GESTÃO, FINANÇAS E CONTABILIDADE

FINANCIAL DEBT STRATIFICATION AND CAPITAL STRUCTURE DETERMINANTS OF COMPANIES LISTED IN THE BM&FBOVESPA

ESTRATIFICAÇÃO DAS DÍVIDAS ONEROSAS E OS DETERMINANTES DA ESTRUTURA DE CAPITAL DE EMPRESAS LISTADAS NA BM&FBOVESPA

ESTRATIFICACIÓN DE LA DEUDA FINANCIERA Y LOS DETERMINANTES DE LA ESTRUCTURA DE CAPITAL DE LAS EMPRESAS QUE PARTICIPAN EN LA BM&FBOVESPA

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ABSTRACT

Through this research we aim at analyzing the influence of the determinants of capital structure on the stratification of the financial debts of the companies listed in the BM&FBOVESPA. We analyzed 160 companies, from 2009 to 2013, reaching a total of 800 observations. The financial debts were analyzed in their totality, as well as in long and short term. We grouped the debts in four different strata – considering their type – and in accordance to the destination of their resources – whether they were fixed investments or working capital. We used the method of fixed effects panel data estimated by GLS (generalized least squares). The results we have found suggest that the determinants of capital structure influence distinctly on the different types of financial debts, varying in terms of signal and of the magnitude of their effects. In the Brazilian economic context such findings might illustrate that the heterogeneity of debts can emerge as relevant factors when analyzing the corporate capital structure.
Keywords: Financial debt stratification. Capital structure determinants. BM&FBOVESPA.

RESUMO

A pesquisa, cujos resultados são apresentados neste artigo, teve como objetivo analisar a influência dos fatores determinantes da estrutura de capital em relação à estratificação das dívidas onerosas das empresas listadas na BM&FBOVESPA. No total, foram analisadas 160 empresas durante o período de 2009 a 2013, totalizando 800 observações. As dívidas onerosas foram analisadas em termos totais e de curto e longo prazo, assim como foram separadas quanto ao tipo (estratificadas em quatro grupos) e quanto à destinação dos recursos (se para capital de giro ou para investimentos). O método utilizado foi a análise de dados em painel com efeitos fixos estimados por GLS (*generalized least squares*). Os resultados encontrados sugerem que os determinantes da estrutura de capital influenciam de formas diferentes os diversos tipos de dívidas onerosas, variando quanto ao sinal e à magnitude de seus efeitos. Tais achados podem indicar que a heterogeneidade das dívidas no contexto econômico brasileiro desponta como um fator relevante na análise da estrutura de capital corporativa.
Palavras-chave: Estratificação das dívidas onerosas. Determinantes da Estrutura de Capital. BM&FBOVESPA.

RESUMEN

Esta investigación, cuyos resultados son presentados en este artículo, tuvo por objetivo analizar la influencia de los factores determinantes de la estructura de capital en relación a la estructura de las deudas onerosas de las empresas que participan en la BM&FBOVESPA. En total, fueron analizadas 160 empresas durante el período de 2009 a 2013, totalizando 800 observaciones. Las deudas onerosas fueron analizadas en términos totales, de corto y largo plazo, y, también, fueron organizadas en cuanto al tipo (estratificado en cuatro grupos) y en cuanto al destino de los recursos (si fue para capital de trabajo o para inversiones). El método utilizado fue datos panel con efectos fijos estimados por GLS (*generalized least squares*). Los resultados sugieren que los determinantes de la estructura de capital influencian de forma diferente los diversos tipos de deudas financieras, variando en dirección y magnitud de sus efectos. Estos resultados pueden indicar que la heterogeneidad de las deudas en el contexto económico brasilero puede ser considerada como un factor importante en el análisis de la estructura de capital corporativa.
Palabras clave: Estratificación de la deuda financiera. Determinantes de la estructura de capital. BM&FBOVESPA.

1 INTRODUCTION

Since the Industrial Revolution, the structure of capital has been an appealing theme in both the corporate and the academic environments (SWANSON; SRINIDHI; SEETHARAMAN, 2003). The definition of an ideal capital structure, that integrates the totality of corporate capital, be it equity or debt capital, fosters deep debates. Regarding this topic, Myers's (1984, p. 575) question regarding "how companies choose their capital structure" is still without a conclusive answer. Famá & Grava (2000) mention that, even after more than 50 years of the publication of Modigliani's and Miller's (1958, 1963) seminal articles, the debates continue. The following question is open to the present day: "what do we know of capital structure?" (RAJAN; ZINGALES, 1995, P.1421).

There have been advances on the theme, and currently some of the theoretical contributions have been channeling the debate towards debts stratification (GRAHAM; LEARY, 2011), especially financial debts. For Rauh & Sufi (2010), most empirical researches on capital structure treat debts as if they were uniform, but the heterogeneity of debts is a common feature, given that several companies present in their Balance Sheets liabilities with conflicting characteristics, such as preferences regarding cash flow (payment order) and supply control.

Studies on the homogeneity and heterogeneity of debt structure in American companies were conducted by Colla, Ippolito & Li (2013). Their results show that 85% of the companies analyzed have predominantly used only a single kind of debt to finance their assets, while diversification and specialization of debts occurred only on large companies which were listed on credit ratings. This research was similar to the one Rauh & Sufi (2010) conducted, its results pointing to the use of multiple sources of debt by high quality credit companies.

