



COVID-19 PANDEMIC IMPACTS ON THE RELATIONSHIP BETWEEN CAPITAL STRUCTURE AND PERFORMANCE: ANALYSIS OF COMPANIES LISTED ON B3

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Abstract

Objective: This study aimed to identify, per sector, the impact caused by the Covid-19 pandemic on the relationship between Brazilian companies listed on B3 capital structure and performance.

Method: Financial Statements data from 2019 and 2020 of 100 Brazilian companies that were listed in B3 were analyzed. After collecting data from the Economática® database, indebtedness, performance, and control variables were calculated.

Originality: The results found may be useful for future studies on the capital structure, helping to enrich the Pecking Order Theory. The study intends to attract the interest of managers who seek to expand their knowledge on the subject.

Results: The findings show that the Covid-19 pandemic negatively impacted all companies in the sample, increasing their indebtedness and, therefore, decreasing their performance, since the correlation between indebtedness and performance was negative. It was found that in all sectors the indebtedness variables showed a negative correlation with the measured performance variables.

Contributions: This study contributes to the expansion of work on capital structure, especially as it presents results of Brazilian companies during Covid-19 period. Furthermore, it is possible to ratify Pecking Order Theory assumptions, or in other words managers adjust their resource preference to finance their firms.

Keywords: Capital structure. Business performance. Covid-19. Pecking order theory.

IMPACTOS DA PANDEMIA DE COVID-19 NA RELAÇÃO ENTRE ESTRUTURA DE CAPITAL E DESEMPENHO: ANÁLISE DAS EMPRESAS LISTADAS NA B3

Resumo

Objetivo: Este estudo teve por objetivo identificar, setorialmente, o impacto causado pela pandemia de Covid-19 na relação entre a estrutura de capital e o desempenho das companhias brasileiras listadas na B3.

Método: Foram analisados os dados das Demonstrações Contábeis dos anos de 2019 e 2020 de 100 empresas brasileiras que estavam listadas na B3. Após a coleta de dados da base de dados Economática®, foram calculadas as variáveis de endividamento, as de desempenho e as de controle.

Originalidade/Relevância: Os resultados encontrados poderão ser úteis para estudos vindouros sobre a estrutura de capital, auxiliando no enriquecimento da Teoria Pecking Order. O estudo pretende atrair o interesse dos gestores, que buscam ampliar os conhecimentos referentes ao tema.

Resultados: Os achados mostram que a pandemia de Covid-19 impactou negativamente todas as empresas da amostra, aumentando o endividamento delas e, por consequência, diminuindo o seu desempenho, já que a correlação entre endividamento e desempenho foi

negativa. Verificou-se, em todos os setores, que as variáveis de endividamento apresentaram, na maior parte, uma correlação negativa com as variáveis de desempenho empregadas.

Contribuição teórica: Este estudo contribui com a expansão dos trabalhos acerca da estrutura de capital, especialmente por apresentar resultados das empresas brasileiras no período da Covid-19. Ademais, é possível ratificar os pressupostos da Teoria Pecking Order, ou seja, os gestores ajustam sua preferência de recursos para financiar suas firmas.

Palavras-chave: Estrutura de capital. Desempenho empresarial. Covid-19. Teoria pecking order.

IMPACTOS DE LA PANDEMIA COVID-19 EN LA RELACIÓN ENTRE ESTRUCTURA DE CAPITAL Y RENDIMIENTO: ANÁLISIS DE LAS EMPRESAS INCLUIDAS EN B3

Resumen

Objetivo: Este estudio tuvo como objetivo identificar, por sector, el impacto causado por la pandemia Covid-19 en la relación entre la estructura de capital y el desempeño de las empresas brasileñas que cotizan en B3.

Método: Se analizaron los datos de los Estados Financieros de los años 2019 y 2020 de 100 empresas brasileñas que estaban listadas en B3. Luego de recolectar los datos de la base de datos de Economática®, se calcularon las variables de endeudamiento, desempeño y control.

Originalidad: Los resultados encontrados pueden ser de utilidad para futuros estudios sobre la estructura de capital, contribuyendo a enriquecer la Teoría del Orden Jerárquico. El estudio pretende despertar el interés de los directivos, que buscan ampliar sus conocimientos sobre el tema.

Resultados: Los hallazgos muestran que la pandemia Covid-19 impactó negativamente a todas las empresas de la muestra, aumentando su endeudamiento y, en consecuencia, disminuyendo su desempeño, ya que la correlación entre endeudamiento y desempeño fue negativa. Se encontró, en todos los sectores, que las variables de endeudamiento mostraron, en su mayor parte, una correlación negativa con las variables de desempeño empleadas.

Contribuciones: Este estudio contribuye a la expansión del trabajo sobre estructura de capital, especialmente porque presenta los resultados de empresas brasileñas durante el período Covid-19. Además, es posible ratificar los supuestos de la Teoría del orden jerárquico, es decir, los gerentes ajustan su preferencia por los recursos para financiar sus empresas.

Palabras clave: Estructura de capital. El Rendimiento del negocio. COVID-19. Teoría del pecking order.

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Introduction

In an increasingly interconnected world with countless companies competing for better results, issues related to companies performance and capital structure become commonplace. Performance, for example, is transfigured into something relevant for business management, because, according to Oliveira and Callado (2019), its "[...] traditional indicators, in addition to revealing useful information for the decision-making process, have an objective character [...]". With concrete data, regarding their companies performance, individuals can acquire an empirical view of how to act to increase relevant indicators that help achieving good income.

Companies capital structure, according to Semedo (2015), is related to the choice between two different financing sources that firms have at their disposal to meet their financial needs: equity or third-party capital. Invariably, someone will have to decide how to proceed when it comes to the company's capital structure, and it will have consequences that can be ephemeral or lasting, beneficial or adverse. It can be inferred, therefore, how a solid knowledge on capital structure benefits the emergence of positive effects resulting from the choices of source of financing for the business.

Research like those from Mette *et al.* (2010), Pinheiro *et al.* (2017) and Rodrigues and Kloeckner (2006), which analyzed the structure of corporate capital, have been conducted for decades. Multiple hypotheses about business capital structure arose from individuals who aspired to discover the perfect way to maximize the value of companies, as well as find the reason they are structured in a certain way. Two of the most important articles on the subject were written by Nobel Award in Economics, Modigliani and Miller (1958; 1963), who were some of the first subjects to ponder these issues, becoming responsible for fundamental contributions to the area.

The Pecking Order Theory of capital structure (Myers & Majluf, 1984) suggests that the use of new shares as financing for the company will be conducted as a last option, after indebtedness and domestic resources. According to the Theory, in an economic crisis scenario, the company's internal resources may not be sufficient, making financing a more satisfactory option. A recent study (Huang & Ye, 2021) shows that there is a joint influence of the capital structure and corporate social responsibility activities on the risk of firms during the COVID-19 pandemic, corroborating the Theory validation.

With these studies, it is clear the importance of acting cautiously on matters related to the entity financing sources, since when selecting investments and choosing the combination of funds that should finance them, the decision-makers should consider their effects on the value of the company (Boucinhas, 1980). In addition, there is the concern about the existence of unknowns that surround studies on the capital structure of companies in different scenarios and that are still present (Valle & Albanez, 2012). Since there is a lot of variables that has different results, the best way to deal with third-party capital and equity raising, in addition to the reasons for this achievement of resources, is not unanimous for the different existing companies.

Adding to this scenario, that in 'normal' situations can be considered complex, the Covid-19 pandemic emerged, impacting humanity in 2020. With the exacerbation of coronavirus, several measures were necessary, which negatively affected Brazil's economy, such as quarantines and the momentary closure of businesses considered non-essential (Backes *et al.*, 2020; Lima & Freitas, 2020; Pinto *et al.*, 2020). Thus, companies listed on Brazil, Bolsa, Balcão (B3) may have particularities related to their indebtedness and performance that were impacted by the pandemic in 2020. Considering the fact that B3 (2021) classifies the companies listed in eleven different sectors of activity (Industrial Goods, Communications, Cyclical Consumption, Non-Cyclical Consumption, Financial, Basic Materials, Others, Oil, Gas and Biofuels, Health, Information Technology and Public Utility), this study will try to identify sectoral specificities related to the capital structure and performance of companies in the years 2019 and 2020.

