

# CAPITAL STRUCTURE AND PROFITABILITY: THE BRAZILIAN CASE

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## Summary

The determination of a company's capital structure constitutes a difficult decision, one that involves several and antagonistic factors, such as risk and profitability. That decision becomes even more difficult, in times when the economic environment in which the company operates presents a high degree of instability. Therefore, the choice among the ideal proportion of debt and equity can affect the value of the company, as much as the return rates can. In the present study, the authors tried to examine the influence of the capital structure of Brazilian companies regarding the factor profitability. The data used in this research corresponds to the financial statements of 70 companies collected in the past seven years. There is, the historical series covers the period immediately after the implantation of *Plano Real*, with its consequences in terms of reduction of inflation rates, increase of interest rates, and instability of the exchange rate politics. The Ordinary Least Squares (OLS) method was employed in the estimation of a function relating the return on the equity (ROE) with the indexes of long and short-run debts, and also with the total of owner's equity. The results indicate that the return rates present a positive correlation with short-term debt and equity, and an inverse correlation with long-term debt.

## KEYWORDS:

Capital structure, profitability, debt.

## INTRODUCTION

Which the relationship between capital structure and profitability? Does the fiscal benefit makes debt more attractive than the issue of new stocks by public offerings? Does the risk associated to the increase of the debt can, or should, be taken by the firm? Should the financing decisions of the firm follow a single pattern, irrespective of the country where it operates? Those are frequently asked questions that are significantly present in the decisory processes related to funds' captation. Notwithstanding several studies have been

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developed regarding the subject, there is not a consensus about what would configure an optimum capital structure.

Decisions of that type tend to become even more difficult when the economic conditions of the country where the firm operates already are (typically) more uncertain. In the Brazilian case, specifically, the presence of two aggravating factors is observed: in first place, the high interest rates practiced in the financial market, and, in second, the instability of the economy before the international conjuncture. Those two factors play distinct roles; however, they produce similar effects under the scope of uncertainty.

The interest rates are, since the introduction of *Plano Real*, the main instrument of the monetary politics, being used to cease any threat of retaking of the inflationary process and, also, to attract external investments, which are essential to the equilibrium of the balance of payments. The effects on the companies happen in varied ways, standing out, on one side, the elevation of the cost of the financing and, on the other hand, inhibiting the sales - given the fall in the economic activity - producing a combined effect of elevation of the degree of uncertainty.

In association to the instability of the economy in the international context, the adoption of different politics is verified, in agreement with the immediate needs of the Country. Therefore, after the introduction of the *Plano Real*, the currency was maintained overvalued in relation to the American Dollar, as a form of facilitating the import of consumption goods - a measure of extreme importance to combat inflation - indirectly favoring the external financing of the companies headquartered in Brazil. With the trade deficit worsening in the external shares, the need of redirecting of the exchange politics, an occasion when the *Real* suffered great depreciation became a pressing call. Therefore, the external financing suffered a considerable rise of costs, besides the reduction of the economic activity, which also increases the uncertainty.

## **OBJECTIVES**

Before the presented picture, it becomes important to evaluate what is the influence of the capital structure over the company' profitability. In this sense, the objective of the present

work is to verify the relationship among the rates of return of the Brazilian companies related to the composition of the capital. The present article will be developed like this: Section 1 will contain the theoretical models on capital structure; Section 2, will show the methodological procedures; Section 3 will present and discuss the results and; Section 4 will interweave the final considerations.

## **1. CAPITAL STRUCTURES**

A capital structure concerns the composition of the liability of the company, or more specifically, which is the relative participation of the several financing sources in the composition of the total obligations (Brealey and Myers, 1992; Gitman, 1997 and Weston & Brigham, 2000). Therefore, it is studied which is the volume of common share (stock) and preferred share (stock) and which is the financing amount the company possesses. This analysis is important because it shows several internal aspects of the company, mainly, which the participation of its equities and, consequently, which is the degree of financial leverage, besides the respective expiration periods. As each source has a specific cost, the return rate can be influenced in a significant way by that composition.

Modigliani & Miller (1958) affirm that, in if treating of perfect markets, the capital structure doesn't have influence on the market value of the company, which will be settled by the composition of its assets. This is a model with several presuppositions - unreal for the current context - in which perfect markets are those without brokerage costs, and individual taxes and where it is possible to investors to obtain financing at the same rates practiced to companies. There is not an information asymmetry, and the company's debt of is free of risk.

