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The relationship between federal tax installments and the future profitability of Brazilian companies listed on B3 S/A

La relación entre las cuotas del impuesto federal y la rentabilidad futura de las empresas brasileñas que cotizan en B3 S/A

A relação entre parcelamentos tributários federais e a rentabilidade futura das empresas brasileiras listadas na B3 S/A

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Abstract

Purpose: The objective of this study is to ascertain whether federal tax installments exert an influence on the future profitability of companies listed on B3 S/A.

Methodology: The sample comprises 129 non-financial Brazilian companies listed on the Brasil Bolsa Balcão (B3 S/A) from 2018 to 2022. To achieve the study's objective of ascertaining the relationship between tax installments and future profitability, two distinct profitability measures were employed: The variables of interest return on assets (ROA) and earnings before interest, taxes, depreciation, and amortization (EBITDA). The ordinary least squares (OLS) regression model was employed to test the formulated hypotheses and analyze the data, with robust standard errors.

Results: The results indicate that tax installments exert a significant influence on the future profitability of these companies. In light of these findings, it can be concluded that companies employ tax installments as a means of indirect financing, with the objective of enhancing economic benefits and the financing of their operations. This approach has a positive impact on profitability and the generation of future cash flows.

Contributions of the Study: The study makes a contribution to the existing literature by identifying how companies use tax installment options for their indirect financing and increase in profitability rates. It also highlights the influence of federal tax installments on increasing the future profitability of Brazilian companies. In terms of practical and social contributions, the results provide mechanisms for discussion on the application of tax laws and for social discussions on the impact of taxes on business performance.

Keywords: Tax Installment; Profitability Indicators; ROA; EBITDA.

Resumen

Objetivo: Este estudio tiene como objetivo verificar si las cuotas de impuestos federales influyen en la rentabilidad futura de las empresas que cotizan en B3 S/A.

Metodología: La muestra está compuesta por 129 empresas brasileñas no financieras listadas en Brasil Bolsa Balcão (B3 S/A), en el período de 2018 a 2022. Para cumplir con el objetivo del estudio, sobre la relación entre cuotas tributarias y rentabilidad futura. , se utilizaron dos medidas de rentabilidad ROA y EBITDA. Y, para probar las hipótesis formuladas en el estudio y analizar los datos, se utilizó el modelo de regresión de mínimos cuadrados ordinarios (MCO), con errores estándar robustos.

Resultados: Los resultados demuestran que las cuotas tributarias influyen en el aumento de la rentabilidad futura de estas empresas. Por lo tanto, los hallazgos del estudio brindan información de que las empresas utilizan las cuotas tributarias como una forma de financiamiento indirecto, para beneficio económico y financiamiento de sus operaciones, lo que permite un impacto positivo en la rentabilidad y generación de flujos de caja futuros.

Contribuciones del Estudio: El estudio contribuye a la literatura al identificar cómo las empresas utilizan las opciones de pago de impuestos para el financiamiento indirecto y el aumento de las tasas de rentabilidad. Destacando la influencia de las cuotas de impuestos federales en el aumento de la rentabilidad futura de las empresas brasileñas. En relación con

las contribuciones prácticas y sociales, los resultados proporcionan mecanismos para la discusión sobre la aplicación de las leyes tributarias y para los debates sociales sobre los impactos tributarios en el desempeño empresarial.

Palabras clave: Cuota de Impuestos; Indicadores de Rentabilidad; EER; EBITDA.

Resumo

Objetivo: O presente estudo objetiva verificar se os parcelamentos tributários federais influenciam na rentabilidade futura das empresas listadas na B3 S/A.

Metodologia: A amostra é composta por 129 empresas brasileiras não financeiras listadas na Brasil Bolsa Balcão (B3 S/A), do período de 2018 a 2022. Para atender ao objetivo do estudo, sobre a relação entre parcelamentos tributários e a rentabilidade futura, foi utilizado duas medidas de rentabilidade ROA e EBITDA. E, para o teste de hipóteses formuladas no estudo e a análise dos dados foi utilizado o modelo de regressão por mínimos quadrados ordinários (MQO), com erros-padrões robustos.

Resultados: Os resultados demonstram que os parcelamentos tributários influenciam no aumento da rentabilidade futura dessas empresas. Portanto, os achados do estudo fornecem informações que as empresas se utilizam dos parcelamentos tributários como forma de financiamento indireto, para benefício econômico e financiamento de sua operação, o que possibilita um impacto positivo na rentabilidade e geração de fluxos de caixa futuro.