In Brazil, Póvoa & Nakamura (2014) conducted a study on the homogeneity and heterogeneity of the debts of companies listed on BM&FBOVESPA between 2007 and 2011. The authors could notice that in larger companies, with a high market-to-book ratio and rating grates, feature heterogeneity in the strong form of their debt structures, although both kinds of structures were found on Brazilian companies. This research concluded, still, that the other determinant variables of capital structure were not statistically significant. In another study on the same topic, Póvoa & Nakamura (2015) found out that debt heterogeneity influences the way capital structure is organized and structured, even in a financial and economic environment that is marked by strong informational asymmetries, as is the case of Brazil.

These researches have been approaching the relevance of investigating debts structure, specifically. For Welch (2006; 2011), it is also important to investigate financial debts, given that the interference of non-financial liabilities in the metric that is adopted for leveraging interferes with the relation between capital structure and its determinant factors, and that could have influenced the findings of empirical researches on the theme that were developed until that point.

Along the lines of current researches, it is understood that the financial debts must be analyzed, i.e., investigations regarding the liabilities that consist of interest-bearing debts must be developed (MACHADO; MEDEIROS; EID JÚNIOR, 2010). In an even more specific manner, the structure of financial debts must be investigated in its different types: banking debts, debentures, subsidized credit, leasing, etc. Thus, there is a gap to investigate the relationship between the determinants of capital structure in relation to the companies' different instruments of financial debt.

Considering the aspects mentioned, the study presented in this article aimed at **analyzing the influence of capital structure's determinant factors in relation to the stratification of financial debts in companies listed on BM&FBOVESPA from 2009 to 2013.** Aside from this introduction, the present article is subdivided in: theoretical framework, which is divided between sections 2 and 3,

that dealt with the structure of financial debts and the empirical evidences that run along the theme; then, the methodology is described (section 4); right after, the analysis and the discussion of the findings were presented (section 5); so as to, finally, in section 6, present the final considerations.

2 STRATIFICATION OF FINANCIAL DEBTS

Since the works of Modigliani & Miller (1958; 1963) were published, empirical evidences on the determinants of capital structure and the prevailing theories that try to explain them are inconsistent on both international (GRAHAM; LEARY, 2011) and national (LEAL, 2008) levels. For Welch (2006; 2011), Rauh & Suffi (2010) and Colla, Ippolito & Li (2013), these inconsistencies can result from the main proxy used on researches on capital structure, i.e., leverage. The first author proposes alternative metrics to measure leverage, while the other two works suggest an analysis of the composition of the debt structure, as well as the verification of its homogeneity or heterogeneity. In fact, the works aforementioned propose complementary analyses, for they emphasize the investigation of financial debts.

Welch (2006; 2011) provides an example of the inconsistency of traditional metrics used for measuring leverage through the basic accounting equation: the equalization of resource application – represented by the total asset – and resource origin – represented by liabilities and the net equity. This interpretation is in line with the dynamics of Balance Sheet. In the basic accounting equation presented in Welch (2006; 2011), the total assets are equal to the sum of financial liabilities, non-financial liabilities, and net equity. Based on this equalization, total assets are financed by financial liabilities, which are represented by obligations that create debts, non-financial liabilities, obligations caused by the conduction of the companies' core activities, and net equity (MACHADO; MEDEIROS; EID JÚNIOR, 2010). For Welch (2006; 2011), the main inconsistency in measuring leverage, according to the ratio between financial liability and total assets, which is a common procedure in empirical researches on capital structure, lies in the assumption that non-financial liabilities also finance the assets that generate value for the companies on the long term.

To understand the root of the problem, one must go back to the basic equation presented in Welch (2006; 2011). For the author, the incremental measure of the traditional leverage metric assumes that the non-financial liability and the net equity are equivalent sources of resources for financing assets. That, according to Welch (2006; 2011), is inconsistent, since the assets with the greatest capacity for generating future cash flows are financed by long-term resources, i.e., by financial debts and equity. This reasoning refers to, for example, the assumption sustained by the correspondence principle, in which the applications of long term resources are preferably financed by resource sources which are also long term (BERK; DeMARZO; HARFORD, 2010).

The solution for this inconsistency is, according to Welch (2006; 2011), measuring leverage based on the relation between financial capital and invested capital. This leverage proxy features have equity as an additional measure, represented by net equity. Thus, consequently, with this form of measuring leverage, there would not be an interference from the non-financial liability in the financing of the assets which generate value on the long term: i.e., when not financed by financial debts, the capital invested in the companies has net equity as the origin for additional resources – two resource sources that present long term characteristics. According to Machado, Medeiros & Eid Júnior (2010), invested capital can be measured by the difference between total assets and non-financial debts.

In parallel to Welch's (2006; 2011) approach towards financial liabilities, Rauh & Sufi (2010) refined the concept through the analysis of the heterogeneity and the homogeneity of the debts' composition. Such analysis opposes the uniform treatment of corporate leverage that is proposed by

most empirical studies on capital structure developed until then. The authors' proposal consists on the conclusion that companies have a wide array of financing instruments, with distinct purposes and characteristics depending on the company's size and its credit quality.

For Póvoa & Nakamura (2014, p. 22), the relevance of the studies on debt structure lies in a "limitation of the theoretical models proposed, that might not correspond the companies' lived reality". Johnson (1997) comments that the existing theoretical models do not fit the use of private debt and public issue, for example, since they present different characteristics. On that matter, Colla, Ippolito & Li (2013, p. 2132) present three possible explanations for companies to use different debt structures: "1) reduction of expected bankruptcy costs; 2) saving costs in monitoring and information collection; and 3) restricted access to capital".

