refinancing tax debts, such as REFIS, as a strategy that may reduce tax aggressiveness among companies (Brazil, 2018).

5 CONCLUSIONS

The objective of the present study was to analyze the association between the tax burden and the level of indebtedness of Brazilian companies. To this end, data from 270 non-financial companies listed on B3 were analyzed for the period from 2010 to 2019, using descriptive statistics, mean difference tests, chi-square tests, correlation analysis, and OLS regression, logistic regression, and hierarchical linear models with panel data.

The chi-square tests and regression analysis showed that companies with higher tax burdens tend to have a greater proportion of overall indebtedness and tax debt, confirming H_1 and H_2. This finding aligns with the data provided by the tax authorities, through the PGFN, indicating that there has been a considerable increase in tax liabilities among companies in recent years.

Regarding hypothesis 1 of this study, it was confirmed, as a positive and significant association was found between the tax burden and overall indebtedness in the OLS regression. Hypothesis 2 was confirmed through logistic regression, indicating an increased likelihood of having higher tax indebtedness, and this was further supported by additional analyses. However, no significant effect on indebtedness was observed when there was an increase in taxes from one period to another. Therefore, it can be stated that H_3 was not confirmed.

The present study aimed to investigate the relationship between the tax burden and the level of indebtedness of Brazilian companies, recognizing the relevance of this topic in light of the ongoing interest of researchers, managers, and regulators in understanding the impact of taxes on economic activity, especially in a context where the tax burden has increased in recent years. The results obtained revealed nuances that challenge some of the initial expectations and highlight the complexity of the interaction between taxation and corporate indebtedness.

Although a positive and significant association between the tax burden and overall indebtedness was observed, the logistic regression tests did not demonstrate a direct and significant relationship explaining the propensity of companies to incur debt. Furthermore, no significant effect on indebtedness was found resulting from the increase in taxes over time.

These results provide insights for managers, tax professionals, creditors, and regulators, suggesting that the tax burden is associated with the overall indebtedness of the analyzed companies, but the increase in this burden does not correlate with levels of indebtedness. However, it is important to emphasize that the relationship between tax burden and indebtedness is not linear and direct, highlighting the need for a deeper understanding of the underlying mechanisms.

The findings contribute by providing information on the association between the tax burden and indebtedness, which should be useful for managers, tax professionals, creditors, and tax regulators. They highlight that, despite taxation being a factor that can compromise a firm's performance, it has distinct implications for different types of indebtedness, and its variation may not impact the levels of indebtedness of companies in the short term.

The findings of this study have implications for understanding the relationship between taxation and corporate indebtedness in the Brazilian context. They suggest that the tax burden is not the primary determinant of companies' indebtedness, and that other factors, such as effective tax management and financing structure, play a crucial role. Therefore, future research should continue to explore these dynamics, considering different business and economic contexts, in order to provide a more comprehensive and enhanced understanding of this complex relationship.

For future studies, it is advisable to replicate this analysis in privately held companies, as well as in micro and small enterprises, in order to examine the association between tax burden and corporate indebtedness across a variety of business contexts. A comparative analysis between developing countries could provide insights into how the tax burden influences indebtedness in different economic and social environments. Furthermore, it is important to examine how tax incentives impact the total indebtedness of companies, providing a more comprehensive understanding of the interaction between tax aggressiveness and corporate indebtedness. These emerging topics represent opportunities to advance the understanding of this relationship in various contexts.

