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The Relevance of the Capital Structure in Firm Performance: A Multivariate Analysis of Brazilian Publicly Traded Companies

Abstract

The economic changes in recent years have made the dynamics of the Brazilian market more complex, which directly impacts the administration of large organizations, particularly in management tasks, such as decisions concerning the definition of the capital structure. The literature in this theoretical field is polarized in two seminal works: the first, by Durand (1952, 1959), discusses the existence of an optimal capital structure that maximizes the value of the firm; and, at the other end, the work by Modigliani and Miller (1958, 1963) considers that it is irrelevant how firms are financed. In this sense, the objective was to verify the effective interference of the capital structure in the performance of Brazilian firms listed on BM&FBOVESPA. The sample consisted of cross-sectional data that were selected from the most recent balance sheets of all companies listed on BM&FBOVESPA, available in the Economática® database. The techniques used were the analysis of variance (ANOVA) and discriminant analysis. Among the indicators used, it was observed that only general liquidity, the degree of immobilization, Tobin's Q, and the opportunity for growth were significant at 1%. The results indicate that the capital structure is not directly related to the performance of Brazilian companies listed on BM&FBOVESPA. In the meantime, the results point to the consolidation of the financial theories expounded by Modigliani and Miller (1958, 1963), as opposed to the traditionalist current started in Durand's studies (1952).

Key words: Capital structure; Financial theories; Firm performance.

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1. Introduction

In the last two decades, the Brazilian market has undergone abrupt economic changes mainly due to factors like the stabilization of the currency, the exchange rate liberalization and the opening of commercial trade. These facts furtheredthe entry of multinationals in the country and made the dynamics of the Brazilian market more complex, which directly impacts the administration of large organizations, particularly in management tasks, like in the case of decisions on the capital structure.

In the meantime, to keep up with the complexity of the market, firms find themselves in constant need for investments in structure and in technology, in which their funding base is a matter amenable to analysis. From the above, it can be observed that, in mainstream financial theory, there are studies on the relevance of the debt structure for the firm's performance and its respective value creation in the market. These studies, however, indicate some disagreement about the optimal capital structure of firms, more specifically on the relevance between the increase in debt or the use of equity as funding instruments.

The literature in this theoretical field is polarized in two seminal works: the first, by Durand (1952, 1959), discusses the existence of an optimal capital structure, affirming that the cost of third parties' capital remains stable up to a certain level of debt, above which the firm becomes more prone to the risk of bankruptcy. At the other end, there is the theoretical current based on the work by Modigliani and Miller (1958, 1963), who consider that it is irrelevant how firms are financed. The two theoretical currents disagree on the extent to which the funding decisions are relevant or irrelevant to change the company value.

Myers and Majluf (1984) and Myers (1984) developed studies that analyzed the two perspectives on capital structure. The first, called Static Trade Off (STO), by Myers (1984), uses a model intended to balance the risk of bankruptcy resulting from the debts and the fiscal advantages of indebtedness. The model indicates a harmonic relation between financial leverage and economic performance (Andersen, 2005). The second model, called Pecking Order Theory (POT), by Myers and Majluf (1984), tries to appoint an order of the funding sources, in which the initial option would be self-funding, following by the securities for trade they hold. Finally, there is the use of external sources, which are considered safe (Ferreira & Brasil, 1997).

In that sense, departing from the diverging premises of Durand (1952) and Modigliani and Miller (1958), the following question is raised: **Does the capital structure (indebtedness) influence the performance (or market value) of the publicly traded companies in Brazil?** To answer that question, the goal in this study is to verify the effective interference of the capital structure in the firm value.

Consequently, the hypotheses raised in the study are: H_0: The capital structure is not related to the performance of the Brazilian firms listed on BM&FBOVESPA and H_1: The capital structure is related to the performance of the Brazilian firms listed on BM&FBOVESPA.

The work is structured in five sections, including this introduction. In the next topic, the theoretical framework is presented to clarify the theoretical models of Durand and that of Modigliani and Miller and other related theories, such as financial management inside firms. Next comes the method used in the research, followed by the results and discussion. At the end, the final considerations are presented.

2. Theoretical Framework

There are several theories in the literature that address the capital structure as the central theme (Jensen & Meckling, 1976; Ross, 1977; Myers, 1984; Myers & Majluf, 1984; Baker & Wurgler, 2002; Rajan, 2012), but none of them dominates the theoretical field and provides a consensus among researchers in the field (Myers 2001; Zou & Xiao, 2006; Albanez, 2012; Martins & Famá, 2012; Almeida, 2014; Nisiyama & Nakamura, 2014; Mangafić & Martinović, 2015).

Given the above, this issue can be polarized in two theoretical perspectives that address the capital structure focused on company value. A proposal by Durand (1952, 1959), referring to the traditional theory, which

highlights their existence is an optimal capital structure and, on the other hand, there is another theoretical current developed based on Modigliani and Miller (1958, 1959, 1963), which considers that, under certain conditions, how firms are financed is insignificant (Bonacim, Ambrozini, & Nagano, 2006; Perobelli & Famá, 2002).

