



**MASTER IN  
FINANCE**

**MASTERS FINAL WORK  
DISSERTATION**

**DETERMINANTS OF CAPITAL STRUCTURE: LARGE PORTUGUESE  
COMPANIES, 1984-1988**

**MARIA RAQUEL MARTINS GONÇALVES**

**MARCH - 2015**



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**MARIA RAQUEL MARTINS GONÇALVES**

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**MARCH – 2015**

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Finally, this thesis is dedicated to my family, who taught me to believe in myself and never give up on a challenge.

## ***Abstract***

This dissertation aims to verify what variables influence the decisions in the capital structure. The objective is to study a gap in a 5-year period in Portugal – 1984 to 1988. This study uses the financial reports of 50 large Portuguese manufacturing firms during this period. The variables were selected based on previous research in this area: size, profitability, level of growth, asset structure, fiscal advantages and business risk.

The empirical results showed a statistically positive significant relationship between the asset structure and leverage. On the other hand, size had a statistically negative significant relationship with leverage. All the other variables showed insignificant relationship in the debt level in a firm.

***Keywords:*** Capital Structure, 1980's, Portugal.

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## ***1. Introduction***

The main objective for corporations is to obtain a profit. However, this process entails many risks and is dependent on the action of internal and external factors, which impact companies and their stakeholders.

Companies have the option of raising equity, debt and/or other outstanding securities, to increase funding. Each of these funding options comes with its own set of consequences.

Moreover, if a company decides to increase its debt, this action will increase its risk of default; on the other hand, if the company decides to raise its equity, it will be less vulnerable to default. As a result, it allows a larger range of investors' access to its operations and capital. The balance between these choices will lead to a greater value in the market (Rogão, 2006).

The decision between equity and debt is influenced by both socio-economic factors of its country as well as the specific aspects of the firm. Indeed, there are many options and stages for the capital structure of a company.

For start-up companies, the owner's equity is the main source of financing for the company. As the firm grows, a start-up tends to increase its debt in order to fulfill the needs of the current operations. As it evolves and becomes a larger company, it is most likely that an initial public offer (IPO) will happen to raise external capital.

The structure of companies' capital is an area of great discussion in academic financial literature. Almost 50 years after the M&M Theory (Modigliani & Miller, 1958), the debate is centered in the influence of tax and some costs related with bankruptcy and financial distress.

Nevertheless, empirical research indicates that the choice in the capital structure depends on current resources and future objectives regarding the firm value and performance. In order to do so, managers can follow two options: exclusively equity or simultaneously equity and debt. The first option is designated as unlevered equity, since there is no existence of debt. In the second option, managers can raise simultaneously equity and debt – outstanding debt, designated by levered equity. This option holds a bigger risk, due to more external control and there is priority in repayment to debt holders and then equity holders.

In a perfect world, capital structure decisions are not relevant for the firm's value (Modigliani & Miller, 1958). However there are market imperfections and the allocation in the capital of a firm is a relevant choice.

One of the market imperfections that affect the decision on the type of funds of a company is the amount of taxes paid. Companies pay taxes after the deduction of interest in their profits, and interest expenses, generated by debt, will reduce the corporate taxes paid by a firm. Hence, this is a incentive to increase their interest expenses since debt will be a gain to investors. As a result, this supplementary amount of taxes that the company has to pay – interest tax shield – depends on the percentage of leverage of the firm. In line with this result, it is important to note that this amount of taxes applies only to companies that generate profit.

Other market imperfections discussed amongst researchers is the cost of financial distress. Direct cost with bankruptcy – legal and accounting expenses – loss of customers, suppliers, employees and other costs relating to creditors



are called costs with financial distress. An imbalance between debt and equity can lead to bankruptcy of the company and involve major insolvency costs as the referred supra.

The final market imperfection referred in Modigliani & Miller (1958) is agency costs. There are two sides to this issue. High levels of debt lead managers and equity holders to take more risk and undervalue investments. On the other hand, more cashflows and lower needs in outstanding debt motivate some unnecessary expenses and less discipline in the investment decisions.

Taking into consideration all the benefits and costs associated with outstanding debt, firms have to determine the optimal level of debt in order to maximize their value.

Empirical studies regarding the capital structure of Portuguese companies has only been done for the period after 1990, leaving a large gap of time to be studied: specifically, the 1980's.

The latter half of the 1980's presents unique characteristics: the great growth of the Portuguese economy and capital markets, which could provide relevant data to the study of the capital structure of Portuguese corporations.