Contribuições do Estudo: O estudo contribui com a literatura ao identificar como as empresas se utilizam das opções de parcelamentos tributários para seu financiamento indireto e aumento dos índices de rentabilidade. Ao destacar a influência dos parcelamentos de tributos federais no aumento da rentabilidade futura das empresas brasileiras. Em relação as contribuições práticas e sociais, os resultados fornecem mecanismos para discussão sobre a aplicação das leis tributárias e para as discussões sociais sobre os impactos tributários no desempenho empresarial.

Palavras-chave: Parcelamento Tributário; Indicadores de Rentabilidade; ROA; EBITDA.

1 Introduction

The Brazilian tax system is considered complex, confusing and hard to be understood and interpreted by the taxpayers, according to data from the Brazilian Institute of Planning and Taxation (IBPT), from 1988, with the enactment of the Federal Constitution, to September 2023, approximately 7,480,773 (seven million, four hundred and eighty thousand, seven hundred and seventy-three) accounting standards were edited, 586 standards edited every day or 845 standards edited per business day (IBPT, 2023).

Furthermore, the Brazilian tax revenue is considered high and comparable to that of developed countries. According to data from the National Treasury of Brazil (2024), the Brazilian tax burden in 2023 was 32.44% (percentage data in relation to GDP), while the average percentage in member countries of the Organization for Economic Cooperation and

Development (OECD) is 34.04%. From the gross tax burden obtained in 2023, 21.99% was obtained with federal tax collection (National Treasury of Brazil, 2024).

As they have many obligations, companies opt to prioritize the payment of those that generate more consequences if they are not paid, such as labor obligations in relation to federal taxes (Silva et al., 2023). According to Silva et al. (2022), these liabilities can significantly affect the financial stability of an organization and interfere with its reputation, both with employees and in the market in which the company operates.

As a result, the search for indirect financing sources, considered attractive for companies and with a low cost, such as tax installments (Lima et al., 2017), becomes a common practice among companies.

Some examples of federal tax installment plans offered by the government are: Tax Recovery Program (Refis), Special Installment Plan (Paes), Special Tax Debt Settlement Program (PERT), Rural Tax Debt Refinancing Program (PRR), Exceptional Installment Payment Program (Paex), "Crisis Refis" Program, and the Program for Settlement of State and Municipal Social Security Debts (PREM) (Brazilian Internal Revenue Service, 2017). Thus, companies can use the tax installment programs formulated by the governments for the payment and release of their tax debts with the government agencies and with the Federal, State, Municipal and Federal District governments.

Paes (2014) evaluated the impact that tax installments had on the behavior of taxpayers and tax revenue. The effects are negative for the state, as they are long-lasting and give taxpayers the expectation of adhering to future tax installment plans. The author also describes that in the simulations of tax revenue payment to creditors, tax installments are always lower when compared to what would be obtained if there was no tax installment plan, during the whole granting stage.

Previous studies investigating the relationship between tax installments and company performance show that tax installments are sources of indirect financing (Lima et al., 2017). Thus, they found that deferring tax payments and awaiting tax installment programs, such as REFIS, is more advantageous for companies than third-party borrowing (Nogueira, Souza Neto & Soares (2019). Campagnoni and Ruiz (2020) analyzed the characteristics of companies applying for tax remission in Brazil and identified that they had a higher market value and distributed more dividends.

With regard to tax installments with the economic-financial indicators of company performance, Oliveira (2020) states that companies that adhered to PERT have higher debt capital and tangibility and lower income tax payment when compared to companies that did not adhere to the program. Moreover, Soler (2020) observes that the relationship between tax installments and the performance of companies listed on IBRX 50 can serve as sources of tax financing. Furthermore, the companies that adhered to REFIS and PERT used this form of tax installment to get a financing source at lower costs (Severiano; Mendonça Neto; Oyadomari & Vieira, 2022; Silva, Santos, Fonseca & Piacente, 2023).

In light of the above, this study tries to answer the following question: **what is the relationship between federal tax installments and the future profitability indicators of companies listed on B3 S/A**? Therefore, the purpose of this research is to determine the relationship between federal tax installments and the future profitability of companies listed on B3 S/A.

Studies addressing the topic become relevant due to the fact that the Brazilian tax system is very specific, confusing and hard to understand. Simplifying the Brazilian tax system can contribute to a higher tax revenue, transparency, surveillance and disincentive to

adhere to future tax installment plans, especially those granted in extraordinary cases and those benefiting delinquent taxpayers.