Andersen (2005) points out that there is a proportional relationship between the firms' financial leverage and economic performance, in line with the premises by Durand (1952, 1959), and also the Static Tradeoff Theory (STT) proposed by Myers (1984), which aims to balance the risk of bankruptcy caused by the large number of debts with their respective tax gains of debt.

On the other hand, according to Modigliani and Miller (1958, 1959, 1963), there is a great combination of debt and equity that minimizes the company's financing costs and thus maximizes its value. They claim that, by following some assumptions about a perfect Market free from taxes, the way companies finance themselves is irrelevant, that is, the market value of a leveraged firm is the same as that of a non-leveraged firm.

In the same context, the current represented by Myers and Majluf (1984), called Pecking Order Theory (POT), states that managers create a ranking to finance their internal projects, first through internal funding, followed by the establishment of new debt; and finally, by raising funds obtained from the issuance of new shares.

2.1 Traditional Model by Durand (1952, 1959)

As mentioned earlier, Durand (1952, 1959), the main representative of the Traditionalist School states that there is a great combination of debt and equity that maximizes the value of the firm. According to the traditional theory, the capital structure interferes with the company's value because the cost of debt alters according to the risk the company presents, i.e. the risk increases as the firm goes into debt. However, the risk is offset by the increased fee charged to lend capital from third parties, so it can be used to the extent that the total capital cost reaches a minimum threshold (Angonese, Santos, & Lavarda, 2011).

Traditionalists use the Weighted Average Cost of Capital (WACC), which results from the weighted average cost of third party capital and company equity, affirming that minimizing the latter would motivate an excellent capital structure (Silva Junior, 2012).

Assaf Neto (2009) explains that competitive companies put more emphasis on funding strategies by replacing equity with debt capital. Interest rates lower than the return on investment of these funds and tax benefits of interest expense admit a favorable financial leverage, increasing the results of the owners and valuing the market price of the shares.

In this context, decisions regarding the level of debt are decisive, as the recent global financial crisis has shown, forcing highly leveraged companies to balance their capital structure through the issuance of shares (Brusov, Filatova, Orehova, & Brusova, 2012; Islam & Khandaker, 2015).

2.1.1 Static Tradeoff Theory (STT)

The increasing study of the STT and POT, in recent decades, has revealed to serve as a guide for research in the field of finance. Minardi and Sanvicente (2009) say that both the Trade-off and Pecking Order theory have intersections with others, such as the Agency theory and information asymmetry theory. According to Cruz, Mendes, Espejo and Dameda (2008), studies related to tax benefits of debt, risk of bankruptcy, agency conflicts and possible signals of the existence of an optimal capital structure have been linked to the Trade-off theory.

The view that diverges from the proposition of Modigliani and Miller according to Damodaran (2004) is that the STT can work on the debt in favor of the company. The optimal capital structure is obtained from the fact that the debt provides earnings up to a certain value, above which the result would reverse (Sirihal & Melo, 1999). The same authors have developed a scheme that summarizes the gains and losses relating to debt provisions in the literature. Below is a summary of the model:

- **Advantages of debt:** 1) tax benefit from the deduction of interest expenses and that, the higher the taxes, the greater the benefit; 2) discipline obtained in the separation between managers and shareholders generate gains in debt.
- **Disadvantages of debt:** 1) the higher the indebtedness, the greater the flow of interest payments and the higher the cost of debt (cost of bankruptcy); 2) agency cost due to monitoring costs and opportunity costs due to restrictive covenants.

Damodaran (2004) points out that the company's exposure to bad debt arising from its operations may not be enough to honor its obligations. In the costs of debt are closely related to the possibility of the firm's destruction.

Further, among the recent work using the Static Tradeoff Theory (STT) the following can be highlighted, Casey (2012), Correa Cruz Basso and Nakamura (2013), Hovakimian, Kayhan and Titman (2012), Ghazouani (2013), Canarella, Nourayi and Sullivan (2014) and Serrasqueiro and Caetano (2015).

2.2 Model by Modigliani and Miller - MM (1958, 1963)

The work of Modigliani and Miller (1958) came to challenge the traditional theory, which linked the firm's value with its capital structure. The hypotheses Modigliani and Miller defended in the Modern theory argue that the value of the firm is free from how assets are financed and are solely related to the expected return of the firm's projects. In 1963, Modigliani and Miller inserted the financial burden for tax purposes in the resolution of the proposals they set forth in 1958. They reported that the company's value should be defined by the net present value of all its investments, plus the amount of tax benefits from indebtedness.

The propositions of Modigliani and Miller (1958) concerning the valuation of securities with different capital structures. It is noteworthy, however, that the proposals are subject to three basic premises; funding rates for legal entities are the same as those of individual financing rates; markets are efficient and admit that the balance is always slightly restored; and there are no taxes on capital gains.