This work aims to study the determinants of the level of debt found on 50 large manufacturing companies in Portugal, from 1984 to 1988.

Furthermore, one analyzes the impact of some variables in the definition of the capital structure, and will seek to relate them with foundational corporate finance theories: Trade-Off and Pecking Order Theory.

Concerning the Trade-Off Theory, there are advantages to the company acquiring debt such as tax benefits. Nonetheless, they will increase their debt

level until EBIT is enough to face the interest expenses, otherwise it will destroy value. Indeed, in order to optimize its overall value, the company will focus on this Trade-Off when choosing how much debt and equity will be used for financing.

The Pecking Order Theory proposes that the costs of financing increases with asymmetric information. In line with this theory, companies prefer internal financing from shareholders and if external financing is required, debt will be preferred over equity due to the threat of external ownership.

The remainder of this study proceeds as follows. In chapter two, we will review some literature and theories in this topic, emphasizing the Portugal case. Moreover, we will describe the variables analyzed and our expectations for their influence in the capital structure. Hence, we mentioned the model and methods used in this research. Finally, in the last sections, we described the results obtained and the conclusions, comparing the expectations and the outcomes of this research.

## **2. Literature Review**

Initially, this section will present a brief summary of the most important theories that identify the determinants in the choice of capital structure.

Moreover, it will go on to present some empirical work concerning the Portuguese case.

### **2.1. M&M Theory**

In 1958, Franco Modigliani and Merton H. Miller published the M&M Theorem (Modigliani & Miller, 1958).

They considered that in a “Perfect World”, without taxes, no transaction costs and no costs associated with bankruptcy, the level of debt was irrelevant for the determination of a company’s value.

*“M&M Proposition I: In a Perfect capital market, the total value of a firm is equal to the market value of the total cash flows generated by its assets and its not affected by its choice of capital structure”* (Berk & Demarzo, 2013).

According to the authors, supressing market imperfections from their analysis, will not affect the firm’s choice in raise just equity or, on the other side, raise equity and outstanding debt to make face to their needs. The above conclusion follows the law of one price, where both securities and assets must have equally market values. As shown, a firm’s value is not affected by the choice in the capital structure.

The main contribution of this theorem for corporate finance was the relationship between the type of debt and the value of a company.

Hence, M&M used this first proposition to explain the relation between leverage and cost of capital. In addition, they concluded that the leverage return equals to a unleverage return plus a premium resulted of debt in the capital structure.

*“M&M Proposition II: The cost of capital of levered equity is equal to the cost of capital of unlevered equity plus a premium that is proportional to the market value debt-equity ratio.”* (Berk & Demarzo, 2013).

In opposition to the first proposition, the value of a leveraged firm comparing with an unlevered one is not equal. As shown, the cost of capital of a leveraged firm is higher than the cost of capital of a unleveraged one. Thus, the difference will be the market value of debt-equity ratio.

Nevertheless, for the two conclusions supra, the authors assume that we live in a perfect world, essential with no taxes. Some years later, the authors did an amendment to the above research, and included the influence of taxes in the capital structure of a firm (Modigliani & Miller, 1963).

## **2.2. Trade-Off Theory**

The Trade-Off Theory states that there is a perfect capital structure that maximizes the value of a company. According to this theory, *“the total value of a levered firm equals the value of the firm without leverage plus the present value*

*of the tax savings from debt, less the present value of financial distress costs”*

(Berk & Demarzo, 2013).

Mathematically, Trade-Off Theory is represented as follows:  $V^L = V^U + \text{Present Value (Interest Tax Shield)} - \text{Present Value (Financial Distress Costs)} \pm \text{PV (Agency Costs/Benefits of Debt)}$ , where  $V^L$  is the value of a company and  $V^U$  is a unlevered company.

Similar to what we referred above, companies pay corporate tax after the deduction of interest expenses in their profits, and these costs will reduce the corporate tax paid by the firm. This additional amount of taxes, which companies have to pay, is called ‘interest tax shield’ and depends on the percentage of leverage of a firm. This benefit, created by leverage, only applies to companies with profit. Therefore, companies must balance their percentage of debt in to achieve the optimal point of leverage. In cases of excessive leverage, the risk of bankruptcy will increase and can lead to no profit in the firm.

The second factor in the formula is financial distress cost. These are direct costs related with bankruptcy – legal and accounting expenses – loss of customers, suppliers and employees. Companies with large levels of leverage can lose the capability of facing their expenses with suppliers and employees.