That initial position was later reviewed by Modigliani & Miller (1963), and started to incorporate the taxes benefits of the debt. From then on, it is considered that the cost of debt would be smaller than the equity, because the government would be indirectly subsidizing the expenses with interests. In other words, as the fiscal legislation allows the company to deduce of the operational profit the amount expended in the payment of interests, the value of the tax levy on revenues would be reduced in the same proportion of the aliquot of the income tax. Therefore, the profit of the company would be smaller, in comparison with a company without debt, however as the profit will be proportional to a smaller equity, the profit per share (stock) tends to be larger.

Later, Miller (1977), elaborated a new revision, analyzing the subject of the taxes paid by the investors, concluding that as the taxation on the revenues of individual persons increases, the company has to increase the interest rate to compensate them, determining a balance point in which the personal and corporate aliquots are equaled. Therefore, there would not be tax advantage related to the debt. Miller (1977) shows that the corporate tax benefits of debt are reduced by the tax penalty due to personal taxation.

Warner (1977), in Brealey & Myers (1992), studied the costs associated to the bankruptcy possibility, identifying direct, legal and administrative costs as well as indirect costs, determined by the difficulty of managing a company during its bankruptcy process, concluding that such costs increase with the debt, hence, reducing the company's value.

In any way, if the cost of debt is lesser than the cost of the equity, the firm with larger degree of financial leverage tends to present, in normal conditions of operation, higher indexes of profitability on equity. In other words, discounting the operational risk determined by the possibility of occurrence of rates of return lower to the initially expected ones. The problem resides in the difficulty of cost estimation of each capital source, and in the practical validity of the weighted average cost, which, according to Brealey and Myers (1992), basically serves to determine the minimum rate of profitability demanded to make the company's projects attractive.

To that respect, McNulty et al (2002), point out the importance of accurately considering the cost of the capital. The authors remind that the cost of capital is used to evaluate the viability of the company's investments. If an imprecise rate were used to discount the cash flows, the company would not accept attractive projects or make investments that will cause damages.

The cost of sources whose payments are fixed doesn't present calculation difficulties, however, due to the complexity of the tributary legislation, the estimation of the effective cost of the loan becomes a more complex task. The cost of ordinary stock options is, by itself, highly complex, taking into account the difficulty to relate the dividends to be paid – which are variables insofar proportional to the profit - to the prices of shares, which frequently are in constant flotation. Besides, the estimation of the cost of all the sources used by the company generates several limitations, because it supposes a constant

structure of capital, being that variable along the time, and also doesn't considers the difficulties inherent to the calculation of the cost of each specific source.

As to the financing decision, the choice of the optimum capital structure will be settled, accordingly to Booth et al (2001), in conformity with three models: 1) the Static Trade-off Model affirms that the firm chooses a goal-structure based on tributary aliquots, types of investment, business' risk, profitability and bankruptcy code; 2) the Agency Theoretic Framework suggests that potential conflicts of interests among internal and external investors determine the optimal structure that compensates agency costs with other financial costs and, 3) the Pecking-Order Hypothesis - based on the market imperfections, specifically shares' costs and asymmetric information - affirms that the choice will be based on the possibility of generation of funds to the company, given the asymmetry of information (e.g.: if the company judges that its shares are sub-evaluated in the moment, it will opt for the use of debt. On the other hand, if the company feels that the shares are well valued, it will issue a new emission of shares).

Hadlock & James (2002), evaluating the possibility of the banking system to provide a certain financial peace for the companies, affirm that the choice among equity and debt will be fundamentally determined by the market evaluation of the shares, confirming the Pecking-Order Hypothesis. In the study, the authors analyze the financing decisions of 500 non-financial companies, concluding that those that were sub-evaluated chose bank financings. That type of choice occurs because the market interprets the loan as a positive step, imagining that the company preferred that type of financing because it anticipates high returns.

Graham (2000) estimated the magnitude of debt's benefit. He point out to a taxes benefit of US\$ 0.2 for each unit of profit before taxes, or the equivalent to 10% of the firm's value, which are still below the potentially maximum benefit, according with his calculations. In the same work, another conclusion indicates that big and profitable companies present a low debt rate.