The three proposals of the model by Modigliani and Miller (1958) are:

I) The market value of any firm is independent from its capital structure and is given by the capitalization of its expected returns at a constant rate appropriate to its risk class, just like its Mean Cost of Capital (CMC) is equal to that of a company without debts.
II) The expected return on equity is identical to the expected return of a firm without debt plus a risk premium proportional to the level of debt.
III) It only shows that the company's investment policy is independent on the type of financing used, as a consequence of the previous proposition. What is important for the sake of investment valuation is to establish whether the profitability is higher than the capitalization rate of the firm in a given class.

In the work by Modigliani and Miller published in 1963, the authors made a correction of the propositions in the 1958 article, stating that the capital structure does not affect the value of the company. But this value can be influenced by market imperfections, such as the income tax. Silva (2013) says that Modigliani and Miller found that, despite the tax effect that the debt interest provides, the firm should not fully borrow, at risk of losing its tolerance for treasury management and the option to choose its funding sources. In short, one cannot state that the capital structure is irrelevant when calculating the tax benefit of debt.

2.2.1 Pecking Order Theory (POT)

The assumptions of POT are related to the problems of information asymmetry by supporting the absence of an optimal capital structure (Cross et al., 2008). Some scholars regard the work by Donaldson (1961) as the framework for studies on the origins of funding sources, but it was only in 1984 that Myers applied it in finance. According to Ferreira and Brazil (1997), the POT, also known as the theory of Hierarchy of Funding Sources, aims to explain an order of fundraising sources firms use.

As Myers (1984) sustains, there is no target for the debt because it will happen to the extent that investment opportunities arise. The POT does not define a level (target) of ideal indebtedness, as it occurs when investment opportunities emerge. Another hypothesis that the POT sustains and that challenges the STT is that companies try to issue their bonds when they are high, when more debt is issued and not equity, in order to conciliate the company's capital structure.

Again in 1984, Myers developed a study with Majluf, in which they analyzed the effects of information asymmetry among internal managers, with their greater knowledge of the investment opportunities than creditors and external funders. The authors depart from the assumption that obtaining resources corresponds to an order of importance: internal financing; distribution of dividends, considering investment opportunities; priority use of safer securities, accompanied by the issuance of convertible bonds; and, finally, the use of external stockholder participation (Cruz et. al., 2008).

In view of what was mentioned, Myers and Majluf (1984) state that funding through internal resources, or debt with risk close to zero, does not alert the market about a company's strategies and does not change the value of a company's stock. By contrast, the issuance of new shares will reduce the price of existing ones. In this context, among the most recent studies using Pecking Order Theory (POT), the works of Atiyet (2012), Mukherjee and Mahakud (2012), Abhijit (2013), Chen Chen, Chen and Huang (2013), Pirtea, Nicolescu and Boţoc (2014) and Bartholdy, Matthew and Olson (2015) can be highlighted.

2.3 Financial Administration in the Firms

The financial analysis permits a diagnosis of the company with its main purpose, which is to determine the critical points of management, and makes it possible to present an outline of the priorities for the solution of their problems (Matarazzo, 2007). Padoveze (2003) also points out that financial analysis is a minimum resource necessary for the ongoing assessment of an organization's relationships issues, while the focus of economic management should be to build models that allow for its maximization.

Financial analysis and its many tools permit the formation of different capital structures which, according to Ross, Westerfield and Jaffe (2007), can use much or little capital from third parties, issue different types of stocks, resorting to loans, financing, debt securities, among others. The capital structure theories are focused on the importance of firms' financing decision, with little relation to the efficient market hypothesis, and highlights the effect of possible imperfections on the choice of the optimal capital structure, particularly the presence of asymmetric information (Bressan Bressan, Lima, & Braga, 2008).

2.3.1 Capital Structure

The capital structure is how the company makes up its funding, and comes from the equity or debt capital in the short and/or long term. Regardless of the source of funding, a positive return is only expected because of the application of resources (Cross et. al., 2008).

By calculating the ratio of permanent third-party funds and own resources (equity), we obtain the financial leverage of the company. The higher the proportion of debt in the capital structure of the composition, the more leveraged a company is, in other words, the higher its debt ratio (Groppelli & Nikbakht, 2002).

As emphasized by Bressan et al. (2008), the STT argues that firms are a great target of indebtedness and, on the other hand, the POT argues that funding decisions are made in an order of preference, as aforesaid.

The formation of the capital structure is not limited to having, or not, debt capital financing the firm's investments; the process is more complex; and there are other issues to consider, such as the deadline for payment of the debt, the characteristics of the debt and contracts, the transaction costs involved in the process and the information asymmetry. This fact confirms that this theoretical field is far from exhausting the research and achieving a consensus among the researchers.

3. Method

This study will take place through an exploratory quantitative research (Hair, Black, Babin, Anderson, & Tatham, 2009). A cross-sectional database was selected, containing the most recente balance sheets available for the year 2014 (final value), of all consolidated companies available in the Economática® database, following the Brazilian International Financial Reporting Standards. Data were tabulated and analyzed using the Statistic Package for Social Science® software (SPSS).

After eliminating companies with missing data, the sample consisted of 238 companies from various sectors and the ones that stand out are the electric power industry, with 35 companies, and the construction sector with 21 firms.