REFERENCES

Ali, S., Rangone, A., & Farooq, M. (2022). Corporate Taxation and Firm-Specific Determinants of Capital Structure: Evidence from the UK and US Multinational Firms. Journal of Risk and Financial Management, 15(2), 55. https://doi.org/10.3390/jrfm15020055

Anindita, R. I., Irawan, F., Firmansyah, A., Wijaya, S., Qadri, R. A., Sumantri, J., Andriani, A. F., & Mahrus, M. L. (2022). The impact of thin capitalization rules on capital structure and tax avoidance. Journal of Governance and Regulation, 11(2), 8. https://doi.org/10.22495/jgrv11i2art1

Araújo, R. A. de M., & Filho, P. A. M. L. (2019). Reflexo do Nível de Agressividade Fiscal sobre rentabilidade de empresas listadas na B3 e na NYSE. Revista Universo Contábil, 14(4). https://doi.org/10.4270/ruc.2018430

Araújo, R. A. M., Da Silva Santos, L. M., Maia Leite Filho, P. A., & Paes de Barros Camara, R. (2018). Agressividade Fiscal: Uma comparação entre empresas listadas na NYSE e BM&FBOVESPA1. Enfoque: Reflexão Contábil, 37(1), 39. https://doi.org/10.4025/enfoque.v37i1.32926

Arnott, R., & Petrova, P. (2006). The Property Tax as a Tax on Value: Deadweight Loss. 13(2–3), 241–266. https://doi.org/Arnott, Richard; Petrova, Petia (2006). The Property Tax as a Tax on Value: Deadweight Loss. International Tax and Public Finance, 13(2-3), 241–266. https://doi.org/10.1007/s10797-006-4938-6

Balakrishnan, K., Blouin, J. L., & Guay, W. R. (2019). Tax Aggressiveness and Corporate Transparency. The Accounting Review, 94(1), 45–69. https://doi.org/10.2308/accr-52130

Bernardo, C. J., Albanez, T., & Securato, J. R. (2018). Fatores Macroeconômicos e Institucionais, Composição do Endividamento e Estrutura de Capital de Empresas Latino-Americanas. BBR. Brazilian Business Review, 15, 152–174. https://doi.org/10.15728/bbr.2018.15.2.4

Brooks, C., Godfrey, C., Hillenbrand, C., & Money, K. (2016). Do investors care about corporate taxes? Journal of Corporate Finance, 38, 218–248. https://doi.org/10.1016/j.jcorpfin.2016.01.013

Carvalho Filho, M. H., & Bueno, N. P. (2018). O efeito da carga tributária no crescimento da economia. Revista Gestão & Tecnologia, 18(3), 188–204. http://dx.doi.org/10.20397/2177-6652/2018.v18i3.1417

Chiachio, V. F. de O., & Martinez, A. L. (2019). Efeitos do Modelo de Fleuriet e Índices de Liquidez na Agressividade Tributária. Revista de Administração Contemporânea, 23(2), 160–181. https://doi.org/10.1590/1982-7849rac2019180234

Costa, F. M. da, & Amorim Júnior, R. L. (2020). Reorganizações Societárias e Agressividade Tributária. Revista Evidenciação Contábil & Finanças, 8(3), 5–22. https://doi.org/10.22478/ufpb.2318-1001.2020v8n3.51368

David, M., Nakamura, W. T., & Bastos, D. D. (2009). Estudo dos modelos trade-off e pecking order para as variaveis endividamento e payout em empresas Brasileiras (2000-2006). Revista de Administracao Mackenzie, 10(6), 132-154. https://doi.org/10.1590/S1678-69712009000600008

Devereux, M. P., Maffini, G., & Xing, J. (2018). Corporate tax incentives and capital structure: New evidence from UK firm-level tax returns. Journal of Banking & Finance, 88, 250–266. https://doi.org/10.1016/j.jbankfin.2017.12.004

Dhawan, A., Ma, L., & Kim, M. H. (2020). Effect of corporate tax avoidance activities on firm bankruptcy risk. Journal of Contemporary Accounting & Economics, 16(2), 100187. https://doi.org/10.1016/j.jcae.2020.100187

Dickinson, V. (2011). Cash Flow Patterns as a Proxy for Firm Life Cycle. The Accounting Review, 86(6), 1969–1994. https://doi.org/10.2308/accr-10130

Fávero, L. P., & Belfiore, P. (2024). Manual de análise de dados (1o ed). LTC.