In this context, the following research question arises: ***sectorally, what was the impact caused by the pandemic on the relationship between the capital structure and the performance of Brazilian companies listed in B3?*** To answer it, this study aims to identify the impact caused by the Covid-19 pandemic on the relationship between the capital structure and the performance of Brazilian companies listed on B3, sectorally. To this end, the following steps are intended to be developed: calculation of companies indebtedness, performance and control variables, during the periods studied; statistical analysis of calculated variables; sector characteristics identification from the calculated results; and comparison of results obtained in 2019 and 2020. At the end of this research, it is assumed that the different sectors of B3 will have companies with different behaviors related to the structuring of capital and the performance obtained in the periods analyzed.

This research is justified, since it presents as a model the study conducted by Machado *et al.* (2015), but with data obtained in more recent years and focuses on the recognition of sectoral peculiarities. Many changes have occurred in Brazil since these authors study data collection was performed (in 2014), such as the emergence of B3. It is pertinent, therefore, to verify how the results obtained by Machado *et al.* (2015) will be compared to those found in 2019 and 2020, regarding the relationship between Brazilian companies listed on B3 capital structure and performance. The results found in this research can be used as a reference in other studies on the capital structure, helping to the enrichment of the theory. Moreover, this study aims to attract the interest of individuals who seek to expand the knowledge related to these subjects.

Theoretical framework

This section deals with some of the main theories of capital framework and structure variables used in the research, the performance of companies and the performance variables that will be used, the economic impact of Covid-19 pandemic in Brazil and the studies related to this subject.

Capital structure

The capital structure "[...] refers to the way in which companies use equity and third-party capital to finance their assets" (Brito, Corrar & Batistella, 2007, p. 10, own translation). In light of this, several scientific studies (Camilo *et al.*, 2010; Michelon, Lunkes & Bornia, 2020; Sampaio *et al.*, 2021) were conducted on this modes of financing, and some of them will be analyzed with the objective of making the area more explicit.

One of the earliest works on capital structure was published by Durand (1952), who stated that the return must be good enough to justify the company incurring the risks arising from third parties resources. The choice of how the company's capital should be structured would then depend on the analysis of the benefits and risks inherent in raising other people's funds. Finding a way to achieve financing that results in positive effects that justify incurring risks would therefore be the business's goal to enhance their values.

The Pecking Order Theory of Capital Structure (Myers & Majluf, 1984) suggests that the use of new shares as company financing be conducted as a last option, after indebtedness and internal resources. According to the Theory, when there is an economic crisis scenario, the company's internal resources may not be sufficient, since they become scarcer, a fact that establishes debt-based financing in a more satisfactory option.

Modigliani and Miller (1958) stated that, from a simplified scenario of reality where, for example, there are no taxes and there is market efficiency, the value that the company has would not depend on its capital structure. However, reality does not work as the scenario presented by these authors, and the existence of taxes has substantial effects on companies. Modigliani and Miller (1963) later made corrections to the formulas of the article published in 1958, intending to explain the tax advantages that surrounds companies financial leverage. Thus, the tax effects that influence the capital structure began to be present in the studies conducted afterwards in the area. According to Borges *et al.* (2017, p. 88, own translation), "many argue that companies should use third-party capital as the primary source of financing on account of the tax benefit, since interest paid on the debt is deductible from the tax payable".

In this study, three sub-variables of companies variable capital structure were used: Total Indebtedness, Long-Term Indebtedness and Short-Term Indebtedness. As its name implies, these three indices refer to companies indebtedness, inform if the business has large debt and what is the deadline for the payment of these obligations. With the calculation of these variables, one has a view of how the structuring of the companies' capital occurs.

Companies' performance

Another theme addressed in this research is the performance of entities and their evaluation indicators. According to Reis (2014, p. 21, own translation), with the investigation of organizational

performance, "[...] it can be observed whether or not the company is achieving its objectives or whether changes are needed in its path that makes it possible to reach them or at least get closer to them". With this, it is possible to establish a relationship between the performance and goals of an organization; indicators need to be adequate with the objectives outlined for the company. If it is intended to thrive, a focus on performance indices that reflect that positive scenario should be made.

The attention given by companies to performance and its evaluation is not recent. Hundreds of years ago, individuals were already carrying out an evaluation of their performance, but, based on Taylorism measures and the continuous evolution of the capitalist system, evaluations were gaining greater prominence (Brandão & Guimarães, 2001). Today's capitalism is different in a plethora of aspects when compared to the capitalism in vogue in the times when Taylorism measures began to be implemented, but performance indices still set up as pieces present in the business world.

In this study, eight sub-variables of companies analyzed variable performance were used: Market Value, Tobin's Q, Economic Value Added (EVA), Return on Assets (ROA), Return on Equity (ROE), Net Margin, Current Liquidity and General Liquidity. The Market Value, without contradicting its denomination, is an indicator that shows the value that a company has in the market. In the words of Kammler and Alves (2009, p. 4, own translation), Tobin's Q is a reason "[...] between the company's market value and the replacement cost of its assets". The EVA, conceptualized by Rodrigues (2016, p. 17, own translation), "[...] is an example of a metric that seeks to calculate the value created for the shareholder".

The ROA "[...] is a measure of return on all invested capital" (Diniz, 2015, p. 127, own translation). The ROE "[...] demonstrates a ratio between the profit that a given company has obtained and the value of its own capital (equity)" (Diniz, 2015, p. 128, own translation). Both relate to performance by helping people identify the return that the company is generating. The Net Margin differs from these indices because, in line with Silva *et al.* (2015, p. 747, own translation), it "[...] determines the percentage of each actual sale that is left after deduction of all expenses, including income tax". Obtaining this profit percentage without any type of expense, a performance evaluation will have an objective indicator, facilitating the analysis of the business that will be conducted.

Regarding the liquidity of companies, Current Liquidity becomes an important indicator for showing the link between current assets and current liabilities (Iudícibus, 2017). A General Liquidity, in addition to current assets and liabilities, brings long-term assets and liabilities in its calculation (Iudícibus, 2017). With these liquidity indicators, one can find out how the association between companies assets and liabilities he is analyzing is situated.

Control variable

According to Lakatos and Marconi (2003, p. 145, own translation), "control variable (C) is that factor, phenomenon or property that the researcher purposely neutralizes or cancels in a research, in

order to prevent it from interfering in the analysis of the relationship between independent and dependent variables". Five of these sub-variables were used in this research: Company Size, Tax Deductions, Degree of Immobilization (GIM), Generic Industry Grouping and Growth Opportunities. By identifying them, it was possible to achieve results that did not change due to factors that did not fit as independent or dependent variables.

The Company Dimension (or Size), according to Camfield et al. (2018, p. 378, own translation), "is usually presented as having a direct relationship with indebtedness, because the larger the company, the higher its level of indebtedness". Tax Deductions are associated with the corporate capital structure due to the tendency to follow positively the indebtedness of companies (Pohlmann & Iudícibus, 2010). The company Degree of Immobilization has the potential to establish the connection that, the higher it is, the greater will be the use of third-party capital of it and vice versa (Machado *et al.*, 2015).

The Generic Grouping of Industry was found through Economática®, which groups companies according to their sectors of operation (Machado et al., 2015). Companies' Growth Opportunities, according to the Pecking Order theory, tend to decrease with the rise in indebtedness and increase with the decrease of it (Kaveski, Zittei & Scarpin, 2014).

Economic impact of the COVID-19 pandemic in Brazil

Few individuals predicted the damage that the spread of a virus would cause in the world in 2020. The impacts of the pandemic caused by it, in a country like Brazil, are still aggravated when one considers the customary indebtedness that most Brazilian families already had and that increased (together with default) (Schmidt & Oliveira, 2020). From this scenario, Brazilian companies were harmed by the Covid-19 pandemic, because with fewer people willing to stimulate the economy due to the lack of money in hand, trade in superfluous products and services decreased, hurting the economy (Backes *et al.*, 2020).

Moreover, it was the measures that made it impossible for companies to operate normally that were most urgent. In research like those of Rezende, Marcelino and Miyaji (2020), the consequences of this, such as the marked impact of their revenues and a greater popularization of the *e-commerce*, become clear. Not going into the discussion as to whether the prohibition of the companies operation for certain periods was a correct attitude, the fact that this happened negatively influenced Brazil economic situation. And even if these attitudes had not been taken, the very existence of a pandemic has a detrimental impact on society economic landscape, increasing population's fear and causing a decrease in spending that would occur in a normal situation.