The variables used were defined based on several empirical studies conducted in this field, among which the following stands out: Titman and Wessels (1988), Oliveira and Antonialli (2004), Bezerra and Corrar (2006), Bonacim et al. (2006), Ross et al. (2007), Bressan et al. (2008) and Grzebieluckas, Marcon, Alberton and Mello (2008). As several indices are recurrent in the work, we sought a scope that was representative of the proper theme.

The variables selected to belong to this sample were divided into three categories, the first being the firm's debt variables, followed by the performance variables of the firm and lastly the control variables. These can best be viewed in Table 1.

Table 1

Indicators used as independent variables.

Description	Abbreviations	Indices/Measures
Firm Indebtedness	Total indebtedness	$\frac{\text{Total Debt}}{\text{Total Assets}}$
	Long-term indebtedness	$\frac{\text{Non-Current Liabilities}}{\text{Total Assets}}$
	Short-term indebtedness	$\frac{\text{Current Liabilities}}{\text{Total Assets}}$
Firm Performance	Market value (VM)	Quote not Adjusted by Proceeds * Total Shares calculated [except treasury]) + DTL + Minority Stockholder Participations
	Tobin's Q	$\frac{\text{Market Value}}{\text{Total Assets}}$
	(EVA)	LL - (PL x CDI)
	Return on Assets (ROA)	$\frac{\text{Operating Income}}{\text{Total Assets – Net Income}}$
	Return on Equity (ROE)	$\frac{\text{Net Income}}{\text{Net Equity – Net Income}}$
	Liquid Margin MrgLiq	$\frac{\text{Net Income}}{\text{Income from Financial Intermediation}}$
	Current Liquidity LC	$\frac{\text{Current Assets}}{\text{Current Liabilities}}$
	General Liquidity LG	$\frac{\text{Current Assets + Long-Term Assets}}{\text{Current Liabilities + Long-Term Liabilities}}$
Control Variables	Company Dimensions (Size)	(Log of Total assets)
	Tax Deductions	LAJIR - LL
	Degree of immobilization (GIM):	$\frac{\text{Fixed Assets}}{\text{Total Assets}}$
	Generic grouping of the industry	Economic Classification
	Growth opportunities	$\frac{\text{Total Assets – Net Equity + Market Value}}{\text{Total Assets}}$

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

Source: research data.

With regard to the capital structure variables, at first, three measures (dependent variables) were used to cover the total accounting debt in the short term and long term. Total debt is the share of third-party investors to finance the company's activities and is equivalent to the concept of leverage (leverage), normally used in empirical research in finance (Strong, 2007; Bastos & Nakamura, 2009; Pohlmann, Aguiar , Bertolucci, & Martins, 2004; Albanez, 2012).

Among the firm's performance variables, one can highlight the ROE, which according to Assaf Neto (2009) aims to assess the return that the company is offering in relation to the capital invested by its shareholders; and ROA (operating efficiency), which can be related to the POT, as highlighted by Bonacim et al. (2006). The most profitable companies prefer to use their own funds originating in the profits instead of third-party funds, which cause interests (financial impact).

In that sense, companies with higher ROAs present lower levels of leverage, while companies with lower ROAs will be more leveraged. If there is equality between the ROAs of companies with high leverage and low leverage, the previous assumption will not be confirmed.

To calculate the EVA, as well as accounts collected in the software Economática®, we chose to use the risk-free rate of the Interbank Deposit Certificate (CDI) as the basis for calculating (Pessanha, Calegario, Safadi & Azara (2012). The CDI used was published by the Central Bank of Brazil through a financial newsletter, and was calculated based on the average of the figures for the month November 2014.

Futema, Basso and Kayo (2009) point out that, in the financial literature, the market value is often regarded as an approximation of Tobin's Q, because it includes the growth opportunities and current profitability, and an index used by market analysts. If q <1, the asset is worth less than its replacement cost and, if q> 1, the asset is worth more than its replacement cost. The market value used is the most recent available in the Economática® database, on the day of the data collection (11/14/2014).

The net margin calculated for all companies in the sample is used to obtain knowledge about the return of a certain company. It deducts operating costs and expenses, in addition to financial and non-operating expenses. Braga, Nossa and Marques (2004) report that the net margin measures the percentage of profit earned or final loss in relation to the net revenues from sales.

The overall liquidity, according to Silva (2013), permits measuring what capacity the company has to meet its short-term liabilities and is thus seen as a short-term solvency test for the company. Thus, the higher the overall liquidity of a company, the higher its short-term solvency. On the opposite, the lower the short-term liquidity, the more vulnerable it is.

Generally, the performance (profitability) of the firm, according to Bressan et al. (2008) and Rajan and Zingales (1995), is negatively correlated with the leverage. However, Daher (2004) considers that, the higher the corporate profitability, the greater the incentive towards debt due to the deductibility of interest from taxable income. Contributing to the debate, Terra (2002) explains that, in the trade-off, a positive relation is expected between profitability and leverage while, in the pecking order, the opposite effect is expected.