Fonseca, P. V., Jucá, M. N., & Nakamura, W. T. (2020). Debt Tax Benefits in a High Tax Emerging Market: Evidence from Brazil. International Journal of Economics and Business Administration, 8(2), 35–52. https://doi.org/10.35808/ijeba/442

Fonseca, A. K., Mendes Sirqueira, D., Araújo, R.A.M., & Garcia, I. A. S. (2021). Reflexo do planejamento tributário no endividamento das empresas não financeiras listadas na Brasil Bolsa Balcão (B3). Revista de Gestão e Secretariado, 12(2), 225–252. https://doi.org/10.7769/gesec.v12i2.1191

Gassen, V., D'Araújo, P. J. S., & Paulino, S. (2013). Tributação sobre Consumo: O esforço em onerar mais quem ganha menos. Seqüência: Estudos Jurídicos e Políticos, 34(66), 213–234. https://doi.org/10.5007/2177-7055.2013v34n66p213

Gentil, D., & Hermann, J. (2017). A política fiscal do primeiro governo Dilma Rousseff: Ortodoxia e retrocesso. Economia e Sociedade, 26(3), 793–816. https://doi.org/10.1590/1982-3533.2017v26n3art9

Goh, B. W., Lee, J., Lim, C. Y., & Shevlin, T. (2016). The Effect of Corporate Tax Avoidance on the Cost of Equity. The Accounting Review, 91(6), 1647–1670. https://doi.org/10.2308/accr-51432

Hanousek, J., & Palda, F. (2009). Is there a displacement deadweight loss from tax evasion? Estimates using firm surveys from the Czech Republic. Economic Change and Restructuring, 42(3), 139–158. https://doi.org/10.1007/s10644-008-9056-2

Hines Jr., J. R., & Keen, M. J. (2021). Certain effects of random taxes. Journal of Public Economics, 203, 104412. https://doi.org/10.1016/j.jpubeco.2021.104412

Jacob, M. (2018). A note on tax research. Revista Contabilidade & Finanças, 29(78), 339–342. https://doi.org/10.1590/1808-057x201890280

Jha, P., & Gozgor, G. (2019). Globalization and taxation: Theory and evidence. European Journal of Political Economy, 59, 296–315. https://doi.org/10.1016/j.ejpoleco.2019.04.001

Jin, X. (2021). Corporate tax aggressiveness and capital structure decisions: Evidence from China. International Review of Economics & Finance, 75, 94–111. https://doi.org/10.1016/j.iref.2021.04.008

Kluzek, M., & Schmidt-Jessa, K. (2022). Capital structure and taxation of companies operating within national and multinational corporate groups: Evidence from the Visegrad Group of countries. Journal of Business Economics and Management, 23(2), Artigo 2. https://doi.org/10.3846/jbem.2022.15634

Kubick, T. R., & Lockhart, G. B. (2017). Corporate tax aggressiveness and the maturity structure of debt. Advances in Accounting, 36, 50–57. https://doi.org/10.1016/j.adiac.2016.10.001

Lin, S., Tong, N., & Tucker, A. L. (2014). Corporate tax aggression and debt. Journal of Banking & Finance, 40, 227–241. https://doi.org/10.1016/j.jbankfin.2013.11.035

Mankiw, G. N., Weinzierl, M., & Yagan, D. (2009). Optimal taxation in theory and practice. Jounal of Economic Perspectives, 23(4), 74–147. https://www.aeaweb.org/articles?id=10.1257/jep.23.4.147

Marques, V. A., Campos, B. da S., Alencastre, B. Z., Louzada, L. C., & Martinez, A. L. (2022). Agressividade tributária, estágios do ciclo de vida e nível de investimentos: uma análise do efeito moderador em empresas listadas na B3. Contabilidade Vista & Revista, 33(2), 57–83. https://doi.org/10.22561/cvr.v33i2.6796

Martinez, A. L., & Dalfior, M. D. (2017). Agressividade Tributária: Um Survey da Literatura. Revista de Educação e Pesquisa em Contabilidade (REPeC), 11(0), 106–124. https://doi.org/10.17524/repec.v11i0.1724

Mello, F. L. R. de, & Portulhak, H. (2020). Refis: Recuperação Fiscal ou Planejamento Tributário? Um Estudo com Base na Percepção de Advogados e Auditores. Revista Contabilidade e Controladoria, 11(2). https://doi.org/10.5380/rcc.v11i2.70917

Mendes, P. C. de M., & Oliveira, E. B. (2016). Relação entre Endividamento Geral, Tributação e o Índice de Basileia nas Maiores Instituições Financeiras do Brasil. Contabilidade, Gestão e Governança, 19(1), 64–82.