According to Graham (2000), several factors, not related to tributary subjects, explain the choice of the financing. The financial cost of a possible bankruptcy will inhibit the grant of loans. The opportunities of investment exerted some influence, as the shareholders can give up projects with positive net present values (NPVs), which result in larger benefits for

the parts engaged. The low liquidity and the irregularity of the cash flow affect the financing decision, as they tend to elevate the cost of the loan. The attitudes of the administration often prod the company to conservatively employ debts, either because the administrators would not like to assume risks, or because they could increase their shareholding participation. Elevated degrees of industrial concentration paired to the unicity of the product line induce the companies maintain low debt indexes, because an extreme case of liquidation would be extremely harmful to many participants of the chain, such as, suppliers, consumers and employees. Large companies, which have means to offer good collaterals, usually find relatively lower financial costs, which don't mean that they have a high debt level. Besides these factors, a lot of firms can opt to maintain flexibility reserves, using debt well below their potential, devising a possible future need.

Fama & French (1998), analyzing the relationship among taxes, financing decisions and the firm's value, conclude that the debt doesn't concede taxes benefits. Besides, the high leverage degree generates agency problems among shareholders and creditors that predict negative relationships between leverage and profitability. Therefore, the negative information-relating debit and profitability obscure the tax benefit of the debt.

Another important aspect to consider, regarding financing decisions, is related to the type of the financial markets, or more specifically, with the development stage presented by the financial markets in countries with considerable economics differences, in what concerns to the sector own structure, per capita income, level of the interest rate, inflation rates, relative participation of the stock market, tributary legislation, etc.

Booth et al (2001) developed a study attempting to relate the capital structure of several companies in countries with extremely different financial markets. They concluded that the variables that affect the choice of the capital structure of the companies are similar, in spite of the great differences presented by the financial markets.

For the specific case of Brazil, the authors affirm that the index of debt of the companies is low, about 30.3%, and the capitalization index through the capital market is also low, 28.9%. The reason between the total volume of capitalization, divided by the gross domestic product, shows the importance of the capital market in the financing process of the companies - 10% in Brazil, a very low value when compared to the index of the least

developed countries, for instance South Korea, Jordan and Malaysia, which are 21.3%, 57%, and 68%, respectively.

Besides, they concluded that profitability has inverse relationship with debt level, size of the firm and tributary aliquots.

The Brazilian legislation, in regard to taxes benefits, allows the paid interests to be deduced of the taxable revenues, according to article 187 of the Law 6.404 of 1976. The aliquot of the income tax of corporations, defined by the Law 9.249 of 1995, starts in 15% and raises to a limit of R\$12 million/year, and after that limit, the aliquot turns to 10%.

In order to the systematic of the indexation starting from 1996, the paid interests to title, partners or shareholders, in the quality of remuneration of the own capital can be deduced for effect of the determination of real profit, according to the Bill 9.249 of 1995. That benefit also extends for the calculation of the social contribution on profit.

A study by Ness Júnior & Zani (2001), which aimed to evaluate if there are significant differences among financial indexes of companies that cast interest on equity, and the indexes of those firms that don't, concluded that there is not a statically significant difference among the leverage degrees, debt indexes and long-term debts of the two groups of companies. The result indicates that the introduction of interest on equity did not change in the capital structure.

In the same study, the authors tried to evaluate the introduction of the interests on equity, would convey fiscal advantages for the companies. For that, the effective average rates of fiscal contribution of the two groups of companies were calculated. The result indicates that, from the moment a larger number of companies started to use the release of interests on equity, the averages among groups were significantly different, what shows the fiscal benefit imparted by the change in the legislation.

## **2. METHODOLOGY**

To test the relationship between debt and profitability, the following function was considered:

$$\text{ROE} = f(\text{ECP}, \text{ELP}, \text{PL}, \text{LP/PL}, \text{U}), \quad (1)$$

Where:

ROE is the return rate, and it corresponds to the net profit divided by the equity;

ECP corresponds to the short-run debt divided by the total liability;

ELP is the long-run debt divided by the total liability;

PL is the equity on total liability;

LP/PL corresponds to the reason between the long-term debt and equity, and;

U is the term of aleatory error.