Finally, the control variables used are discussed, in which Gomes (1999) and Terra (2002) consider that the opportunity for growth, when negatively correlated with debt, collaborates with STT. When positively correlated, however, they support the POT. According to the authors, unlike the STT theory, the POT also suggests that growth opportunities would be positively related to the debt of the firm. This is because firms with high growth would not have sufficient resources for funding with their own resources, opting for greater leverage.

As a control variable, we also have the degree of immobilization (GIM), which according to Silva (2013), companies with a large number of non-current (fixed) assets in the event of a bankruptcy or liquidation, will have more guarantees, because the creditors will recover their money by selling these. Therefore, it can be concluded that companies with a high value of assets of this type may have more debt in their capital structure.

Silva (2013) considers that the scale (size) of the company is shown in the STT theory as a determinant of capital structure, because the larger the size of the company, the more access it has to credit and the capital market at a lower cost, thus reducing the bankruptcy costs. For the POT, the larger companies have more information, permitting a lesser relation to of asymmetric information problems.

In addition, tax deductions according to Silva (2013), while correlated with debt, help to prove the existence of STT. With regard to tax deductions, one can find a level of debt for each company, knowing that the companies with larger tax deductions rely more on debt capital than others. According to Titman and Wessels (1988), tax deductions for depreciation and tax credits for investment are replaced by tax benefits obtained through funding in borrowed capital.

Perobelli and Famá (2002) observe an extreme polarization to accommodate some peculiarities. In STT, companies work in a setting where there is tax exemption on interests paid. They are financed only with third-party resources to take full advantage of the tax benefits of debt. On the other hand, the POT considers that, if there is no tax or tax exemption, the debt ceases to be an attractive instrument.

Continuing, for the data analysis, we used the techniques of variance (ANOVA), which is a technique of dependence and discriminant analysis. According to Hair et al. (2009), discriminant analysis can be viewed as an appropriate statistical technique, when there is a categorical and dependent variable (nominal or not metric) and the independent variables, in turn, are metric.

Virgillito and Famá (2008) state that there are two groups of companies with two measures, V1 and V2. Their observations are the ellipses A and B (drawn with small dots and large dots in Figure 1), their universes, and Z, the axis determined by a discriminant function which, in turn, consists of indices. When drawing a straight line through the intersection area of the two ellipses and projecting this line on a new axis Z, according to Hair et al. (2009), one may say that the overlapping area between the two univariate distributions A and B (represented by the shaded area in Figure 1) will be the smallest among all other possible lines being drawn through the overlapping area of the two ellipses.

The overlapping area in Figure 1, which is projected on the Z axis, can be interpreted as the discrimination between the two groups. Thus, the smaller the overlapping area, the lower the number of companies with low levels of debt, classified as companies with high indebtedness and vice versa.

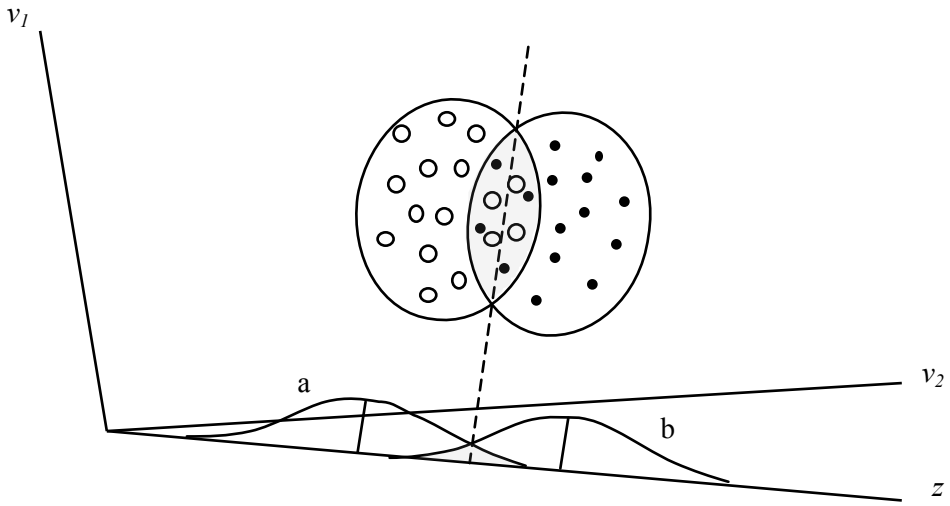

Figure 1. Graphic representation of the two-group discriminant analysis.

Source: Hair *et al.* (2009, p. 214).

Hair et al. (2009) notes that, based on the discriminant function (or sorting function), we obtain a discriminant Z score that is the compound result of multiplying each independente variable by its corresponding weight. The discrimination of the groups is achieved through the establishment of the weights of the statistical variable (not metric predicted variable) for each predictive variable in order to maximize the variance between groups and within each group.

It is considered that the discriminant function efficiently identifies the groups if the overlapping of the distributions of the discriminant scores for the groups is small (Hair et al., 2009).

4. Results And Discussion

Seeking to understand how variables behave towards the total debt levels, in the long and short terms, based on the logarithm of the variables, the correlations between the three types of debt adopted and the research variables were generated. In this procedure, as shown in Table 2, most of the variables have a negative correlation with the three levels of indebtedness.