Effects on capital structure and business performance are also impacts caused by the pandemic on the Brazilian economy. Faced with uncertainties, companies can make changes in their financing sources, becoming more indebted, for example. Moreover, in the context of performance, the decrease

in revenue stemming from the pandemic can be considered one of its negative effects on business. Throughout this research, these Covid-19 pandemic effects will be verified.

Related studies

Silva (2014) proposed to see how the Trade-Off and Pecking Order theories of capital structure explain the way the capital of companies from emerging countries such as Brazil is structured, based on an era that encompasses years before and after the Economic Crisis that began in 2007. Among his conclusions, he indicates that these two theories explain Brazilian companies structures.

Machado *et al.* (2015, p. 397) verified the effective interference of the capital structure in the performance of Brazilian firms listed on the BM&FBOVESPA. They concluded that there is no direct relationship between these two issues in the companies scrutinized; and their findings corroborate the theories Pecking Order and those of Modigliani and Miller (1958; 1963). Huang and Ye (2021) investigated the joint influence of the capital structure and corporate social responsibility activities on firms' risk during the Covid-19 pandemic. In conclusion, they proposed that heavily indebted companies presented higher risks during the pandemic when compared to less indebted companies. In the methodological procedures, Table 1 is presented with the indicators used for each of the variables used in the study.

Methodological procedures

This research is classified as quantitative, descriptive and documentary. The use of statistics aiming at detailing of the nexus between variables of capital structure and performance of companies characterizes the study as quantitative (Fonseca, 2002). Given that events related to indebtedness and performance of the companies analyzed are precisely detailed, the research is classified as descriptive (Triviños, 1987). By using information provided by the companies listed on B3, ordered in different ways by the researchers to comply with the goals of the study, which is defined as documentary.

In this study, it was analyzed the data from the Financial Statements and those related to the market in the third quarter of 2019 and 2020 of the Brazilian companies that were listed on B3, using Economática®. LibreOffice Calc and IBM SPSS Statistics version 27.0.1 were applied to organize the information and perform calculations. The figures are from 2019 and 2020, so that the impacts of the Covid-19 pandemic can be more evidently verified. After data collection, the variables of indebtedness, performance and control were calculated. They are the same as the work of Machado *et al.* (2015) and are described on Table 1. This choice was made so that a more effective comparison can be established between the conclusions found.

Table 1

Indicators used as variables

Description	Acronyms	Indices/Measures
Firm Indebtedness	Total Indebtedness	Total Debts/Total Assets
	Long-Term Indebtedness	Non-Current Liabilities/Total Assets
	Short-Term Indebtedness	Current Liabilities/Total Assets
Firm Performance	Market Value (MV)	(Price not Adjusted for Earnings * Total Shares calculated [except treasury]) + DTL + Minority Shares
	Tobin's Q (EVA)	Market Value/Total Assets
	Return on Assets (ROA)	LL- (PL x CDI)
	Return on Equity (ROE)	Operating Income / (Total Assets - Net Income)
	Net Margin	Net Income/(Shareholders' Equity - Net Income)
	Current Liquidity (CL)	Net Income/Income from Financial Intermediation
	General Liquidity (GL)	Current Assets/Current Liabilities
Control Variables	Company Size	(Current Assets + Achievable in the Long Term)/(Current Liabilities + Long-Term Liabilities)
	Tax Deductions	(Natural logarithm of Total Assets)
	Degree of Immobilization (GIM)	EBIT- Net Income
	Generic Industry Grouping	Non-Current Assets/Total Assets
	Growth Opportunities	Classification of Economática®
		(Total Assets - Shareholders' Equity + Market Value)/Total Assets

Legend: LL = Net Income; PL = Shareholders' Equity; DTL = Total Net Debt; CDI = Interbank Deposit Certificate.

Source: Edited based on Machado et al. (2015).

After calculating the indicators, the statistical analysis of the variables was performed according to that showed by Machado *et al.* (2015), initially with all the companies in the sample and then by sector. First, there was an investigation of the correlation between the three dependent variables of capital structure with the others. Correlation, according to Lira (2004), evaluates the intensity and direction of the linear or nonlinear relationship between the variables, and, therefore, will show how this relationship occurs between the study variables, being positive, neutral or negative.

Following the model of Machado *et al.* (2015), the companies were divided into two groups: one is made of companies that have a Total Indebtedness variable of less than 50%, and other made of companies that have an index of more than 50%. With this separation, one can use analysis of variance (ANOVA) in the variables. According to Silva (2012, p. 1, own translation), ANOVA "[...] fundamentally aims to verify whether there is a significant difference between the means [...]", therefore, these differences between the means of the indicators may clarify how much the companies' indebtedness affects them. ANOVA was not made for each of the sectors, since it is expected that the results, in general, are not quite different from those found on the basis of the companies together.

Analysis of results

This section presents the sample profile and statistical results obtained by the investigation of the data collected from all the companies in the sample, together and by each segment.

Sample profile

The sample consists of 100 Brazilian companies listed on B3, in the third quarter of 2019 and 2020, and Table 2 shows how this division occurred by the different economic sectors of B3. This number was found eliminating companies that were not active in the years under study and those that did not have all the data available for statistical analysis. Companies from Financial sector were also excluded from the sample due to the differences presented when compared to others, regarding the composition of their Balance Sheets. Similarly, companies that was impossible to perform their data logarithmic transformation, to calculate correlation, were eliminated.

Table 2

Number of companies in the sample

Bovespa Economic Sector	Number of Companies	%
Public Utility	32	32,00%
Cyclical consumption	21	21,00%
Industrial Goods	15	15,00%
Basic Materials	9	9,00%
Health	9	9,00%
Non-cyclical consumption	5	5,00%
Oil, gas and biofuels	4	4,00%
Communications	2	2,00%
Information Technology	2	2,00%
Others	1	1,00%
Total	100	100,00%

Source: Elaborated from the research data (2021).

Table 2 shows that Public Utility, Cyclic Consumption and Industrial Goods segments together have 68% of the total companies in the sample. The Communications, Information Technology and Others sectors have 5% of the companies analyzed. It should be kept in mind that this profile does not exactly reflect the composition of all companies on B3, but only that of the sample analyzed.

Table 3 was prepared to better visualize the profile of companies, in which the arithmetic average of amounts in reais of Total Assets, Current Assets, Non-Current Assets, Current Liabilities, Non-Current Liabilities, Shareholders' Equity and Net Income in the year of all sample companies in the third quarter of 2019 and 2020 are presented, together with the percentage change that occurred from one year to the next. It is noteworthy that the values were adjusted for inflation and come from consolidated Financial Statements.

Table 3

Average amounts in R\$ of groups in the Balance Sheet and Net Income

	3rd quarter of 2019	3rd quarter of 2020	Δ %
Total Assets	R\$ 15.060.876.112,92	R\$ 17.217.136.021,47	14,32%
Non-Current Assets	R\$ 10.669.906.233,39	R\$ 11.708.361.248,69	9,73%
Current Assets	R\$ 4.390.969.879,53	R\$ 5.508.774.772,78	25,46%
Current Liabilities	R\$ 2.886.742.612,08	R\$ 3.589.686.914,91	24,35%
Non-Current Liabilities	R\$ 5.778.464.611,79	R\$ 6.604.728.898,15	14,30%
Net Worth	R\$ 5.993.028.603,84	R\$ 6.491.011.493,86	8,31%
Net Income	R\$ 609.106.254,17	R\$ 531.372.399,32	-12,76%

Source: Authors.

Table 3 shows the increase of the average value of groups related to the Balance Sheet of companies between the third quarter of 2019 and 2020, and the decrease of average Net Income obtained. It is worth mentioning the increase of around 25% of Current Assets and Current Liabilities in one year, which shows short-term changes in the companies' Assets, a pandemic consequence. This corroborates the Pecking Order Theory of capital structure, because, with the current economical negative scenario caused by Covid-19, companies sought external and internal financing, which resulted in this growth of Liabilities and Assets.