This study makes a contribution to the existing literature by investigating the influence on the future profitability of companies, from the use of federal tax installments as a financing source, in which not paying your taxes is more interesting than getting into debt with other third-party sources. In terms of practical contributions, this study will show the companies that they can benefit from adhering to tax installment plans and also increase their future profitability. In terms of social contributions, it can serve as a foundation for discussion about the weaknesses that the government and tax laws have, and also serve as an alert to the Brazilian government in the development of actions to increase tax revenue, make the tax system simpler to understand, and reduce taxpayers' tax default.

2 Literature Review

2.1 Tax Installments

Tax installments are considered tax expenses and refer to the tax debt settlement programs offered to taxpayers, created by the government and by the Office of the General Counsel for the Federal Treasury (PGFN), aimed at meeting economic and social objectives (Viana, Campagnoni & Esteves, 2023). Prescribed by Art. 151 of the Brazilian Tax Code (CTN) (Brasil, 1966), they can be subdivided into conventional or special tax installments. Conventional tax installment plans are those that taxpayers can adhere to in ordinary situations and pay their debts in up to 60 installments, and special tax installment plans are those in which situations are out of the conventional, offered in extraordinary cases. Special tax installment plans have as a characteristic bringing the interests of the government and the companies together; the government believes that it will have an increase in revenue by receiving part of the debts, and the companies will have an opportunity to reduce their tax liabilities at lower costs (Paes, 2014). The most relevant tax installment programs, according to the Brazilian Internal Revenue Service (2017), are: Refis, Paes, Paex, "Crisis Refis" and PERT (Table 1).

Table 1

Tax Installment Programs and their information

Programs	**Law**	**Term**	**Taxpayers adhering to the program**
Tax Recovery Program (Refis)	Law No. 9,964 of April 10, 2000.	Indefinite	129 thousand taxpayers
Special Installment Plan (Paes)	Law No. 10,684 of May 30, 2003.	180 months	282 thousand legal entities and 92 thousand individuals
Exceptional Installment Payment Program (Paex)	Provisional Presidential Decree No. 303 of June 29, 2006.	3 installment modalities: into 6, 120 and 130 installments	244,722 taxpayers
"Crisis Refis" Program	Provisional Presidential Decree No. 449 of	14 modalities were created, including	717,761 legal entities and

	December 3, 2008 and Law No. 11,941 of May 27, 2009.	payment at sight and debt installment	168,592 individuals
Special Tax Debt Settlement Program (PERT)	Provisional Presidential Decree No. 783, which was voted into Law No. 13,496.	The period for adhesion was reopened three times.	443 thousand legal entities and 297 thousand individuals

Source: *Adapted from the Brazilian Internal Revenue Service (2017).*

There are other installment programs for tax liabilities, which are specific to the Simples Nacional, PIS, Cofins, IRPJ and CSLL taxes, among others, all of them created in order to reduce tax liabilities and settle the tax debts of delinquent taxpayers (Brazilian Internal Revenue Service, 2017). However, according to the same author, taxpayers failed to make the payments agreed under the tax installment plans they had adhered to, and later adhered to other tax installment plans, generating more tax liabilities. Federal tax installment programs have two main purposes: (i) the demand for increasing tax revenue and resuming the economic growth; and (ii) settlement of the taxpayers' tax liabilities, whether individuals or legal entities (Viana, Campagnoni & Esteves, 2023; Brasil, 2017).

Viana, Campagnoni and Esteves (2023) point out that in the last decades the government has developed laws that bring benefits to delinquent taxpayers, such as the pardon of 100% of the penalties and interests on the late tax amount at the date of debt installment. Such benefits are related to lower interest rates, as the Special System for Settlement and Custody (Selic) and the Long-Term Interest Rate (TJLP) are used as average adjustment rate, both lower than the interest rates used in the financial market (Moraes Filho, Moura & Cunha, 2022). Moreover, the pardon of the payment of interests and penalties and a longer term to pay taxes (Rezende, Dalmácio & Rathke, 2018).

2.2 Formulation of Hypotheses

The companies' performance can be observed through the profitability indicators, such as the Return on Assets (ROA) and Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA). ROA's main objective is to measure the company's ability to generate profits from the available assets (Gitman, 2010). And EBITDA is one of the most used metrics among investors for decision-making and its purpose is to estimate a company's future cash flow (EBITDA). Thus, companies showing good profitability indicators show their ability to withhold assets and higher cash availability.