The correlation shows that, when the indebtedness increases, almost all variables tend to decrease. It is noted, however, that the relationships are not all significant at 1% and 5% in statistical terms.

Table2

Correlation between all variables and total, long and short-term indebtedness.

Correlations – N: 238		Indebt.T	Indebt. LT	Indebt. ST
VM	Pearson's Correlation	-0.009	0.110	-0.189**
	Sig. (2-tailed)	0.885	0.090	0.003
QdT	Pearson's Correlation	-0.317**	-0.302**	-0.097
	Sig. (2-tailed)	0.000	0.000	0.135
EVA %	Pearson's Correlation	-0.132*	-0.118	-0.105
	Sig. (2-tailed)	0.042	0.069	0.106
ROA	Pearson's Correlation	-0.168**	-0.162*	-0.111
	Sig. (2-tailed)	0.009	0.012	0.088
ROE	Pearson's Correlation	-0.161*	-0.140*	-0.140*
	Sig. (2-tailed)	0.013	0.031	0.030
Mrg Liq	Pearson's Correlation	-0.225**	-0.184**	0.168**
	Sig. (2-tailed)	0.000	0.004	0.009
LC	Pearson's Correlation	-0.523**	-.249**	-0.314**
	Sig. (2-tailed)	0.000	0.000	0.000
LG	Pearson's Correlation	-0.570**	-0.558**	-0.053
	Sig. (2-tailed)	0.000	0.000	0.415
LN. Asset	Pearson's Correlation	0.195**	0.325**	-0.158*
	Sig. (2-tailed)	0.003	0.000	0.014
Tax Ded.	Pearson's Correlation	-0.009	-0.002	-0.025
	Sig. (2-tailed)	0.892	0.974	0.698
GIM	Pearson's Correlation	-0.029	0.413**	-0.418**
	Sig. (2-tailed)	0.659	0.000	0.000
Opport. Growth	Pearson's Correlation	0.091	-0.105	0.174**
	Sig. (2-tailed)	0.162	0.105	0.007

Source: research data.

To ascertain the effect of debt on the companies, two groups were created based on the Total Debt ratio. For the specification of each group, it was decided to define as Group 1 companies that exhibited debt levels inferior to 50%; and as Group 2 companies that exposed debt levels equal or superior to 50%. The reason for setting this cutoff point departs from an attempt to dichotomize between companies with high level of indebtedness and companies with a low debt burden, making it possible to ascertain whether these companies have different parameters.

Based on this process, from the total of 238 firms in the sample, 86 were classified as belonging to Group 1, having debt inferior to 50%, and 152 companies were in Group 2, with debt levels superior to 50%.

Initiating the analysis, we used the ANOVA technique - with two groups. The focus of the analysis of variance is to confront the means of distinct populations (Group 1 and Group 2). This comparison intends to find significant differences in the variances of each group, examining whether these are similar or not and whether there is influence of some variable in the groups. As can be seen in Table 3, the variables Tobin's Q, EVA%, ROA, ROE, Mrg Liq, LiqCor, LiqGer and Asset LN showed statistical significance at 5%. Further, this difference can be seen by the uneven averages between the variables, which confirms the existence of differences between companies with high indebtedness and companies with low levels of debt.

Table 3

ANOVA based on Group 1 and Group 2.

ANOVA		Descriptive				F	Sig.
		N	Mean	Standard deviation	Standard error		
Market Value	1	86	9.07E+09	3.05E+10	3.29E+09	1.114	0.292
	2	152	5.92E+09	1.56E+10	1.27E+09		
	Total	238	7.06E+09	2.22E+10	1.44E+09		
Tobin's Q	1	86	1.020874	0.9090582	0.0980263	16.711	0.000
	2	152	0.569403	0.7627837	0.0618699		
	Total	238	0.732540	0.8451788	0.0547848		
EVA %	1	86	5.541112	8.4613126	0.9124068	3.875	0.050
	2	152	-4.392998	46.3246803	3.7574277		
	Total	238	-0.803362	37.6273168	2.4390167		
ROA	1	86	5.367894	8.7581449	0.9444151	11.880	0.001
	2	152	1.470146	8.1605157	0.6619052		
	Total	238	2.878576	8.5708921	0.5555684		
ROE	1	86	8.146424	13.2371709	1.4274008	4.026	0.046
	2	152	-3.997019	55.1882491	4.4763581		
	Total	238	0.390948	45.1392791	2.9259449		
Mrg Liq	1	86	359.273139	2285.0030412	246.3982147	4.075	0.045
	2	152	-18.845945	269.3723410	21.8489820		
	Total	238	117.785320	1397.1261124	90.5622348		
LC	1	86	3.193959	4.8039941	0.5180280	17.515	0.000
	2	152	1.526602	0.7963994	0.0645965		
	Total	238	2.129092	3.0537566	0.1979456		
LG	1	86	1.789446	1.4670286	0.1581938	54.142	0.000
	2	152	0.864854	0.3793528	0.0307696		
	Total	238	1.198950	1.0303784	0.0667895		
LN Asset	1	86	21.494197	1.7806333	0.1920106	5.151	0.024
	2	152	22.002137	1.5858821	0.1286320		
	Total	238	21.818595	1.6731242	0.1084525		
Tax Deductions	1	86	1.04E+08	4.41E+08	4.76E+07	0.004	0.948
	2	152	1.08E+08	4.09E+08	3.32E+07		
	Total	238	1.06E+08	4.20E+08	2.72E+07		
GIM	1	86	62.535400	20.6808571	2.2300742	1.643	0.201
	2	152	58.905667	21.1571864	1.7160744		
	Total	238	60.217251	21.0153200	1.3622209		
Growth Opportunities	1	86	1.381842	0.8907297	0.0960499	1.081	0.299
	2	152	1.268426	0.7579353	0.0614767		
		238	1.309408	0.8084204	0.0524021		