The discussions on the different debts structures are related to the following characteristics: incentive to managers, source of resources, involved guarantees, maturity term, company's quality or reputation, index, cash flow alterations, among others (COLLA; IPPOLITO; LI, 2013; PÓVOA; NAKAMURA, 2014; RAUH; SUFI, 2010). The particularities are determinant for a company to decide between a private debt (contracting financing through banks) and corporate securities issuance (such as issuing debentures and promissory notes), among other financing options available in the market.

This way, it becomes important to investigate how the determinants of capital structure influence on the structure of financial debts. Considering third-party capital as something homogenous can neglect the diversity of financial bills that make up corporate leverage, as well as the factors that determine corporate capital structure (PÓVOA; NAKAMURA, 2015).

Other characteristics neglected by researches on the determinants of capital structure that are, at least partially, contemplated by the researches on debt heterogeneity and homogeneity, are the implications of financial contracts on capital structure (GRAHAM; LEARY, 2011). For Graham & Leary (2011), evidencing that capital structure results from the comprehension of financial contracts contributes for the advance of empirical researches on the theme. These authors believe to be fundamental the comprehension that, aside from the investigation of the characteristics of existing debt contracts (maturity, renegotiation, agreements, etc), this literature points to the fact that not all debts are equivalent, such as the metrics adopted for measuring leverage tacitly assume. These authors claim that each debt has different incentives and contractual clauses, making it necessary for empirical researches to develop these questions on different companies.

3 EMPIRICAL EVIDENCE

Empirical researches on debt structure in account subgroups, as well as its influence on corporate capital structure, are still recent. In the last years, four important researches discussed that matter on national and international levels.

Providing new insights into what determines corporate capital structure, Rauh & Sufi (2010) investigated non-financial American companies from 1996 to 2006. The results showed that the debt structure varies depending on the companies' credit quality. These authors have also demonstrated the importance in acknowledging the heterogeneity of debt composition, given that 70% of the companies' annual reports present at least two account subgroups (or debt types) that constitute these corporate liabilities; that, aside from the fact that 25% of the collected observations did not present significant variations in a year, but there was a significant adjust on the debt composition in the period. That is, the total variation of the liabilities might not have been significant, but the adjustments of the account subgroups that constitute these liabilities varied significantly.

Slightly divergent results from those by Rauh & Sufi (2010) were found by Colla, Ippolito & Li (2013). These authors analyzed 3,296 American companies with credit risk ratings between 2002 and 2009. The research's finding indicated that 85% of the sample has contracted only one type of debt, and only large companies presented multiple types of debts.

Bringing the researches conducted by these authors into the Brazilian context, Póvoa & Nakamura (2014) developed an unprecedented study, in which they analyzed 113 public listed Brazilian companies between 2007 and 2011. By identifying the debts' homogeneity and heterogeneity through the Herfindahl-Hirschman index, the authors found out that the Brazilian companies use capital structures of both homogenous and heterogeneous types, the later being in the weak and strong forms. Furthermore, those authors also verified that the debt structure is related to some determinant variables of capital structure: company size, market-to-book and the presence of credit rating.

Póvoa & Nakamura (2015) have investigated the determinants of capital structure in relation to the heterogeneity of debt structure, constituting in leverage in aggregated terms (total, long and short term) and disaggregated terms (external funding, bank debts, subsided debts and corporate bonds) from 2007 to 2011. The results of the research pointed to the fact that the determinants of capital structure vary according to the way leverage was measured. That indicates that the heterogeneity of debts influences on the way that companies' funding sources and how their determinants are organized and structure, even when they act on a little diversified economic context, such as is the case of Brazil (PÓVOA; NAKAMURA, 2015).

Considering the elements above, it is understood that the research presented on this article is in line with previous studies, specially those by Póvoa & Nakamura (2014; 2015). However, the difference lies centrally on the approach to the investigation of the relationship between capital structure and financial debts stratification. Póvoa & Nakamura (2014) used the Herfindahl-Hirschman index in their analyses, while Póvoa & Nakamura (2015) used a different metric for measuring leverage from the one adopted in the present research, aside from debt stratification, which was classified in six subgroups. On the other hand, the research here presented analyses leverage through its standardization by the financial debts in relation to invested capital, as suggested by Welch (2006; 2011) and validated in the Brazilian context by Machado, Medeiros & Eid Júnior (2010). Furthermore, only 4 subgroups of the stratification of financial debts were employed, and also, an additional proposal of financial debts stratification was put forward. This additional stratification is related to the destination of resources, i.e., whether they are intended for the formation of working or investment capital.

4 METHODOLOGY

The research sample was comprised of 160 active non-financial companies listed on BM&FBOVESPA from 2009 to 2013, with a total of 800 observations. The data structure was balanced, given that all the observations on the companies were collected throughout the researched period. For Baltagi (2008), a balanced data structure avoids the need for additional procedures to adjust the random error term of the regression, as would be the case with an unbalanced panel.

The time period was delimited with the objective of collecting financial information in the financial statements that might had already been aligned to the changes proposed by the Brazilian Accounting Pronouncements Committee (*Comitê de Pronunciamentos Contábeis* – CPC). The possibility of recognizing the liabilities to present value, reclassification of sheet and earnings accounts, as well other changes on the accounting recognitions caused by harmonizing Brazilian

norms to the IFRS (International Financial Report Standards) norms can cause significant changes in financial statements.

The final amount of companies was obtained after filtering the active and non-financial firms that presented a positive net equity during the periods that were analyzed, and that featured all the information available to calculate leverage and its stratification, as well as the determinant variables of capital structure. Along with these procedures, companies that presented inconsistent information and displayed some particularities concerning the stratification of financial debts were removed from the sample, because they could bias the analysis. This was, for example, the case with Eletrobrás, which presented a rather particular debts behavior in relation to other companies in the sample, since it granted resources with a differentiated rate, through subsidies, to companies from the same sector.