Previous studies, such as Lima et al. (2017), Nogueira et al., (2019) and Oliveira (2020) tried to understand how companies used tax installment plans and their impact on the performance of organizations. Lima et al. (2017) examined the use of federal tax installments, which can be used by companies as a source of indirect financing, comparing the advantages in relation to the market and their impact on the capital structure of companies. Through the application of case study methodology, they simulated the impact of tax installments and third-party borrowing on capital structure. The results show that the cost of tax installments is lower than that of third-party borrowing. Therefore, a lower capital cost related to tax installments is beneficial for companies using such programs as a source of indirect financing.

The study by Oliveira (2020) identified if the behavior of financial indicators, such as ROA estimated by the ratio between EBITDA and total assets, and determinants of the capital structure, debt capital, short-term indebtedness, and tangibility of the companies listed on B3

S/A were influenced by the adherence to the PERT installment program. The results evidence that the companies that adhered to PERT had a higher level of indebtedness and tangibility and lower income tax payment than the entities that did not adhere to the program.

Nogueira, Souza Neto and Soares (2019) examined what the financial savings choice (allocation of financial resources) can cause for the company. In the study, they used a family business in the city of Mossoró-RN, from 2015 to 2016, through aggressive tax planning, in compliance with the Refis Program. The authors made a simulation of aggressive tax planning and found out that getting into debt to pay its taxes is less advantageous for a company than using other ways to capitalize, for instance, through financial investments or through the purchase of high turnover products, in which it was expected a profit 40% higher than waiting for the REFIS program to be released by the government.

Campagnoni and Ruiz (2020) identified what are the characteristics of the companies listed on the Brazilian capital market that adhered to PERT from the analysis of the footnotes to the financial statements and statements issued by the companies. The results showed that the companies that adhered to the program paid more dividends and showed a higher market value. However, they did not identify the existence of economic-financial differences in the companies before and after adhering to tax installment plans. Soares e Pimenta (2020) investigated the correlation between special federal tax installment plans and the level of fixed assets of the companies in the industrial goods sector listed on B3 S/A. The data analysis was performed using descriptive statistics and the Spearman's test of correlation between the level of fixed assets and the tax installment amount. The results do not show a correlation between tax installments and the level of fixed assets of the analyzed companies.

Soler (2020) analyzed short and long-term tax indebtedness of the companies and its relation to the performance of the companies listed on IBrX 50, from 2014 to 2018. The results indicate a positive relationship between the two variables used, i.e., companies that have a higher tax indebtedness have a higher return on assets (ROA). Aretz et al. (2023) examined the economic-financial performance of companies filing under Chapter 11 listed on B3 S/A, from 2019 to 2021. After collecting information and calculating the current ratio, Indebtedness, Operating Profit Margin, EBITDA and Gross Profit from 2019 to 2021, they concluded that only two companies suffered negative impacts due to the COVID-19 pandemic. Moreover, they identified that companies improved their economic-financial performance during the analyzed period.

Severiano et al. (2022) analyzed if the Brazilian companies adhering to REFIS actually adhered by necessity or financial benefit. It is a quantitative research and used Student's t-test analysis to compare the difference between the average indicators of companies that adhered to tax installment plans and those of companies that did not adhere to them. The indicators used were: Payout, General Indebtedness and EBITDA Margin. The authors concluded that the companies adhering to REFIS benefit from indirect financing sources at a lower cost, but they hinder the government's tax collection. Silva, et al. (2023) investigated if the institutions adhering to the Special Tax Debt Settlement Program-PERT/2017 had financial difficulties to properly pay their taxes. The authors examined 100 companies that had the highest social security debts and analyzed the amounts of earned revenue and results verified at a date close to the plan, from 2014 to 2018. The methodology used was the ABC Curve and the Conglomerate Analysis. They thereby noticed that the indirect financing practice occurs, since 71% of the entities had significant revenues and 51% resulted in profits.

Based on the above-mentioned studies, the following research hypotheses were formulated:

H_1. Tax installments have a positive influence on the future profitability (ROA) of companies.

H_2. Tax installments have a positive influence on the future profitability (EBITDA) of companies.

Based on the hypotheses presented, it is expected that companies that adhered to federal tax installment programs have obtained a source of indirect financing resulting in future economic benefits for them through profitability and cash flow generation.