ROE indicates the rate of return proportional to the equity, ECP, ELP and PL shows the capital structure of the company, representing the total debt, of short and long run, and the total of equity in relation to the total liability, respectively. The index LP/PL shows the proportion of debts of long term in relation to the equity, and U is the error term.

The process of estimation of the function will be the Ordinary Least Squares (OLS), for which the classic presuppositions are assumed - in conformance to the procedures described by Gujarati (2000), Hair (1998), and Kmenta (1994). The graphic analysis of residues will be used to verify the normality of the term of error and to check if the series is homoscedastic; the presence of autocorrelated residuals will be verified through the Durbin-Watson's test and the colinearity among the data for the measure of tolerance and the Variance Inflation Factor.

Several functional forms will be tested, including the transformation of data and exclusion of variables, and the choice in the appropriate functional form will be made *posteriorly*, based in the coherence of the signs, significance of the parameters, measured by the test  $t$  and by the degree of adjustment of the data, appraised by adjusted  $R^2$ .

The used data correspond to the financial statements of 70 companies - industrial, commercial and service firms - operating in the Brazilian market, covering the period that includes the fiscal years 1995-2001, summing up a total of 489 observations (only one company published 6 reports!) The companies that presented negative equity were excluded from the analysis, remaining a sample of 468 observations. All the values are deflated. The historical series were obtained at the following website: [www.economatica.com.br](http://www.economatica.com.br)

### 3. RESULTS AND DISCUSSION

The descriptive statistics of the analyzed data are shown in Table 1.

**Table 1. Financial indexes of selected Brazilian companies - 1995-2001.**

Index	Average	Standard Deviation
ROE	-0.21	2.18
ECP	0.08	0.08
ELP	0.10	1.46
PI	0.57	0.24
LP/PL	0.60	4.49

*Source:* economática ([www.economatica.com.br](http://www.economatica.com.br))

The data present average indicators, which originated from the information collected in the financial statements of each company. The return rate measured by the return on equity (ROE), presents negative values, there is, -0.21, indicating that the companies showed a bad performance in the analyzed period. However, the standard deviation is very high, what suggests the need of a more accurate analysis. Resorting to the database, the presence of 5 outliers, varying from -5 to -40, is observed; those values can distort the average. With the exclusion of those observations, the average is located on -0.04, and the standard deviation on 0.46, a situation closer to the normal standards. Additionally, it is verified that only 30% of the cases present a negative net profit, however as some large companies are in this situation the average tends to fall. It is also relevant to consider that the historical period studied is characterized by profound changes in the Brazilian economy, with the companies adjusting their practices to the, new, reality of a non - inflationary context.

The variable ECP, that shows the short-term debt in relation to the total of liabilities, presents average and standard deviation of the same value, indicating a relatively low dispersion of data. The value of 0.08 indicates that the short-term debt corresponds only to 8% of the total liability, a fact that can be explained by the high interest rates practiced in the Brazilian market for funding/financing of that type.

The ELP correspondent to the long-term debt in relation to the total liability, presents an average of 0.10, however, the dispersion is very high, indicating the diversity in the choice of long term funds as financing options for the companies. The work of Booth et al (2001) displays an index of total debt of 30.3%, including current liabilities, which is very different from the values found in the present study, considering that the sum of ECP plus ELP would reach 0.18. The difference can be credited to the universe in analysis, or also to the period in focus. Anyway, this index is very low when compared to the corresponding indexes of more developed countries such as, United States (58%), Japan (69%), Germany (73%) and United Kingdom (54%).

The participation of equity in the financing of the companies measured by the index LP/PL, presents average of 0.57 and standard deviation of 0.24. The data suggest a certain uniformity of that capital source, that is, an elevated number of companies falls back mainly upon equity as a financing form. The values are quite high, what is justified by the low debt level, also showing different behavior when compared to the companies headquartered in countries with developed economies.

The index LP/PL shows the financial leverage of the companies, presenting an average of 0.60, but also a great dispersion, 4.49. In consonance with the previous results, it indicates the vast variability of the use of long-term debt.

The results of the analysis of the regression estimated to evaluate the influence of the capital structure on the profitability are shown in Table 2.