Orair, R., & Gobetti, S. (2018). Reforma tributária no Brasil: princípios norteadores e propostas para debate. Novos Estudos - CEBRAP, 37(1), 213–244. https://doi.org/10.25091/S01013300201800020003

Oates, W. E., & Schwab, R. M. (2015). The Window Tax: A Case Study in Excess Burden. Journal of Economic Perspectives, 29(1), 163–180. https://doi.org/10.1257/jep.29.1.163

Platikanova, P. (2017). Debt Maturity and Tax Avoidance. European Accounting Review, 26(1), 97–124. https://doi.org/10.1080/09638180.2015.1106329

Receita Federal do Brasil. (2018). Carga Tributária no Brasil 2017 – Análise por tributos e bases de incidência. Brasília. https://receita.economia.gov.br/dados/receitadata/estudos-e-tributarios-e-aduaneiros/estudos-e-estatisticas/carga-tributaria-no-brasil/ctb-2018-publicacao-v5.pdf

Ricca, L. T., Jucá, M. N., & Hadad Junior, E. (2021). Tax benefit and bankruptcy cost of debt. The Quarterly Review of Economics and Finance, 81, 82–92. https://doi.org/10.1016/j.qref.2021.05.003

Richardson, G., Lanis, R., & Leung, S. C.M. (2014). Corporate tax aggressiveness, outside directors, and debt policy: An empirical analysis. Journal of Corporate Finance, 25, 107–121. https://doi.org/10.1016/j.jcorpfin.2013.11.010

Santos, M. A. C. dos, Cavalcante, P. R. N., & Rodrigues, R. N. (2013). Tamanho da firma e outros determinantes da tributação efetiva sobre o lucro no Brasil. Advances in Scientific and Applied Accounting, 179–210. https://doi.org/10.14392/ASAA.2013060204

Schächtele, S. (2020). Tax Responses at Low Taxable Incomes: Evidence from Germany. Fiscal Studies, 41(2), 411–439. https://doi.org/10.1111/1475-5890.12220

Schepens, G. (2016). Taxes and bank capital structure. Journal of Financial Economics, 120(3), 585–600. https://doi.org/10.1016/j.jfineco.2016.01.015

Secretaria do Tesouro Nacional. (2022). Boletim Estimativa da Carga Tributária Bruta do Governo Geral. In Secretaria do Tesouro Nacional (Ed.), Secretaria do Tesouro Nacional (pp. 1–13). Secretaria do Tesouro Nacional. https://sisweb.tesouro.gov.br/apex/f?p=2501:9::::9:P9_ID_PUBLICACAO:43205

Stoiljković, A., Tomić, S., Leković, B., & Matić, M. (2023). Determinants of Capital Structure: Empirical Evidence of Manufacturing Companies in the Republic of Serbia. Sustainability, 15(1), Artigo 1. https://doi.org/10.3390/su15010778

Stoilova, D. (2017). Tax structure and economic growth: Evidence from the European Union. Contaduría y Administración, 62(3), 1041–1057. https://doi.org/10.1016/j.cya.2017.04.006

Wooldridge, J. (2011). Econometria introdutória: Uma abordagem moderna (2o ed). São Paulo: Thompson Learning.

Revista Contabilidade Vista & Revista, ISSN 0103-734X, Universidade Federal de Minas Gerais, Belo Horizonte, v. 35, n. 2, p. 1-25, mai./ago. 2024.

25