3 Methodological Procedures

3.1 Research Typology

This is a descriptive and quantitative research study, for it shows the relationship between tax installments and profitability indicators of the companies listed on B3 S/A, through statistical procedures and multivariate analysis.

As to the data collection procedures, a review of the footnotes to the financial statements was used to determine the tax installment amounts of the companies from 2018 to 2022. The profitability indicators (ROA and Ebitda) and the control variables were collected based on the Economática® database.

3.2 Population or Sample

The initial population of the study consisted of non-financial companies listed on B3 S/A, totaling 295 companies. The companies that did not adhere to federal tax installments and/or with missing data for the variables in the model (Table 2) were excluded from the sample. Thus, the final sample of the study consists of 129 companies.

3.3 Definition of the Variables and Econometric Model of the Study

To answer the question proposed in this study, the variables were defined by reviewing the previous literature, presented in Table 2. To measure the dependent variables referring to company profitability, the indicators Return on Assets (ROA) and Earnings before interest, taxes, depreciation and amortization (EBITDA) were used. The dependent variables concerning profitability rates were chosen due to the observation of how tax installments are an indirect form of financing, affect profitability (ROA) and the company's ability to generate future cash flow measured by EBITDA (Lima et al., 2017; Oliveira, 2020; Soler, 2020; Aretz et al., 2023).

The independent variable is the amount of federal tax installments of the companies in the study sample (Maia, Soares & Pimenta, 2020). And as control variables, we used a dummy variable referring to negative net worth (DPN), business size (TAM) measured by the natural logarithm of total assets, degree of financial leverage (LEV), current ratio (LC), and revenue growth (Growth).

Table 2
Variables used in the study

VAR	Description	Calculation	Source
Dependent Variables			
ROA	Return on Assets	$ROA = \frac{Ooperating\ Income\ (ebit)}{Total\ Assets_{t-1}}$	Oliveira (2020); Soler (2020).
Ebitda	Ebitda	Earnings before interest, taxes, depreciation and amortization	Aretz et al. (2023).
Independent Variable			
PARC	Tax Installment	Ln of the tax installment amount	Maia, Soares and Pimenta (2020).
Control Variables			
DPN	Dummy variable referring to Negative Net Worth	1 for companies with a negative net worth; otherwise 0.	Borges and Rech (2021).
TAM	Business Size	Ln total assets	Lima, Wilbert and Serrano (2017).
LEV	Financial Leverage	$LEV = \frac{Onerous\ Liabilities}{Total\ Assets}$	Lima, Wilbert and Serrano (2017).
LC	Current Ratio	Current Assets / Current Liabilities	Lima, Wilbert and Serrano (2017).
Growth	Revenue Growth	$Growth = \frac{(Net\ Revenue_t - Net\ Revenue_{t-1})}{Net\ Revenue_{t-1}}$	Borges and Rech (2021).

Source: *research data.*

To test the study hypothesis, a regression model was developed, as presented in equations 1 and 2:

$$ROA_{i,t+1} = \beta_0 + \beta_1 PARC_{i,t} + \beta_2 DPN_{i,t} + \beta_3 TAM_{i,t} + \beta_4 LEV_{i,t} + \beta_5 LC_{i,t} + \beta_4 Growth_{i,t} + \beta_6 Setor_i + \beta_7 ANO_t + \varepsilon_{i,t} \quad (1)$$

$$Ebitda_{i,t+1} = \beta_0 + \beta_1 PARC_{i,t} + \beta_2 DPN_{i,t} + \beta_3 TAM_{i,t} + \beta_4 LEV_{i,t} + \beta_5 LC_{i,t} + \beta_4 Growth_{i,t} + \beta_6 Setor_i + \beta_7 ANO_t + \varepsilon_{i,t} \quad (2)$$

[*Setor = Sector; Ano = Year*.]

The regression model proposed was estimated using Ordinary Least Squares (OLS), with robust standard errors and data organized in an unbalanced panel format. Moreover, the sector and year fixed effects were controlled. First, the Shapiro-Francia test was used for estimation of data normality, the White test to detect if there are heteroscedasticity problems, and the VIF test to check for possible variable multicollinearity problems (Fávero & Belfiori, 2017). Furthermore, Spearman's correlation was estimated to assess if the study variables had a strong correlation among themselves, which would be an indication of problems and multicollinearity.

4 Results and Analysis

4.1 Descriptive Statistics and Spearman's Correlation Analysis

In Table 3, the results of descriptive statistics are presented in order to show the behavior of the variables used in this study.