The 12,76% decrease of Net Income average value for one year to the next can be explained by the adverse effects that the pandemic has caused, such as: increased unemployment, decrease in gross domestic product (GDP), and the implementation of measures that closed companies for certain periods. A higher indebtedness (higher Liabilities) and a decrease in the performance (lower profit) of the companies listed on B3 seem to have been the impact of the Covid-19 pandemic on the relationship between capital structure and performance. The next subsection presents the other statistical analyses to verify this result.

Statistical analysis of all companies

With the acquired data and indicators/variables found and considering all companies without discrimination by sectors, Pearson's correlation coefficient was calculated between the Total, Long-Term and Short-Term Indebtedness and other variables. Before that, however, the logarithmic transformation of the variables was performed, according to the work of Machado *et al.* (2015). This, according to Winter and Lôbo ([201-?], p. 1, own translation), "[...] can reduce the effect of bias". on statistical analysis when correlation is calculated.

Figueiredo e Silva (2009, p. 119, own translation) affirmed that "a perfect correlation (-1 or 1) indicates that the score of one variable can be determined by knowing the score of the other. A zero-value correlation indicates that there is no linear relationship between the variables." Thus, it was possible to interpret the correlation results presented in Table 4.

Table 4

Pearson's correlation coefficient between variables

	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020
	Total Indebtedness		Long-Term Indebtedness		Short-Term Indebtedness	
<i>Market Value</i>	0,273	0,376	0,312	0,392	0,099	0,083
<i>Tobin's Q</i>	-0,279	-0,280	-0,255	-0,299	-0,145	-0,015
<i>EVA</i>	0,335	0,206	0,244	0,124	0,182	0,186
<i>ROA</i>	-0,207	-0,333	-0,208	-0,302	-0,130	-0,127
<i>ROE</i>	0,281	0,172	0,212	0,094	-0,130	0,133
<i>Net Margin</i>	-0,329	-0,371	-0,118	-0,192	-0,522	-0,435
<i>Current Liquidity</i>	-0,634	-0,657	-0,408	-0,305	-0,690	-0,731
<i>General Liquidity</i>	-0,818	-0,822	-0,744	-0,713	-0,403	-0,382
<i>Natural Liquidity</i>	0,413	0,504	0,439	0,520	0,188	0,104
<i>Logarithm of Assets</i>						
<i>Tax Deductions</i>	0,383	0,509	0,377	0,511	0,183	0,118
<i>GIM</i>	0,141	0,194	0,271	0,300	0,077	0,027
<i>Growth Opportunities</i>	-0,021	0,023	-0,051	-0,074	0,004	0,152

Source: Authors.

Comparing the correlation of the variables in 2019 and 2020, shown in Table 4, there are more similarities than dissimilarities. In both years, Current Liquidity and General Liquidity showed the most considerable negative correlations for all types of indebtedness. In other words, the increase in corporate indebtedness results in an almost linear decrease in their liquidity and vice versa.

In fact, of the eight performance variables, five (Tobin's Q, ROA, Net Margin, Current Liquidity and General Liquidity) have a negative correlation with all the debt indicators of the companies that were analyzed in the two years. With higher indebtedness, lower tends to be the performance of companies based on these results. One variable that presented a positive correlation with indebtedness was Tax Deductions, and, contrary to what was proposed by Modigliani and Miller (1963) regarding the tax effects of indebtedness, a higher indebtedness tended to impair the performance of companies, resulting in higher Tax Deductions and lower profits. The next step was to divide the sample companies into two groups (group 1, Total Indebtedness < 50%; and group 2, ≥ 50%) and then use ANOVA method, which is illustrated in Table 5.

Table 5

Division of companies into two groups based on their Total Indebtedness

Total Indebtedness Group	No. of Companies 3rd quarter 2019	%	No. of Companies 3rd quarter 2020	%
1	40	40,00%	36	36,00%
2	60	60,00%	64	64,00%
Total	100	100,00%	100	100,00%

Source: Authors.

Table 5 shows that most companies are in debt, with an increase from 2019 to 2020. This was observed due to the negative correlation between indebtedness and most performance variables, so it is feasible to infer that the Covid-19 pandemic impaired B3's business performance. With this, ANOVA was performed, based on these two groups and in order to further thoroughly verify the relationship among indebtedness and performance through the means of the variables. Table 6 expresses analysis of variance (ANOVA) in 2019 third quarter.

Table 6

ANOVA of all companies in the 2019 sample

		Descriptive 3rd quarter 2019				ANOVA 3rd quarter 2019	
		N	Mean	Standard deviation	Standard error	Z	Sig.
<i>Market Value</i>	1	40	17.783.718.729,475	52.579.117.398,193	8.313.488.416,984	0,366	0,547
	2	60	13.461.762.593,415	14.421.172.550,694	1.861.765.370,721		
	Total	100	15.190.545.047,839	34.893.275.383,405	3.489.327.538,341		
<i>TobinsQ</i>	1	40	1,310	1,197	0,189	3,270	0,074
	2	60	0,943	0,832	0,107		
	Total	100	1,090	1,005	0,101		
<i>EVA</i>	1	40	7,600	4,955	0,784	9,944	0,002
	2	60	12,603	9,171	1,184		
	Total	100	10,602	8,116	0,812		
<i>ROA</i>	1	40	7,396	4,300	0,680	1,308	0,256
	2	60	6,292	4,993	0,645		
	Total	100	6,734	4,736	0,474		
<i>ROE</i>	1	40	11,476	6,558	1,037	10,013	0,002
	2	60	18,525	13,017	1,681		
	Total	100	15,705	11,401	1,140		
<i>NetMargin</i>	1	40	16,959	14,618	2,311	3,762	0,055
	2	60	11,798	11,873	1,533		
	Total	100	13,862	13,216	1,322		
<i>CurrentLiq</i>	1	40	4,052	5,255	0,831	1,319	0,254
	2	60	2,552	7,057	0,911		
	Total	100	3,152	6,411	0,641		
<i>GeneralLiq</i>	1	40	2,712	3,741	0,591	13,811	0,000
	2	60	0,910	0,356	0,046		
	Total	100	1,631	2,525	0,252		
<i>LNAsset</i>	1	40	21,744	1,906	0,301	9,414	0,003
	2	60	22,803	1,531	0,198		
	Total	100	22,379	1,760	0,176		
	1	40	145.588.599,457	278.849.780,105	44.090.021,508	3,578	0,062

Descriptive 3rd quarter 2019						ANOVA 3rd quarter 2019	
		N	Mean	Standard deviation	Standard error	Z	Sig.
TaxDeduc	2	60	272.286.170,582	357.022.915,986	46.091.460,261		
	Total	100	221.607.142,132	332.396.285,537	33.239.628,554		
GIM	1	40	58,357	20,067	3,173	0,989	0,323
	2	60	62,429	20,061	2,590		
	Total	100	60,800	20,062	2,006		
GrowthOpp	1	40	1,668	1,169	0,185	0,057	0,811
	2	60	1,620	0,830	0,107		
	Total	100	1,639	0,975	0,097		

Source: Authors.

Table 7 illustrates ANOVA of the third quarter/2020. Both were elaborated in the IBM SPSS Statistics software, and the focus of the analysis was on the mean values between group 1 and 2.