In the case of bankruptcy, firms will face an increase in legal expenses as well as the loss of the market position and their client base.

Lastly, agency costs or benefits are related to conflicts between stakeholders.

When a firm is leveraged, there are conflicts of interest. In the case of different

investment decisions, different consequences will influence the value of debt or equity.

According to the formula, there is an incentive to the increase of debt, in order to achieve the benefits from interest tax shields.

Aligned with this theory, firms must balance on one side the benefits of tax shield and on the other the costs of financial distress, and measure the impact on corporate financing.

### ***2.3. Pecking Order Theory***

Concerning the Pecking Order theory, researchers defend that there is a tendency to prefer internal sources of funds rather than the external sources (Myers & Majluf, 1984). According to Myers and Majluf, there are three sources of funds: debt, equity and retained earnings. When retained earnings (i.e. internal cashflows generated by the firm) are not enough to support the costs, it is preferred debt instead of equity.

For an outside investor, equity is a riskier fund comparing with debt. From an insider perspective, retained earnings are a better source of funding comparing with an outside one and are used when possible. However, when the retained earnings are inadequate, debt will be used instead of equity.

This theory did not present an optimal leverage ratio, just compared three types of funds and the ideal fund for the needs of the firm.

## **2.4. Other Theories**

Researchers have been developing theories in order to support the behaviour of firms regarding the capital structure decisions.

Norman Toy was one of the first authors with some evidence that the growth of a company and their debt level are related (Toy et al., 1974). Nowadays, the growth and debt are associated with the Pecking Order.

According to the financial literature, companies have five stages in life and in each stage there is a tendency to seek more debt or more equity.

The development stage is the beginning of the business lifecycle. The investor has one business idea and the main challenge is the research regarding the industry.

Start-up firms fall into the second stage of the financial evolution. These companies are constituted by owner's equity and almost no bank debt. Moreover, there are some cases of business angels entering the capital structure of the company.

The third stage of growth is the expansion stage where the company establishes some presence in the market. In this phase, internal cash flows are not enough for the current operations so many firms tend to go to the market to raise stock. We find a tendency to seek more debt in this stage.

Concerning the fourth stage, we find more mature companies with stable growth rates. In this case, the existent cashflows come from past investment and there are no need of future investments.

In the final stage, we encounter companies in the last stage of their life where it is visible a decrease in the return on investment. Generally, firms in this stage

have a decreasing market presence and its market value is taken by new competitors with inovating ideias/products.

Another theory discussed among researchers is the Market Timing theory (Baker & Wurgler, 2002). This theory is related with shares issued in the market and price fluctuations. In the view of Baker and Wurgler, firms take advantages of temporary fluctuations in the cost of equity in the market. It is logical to think that managers will take advantage when the share price is below the fair one. As such, they will issue equity. In opposition, when the share price is above the fair market price, managers will repurchase shares.

Authors concluded that the firm capital struture is related wit the variation in the stock price and companies with lower leverage will raise more funds when their market value is higher.

## **2.5. Portuguese Case**

There are several studies that analyze the determinants of the Portuguese Capital Structure as Antão and Bonfim (2008), Couto and Ferreira (2010), Rogão (2006), Serrasqueiro et al. (2011), Serrasqueiro and Rogão (2009), Vieira (2013) or Jorge and Armada (2001). However, as noted above, these studies relate to periods subsequent to 1990. Among them, the one that embarks a more close period to 1980s is Jorge and Armada ( 2001).

These authors developed a study about the debt level of large portuguese companies, from 1990 until 1995. They included some factors already discuss by other authors like Remmers (1974), Titman & Wessels (1988) or Toy et all (1974) in their work. One of the determinants discussed in this study was the



type of industry in which the company operates, but according to Remmers et al. (1974) this factor is not a determinant of capital structure. They considered other factors and we have some of them in consideration in this study: dimension, growth of the firm, business risk, profitability, asset structure, fiscal advantages in debt for the company.

Regarding this research, they considered the dimension a positive factor in the capital structure, big companies have more diversification in the capital structure and more access to external funds (Remmers et al., 1974). Large companies have less risk of bankruptcy and more guarantees, which leads to higher levels of trust from banks in loan operations. When compared dimension with short term debt, some researchers observed a negative relation between these factors (Rajan & Zingales, 1995). Jorge and Armada (2001) concluded that the dimension did not influence the capital structure. Due to the fact that the sample selected includes only large companies, the influence of this determinant was negligible. They determined that with a more diverse sample results for this factor would be different.