Table 3
Descriptive statistics of the variables from 2018 to 2022

Variable	Notes	Mean	Standard Deviation	Minimum	Maximum
ROA	541	0.0725043	0.14895	-0.3672046	0.6531264
EBITDA	541	1,265,865	3678562	-1.40E+07	4.13E+07
PARC	541	95,029.99	291259.1	117	4094352
TAM	541	1.10+07	2.72E+07	9064	2.70+08
LEV	541	0.352748	0.2933564	0	1.922294
LC	541	1.345617	0.8510389	0.0342434	4.775983
GROWTH	541	0.2406145	0.5809216	-0.8833892	4.002004

Key: ROA – Return on Assets, PARC – Federal Tax Installment, DPN - Dummy variable referring to Negative Net Worth, TAM – Business Size, LEV – Financial Leverage, LC – Current Ratio, and GROWTH – Revenue Growth.
Source: *research data*.

We can see that ROA has a mean of 7.25%, which is considered low, since there is a company in the sample with a maximum value of 65.31% and minimum value of -36.72%, therefore, a large part of the companies have a low return on assets (Table 3). For the average Ebitda, the amount of BRL 1,265,865 was found, i.e., they have a positive ability to generate future cash flow. With regard to tax installments, companies have an average installment amount of BRL 95,029.99 (Table 3), that is, companies are using tax installments as a source of indirect financing, which is consistent with the studies by Lima et al., (2017), Severino et al. (2022), and Silva et al. (2023).

As to the control variable concerning the business size (TAM), we can see that the companies with tax installments have significant values of assets and a standard deviation higher than the mean (Table 3). The degree of financial leverage (LEV) on the other hand, has a mean of 35.27%, with a maximum of 192.22% and minimum of (0) zero, which represents a tendency to use debts for asset financing (Table 3). Current ratio (LC) has a percentage of 134.56%, with a standard deviation of 58.09%, which represents that most of the current assets of these companies are used to pay current liabilities (short-term debts). The growth variable (GROWTH) has a mean of 24%, which is considered a low variance (Table 3).

Table 4 shows the results of the Spearman's correlation of the study variables. We can see that the ROA variable has a positive and significant correlation with the Ebitda variable, because both represent the profitability of the analyzed companies, as well as ROA with the growth variable. When the correlations with EBITDA are analyzed, we can see a positive and significant correlation with the tax installment variable (PARC). This result explains that tax installments can be seen as a form of indirect financing (Lima et al., (2017), Severiano, Mendonça Neto, Oyadomari and Vieira (2022), and Silva, Santos, Fonseca and Piacente (2023)). Furthermore, this may be an indication that tax installments have a positive influence

on the future performance of companies and also serve as a leverage tool. The business size (TAM), leverage (LEV) and current ratio (LC) variables also had a significant relation with Ebitda. However, the correlation was negative with the dummy variable referring to negative net worth (DPN), therefore, companies with excess of liabilities over assets do not have a high EBITDA.

Table 4
Spearman's Correlation Matrix

	ROA	Ebitda	PARC	DPN	TAM	LEV	LC	Growth	Sector
ROA	1.0000								
Ebitda	0.1878*	1.0000							
PARC	-0.0129	0.1794*	1.0000						
DPN	-0.0551	-0.2835*	0.2125*	1.0000					
TAM	-0.0884	0.9314*	0.1842*	-0.2985*	1.0000				
LEV	-0.0049	0.2443*	0.1647*	0.1125*	0.2560*	1.0000			
LC	0.0909	0.2197*	-0.1684*	-0.4840*	0.2432*	-0.1429*	1.0000		
Growth	0.2257*	-0.0011	-0.0004	-0.0505	-0.0556	0.0158	0.1017*	1.0000	
Sector	0.013	0.2242*	0.0695	-0.2052*	0.2834*	-0.0388	0.1389*	-0.06	11.0000

Key: ROA – Return on Assets, PARC – Federal Tax Installment, DPN - Dummy variable referring to Negative Net Worth, TAM – Business Size, LEV – Financial Leverage, LC – Current Ratio, GROWTH – Revenue Growth, Sector.
Note: *significance of 5%
Source: *research data.*

By analyzing the tax installment (PARC) variable, we can point out a positive and significant correlation with negative net worth (DPN), business size (TAM) and leverage (LEV), which is consistent with the results found by Lima et al., (2017) and Severino et al. (2022), with indications that large, indebted companies with excess of liabilities over assets are those that adhere to tax installment programs. However, when analyzed with the current ratio, we can see a negative correlation with tax installment, showing that such companies are not able to meet their short-term liabilities.