Table 7

ANOVA of all companies in the 2020 sample

Descriptive 3rd quarter 2020						ANOVA 3rd quarter 2020	
		N	Mean	Standard deviation	Standard error	Z	Sig.
Market Value	1	36	17.082.107.632,57	41.957.521.777,19	6.992.920.296,20	0,095	0,758
	2	64	15.137.940.567,10	21.144.226.188,32	.643.028.273,54		
	Total	10	15.837.840.710,67	30.129.048.436,32	3.012.904.843,63		
TobinsQ	1	36	1,434	1,316	0,219	4,829	0,030
	2	64	0,912	1,030	0,129		
	Total	10	1,100	1,162	0,116		
EVA	1	36	10,881	11,582	1,930	0,009	0,923
	2	64	11,095	10,084	1,260		
	Total	10	11,018	10,589	1,059		
ROA	1	36	9,538	7,616	1,269	19,631	0,000
	2	64	4,794	2,977	0,372		
	Total	10	6,502	5,603	0,560		
ROE	1	36	14,698	11,957	1,993	0,098	0,755
	2	64	15,545	13,579	1,697		
	Total	10	15,240	12,964	1,296		
NetMargin	1	36	20,844	16,214	2,702	15,819	0,000
	2	64	10,572	9,644	1,206		
	Total	10	14,270	13,292	1,329		
CurrentLiq	1	36	4,247	5,906	0,984	11,292	0,001
	2	64	1,743	0,723	0,090		
	Total	10	2,645	3,758	0,376		
GeneralLiq	1	36	2,536	2,384	0,397	27,675	0,000
	2	64	0,949	0,321	0,040		
	Total	10	1,521	1,631	0,163		

		Descriptive 3rd quarter 2020				ANOVA 3rd quarter 2020	
		N	Mean	Standard deviation	Standard error	Z	Sig.
<i>LNAsset</i>	1	36	21,461	2,014	0,336	24,271	0,000
	2	64	23,094	1,298	0,162		
	Total	10	22,506	1,768	0,177		
<i>TaxDeduc</i>	1	36	119411193,109	199115981,997	33185997,000	4,387	0,039
	2	64	221483050,795	251176582,513	31397072,814		
	Total	10	184737182,028	237885183,335	23788518,334		
<i>GIM</i>	1	36	54,076	20,264	3,377	2,825	0,096
	2	64	60,490	17,144	2,143		
	Total	10	58,181	18,487	1,849		
<i>GrowthOpp</i>	1	36	1,775	1,324	0,221	0,575	0,450
	2	64	1,595	1,021	0,128		
	Total	10	1,660	1,136	0,114		

Source: Authors.

The negative effect of indebtedness on performance is observed, since group 1 presents better averages than group 2 for performance variables in the years under study. This corroborates the results of Machado *et al.* (2015), and, similarly to this research, concludes that the Pecking Order Theory is valid. Furthermore, with the Covid-19 pandemic in 2020, it was possible to see a worsening in the averages of the performance variables of group 2 companies, compared to those in 2019, which explains a negative impact on performance coming from the pandemic.

In this section, it was verified that the Covid-19 pandemic negatively impacted all the companies in the sample together, increasing their indebtedness and, consequently, decreasing their performance, given that the correlation between indebtedness and performance was negative. In the next section, the sectoral particularities of the sample companies will be investigated with the use of the correlation.

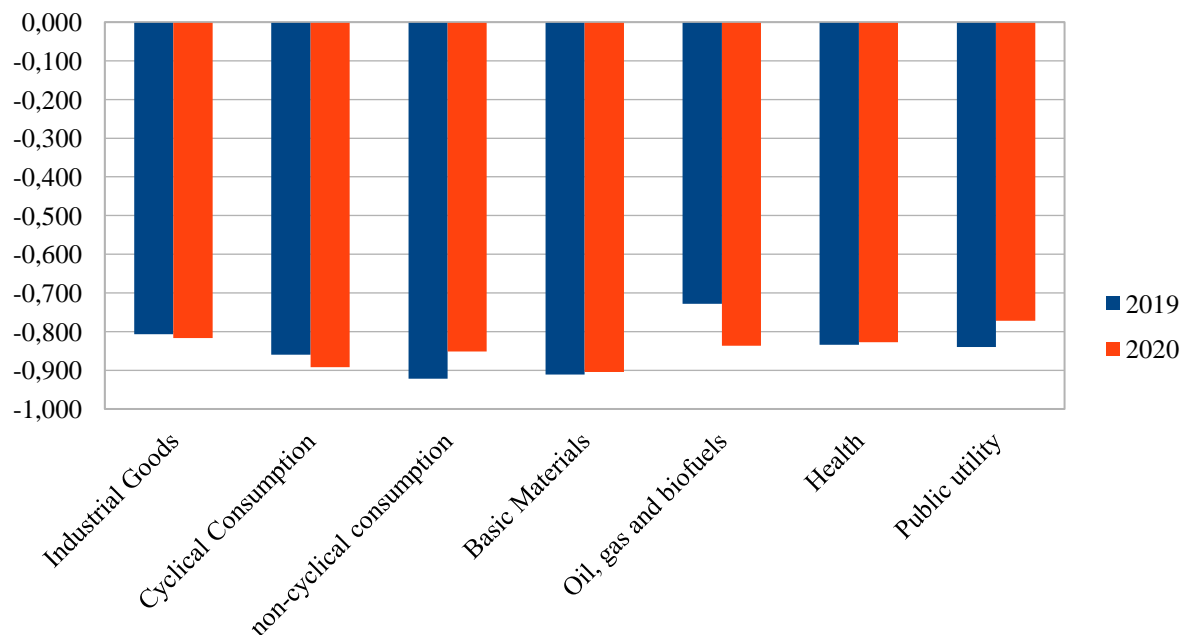
Sector analysis of pandemic impacts

Pearson's correlation coefficient, between indebtedness and performance variables, was again calculated, but in each sector. The Communications, Others and Information Technology segments were excluded from the analysis because they presented few companies, making it impossible to effectively calculate the correlation. All data, from 2019 and 2020, also went through logarithmic transformation for better analysis, and the result is found in Appendix A.

As in the analysis based on all companies, all segments presented a negative correlation between most performance and debt variables. This endorses the results of Silva (2014) and Machado *et al.* (2015), with regard to the Pecking Order Theory, which correctly explains the capital structure of companies, as it predicts this negative correlation between indebtedness and performance. This correlation was more evident between the indebtedness and liquidity of the companies, as shown in Figure 1.

Figure 1

Comparison of the correlation between General Liquidity and Total Indebtedness, between sectors



Source: Authors.

Figure 1 shows how Covid-19 pandemic did not impact the relationship between indebtedness and business liquidity, since the correlation between the third half of 2019 and of 2020 showed no significant change. This occurred with most variables, in all sectors and with few exceptions. As can be seen in Figure 1, one of these exceptions was the negative correlation between Total Indebtedness and General Liquidity in the Oil, Gas and Biofuels sector, which became significantly more negative from 2019 to 2020.

Citing as highlights of the correlation analysis, Net Margin also showed a constant and relevant negative correlation with business indebtedness in all sectors, but, in the Basic Materials sector, it tended to be more neutral from the third quarter of 2019 to the same period of 2020. Unlike this segment, in the Industrial Goods and Oil and Gas and Biofuels, there was a significant increase in the negative correlation between indebtedness and Net Margin from 2019 to 2020. However, Tax Deductions tend to have a positive correlation with indebtedness in all sectors, again pointing to a relationship between tax impacts on business and debt. The Non-Cyclical Consumption sector showed a significant increase in the positive correlation of Tax Deductions with debt from 2019 to 2020.

With the performance of the correlation, as explained in Table 8, the division of companies, according to their levels of Total Indebtedness was continued by segments. Thus, it was possible to see how the majority of these remained unchanged from the third half of 2019 to the 2020 as regards Total Indebtedness. Only the Basic Materials, Health and Public Utility segments became more indebted, while, in the Others segment, its only company (Atompar) became less indebted.

Table 8

Division by sector of companies into two groups based on their Total Indebtedness

INDUSTRIAL GOODS					COMMUNICATIONS				
Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%	Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%
1	8	53,33%	8	53,33%	1	2	100,00%	2	100,00%
2	7	46,67%	7	46,67%	2	0	0,00%	0	0,00%
Total	15	100,00%	15	100,00%	Total	2	100,00%	2	100,00%
CYCLICAL CONSUMPTION					NON-CYCLICAL CONSUMPTION				
Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%	Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%
1	9	42,86%	9	42,86%	1	2	40,00%	2	40,00%
2	12	57,14%	12	57,14%	2	3	60,00%	3	60,00%
Total	21	100,00%	21	100,00%	Total	5	100,00%	5	100,00%
BASIC MATERIALS					OTHERS				
Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%	Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%
1	6	66,67%	4	44,44%	1	0	0,00%	1	100,00%
2	3	33,33%	5	55,56%	2	1	100,00%	0	0,00%
Total	9	100,00%	9	100,00%	Total	1	100,00%	1	100,00%
OIL, GAS AND BIOFUELS					HEALTH				
Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%	Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%
1	1	25,00%	1	25,00%	1	4	44,44%	3	33,33%
2	3	75,00%	3	75,00%	2	5	55,56%	6	66,67%
Total	4	100,00%	4	100,00%	Total	9	100,00%	9	100,00%
INFORMATION TECHNOLOGY					PUBLIC UTILITY				
Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%	Total Indebtedness Group	3rd quarter 2019	%	3rd quarter 2020	%
1	1	50,00%	1	50,00%	1	7	21,88%	5	15,63%
2	1	50,00%	1	50,00%	2	25	78,13%	27	84,38%
Total	2	100,00%	2	100,00%	Total	32	100,00%	32	100,00%

Source: Authors.