The analysis of the residues indicated normal distribution and pointed out the homoscedastic character of the series. Besides, the size of the sample doesn't suggest great concerns with those presuppositions, according to Kmenta (1994) and Hair (1998). The tolerance measure and the variance inflation factor didn't show the presence of collinear variables, and the Durbin-Watson's test was inconclusive. Proceeded the correction, by the Cochrane-Orcutt iterative method, according to Kmenta (1994) and Gujarati (2000), the estimated values presented insignificant differences.

**Table 2. Regression Model among the financial indexes of selected Brazilian companies. 1995-2001.**

<b>Variable</b>	<b>Parameter</b>	<b>Significance</b>	<b>t test</b>	<b>Tolerance</b>	<b>VIF</b>
Intercept	-0.69	1%	-3.28		
ECP	2.10	2%	2.38	0.72	1.37
PL	0.97	1%	3.49	0.71	1.40
LP/PL	-0.39	1%	-29.89	0.95	1.05
R <sup>2</sup>	0.676				
F test	326.54	1%			
Durbin-Watson	1.781				

*Source:* Authors' study.

The adjusted determination coefficient ( $R^2$ ) shows that 67.6% of the variations of the return rate (ROE) were explained in conjunct by the independent variables, which, allied to the level of significance of the test F (1%), indicates a good adjustment degree.

The long-term debt (ELP) was not significant in the model, being excluded from the analysis. The index LP/PL has a larger explanation power in the model, and its negative sign indicates an inverse relationship. The result indicates that the return rates are inversely proportional to the debt, in other words: the larger the debt, the lower is the profitability. Those results are in conformity with the conclusions of Booth et al (2001), Fama & French (1998), Graham (2000), and Miller (1977). On the other hand, the initial propositions of Modigliani and Miller (1958 and 1963) don't find back up for in the results now discussed.

The short-term debt (ECP) presented positive sign and level of significance of 2%, showing to be an important variable in the model. The explanation for such fact can reside in the low relative participation of that type of debt, and can also suggest that ECP is a common practice among the most profitable companies, considered the instability of the Brazilian economy, which arises the need of short run funds to provide the necessary working capital – which are the type of resources supposedly offered with relative abundance and easiness by financial institutions.

The relative participation of the equity in the capital structure of the company, represented by the index equity divided by the total liability, was significant at the level of 1% and its sign indicates positive relationship with profitability. This fact is in unison with the above mentioned works and shows to main financing option chosen by the Brazilian companies.

The results presented by Ness Júnior and Zani (2001) indicate the nonexistence of considerably differences among the indexes of debt of the analyzed companies, a fact that contradicts the evidences found in the present work, which shows a great variability of indicators. However, Ness Junior and Zani's research compares two groups of companies, characterizing a different analysis, and their sample is substantially smaller, what can explain the conflicting results.

#### **4. FINAL CONSIDERATIONS**

Already knowing that the finance decision of the company is characterized as being of extreme difficult - involving the analysis of several variables - the present work tried to evaluate which the relationship among capital structure and rates of return.

In the specific case of the Brazilian economy, the difficulties are enlarged due to the instability, a common feature of an economy that recently went through a process of monetary adjustment and that still very dependent of instruments of monetary politics, especially interest rate, and external relations.

The theoretical models on capital structure don't indicate to be an optimum composition, one that would be the ideal for the company to adopt as seeking to maximize the value of its shares. However several studies relate high return rates with low debt level, contradicting the works of Modigliani and Miller (1958 and 1963), which affirm that the value of the company does not depend on the capital composition, also indicating the existence of taxes benefits of the debt.

The results of the work show a great dispersion among the several capital sources used by the Brazilian companies, exception to the equity, the main component, and the one that presents smaller variability.

As to the relationship between return rates and debt, the results indicate inverse relationship for the long run financing, and direct relationship for short-run financing and equity. Those conclusions are in conformance with the works of Booth et al (2001), Fama & French (1998), Graham (2000), and Miller (1977).

The facts of the most lucrative companies are the ones with lowest debt are in consonance with other empiric evidences. However the low debt level - when compared to the debt level of more developed economies, such as United States, Japan, Germany and United Kingdom - indicates that the Brazilian companies are using debt in a extremely conservative way. Perhaps the high interest rates practiced at the Brazilian market, the instability of the exchange rate politics and remaining atmosphere of uncertainty of the local economy - which conveys operational and financial risks that hinder the managerial planning and inhibit the adoption of more sophisticated debt politics - can explain that fact.

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