4.2 Hypothesis Testing

Table 5 shows the results of the regression assumption tests. The data do not show a normal distribution, according the Shapiro-Francia test (p-value = 0.0000). It presents heteroscedasticity problems, as observed in the White test (p-value = 0.0000), in which it was necessary to estimate the regression model with robust standard errors to correct the heteroscedasticity problems. After such analysis, we verified that the variables do not present multicollinearity problems, as they exhibit an average VIF below 4, as pointed out by Fávero e Belfiori (2017).

Table 5
Regression assumption tests

Description	Test	p-value
Normality of Residuals	Shapiro-Francia	0.0000
Heteroscedasticity	White	0.0000
Multicollinearity	**VIF**	**1.44**

Source: *research data.*

Table 6 shows the results referring to the testing of hypothesis H_1, which presupposes that tax installments (PARC) have an influence on the future ROA of the companies listed on B3 S/A. The results found do not reject H_1 and point out a level of significance of 5%. That is, tax installments (PARC) have a positive influence on the future ROA of the companies in the sample. Thus, for every BRL1.00 of tax installment, the company has a future profitability of 7.8%, measured by ROA. Such indications prove that companies use tax installments for financing and to obtain future profitability. These findings are consistent with the studies by Lima et al., 2017; Oliveira, 2020; Soler, 2020; Aretz et al., 2023.

Table 6
Statistical Inferences

Variables	**ROA**	**EBITDA**
PARC	0.0078623**	0.0481847**
	2.45	2.4
DPN	-0.1061914***	-0.2602009*
	-5.10	-1.86
TAM	-0.0038783	0.9553604***
	-0.95	47.62
LEV	0.024892	0.1101643
	0.68	0.71
LC	0.006011	-0.082041
	0.71	-1.56
GROWTH	0.0279381	0.0324461
	1.33	0.30
Sectors:		
Communications	-0.0490703	-0.3401872
	-1.56	-1.19
Consumer cyclical	-0.0573442***	-0.3035387**
	-3.02	-2.86
Consumer non-cyclical	0.0080595	-0.191561*
	0.41	-1.77
Basic materials	0.046675*	0.1542477
	1.92	1.09
Oil, gas and biofuels	-0.0373947	-0.2610959**
	-1.28	-2.14
Healthcare	-0.0121923	-0.3146455**
	-0.63	-2.57
Information technology	-0.0270626	-0.5188305**
	-1.08	-2.50
Utilities	-0.0093974	-0.1656126
	-0.51	-1.36
T		
2019	0.0009657	0.1727515
	0.05	1.34
2020	0.0125226	0.0506054
	0.66	0.38
2021	0.0500919**	0.1699374
	2.47	1.33
2022	0.040758**	0.2779726**
	2.00	2.20
Cons	0.0461827	-1.90035***
	0.72	-4.84

Key: ROA – Return on Assets, EBITDA – Earnings Before interest, taxes, depreciation and amortization, PARC – Federal Tax Installment, DPN - Dummy variable referring to Negative Net Worth, TAM – Business Size,

ALAV – Financial Leverage, LC – Current Ratio, GROWTH – Revenue Growth, Sectors, t - years. Significance: * < 10%, ** < 5% and *** < 1%. Robust Standard Errors.
Source: *research data.*

With regard to the control variables, we can see in Table 6 that the companies with negative net worth (DPN) have lower profitability (ROA). That is, for every BRL 1.00 of DPN, the profitability of the company (ROA) decreases 10.62%. The other variables, such as TAM, LEV, LC and GROWTH, did not have a significant relation with ROA.

With regard to the sectors, only the consumer cyclical and the basic materials sectors had a significant relation. The basic materials sector stood out with a positive relation, and the consumer cyclical sector in a negative way. This aspect is related to the population's need for consumption. We can also see that, during the period of the COVID-19 pandemic (2021 and 2022), it had a positive and significant relation with ROA, showing an increase in the profitability of such companies.

Table 6 shows the results referring to the testing of H_2, establishing that tax installments (PARC) influence the future EBTIDA of the companies listed on B3 S/A. The results found do not reject H_2 at a level of significance of 5%. That is, tax installments (PARC) have a positive influence on the future EBTIDA of the companies in the sample. Therefore, for every BRL 1.00 of tax installments, there is an increase of 4.81% in the company's EBITDA.