The most indebted segments in 2020, indicated in Table 8, were those of Public Utility and Oil, Gas and Biofuels, while the least indebted were Communications, Others and Industrial Goods. These more indebted sectors had higher risks during Covid-19 pandemic (due to the fall in demand for energy sources), which corroborates the results of the study by Heng and Ye (2021). The indebtedness of companies in the Public Utility sector, which was considerable in 2019 and worsened in 2020, is potentially affecting the performance of these companies, which were at a level almost 85% above or equal to a Total Indebtedness of 50%.

The findings of this research dialog with previous studies (Silva, 2014; Machado *et al.*, 2015), as it demonstrates that the capital structure of the companies is related to the firm's performance. The results show that information, such as indebtedness, is important, so that shareholders can reduce the informational asymmetry between managers and investors and can choose the best companies to invest in. According to Modigliani and Miller (1963), the companies financing sources are conditioned to the company's operations segment, which is why in this study the sectors were analyzed individually.

Although the studies of Silva (2014) and Machado *et al.* (2015) collaborate with the results of this study, Sampaio *et al.* (2021) research found that compliance practice was contrary to the premises of the Pecking Order Theory, since there was a positive relationship between the firm's performance and total indebtedness depending on each segment. Therefore, the capital structure of the companies reflects each segment characteristics, especially in the Covid-19 pandemic, in which the Oil, Gas and Biofuels sector obtained higher indebtedness than the Communications sector, for example, as verified in this empirical study.

In general, this study found that larger companies tend to have a higher level of indebtedness, which is in line with the Pecking Order Theory, which states that smaller companies have a greater conflict of interest between shareholders and creditors. In larger companies, ownership is less concentrated. So managers cannot switch projects easily, contrary to the interests of investors. Additionally, it can be affirmed that companies should seek a hierarchical preference for financing sources. In other words, managers should be aware that the resources generated within the organization lower transaction costs and that issuing new debt can be a positive sign to the stock market.

Final considerations

This study aimed to identify the impact caused by Covid-19 pandemic on the relationship between the capital structure and the performance of Brazilian companies listed on B3, sectorally. To meet this goal, data from 2019 and 2020 from 100 companies listed in B3 were statistically analyzed.

It was observed that all sectors tend to have a negative correlation between most performance and debt variables, which is in accordance with the conclusions of Silva (2014) and Machado *et al.* (2015), since the Pecking Order Theory was able to explain the companies' capital structure behaviour. Regarding Covid-1 pandemic impact, it was noted that in most cases, it did not have a significant impact

on the relationship between indebtedness and companies' performance. There was also an increase in the companies of the sample Total Indebtedness from the third half of 2019 to the third half of 2020. The most indebted sectors were Public Utility and Oil, Gas and Biofuels, which experienced higher risks during the pandemic, due to the impacts on demand for energy sources, and that corroborates the conclusions of Heng and Ye (2021).

This study presents theoretical contributions by expanding Pecking Order Theory power of explanation of firms relationship between performance and capital structure. The research findings showed that large firms in Brazil have presented a 'corporate immunity' to the impact of Covid-19 on their financial structures. Nevertheless, the results showed that, in the period analyzed, companies in the Oil, Gas and Biofuels sectors had higher indebtedness. In fact, with the pandemic, there was a reduction in global demand for oil fuels, which has economically affected the oil industry. In addition, indebtedness in this industry may be associated with the cost of storage, processing, and refineries.

The results found allow to infer that in Brazilian companies the higher indebtedness negatively impacts financial performance and, consequently, the return to shareholders. As a managerial implication, the paper suggests that managers can rethink and improve their corporate practices of obtaining financial resources in order to use them in the context of a crisis. Companies should improve their financial planning and focus on post-pandemic recovery policies.

It is noteworthy that the corporate actions taken in one sector do not necessarily apply to the others, since each one demonstrated different characteristics during the Covid-19 period in this research. Government implications may be derived from this study. For example, the most indebted industries, to maintain their continuity, need government financial support through loan facilitation, tax reductions and subsidies.

Although this study is one of the pioneers to relate the capital structure and financial performance of Brazilian companies in the Covid-19 pandemic, it is not free of limitations. The research did not consider a temporal analysis beyond the years 2019 and 2020, which makes it difficult to generalize the results for other years. Additionally, the study did not use a panel data analysis in order to compare firms financial performance and indebtedness over the years.

Therefore, further studies should employ the use of more robust statistical techniques to verify the effect of variables in the pandemic period. In addition, new research may include the creative industry sector, which comprises the music industry, festivals and events. The companies in that sector were not included in the sample, since they did not have information available in the database that was used to collect data. The results of this study are restricted to large companies. So it is suggested that future research in this area investigate the impact of the Covid-19 pandemic on small and medium-sized organizations. It can also be recommended to elaborate studies to compare companies' financial performance metrics during the global crisis of 2008 and during the pandemic of 2020.

References

- Backes, D. A. P., Arias, M. I., Storopoli, J. E., & Ramos, H. R. (2020). Os efeitos da pandemia de Covid-19 sobre as organizações: um olhar para o futuro. Editorial. *Iberoamerican Journal of Strategic Management (IJSM)*, 19(4), 1-10. <https://doi.org/10.5585/riae.v19i4.18987>
- Brasil, Bolsa Balcão – B3. (2021). *Consultas*. http://www.b3.com.br/pt_br/produtos-e-servicos/negociacao/renda-variavel/acoes/consultas/classificacao-setorial/
- Borges, D., Jr., Sarvas, L., Oliveira, J., & Ribeiro, K. (2017). Endividamento de longo prazo e desempenho em tempos de crise: evidências de empresas no Brasil e América Latina. *Revista Catarinense da Ciência Contábil*, 16(47), 87-96. <https://doi.org/10.16930/2237-7662/rccc.v16n47p87-96>
- Boucinhas, J. (1980). Custo, estrutura de capital e decisões de investimento em condições de inflação. *Revista de Administração de Empresas*, 20(4), 7-12.
- Brandão, H., & Guimarães, T. (2001). Gestão de competências e gestão de desempenho: tecnologias distintas ou instrumentos de um mesmo construto? *Revista de Administração de Empresas*, 41(1), 8-15. <http://dx.doi.org/10.1590/S0034-75902001000100002>
- Brito, G. A. S., Corrar, L. J., & Batistella, F. D. (2007). Fatores determinantes da estrutura de capital das maiores empresas que atuam no Brasil. *Revista Contabilidade & Finanças*, 18(43), 9-19. <https://doi.org/10.1590/S1519-70772007000100002>
- Camfield, C. E. R., Freitas, G. M., Correia, M. R. F., & Serrasqueiro, Z. (2018). A estrutura de capital de empresas de pequena dimensão em Portugal: uma abordagem segundo as teorias do Trade-off e da Pecking-order. *Race: revista de administração, contabilidade e economia*, 17(1), 365-388.
- Camilo, S. P., Xavier, W. G.; Bandeira-de-Mello, R., & Marcon, R. (2010). A Estrutura de Capital como Recurso e o Efeito no Desempenho das Firms. *Iberoamerican Journal of Strategic Management (IJSM)*, 9(1), 102-126.
- Diniz, N. (2015). *Análise das demonstrações financeiras*. Rio de Janeiro: SESES.
- Durand, D. (1952). Cost of debt and equity funds for business: Trends and problems of measurement. *Conference on research on business finance*, 215-262, New York: National Bureau of Economic Research. <https://www.nber.org/chapters/c4790.pdf>
- Figueiredo, D., Filho, & Silva, J., Jr. (2009). Desvendando os mistérios do Coeficiente de Correlação de Pearson (r). *Revista Política Hoje*, 18(1), 115-146.
- Fonseca, J. (2002). *Metodologia da pesquisa científica*. Fortaleza: UEC. Apostila.
- Henrique, M. R., Silva, S. B., Soares, W. A., & Silva, S. R. da (2018). Determinantes da estrutura de capital de empresas brasileiras: uma análise empírica das teorias de Pecking Order e Trade-Off no período de 2005 e 2014. *Revista Ibero-Americana de Estratégia*, 17(1), 130-144. <https://doi.org/10.5585/riae.v17i1.2542>
- Huang, H., & Ye, Y. (2021). Rethinking capital structure decision and corporate social responsibility in response to COVID-19. *Accounting & Finance*, 61(3), 4757-4788. <https://doi.org/10.1111/acfi.12740>
- Iudícibus, S. (2017). *Análise de balanços*. 11. ed. São Paulo: Atlas.