The source of the data was based on the publicly traded companies' financial statements. Specifically, the data concerning financial debt stratification was collected from Explanatory Notes, available at BM&FBOVESPA's website.

Since the goal of the research was to analyze financial debt stratification and the determinants of capital structure, Chart 1 presents the independent variables, which are representative of the determinants of capital structure, based on national empirical evidences from Perobelli & Famá (2002; 2003), Nakamura et al. (2007), Kayo & Kimura (2011), Rocha (2014) and Póvoa & Nakamura (2014; 2015).

Chart 1: Definition of the Explanatory Variables

Abbreviation	Description	Calculation
TE	Company Size	Natural logarithm of the Total Assets
LU	Profitability	EBITDA divided by Total Assets
EF	Tax Shield	Depreciation plus Amortization divided by Total Assets
OC	Opportunity for Growth	Company's market value divided by net equity
RF	Bankruptcy risk – calculated based on the Altman Z-score adapted from Mackie-Mason (1990)	3.3 multiplied by the ratio between EBIT and Total Assets, plus the ratio between net income and Total Assets, plus 1.4 divided by the revenue reserve ratio divided by Total Assets
SI	Singularity	Intangible Assets divided by Total Assets
TA	Loan guarantees, or total assets	Tangible assets divided by total assets

Source: Created by the authors

In order to conduct the analysis of the financial debts stratification, which is the dependent variables of the research, we took three steps. The first one was to analyze the determinants of capital structure when leverage is measured on total terms and on short and long term. Then, in the second step, the type of debt was stratified in four subgroups and analyzed in relation to the determinants of capital structure. Finally, on the third step, the resource allocation was measured in terms of debts destined to working capital and investment capital. Both types of data were collected through the investigation and analyses of explanatory notes, available at BM&FBOVESPA's website. On the following paragraphs, each of these steps and their classification criteria are described.

The dependent variable of the research, leverage measuring was calculated in accordance to Welch's (2006, 2011) and Machado, Medeiros & Eid Júnior's (2010) proposal. Apart from measuring

in total terms, leverage was also measured in short and long term, according to their classification in the financial statements. This is the first step.

As for the stratification of financial debts, which is our second step, the proposals made by Rauh & Sufi (2010), Colla, Ippolito & Li (2013) and, specifically, Póvoa & Nakamura (2014; 2015) were followed. On that subject, Póvoa & Nakamura (2014) classified debts as following: (i) private banking debt; (ii) non-banking private debt; (iii) corporate debt securities; (iv) subsidized debts; (v) international fund raising debts; (vi) commercial lease; and (vii) other unclassified sources. In this research, Póvoa's & Nakamura's (2014) classification was simplified, due to the low representation of leases, international debts and non-banking debts. In relation to Póvoa & Nakamura (2015), only international fund raising debts, non-banking debts and financial leases were not used. This way, the present research has classified financial debts into four groups: banking debts, subsidized debts, debentures, and others.

Banking debts were considered free resources, according to the classification proposed by the Brazilian Central Bank in their time series system. This kind of financing is provided by national or international private banks, that feature the majority of their lines linked to the Interbank Certificate of Deposit (CDI), and are destined, according to Póvoa & Nakamura (2015) to loans, guaranteed accounts, discount bills, compror and vendor operations, etc.

Subsidized debts consist on fundings that are regulated by their own legislation, and are usually destined to certain sectors of economy with a specific finality (LUNDBERG, 2011). The analysis of subsidized debts is relevant in Brazil due to the significant participation of the BNDES (National Development Bank) in corporate funding, through special interest rates that, in general, are inferior and more attractive than those practiced in the market (PÓVOA; NAKAMURA, 2014, 2015). In this kind of debt, the government subsidizes part of the cost, which is passed on by development agencies such as BNDES (investment lines destined to several economic sectors, except housing, usually linked to Long Term Interest Rate), Caixa Econômica Federal (housing investment lines, usually indexed through Reference Rate) and Banco do Nordeste (through constitutional development funds). It is important to mention that such lines can be passed on by other financial institutions, but the source of these resources is still those development agencies. According to the description above, when the source of the resource is not clearly stated, the classification was done through the indexer, regardless of the bank that passed it on.

Debentures are debt securities issued by companies and which do not involve real guarantees (although the possibility exists in Brazil). This characteristic of debentures in the Brazilian environment can modify the structure of the companies' resource sources, but the exploration of this characteristic is not within the scope of the present research. This way, debentures can be convertible or non-convertible into stocks, and can also be negotiated in Stock Markets (PÓVOA; NAKAMURA, 2015). Additionally, promissory notes were also included, which are debt securities issued with no link to any guarantee whatsoever, with terms shorter than a year, also known as commercial papers.

Finally, the “other financial debts” were created when the description of the debts could not be framed clearly within any of the previous criteria, constituted by the balance of total financial debts subtracted of banking and subsidized debts and debentures.

Apart from the stratification of financial debts proposed on the second step, the research performed another further stratification of these debts. The third step of the analyses departs from the assumption that financial debts can be classified based on resource destination, that is, whether they are destined to the formation of working or investment capital. This classification was done based on

explanatory notes, when they presented this information clearly. Additionally, the indexer was observed when the previous criterion did not define clearly the destination of the resources.