Source: research data.

As can be seen, the difference of means between the groups is pronounced for variables such as ROA, which show a mean ROA of 5.36 for companies with low leverage; while companies with high leverage have an ROA averaging 1.47.

For all the performance variables of the firm that were statistically significant, the companies of Group 1 which have lower debt levels demonstrate better performance than the companies in Group 2, which have higher debt levels.

Thus, the technical ANOVA signals the theoretical background provided by POT. As Terra (2002) explains, in the STT, a positive relationship is expected between profitability and leverage while, in the POT, the opposite effect is expected, as found in the analysis of variance.

Thereafter, it was decided to use discriminant analysis in an attempt to clarify what variables best discriminate the two proposed groups. For this analysis, we used the stepwise method as a selector of the most significant variables to discriminate between groups 1 and 2. As mentioned in Corrar, Paulo, Dias Filho (2007), one way to test the discriminant function is to divide the total sample into two subsamples: one for developing the discriminant function (original sample) and the other to test the function found (test sample). Accordingly, the original sample included 187 cases, and the test sample 75 cases.

When analyzing the correlation matrix of the independent variables of the first model produced with the original variables, however, a much more accentuated correlation was found than the others (0.98), and this between Tobin's Q and the variable growth opportunity, in which, as stated by Futema et al. (2009), Tobin's Q includes the growth opportunities of the firm. This fact led to a case of multicollinearity (independent variables that have exact or near-exact linear relationships and that, therefore, may even make any estimation impossible) confirmed by the criterion of Tolerance.

Field (2009) observes that there are no statistical consequences of transforming the data, and the transformation can correct atypical values, like the case presented. In that sense, to avoid the occurrence of biased and unrepresentative estimators, the choice was made to work with the logarithmic variables. In Table 4, a high correlation can be observed between Tobin's Q and the variable growth opportunity, corresponding to 0.84, and between the asset Log and the market value, corresponding to 0.86.

Table 4
Correlation matrix between the independent variables

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1)	VM	1.00												
(2)	QdT	0.54	1.00											
(3)	EVA	0.05	0.11	1.00										
(4)	ROA	0.24	0.35	0.28	1.00									
(5)	ROE	0.17	0.19	0.40	0.53	1.00								
(6)	MLiq	0.07	0.22	0.00	0.04	0.00	1.00							
(7)	LC	0.06	0.25	0.09	0.14	0.08	0.44	1.00						
(8)	LG	-0.27	0.04	0.06	0.11	0.05	-0.02	0.48	1.00					
(9)	LN-A	**0.86**	0.02	-0.01	0.06	0.08	-0.05	-0.08	-0.34	1.00				
(10)	Ded. F.	0.31	0.21	0.03	0.11	0.07	0.05	-0.02	-0.10	0.23	1.00			
(11)	GIM	0.22	-0.12	-0.06	-0.13	-0.03	-0.06	-0.44	-0.61	0.33	0.05	1.00		
(12)	Ind.	-0.07	0.02	-0.09	-0.01	-0.07	0.06	0.08	-0.12	-0.09	0.08	0.01	1.00	
(13)	Op.C	0.48	**0.84**	0.05	0.34	0.11	0.05	0.02	-0.03	0.05	0.16	-0.13	0.02	1.00

Source: research data.

The variables Asset Log and market value were excluded from the model through the stepwise process (Hair *et al*., 2009), and the variables Tobin's Q and "growth opportunity' presented a Tolerance criterion of 0.295 and 0.288, respectively as, according to Corrar, Paulo and Dias Filho (2007), coefficients between 0.10 and 1 represent an acceptable multicollinearity standard.

Through the discriminant analysis, it is observed that the canonic correlation was low (0.658), but nevertheless significant to verify the influence of the capital structure on firm performance, reminding that the canonic correlation is used to analyze the adjustment of the variables extracted by the method. Thus, the square root of this coefficient works similarly to the determination coefficient and, in the case analyzed, it means that 43.3% of the variances in the variables are explained by the discriminant model, which demonstrates, according to Corrar *et al.* (2007), that the technique is not perfect, but presents a certain degree of reliability.

The discriminant analysis was also used to assess which variables best discriminate the groups in question (high and low level of leverage). As observed, only LG, GIM, Tobin's Q and Growth Opp. Were significant at 1% to discriminate the groups after the stepwise process. This result is better visualized in Table 5.