- Kammler, E., & Alves, T. (2009). Análise da capacidade explicativa do investimento pelo “q” de Tobin em empresas brasileiras de capital aberto. *Revista de Administração de Empresas - eletrônica*, 8(2). <https://doi.org/10.1590/S1676-56482009000200007>
- Kaveski, I. D. S., Zittei, M. V. M., & Scarpin, J. E. (2014). Trade-off e Pecking order: Uma Análise das Empresas de Capital Aberto da América Latina. In *Anais do Congresso USP Controladoria e Contabilidade, São Paulo* (Vol. 14).
- Lakatos, E., & Marconi, M. (2003). *Fundamentos de metodologia científica*. 5. ed. São Paulo: Atlas.
- Lima, A., & Freitas, E. (2020). A pandemia e os impactos na economia brasileira. *Boletim Economia Empírica*, 1(4). <https://www.portaldeperiodicos.idp.edu.br/bee/article/view/4773>
- Lira, S. (2004). *Análise de correlação: abordagem teórica e de construção dos coeficientes com aplicações*. 2004. 196 f. Dissertação (Mestrado em Ciências) - Curso de Pós-Graduação em Métodos Numéricos em Engenharia, Universidade Federal do Paraná, Curitiba.
- Machado, L., Prado, J., Vieira, K., Antonialli, L., & Santos, A. (2015). A relevância da estrutura de capital no desempenho das firmas: uma análise multivariada das empresas brasileiras de capital aberto. *Revista de Educação e Pesquisa em Contabilidade (REPeC)*, 9(4), 397-414 <https://doi.org/10.17524/repec.v9i4.1313>
- Mette, F., Martins, M., Butzen, P., & Macêdo, G. (2010). Estrutura de capital: uma análise em empresas seguradoras. *ConTexto*, 10(18), 97-105.
- Michelon, P. S., Lunkes, R. J., & Bornia, A. C. (2020). Há influência de características do Top Management Team na estrutura de capital das empresas financeiras? *Iberoamerican Journal of Strategic Management (IJSM)*, 19(2), 87-104. <https://doi.org/10.5585/riae.v19i2.16132>
- Modigliani, F., & Miller, M. (1963). Corporate income taxes and the cost of capital: A correction. *American Economic Review*, 53(3), 433-443.
- Modigliani, F., & Miller, M. (1958). The cost of capital, corporation finance and the theory of investment. *American Economic Review*, 48(3), 261-297.
- Myers, S., & Majluf, N. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2), 187-221.
- Oliveira, A., & Callado, A. (2019). Fatores contingenciais externos e a mensuração de desempenho: um estudo em ONGs brasileiras. *Revista de Educação e Pesquisa em Contabilidade (REPeC)*, 13(2), 235-249. <http://dx.doi.org/10.17524/repec.v13i2.1928>
- Pinheiro, B., Vasconcelos, A., Luca, M., & Crisóstomo, V. (2017). Estrutura de Capital e governança corporativa nas empresas listadas na BM&FBovespa. *Revista de Educação e Pesquisa em Contabilidade (Repec)*, 11(4), 451-466. <https://doi.org/10.17524/repec.v11i4.1706>
- Pinto, R. F., Ribeiro, I., Cirani, C. B., Storopoli, J. E., & Ramos, H. R. (2020). Cortar ou investir? Ações estratégicas para enfrentar a crise provocada pela Covid-19. Editorial. *Iberoamerican Journal of Strategic Management (IJSM)*, 19(3), 1-5. <https://doi.org/10.5585/riae.v19i3.18391>
- Pohlmann, M. C., & Iudícibus, S. de (2010). Relação entre a tributação do lucro e a estrutura de capital das grandes empresas no Brasil. *Revista Contabilidade & Finanças*, 21, 1-25.
- Reis, C. (2014). *Controladoria Estratégica*. Rio de Janeiro: Apostila.

- Rezende, A., Marcelino, J., & Miyaji, M. (2020). A reinvenção das vendas: as estratégias das empresas brasileiras para gerar receitas na pandemia de Covid-19. *Boletim de Conjuntura (BOCA)*, 2(6), 53-69.
- Rodrigues, E. (2016). *A criação de valor através do Economic Value Added num período de crise financeira: um estudo de caso*. 2016. 56 f. Dissertação (Mestrado em Contabilidade e Finanças) - Escola Superior de Ciências Empresariais, Setúbal.
- Rodrigues, P., & Kloeckner, G. (2006). Estrutura de capitais e seus fatores determinantes no Brasil. *ConTexto*, 6(10), 42-64.
- Sampaio, T. S. L., Pinheiro, A. B., Rodrigues, R. C., & Lameu, E. V. M. (2021). Aderência a teoria Pecking order pelas firmas brasileiras: uma análise multisetorial. *Revista Ambiente Contábil*, 13(1), 151-180. <https://doi.org/10.21680/2176-9036.2021v13n1ID19560>
- Schmidt, A., & Oliveira, R. (2020). A cessão de crédito e o superendividamento empresarial e social no Brasil durante a pandemia do Covid-19. *Revista Eletrônica*, 2(6), 13-24.
- Semedo, I. (2015). *Teorias da estrutura de capital das empresas: uma aplicação às empresas Portuguesas cotadas na Euronext Lisboa*. 2015. 96 f. Dissertação (Mestrado em Gestão Financeira) - Programa de Pós-Graduação em Gestão Financeira, Instituto Superior de Gestão de Lisboa, Lisboa.
- Silva, A., Filho. (2012). Estudo sobre a aplicação da análise de variância. *Revista Pensar Gestão e Administração*, 3(2), 19-34.
- Silva, E., Lima, E., Costa, S., & Sant'Anna, A. (2015). Análise comparativa de rentabilidade: um estudo sobre o Índice de Sustentabilidade Empresarial. *Gestão & Produção*, 22(4), 743-754. <https://doi.org/10.1590/0104-530X1889-14>
- Silva, E. S. (2014). *Estudo da estrutura de capital das principais economias emergentes e desenvolvidas mediante cenário de crise*. 2014. 148 f. Tese (Doutorado em Administração) - Programa de Pós-Graduação em Administração, Universidade Federal de Pernambuco, Recife.
- Triviños, A. (1987). *Introdução à pesquisa em ciências sociais: a pesquisa qualitativa em educação*. São Paulo: Atlas.
- Valle, M., & Albanez, T. (2012). Juros altos, fontes de financiamento e estrutura de capital: o endividamento de empresas brasileiras no período 1997-2006. *Revista de Contabilidade e Organizações*, 6(16), 49-72. <https://doi.org/10.11606/rco.v6i16.52667>
- Winter, O., & Lôbo, T. (2021). Por que usar transformação logarítmica em dados? *Rpubs*. http://rstudio-pubs-static.s3.amazonaws.com/289147_99e32d5403f942339c3fe05414ac62fd.html