This way, in order to proceed with the stratification regarding the destination of financial debts, the classification criteria were subjective and departed from some assumptions based on the analysis of explanatory notes. First, debts destined to the fulfillment of the companies' accounting needs were considered to be working capital debts. To identify them, we departed from the assumption that most of them were passed on by commercial banks (both public and private), and are generally linked to the Interbank Certificate of Deposit (CDI) or to some foreign currency. Consequently, when the explanatory note did not clearly identified whether they were investment or working capital, they were treated as working capital.

And, finally, debts destined to the formation of fixed assets through the acquisition of equipment and machinery, buildings and industrial facilities, improvements and modernizations, etc., were considered to be investments. These lines can display either public or private financing. To identify them, when not clearly defined in their explanatory notes, the following criteria were adopted: lines linked to the TJLP and/or TR. It is known that there is a working capital financing linked to TJLP, however, most of it is linked to a development project, and is residual, i.e., it is only a part of the financing, and it is necessarily linked to an investment project. After the definition of the dependent variables used in the research, Chart 2 summarizes their abbreviations, descriptions, calculations, and the references of the authors that base them.

Chart 2: Definition of the Dependent Variables

Abbreviation	Description	Calculation	Authors
Alt	Total Leverage	Financial debts divided by invested capital	Welch (2006; 2011)
Alcp	Short term leverage	Short term financial debts divided by invested capital	Welch (2006; 2011)
Allp	Long term leverage	Long term financial debts divided by invested capital	Welch (2006; 2011)
Alav Sub	Subsidized Leverage	Subsidized debt divided by invested capital	Welch (2006; 2011) and Póvoa & Nakamura (2014; 2015)
Alav deb	Leverage – Debentures	Debentures divided by invested capital	Welch (2006; 2011) and Póvoa & Nakamura (2014; 2015)
Alav banc	Leverage – Banking	Banking debts divided by invested capital	Welch (2006; 2011) and Póvoa & Nakamura (2014; 2015)
Alav outros	Leverage – Others	The result of the difference between total financial debts and debentures, subsidized debts, and banking debts, divided by invested capital	Welch (2006; 2011) and Póvoa & Nakamura (2014; 2015)
Cdg	Debts – Working Capital	Working capital debts divided by invested capital	Welch (2006; 2011) and a proposition of the research
Inv	Debts – Investment	Investment debts divided by invested capital	Welch (2006; 2011) and a proposition of the research

Source: Created by the authors

After defining the dependent and independent variables, 9 regressions in a panel data structure were estimated, as demonstrated by the following 9 equations.

$$\text{Alt}_{it} = \alpha + \mu_i + \beta_1 TE_{it} + \beta_2 RF_{it} + \beta_3 LU_{it} + \beta_4 EF_{it} + \beta_5 OC_{it} + \beta_6 SI_{it} + \beta_7 TA_{it} + \varepsilon_{it} \quad (1)$$

In equation 1, the dependent variable is total leverage, and the independent variables are the determinants of capital structure, as described in Chart 1, and α being the interception. The underwritten *i* and *t* refer to the company and the year, respectively; μ is the fixed effect and ε is random error. Equations 2 to 9 follow a similar pattern, with changes in the dependent variables, based on the three steps undertaken in the data analysis. It must be emphasized that, according to the Hausman test, fixed effects were indicated to the regression expressed in equation 1. According to Wooldridge (2008), the fixed effects model tries to capture non-observed variables that vary from individual to individual, but that remain constant over time, such as, for instance, the manager's experience in the companies that were analyzed. For that end, it is assumed that the fixed effect noted as varies form one individual to another, therefore the presence of the underwritten *i*, but it constant (unchanged) over time, such as what Wooldridge (2008, p.415) calls "non-observed heterogeneity" or "company's heterogeneity".

In order to standardize the effects for the other estimations so as to facilitate the analyses and interpretations of the results, all equations were estimated with fixed effects.

$$\text{Alcp}_{it} = \alpha + \mu_i + \beta_1 TE_{it} + \beta_2 RF_{it} + \beta_3 LU_{it} + \beta_4 EF_{it} + \beta_5 OC_{it} + \beta_6 SI_{it} + \beta_7 TA_{it} + \varepsilon_{it} \quad (2)$$

In equation 2, short term leverage is the dependent variable and the determinants of capital structure are the independent variables.

$$\text{Allp}_{it} = \alpha + \mu_i + \beta_1 TE_{it} + \beta_2 RF_{it} + \beta_3 LU_{it} + \beta_4 EF_{it} + \beta_5 OC_{it} + \beta_6 SI_{it} + \beta_7 TA_{it} + \varepsilon_{it} \quad (3)$$

In equation 3, long term leverage is the dependent variable and the determinants of capital structure are the independent variables.

$$\text{Alav\_Sub}_{it} = \alpha + \mu_i + \beta_1 TE_{it} + \beta_2 RF_{it} + \beta_3 LU_{it} + \beta_4 EF_{it} + \beta_5 OC_{it} + \beta_6 SI_{it} + \beta_7 TA_{it} + \varepsilon_{it} \quad (4)$$

From equations 4 to 7, the stratification of financial debts was conducted. In equation 4, subsidized leveraged was regressed by the determinants of capital structure.

$$\text{Alav\_Banc}_{it} = \alpha + \mu_i + \beta_1 TE_{it} + \beta_2 RF_{it} + \beta_3 LU_{it} + \beta_4 EF_{it} + \beta_5 OC_{it} + \beta_6 SI_{it} + \beta_7 TA_{it} + \varepsilon_{it} \quad (5)$$

In equation 5, bank leverage was regressed by the determinants of capital structure.