With respect to the control variables, we can see that the companies with negative net worth values have a negative influence on EBTIDA, with a level of significance of 10%. That is, for every BRL 1.00 of DPN, the EBTIDA decreases 26%. Furthermore, another variable that has a significant and positive influence on EBTIDA at the level of 1% is the business size (TAM), which means that for every BRL 1.00 of TAM, the EBTIDA increases 95.53%. Nevertheless, the financial leverage (ALAV), current ratio (LC) and growth (GROWTH) variables do not have a significant influence on EBTIDA.

As to the sectors, the Consumer Cyclical and the Healthcare sectors have a level of significance of 1%, while the Oil, Gas and Biofuels and Information Technology sectors have a level of significance of 5%, These sectors have grown over the past years and the consumer non-cyclical companies have a level of significance of 10%. This aspect is related to the fact that consumers depend on such services and products. However, all of them with a negative influence on EBITDA. By analyzing the years, only 2022 stood out in a positive and significant manner, at the level of 5% in relation to EBITDA, which represents that the companies had the ability to generate future cash flow.

The results found corroborate previous studies by Campagnoni and Ruiz (2020), by verifying a positive impact on profitability, which can influence on the increase of the market value of the companies. Moreover, they confirm that tax installments have a positive influence on future ROA, which is consistent with the results found by Soler (2020). About the positive effect on future EBITDA, the results reinforce the findings by Severino et al. (2020) and Aretz et al. (2023), which also identified the influence of tax installments on the improvement of economic performance related to the EBITDA margin. Therefore, tax installments can be considered a form of indirect financing (Lima et al., 2017) that influences on the improvement of future profitability of the companies in the study sample.

Furthermore, the findings of this research corroborate with the existing literature, such as the studies by Nogueira et al. (2019) and Oliveira (2020), which identified federal tax installments as a source of indirect financing for companies, with a lower interest rate exposure in relation to their capital structure, associated with third-party borrowing by the company. A lower borrowing cost resulting in an increase in profitability, which as a result

has an impact on the improvement of the profitability indicators related to ROA and EBITDA. Nogueira et al. (2019) claim that the companies had a higher profitability in the waiting periods for Refis by using tax payment funds for market capitalization through investments. Furthermore, Oliveira (2020) and Soares and Pimenta (2020) point out that the companies that adhered to tax installment programs have higher levels of fixed assets, which can result in future economic benefits and an increase in profitability and in the company's performance.

5 Final Remarks

The objective of this study is to verify the relationship between federal tax installments and the future profitability of the companies listed on B3 S/A from 2018 to 2022. The results found were that tax installments have a positive influence on the future ROA of the companies listed on B3 S/A and on future EBTIDA, thus not rejecting hypotheses H_1 and H_2. It can be concluded that the companies benefit from federal tax installments by using them as a form of indirect financing, resulting in economic benefits to companies through profitability and cash flow generation.

The theoretical contribution of this study is related to the literature that considers tax installments as a form of indirect financing. Moreover, it can be a source of information for companies, as they can benefit from using tax installments to improve their future profitability, which is the practical contribution of this study. In terms of social contributions, the results can serve as a foundation for discussions, since they reveal a weakness in tax laws and also serve as an alert for the Brazilian government.

Among the implications of the study, it leads to a consideration of the proposed topic with the current national tax system, in effect in Brazil since 1966, and the tax reform approved by Constitutional Amendment Bill (PEC) 45/2019. It is known that we have a tax system that is complex, confusing and hard to understand, used by many companies in an aggressive way to obtain future profitability. At the same time, there is PEC 45, to be implemented in a gradual manner as of 2026, and expected to be fully applied by 2033, a long period, during which it will result in changes in national culture about how to look at indirect taxes in Brazil. In this scenario, the government regulators should be aware of that in order to enact laws and regulations to avoid politicking, deficiency in equality, opportunism among taxpayers, and actions characterizing or encouraging illicit or illegal conducts, taking into account the past experiences of endless tax installments.

However, there are some limitations in the study regarding non-classification and segregated analysis of the types of federal tax installment plans adhered to by the companies. Therefore, for future research studies we suggest verifying the relationship between federal tax installments and the future profitability of companies, but using other profitability rates, such as ROI and ROE, or even providing solutions so that companies will use tax installment plans only when they need them, and not as a form of financing. Thus, they would increase tax revenues and reduce taxpayers' volume of tax liabilities (Paes, 2014), which would be the government's main purpose by creating tax installment plans.

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