APPENDIX A

Pearson correlation coefficient between variables, by sector

Pearson's Correlation Coefficient - Industrial Goods						
	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020
	Total Indebtedness		Long-Term Indebtedness		Short-Term Indebtedness	
Market Value	0,656	0,511	0,543	0,489	-0,210	-0,155
Tobin's Q	-0,039	-0,505	-0,133	-0,419	0,366	0,157
EVA	0,189	-0,638	0,182	-0,702	0,257	0,508
ROA	-0,570	-0,862	-0,603	-0,832	0,632	0,311
ROE	-0,063	-0,716	-0,164	-0,744	0,632	0,467
Net Margin	0,232	-0,646	0,086	-0,611	0,099	-0,004
Current Liquidity	-0,578	-0,612	-0,564	-0,310	0,243	-0,539
General Liquidity	-0,807	-0,816	-0,854	-0,808	0,479	0,107
Natural Logarithm of Total Assets	0,732	0,717	0,634	0,651	-0,333	-0,198
Tax Deductions	0,637	0,598	0,578	0,492	-0,356	-0,094
GIM	0,492	0,481	0,701	0,734	-0,662	-0,504
Growth Opport.	0,375	-0,160	0,239	-0,095	0,218	0,099
Pearson's Correlation Coefficient - Cyclical consumption						
	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020
	Total Indebtedness		Long-Term Indebtedness		Short-Term Indebtedness	
Market Value	0,234	0,262	0,094	0,129	0,261	0,208
Tobin's Q	-0,204	-0,175	-0,390	-0,369	0,184	0,095
EVA	0,487	0,459	0,108	0,266	0,709	0,398
ROA	-0,009	-0,222	-0,353	-0,335	0,402	0,036
ROE	0,373	0,274	-0,006	0,038	0,402	0,373
Net Margin	-0,309	-0,399	-0,379	-0,236	-0,190	-0,376
Current Liquidity	-0,794	-0,772	-0,537	-0,339	-0,776	-0,890
General Liquidity	-0,860	-0,892	-0,808	-0,780	-0,517	-0,519
Natural Logarithm of Total Assets	0,379	0,411	0,294	0,344	0,232	0,211
Tax Deductions	0,326	0,471	0,110	0,302	0,345	0,316
GIM	0,157	0,172	0,299	0,333	-0,127	-0,104
Growth Opport.	0,136	0,177	-0,130	-0,100	0,443	0,361
Pearson's Correlation Coefficient - Non-cyclical consumption						
	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020
	Total Indebtedness		Long-Term Indebtedness		Short-Term Indebtedness	
Market Value	-0,241	-0,307	-0,439	-0,361	-0,049	-0,146
Tobin's Q	-0,752	-0,834	-0,893	-0,888	-0,551	-0,609
EVA	-0,227	0,018	-0,042	-0,122	-0,349	0,219
ROA	-0,787	-0,738	-0,836	-0,797	-0,655	-0,527
ROE	-0,129	-0,347	-0,243	-0,470	-0,655	-0,102
Net Margin	-0,713	-0,741	-0,654	-0,681	-0,675	-0,698
Current Liquidity	-0,641	-0,753	-0,320	-0,707	-0,840	-0,715
General Liquidity	-0,922	-0,851	-0,940	-0,939	-0,808	-0,594
Natural Logarithm of Total Assets	0,150	0,096	-0,045	0,059	0,295	0,164
Tax Deductions	0,386	0,629	0,113	0,441	0,576	0,829
GIM	-0,960	-0,281	-0,977	-0,120	-0,838	-0,462
Growth Opport.	-0,600	-0,715	-0,764	-0,782	-0,397	-0,480
Pearson's Correlation Coefficient - Basic Materials						
	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020
	Total Indebtedness		Long-Term Indebtedness		Short-Term Indebtedness	
Market Value	0,257	0,540	0,474	0,732	-0,227	-0,237
Tobin's Q	-0,412	-0,047	-0,216	-0,047	-0,499	0,126
EVA	-0,112	0,321	0,158	0,209	-0,516	0,456
ROA	-0,739	0,085	-0,506	-0,028	-0,772	0,370
ROE	-0,262	0,346	-0,054	0,209	-0,772	0,512
Net Margin	-0,767	-0,022	-0,546	-0,088	-0,792	0,261
Current Liquidity	-0,700	-0,672	-0,410	-0,416	-0,805	-0,715
General Liquidity	-0,911	-0,905	-0,774	-0,806	-0,681	-0,493
Natural Logarithm of Total Assets	0,417	0,516	0,549	0,684	-0,015	-0,220

<i>Total Assets</i>						
<i>Tax Deductions</i>	0,381	0,679	0,521	0,695	-0,075	0,114
<i>GIM</i>	0,337	0,344	0,211	0,302	0,260	0,069
<i>Growth Opport.</i>	0,335	0,764	0,600	0,809	-0,219	0,308
Pearson's Correlation Coefficient - Oil, gas and biofuels						
	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020
	Total Indebtedness		Long-Term Indebtedness		Short-Term Indebtedness	
<i>Market Value</i>	0,962	0,980	0,559	0,980	0,840	0,827
<i>Tobin's Q</i>	0,251	0,484	-0,438	0,499	0,887	0,366
<i>EVA</i>	0,700	-0,539	0,165	-0,674	0,914	-0,102
<i>ROA</i>	0,237	-0,783	-0,302	-0,710	0,751	-0,854
<i>ROE</i>	0,629	-0,588	0,090	-0,495	0,751	-0,740
<i>Net Margin</i>	-0,594	-0,781	-0,413	-0,660	-0,386	-0,975
<i>Current Liquidity</i>	-0,677	-0,993	-0,174	-0,998	-0,873	-0,823
<i>General Liquidity</i>	-0,728	-0,837	-0,840	-0,918	-0,188	-0,493
<i>Natural Logarithm of Total Assets</i>	0,998	0,997	0,763	0,993	0,661	0,851
<i>Tax Deductions</i>	0,943	0,523	0,518	0,371	0,862	0,839
<i>GIM</i>	-0,060	-0,009	0,258	0,169	-0,332	-0,473
<i>Growth Opport.</i>	0,727	0,927	0,106	0,923	0,993	0,792
Pearson's Correlation Coefficient - Health						
	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020
	Total Indebtedness		Long-Term Indebtedness		Short-Term Indebtedness	
<i>Market Value</i>	0,211	0,180	0,464	0,502	-0,365	-0,545
<i>Tobin's Q</i>	-0,081	-0,129	0,063	0,152	-0,243	-0,402
<i>EVA</i>	0,214	-0,388	0,188	-0,398	-0,045	-0,034
<i>ROA</i>	-0,094	-0,627	0,097	-0,535	-0,326	-0,084
<i>ROE</i>	0,277	-0,267	0,355	-0,266	-0,326	-0,089
<i>Net Margin</i>	-0,300	-0,510	0,167	-0,284	-0,715	-0,395
<i>Current Liquidity</i>	-0,481	-0,269	-0,075	-0,120	-0,521	-0,205
<i>General Liquidity</i>	-0,834	-0,828	-0,697	-0,905	-0,114	0,439
<i>Natural Logarithm of Total Assets</i>	0,335	0,297	0,617	0,615	-0,394	-0,569
<i>Tax Deductions</i>	-0,227	-0,054	0,219	0,307	-0,680	-0,651
<i>GIM</i>	0,046	0,222	0,506	0,648	-0,698	-0,819
<i>Growth Opport.</i>	-0,062	-0,075	0,040	0,196	-0,188	-0,406
Pearson's Correlation Coefficient - Public Utility						
	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020	3rd quarter 2019	3rd quarter 2020
	Total Indebtedness		Long-Term Indebtedness		Short-Term Indebtedness	
<i>Market Value</i>	0,273	0,434	0,385	0,614	0,021	-0,048
<i>Tobin's Q</i>	-0,570	-0,388	-0,544	-0,292	-0,505	-0,142
<i>EVA</i>	0,132	0,262	0,069	0,257	0,187	0,227
<i>ROA</i>	-0,484	-0,394	-0,449	-0,096	-0,471	-0,409
<i>ROE</i>	0,176	0,401	0,136	0,354	-0,471	0,255
<i>Net Margin</i>	-0,605	-0,618	-0,485	-0,322	-0,724	-0,658
<i>Current Liquidity</i>	-0,832	-0,576	-0,720	-0,183	-0,837	-0,764
<i>General Liquidity</i>	-0,839	-0,772	-0,784	-0,584	-0,724	-0,455
<i>Natural Logarithm of Total Assets</i>	0,636	0,617	0,723	0,709	0,356	0,053
<i>Tax Deductions</i>	0,514	0,519	0,572	0,672	0,295	0,004
<i>GIM</i>	-0,018	-0,141	0,137	0,523	-0,290	-0,514
<i>Growth Opport.</i>	-0,499	-0,161	-0,552	-0,222	-0,313	0,135

Source: Elaborated from the research data (2021).