$$\text{Alav\_Deb}_{it} = \alpha + \mu_i + \beta_1 TE_{it} + \beta_2 RF_{it} + \beta_3 LU_{it} + \beta_4 EF_{it} + \beta_5 OC_{it} + \beta_6 SI_{it} + \beta_7 TA_{it} + \varepsilon_{it} \quad (6)$$

In equation 6, the dependent variable is the debentures and the explanatory variables are the determinants of capital structure. And, finally, in equation 7, the dependent variables are the other types of debts, which consist on the result obtained from the difference between total financial debts and debentures, subsidized and banking debts.

$$\text{Alav\_outros}_{it} = \alpha + \mu_i + \beta_1 TE_{it} + \beta_2 RF_{it} + \beta_3 LU_{it} + \beta_4 EF_{it} + \beta_5 OC_{it} + \beta_6 SI_{it} + \beta_7 TA_{it} + \varepsilon_{it} \quad (7)$$

In the final step, the financial leverage was classified into two subgroups: working capital and investments. The both subgroups are represented in equations 8 and 9.

$$CDG_{it} = \alpha + \mu_i + \beta_1 TE_{it} + \beta_2 RF_{it} + \beta_3 LU_{it} + \beta_4 EF_{it} + \beta_5 OC_{it} + \beta_6 SI_{it} + \beta_7 TA_{it} + \varepsilon_{it} \quad (8)$$

$$INV_{it} = \alpha + \mu_i + \beta_1 TE_{it} + \beta_2 RF_{it} + \beta_3 LU_{it} + \beta_4 EF_{it} + \beta_5 OC_{it} + \beta_6 SI_{it} + \beta_7 TA_{it} + \varepsilon_{it} \quad (9)$$

So as to substantiate the division of financial leverage into two subgroups, as indicated in equations 8 and 9, the T-test of difference in means was conducted. The expected signs of all estimations were compared to the empirical evidence found by Póvoa & Nakamura (2014; 2015).

5 ANALYSIS AND DISCUSSION OF THE RESULTS

The aim of this research is analyze the influence of the determinant factors of capital structure in relation to the stratification of financial debts in the companies listed in the BM&FBOVESPA from 2009 to 2013. Initially, in order to reach the proposed aim of this paper, the descriptive statistics of the collected data were analyzed, as presented in Table 1.

Table 1: Descriptive statistics of the collected data

	Average	Standard Deviation	Minimum	Maximum	1st Quartile	2nd Quartile	3rd Quartile
Alt	0,416	0,214	0	0,995	0,256	0,419	0,568
Alcp	0,202	0,179	0	0,988	0,664	0,151	0,279
Allp	0,279	0,178	0	0,923	0,137	0,271	0,392
Alav sub	0,119	0,131	0	0,699	0,009	0,079	0,179
Alav banc	0,181	0,179	0	0,941	0,035	0,124	0,281
Alav deb	0,087	0,119	0	0,676	0	0,005	0,156
Alav outros	0,029	0,085	0	0,716	0	0	0,007
Cdg	0,302	0,219	0	2,01	0,129	0,288	0,429
Inv	0,124	0,133	0	0,699	0,023	0,079	0,174
Ta	0,343	0,226	0	0,926	0,176	0,324	0,505
Te	14,947	1,522	10,255	19,492	13,983	15,006	16,020
Lu	0,104	0,099	-0,678	0,560	0,058	0,097	0,151
Ef	0,029	0,025	-0,009	0,316	0,011	0,027	0,038
Oc	2,352	3,422	0	57,132	0,903	1,545	2,547
Rf	1,895	1,229	0,029	16,295	1,148	1,649	2,298
Si	0,077	0,162	0	0,843	0	0,002	0,049

Source: Created by the authors

According to Table 1, it can be noted that, in average, financial debts represent approximately 41% of invested capital, while short term financial debts amounted to 20% and long term to 27% in relation to invested capital. Financial debts categorized as banking and subsidized debts presented close average values, far superior to debentures and to the other debts. Such results were similar to those presented in Póvoa's & Nakamura's (2014) Figure 1, a possible indication that the two main funding sources of the companies analyzed during the time-period coverage in this paper were private banks and subsidized sources.

Table 1 evidences that, even if in average terms, the debts intended for the formation of working capital were superior to the debts intended for investments. To verify whether they were both divergent, a T-test of difference in means was conducted. The result of this test indicated that the means of the working capital and the investment debts are statistically different, evidencing that both can be analyzed separately.

As to what concerns the determinants of capital structure, it can be noticed that the singularity presented the lowest average coefficient and that the company's size presented the highest one, while the opportunities for growth presented the greatest variation, as evidenced by the standard deviation.

Before proceeding with the analyses of the data through regressions, it is important to highlight that, for each of the nine proposed estimations, tests were conducted to identify the problems of multicolinearity, autocorrelation and heteroscedasticity. For Beck & Katz (1995), these are the most common problems in regressions estimated by panel data models. The VIF test (variance inflation factor) did not identify any multicolinearity problems, while the autocorrelation and heteroscedasticity tests identified these problems alternately throughout the nine estimations, as presented in Table 2. In order to make these estimations robust in relation to these problems, the regressions presented in Table 3 were estimated through GLS (generalized least squares), due to the violations of the assumption of OLS (ordinary least squares) estimator. In this way, the results presented in Table 3 were robust in relation to the problems of autocorrelation, through the incorporation of AR(1), and heteroscedasticity.