Table 5
Significant variables for the model

Step	Inserted	Wilks' Lambda							
		Statistics	df1	df2	df3	Exact F			
						Statistics	df1	df2	Sig.
1	LG	0.810	1	1	161.00	37.78	1	161.00	0.00
2	GIM	0.694	2	1	161.00	35.33	2	160.00	0.00
3	Tobin's Q	0.617	3	1	161.00	32.92	3	159.00	0.00
4	Growth Opp.	0.563	4	1	161.00	30.65	4	158.00	0.00

Source: research data.

According to Corrar *et al.* (2007), the importance of each variable in the discriminant function can be understood through the analysis method of the standardized coefficients of the canonic function. Thus, the most relevant variables for the study, in order of importance and ignoring the positive and negative signs, were: Tobin's Q (1.201), the "growth opportunity" (-0.867), the general liquidity (0.836); and the "degree of immobilization" (0.616).

Another method that permits a closer interpretation of the importance of the actual values, according to Corrar *et al.* (2007), is the table of the non-standardized coefficients of the canonic discriminant function (Table 6). A priori, it is observed that the degree of immobilization (GIM) goes against the acceptance of the STT as well as the POT, both of which positively relate the tangibility of the assets and the indebtedness level. The results indicate that the degree of immobilization is directly related to Group 1, that is, the higher the level of tangibility of the assets, the lower the firm's indebtedness.

Table 6
Coefficients of non-standardized canonic discriminant functions

Variables	Function 1
Tobin's Q	1.154
LG	1.411
GIM	1.271
Growth Opportunity	-1.777
(Constant)	-3.796

Source: research data.

Among the firm performance variables, only Tobin's Q and general liquidity presented significant results for the discriminant function, contributing to the fact that, the higher the coefficient of these variables, the greater the possibility that the company will be present in the group with a lower degree of indebtedness. This negative relation between indebtedness and leverage rests on the PT, in accordance with Bressan *et al.* (2008), Terra (2002) and Rajan and Zingales (1995).

In the same perspective, the results demonstrated a negative coefficient in the discriminant function for the variable growth opportunity, contributing to the fact that, the higher the coefficient for this variable, the greater the probability that the firm is part of Group2, with a higher degree of indebtedness. This positive correlation is in line with the POT, as the growth opportunities are positively related with the firm indebtedness, while the high growth levels do not provide sufficient funds for funding with internal resources. That will oblige them towards higher leverage, in line with Gomes (1999) and Terra (2002).

To support the discussion, the degree of correctness of the discriminant function is verified in trying to classify the groups. As can be seen in Table 7, the percentage of correctness corresponded to 86.1% of the original cases, which represents a good percentage.

Table 7
Results of the classification *

		Group_IndebtT	Association with expected group		Total
			1	2	
Original Sample	Counting	1	47	15	86
		2	8	93	101
	%	1	75.8	24.2	100.0
		2	7.9	92.1	100.0
Test Sample	Counting	1	19	5	24
		2	5	46	51
	%	1	79.2	20.8	100.0
			9.8	90.2	100.0

*.: 86.1% of original grouped cases correctly classified.

Source: research data.

The results of the original sample demonstrate that 15 companies with low indebtedness levels were classified as highly indebted companies. Concerning the companies with high levels of indebtedness, eight were mistakenly considered as companies with a low level of indebtedness, and five highly indebted companies were classified with a low level of indebtedness.

5. Final Considerations

Based on relevant theories on the capital structure, different indicators were tested. Among these, only the general liquidity, the degree of immobilization, Tobin's Q and the growth opportunity were significant at 1% to discriminate the groups after the stepwise process. Among these, it can be highlighted that the degree of immobilization went against the premise of the two theoretical currents (STT and POT).

The control variable "growth opportunity" was significant, appointing a positive correlation between indebtedness and firm performance, confirming the appropriateness of the pecking order theory for the present sample. In that context, the performance variables Tobin's Q and general liquidity presented statistical significance, demonstrating a negative correlation between indebtedness and performance, highlighting the pecking order theory and the studies by Modigliani and Miller.

The theoretical contribution in this study is to put the debate on the relevance of the capital structure and its different approaches on the agenda in the field of Finance theory. The empirical contribution rests on the applicability of the theories on the capital structure in the context of Brazilian companies listed on BM&FBOVESPA, and on the contribution for the managers to fund their investments.

One of the limitations in this study is related to the non-observance of the data over a significant period, in view of the use of the cross-sectional sample for the analysis. Another limiting factor is not considering the qualitative aspects that can interfere in the decision making on the best capital structure. As a suggested agenda for future studies, a more detailed study should be undertaken that considers the qualitative and quantitative aspects of the process, or even a study focused on a certain industrial sector.

Finally, it should be highlighted that the null hypothesis that the capital structure is not directly related to the performance of Brazilian firms listed on BM&FBOVESPA. In this interval, the results appoint the consolidation of the financial theories exposed by Modigliani and Miller (1958, 1963), as opposed to the traditionalist current that started with the studies by Durand (1952).

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