Table 2: Model tests – autocorrelation and heteroscedasticity

Dependent Variable (equations)	Serial Correlation H_0: non-autocorrelation first order	Homoscedasticity H_0: homoscedastic errors	Identified problems	
	Prob > F	Prob > Chi2	Autocorrelation	Heteroscedasticity
(2)Leverage	0.000	0.000	Yes	Yes
(3)Short Term	0.000	0.000	Yes	Yes
(4)Long Term	0.000	0.000	Yes	Yes
(5)Subsidized	0.001	0.000	Yes	Yes
(6)Banking	0.001	-	Yes	No
(7)Debentures	0.000	1.000	Yes	No
(8)Others	0.000	1.000	Yes	No
(9)Working capital	0.001	0.000	Yes	Yes
(10)Investments	0.132	0.000	No	Yes

Observations: The serial correlation test for panel data used was the Wooldrige test for autocorrelation in panel data and the heteroscedasticity test used was the likehood ratio test, both considering a significance level of 10%

Source: Created by the authors based on the research data

The results found in Table 3 showed that the determinants of capital structure influenced differently the different types of financial debts, with variations in both the sign and the magnitude of their effects. The analysis was conducted by following each of the three steps undertaken in the methodology section.

Initially, following the analyses of step 1, it can be verified that the determinants of capital structure influenced total, short term and long term leverage in similar ways, except for the company size variable. In it, the sign was positive and significant for total and long term leverage, but negative

and significant for short term leverage. In spite of the divergence, the interpretation of this result is comprehensible, given that smaller companies tend to incur into less debts due to the restrictions in access to credit, while larger companies have a superior bargaining power and presented smaller informational asymmetries, which encourages them to look for long term funding (MYERS, 1984; SWANSON; SRIDHI; SEETHARAMAN, 2003). Singularity, in turn, was only statistically relevant for total leverage, an indication that companies with intangible assets incur into less debts, given the larger proportion of intangible assets within their assets structure, i.e., assets that, due to their nature, are more specific and its execution, such as guarantees, that can generate larger transaction costs, since their commercialization is specialized, which can contribute to a more restrict access to third-party capital by these companies (PEROBELL; FAMÁ, 2002; 2003).

In relation to step 2, the determinants of capital structure influenced the stratification of debts differently. For subsidized leverage, only profitability, opportunity for growth and risk were statistically significant, with positive signs being displayed for the two former variables, and a negative one for the latter. That can be an indication that growing companies and those that present a higher profitability tend to recourse to subsidized funding sources, but the larger its risk, the lower the leverage tends to be. Such results were different from the ones found in Póvoa & Nakamura (2015), but they converged to the fact that the variable size was not statistically significant. For these authors, this result can be an indication that sources that were subsidized by the government take into consideration other factor in order to provide credit, aiming at fostering the economic activity of a sector through more attractive interest rates in relation to the market.

On the other hand, when analyzing banking debts, the tangible assets variable presented a positive and statistically significant coefficient, a sign that private banks prioritize the provision of collateral by the companies as a condition for providing them with resources. This can be explained by the fact that, usually, tangible assets are used as collateral for loans and are employed in the reduction of informational asymmetry problems in financial contracts (GRAHAM; LEARY, 2011; MYERS, 1984). Besides tangible assets, profitability, opportunity for growth and risk were also statistically relevant. The direction of the signs that were found suggest that profitable and larger risk companies incur into less debts, while companies with larger opportunities for growth incur into more debts, which is in line with Myers's (1984) and Myers's & Majluf's (1984) pecking order theory, as well as with the trade-off theory.

The debentures, in turn, displayed size and tangible assets as the main variables when determining firm's capital structure, like in Póvoa & Nakamura (2015), besides profitability and singularity variables. These results show that companies which issue debt securities in the Brazilian capital market are, generally, larger companies (which is represented by their size) and with a good market attractiveness (which is represented by profitability and singularity). With such characteristics, these firms can gather more resources based on debentures, as emphasized by Póvoa & Nakamura (2015) and explained in Myers's (1984) pecking order theory, which the informational asymmetry tends to be smaller in these companies and it can decrease the need to offer collateral assets (which are represented by the tangible assets).

Table 3: Estimations results

	General Lev.	CP Lev.	LP Lev.	Subs. Lev	Bank. Lev.	Deb. Lev.	Lev. Others	Working Capital	Investments
TA	-0,079***	-0,042***	-0,076***	0,017	0,078**	-0,104***	-0,024	-0,059**	-0,015**
	0,000	0,000	0,000	0,475	0,013	0,000	0,182	0,014	0,033
TE	0,035***	-0,009***	0,066***	-0,001	-0,007	0,023***	0,012***	0,056***	-0,002***
	0,000	0,000	0,000	0,787	0,218	0,000	0,001	0,000	0,003
LUC	-0,437***	-0,141***	-0,083***	0,073*	-0,382***	-0,073**	-0,016	-0,483***	-0,054**
	0,000	0,000	0,000	0,070	0,000	0,046	0,601	0,000	0,028
EF	0,059	-0,053	0,253	0,153	0,256	-0,122	0,138	1,046***	0,956***
	0,753	0,651	0,145	0,361	0,256	0,423	0,269	0,000	0,000
OC	0,015***	0,009***	0,009***	0,002*	0,005***	0,001	-0,001	0,015***	0,002*
	0,000	0,000	0,000	0,079	0,000	0,241	0,602	0,000	0,058
RF	-0,028***	-0,030***	-0,008***	-0,007**	-0,023***	0,002	0,002	-0,017***	-0,004***
	0,000	0,000	0,000	0,011	0,000	0,480	0,403	0,000	0,003
SI	-0,033*	-0,015	-0,030	-0,013	-0,021	0,061**	-0,049**	-0,014	-0,030***
	0,081	0,185	0,821	0,657	0,594	0,018	0,019	0,593	0,000
CONST	-0,042	0,323***	-0,733***	-0,130*	-0,320***	-0,215***	-0,139***	-0,553***	0,817***
	0,562	0,000	0,000	0,064	0,000	0,001	0,010	0,000	0,000

Observations: The fixed effects model was indicated by the Hausman test for general leverage. In order to standardize the analyses, the fixed model was used for the other estimations. The standard deviations are robust in relation to heteroscedasticity and for autocorrelation it was included an AR(1) in some regressions, estimating them through GLS (generalized least squares). The specification for each of those robustness is described in Table 2. The regressions for the equations numbered from 1 to 9 are presented in that table. The order is put in sequence from left to right, from 1 to 9. We presented specifically the coefficients and the p-values estimated in the regressions, in such a way that the asterisks *, ** and *** refer to the significance levels of 10%, 5% and 1%, respectively.

Source: Created by the authors

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Finally, the stratification of the debts categorized as "others" had as determinant explanatory variables only size and singularity, which displayed a positive and a negative sign, respectively. Generally, this result can be an indication that, for the other types of debts, larger companies tend to incur into them, while the same does not happen to companies with larger investments in intangible assets.

On the third step of the analysis, the financial debts were categorized as to their destination, i.e., whether they are linked to investment or working capital activities. According to Table 3, it can be noticed that the determinants of capital structure were significant in these two stratifications of financial debts, except for the variable of singularity in relation to the working capital debts. Only the coefficients of the size variable presented divergent results: on the working capital debts, the statistical relation was directly proportional, while for the investment debts, it was inversely proportional. In spite of its apparent counter-intuitive nature, this result might be an indication that, since the determinants of investment debts presented a larger singularity and a smaller profitability in relation to the determinants of working capital debts, these companies display a greater tendency to seek third-party capital in the formation of tangible assets when they are small-sized, given that they face larger informational asymmetry problems. Other characteristics that are specific to this stratification of debts is the fact that tax shields were positive and significant, which shows that the larger the amount of financial debts, the larger the tax shields are, which can be deductible from the companies' income tax.

In order to summarize the general analyses of the results presented in Table 3, Chart 3 shows the signs found and the statistical significance in a summarized manner.

Chart 3: Grouping of the results found in Table 3

	TA	TE	LUC	EF	OC	RF	SI
ALT	-	+	-	+	+	-	-
ALCP	-	-	-	-	+	-	-
ALLP	-	+	-	+	+	-	-
ALAV SUB	+	-	+	+	+	-	-
ALAV BANC	+	-	-	+	+	-	-
ALAV DEB	-	+	-	-	+	+	+
ALAV OUTROS	-	+	-	+	-	+	-
CDG	-	+	-	+	+	-	-
INV	-	-	-	+	+	-	-

Observations: The signs + and - note, respectively, the direct and inversely proportional relations between the dependent variables, represented in the rows, and the explanatory variables, represented in the columns. The order of the results follows the estimations of the equations 1 to 9. The gray-shadowed areas note the statistic significances of 1%, 5% and 10%.

Source: Created by the authors

According to Chart 3, it is possible to verify that the determinants of capital structure that displayed a larger consistency in the estimations made in this paper, i.e., which presented the same signs for the different types of financial debts, were opportunity for growth and risk, followed by profitability, which displayed only one sign that differed from the other estimations. The other determinants varied the signs of their coefficients in relation to the other stratifications of financial

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debts. This result might indicate that the determinants of capital structure influence in different ways the stratified financial debts.

6 FINAL CONSIDERATIONS

Since the goal of this research was to analyze the influence of the determinant factors of capital structure in relation to the stratification of financial debts of the public listed companies on BM&FBOVESPA, the financial debts were categorized by following three steps: (1) initially, the financial debt was calculated in total, short and long term, as suggested by Welch (2006; 2010); then, (2) the financial debts were classified according to their types, organized into four groups (banking debts, subsidized debts, debentures and others), following the stratification that was also adopted by Póvoa & Nakamura (2014; 2015); and finally, (3) the research stratified the financial debts based on their destination, i.e., whether they were used for the formation of working capital or for investments.

By analyzing a sample of 160 companies throughout a time span of 5 years (2009-2013), and by using the method of panel data analysis with fixed effects estimated by GLS, the results found suggest that the determinants of capital structure influence the stratification of financial debts in different ways, but the most consistent variables were opportunity for growth and risk, where the influence on the debts was direct and inversely proportional, respectively. The stratification of debts based on destination proposed by the research displayed a strong statistical adherence to the determinants of capital structure, except for the variable singularity to what concerns the debts directed at the formation of working capital.

The contributions of these findings might indicate that different stratifications of financial debts in the Brazilian economic context can present different relations towards the determinant variables of corporate capital structure, making it necessary for other researches to discuss the subject and explore these particularities. In relation to former researches, the present research converges to the evidence that the determinants of capital structure can vary in terms of the expected sign and statistical significance according to the way leverage is measured.

As limiting conditions for the interpretation of the results obtained in this paper, one must cite the methodological steps taken, i.e., it must be considered that the results that were found are restricted to the companies analyzed, to the period of investigation, to the method of analysis which is based in a parametric model, considering that the analyses where developed in average terms, as well as by the discretionary analysis of the researched companies' explanatory notes. For future researches, it is suggested to conduct a quartile or percentile analysis of the sampling distribution, investigating how the determinants of capital structure behave in relation to the different classifications of financial debts, while emphasizing the interpretation for leveraging or deleveraging companies.

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