There are two generally accepted ways to measure the influence of growth factor in capital structure choice: percentage of growth of the assets or the rate of growth of profit before depreciations and provisions. Jorge and Armada concluded that there is a positive influence with the capital structure choice, regardless the way of measure used.

When a firm is in the growth stage, the internal funds and retained earnings are not enough to face their expenses. Moreover, in this stage the firm do not have enough retained earnings, so a large investment in its structure is necessary to

increase its market position. In order to do so, they choose to use debt/external funds to face these expenses. In this line of thought, firms with a higher growth of their assets tend to have more leverage in their structure.

For the profitability factor, they expected a negative relation with capital structure, according with Pecking Order and the preference in internal funds by the firm (Myers & Majluf, 1984). Therefore, they concluded that if took in consideration the profit before depreciations and provisions, in their calculations, the relation with leverage would be negative (in line with Pecking Order theory). On other hand, if they considered the operational profit, the relation with leverage would be positive. Hence, the difference between these two ways of calculating will be the extraordinary profit, and this is the factor that influences the capital structure decision.

In the business risk, they expected a negative relation with leverage, especially short term debt. Several researchs have studied the relation between this factor and leverage (Toy et al., 1974). Intuitively, higher risk leads to less trust in the entity and less ability to face costs in case of bankruptcy. They concluded that with the growth of risk in the business, the ability to meet its future costs could be compromised, leading the firm to decrease the weight of debt in the capital structure. This examination determined that these two factors have a negative relationship (i.e. more risk in the business leads to less leverage in the capital structure of the company).

Regarding the asset composition, they expected a positive relation to tangible assets and a negative association to intangible assets. This followed the idea that tangible assets are collaterals for leverage (Titman & Wessels, 1988,

Rajan & Zingales, 1995). Tangible assets have a quantitative value in the market and creditors see these assets as guarantees in the credit operations. On other side, we have intangible assets where their value is specific to the firm and it is more difficult to have the same value in the market accepted by all creditors.

The majority of research on these factors (Titman & Wessels, 1988, Rajan & Zingales, 1995, Jorge & Armada, 2001), concluded that there is a relationship between the tangibility of assets and the leverage of a firm. Jorge and Armada concluded that a firm with more tangible assets tends to have more debt in his structure compared with a firms with more intangible assets in his structure.

Concerning the fiscal advantages of debt, they expected that if they considered the depreciation of the assets, the relationship between this factor and leverage would be positive. If in the calculation they used costs with research and development, they expected a negative relation with leverage (Titman & Wessels, 1988). Other fiscal advantage is the weight of tax shield and how debt can decrease the corporate tax in a firm. After deducting all of their costs, and presenting a profit companies have to pay corporate tax.

If they have less profit before taxes, due to a higher leverage in the company, the value of the tax shield will be lower. So, the interest expenses depend on the leverage of a firm, and more costs will reduce the corporate tax paid at the end of the business year.

This is an incentive to increase the interest expenses of a firm since debt will be a gain for investors. It is important to note that this amount of taxes applies only to companies with profit. In line with this facts, companies need to weight the balance between profit and interest expenses in order to have a positive profit

before taxes. In Jorge and Armada research, after they tested this factor in the model, the results were that fiscal advantages did not influenced the leverage level of a firm.

For the activity sectors, Jorge and Armada expected a significant level of relation with leverage, contrary to Remmers et al. (1974). Firms in the same activity sector face the same business risk (Ferri & Jones, 1979). As discussed above, the business risk is a determinant of the capital structure and it has a positive relation with leverage (Remmers et al., 1974). Therefore, the conclusion for the activity sector should be similar - it should be a determinant of the capital structure of a firm. The results showed that this factor was not a determinant for capital structure.

Regarding the shareholder control, they expected that this would have a higher influence on the capital structure's decision, as management style influences the decisions in the firm and the weight of leverage in a company. Besides, the results were contrary to expectations of the authors and shareholder control was not a determining factor in the choice of capital structure.

### 3. Methods and Data

In this section we present the data and the methodology used to analyze the determinants of the capital structure of large Portuguese firms, in the second half of 1980s.

#### 3.1. Data

The analysis was based on 50 large Portuguese manufacturing firms. First we identified the companies with assets and operating revenue of more than  $6 \cdot 10^9$  PTE in 1987, having found 41 companies. To complete the sample we selected other nine companies that were listed on the stock exchange.

For these 50 companies, we collected financial information from the annual reports published in the Portuguese Official Gazette, in order to create a database composed with all the variables described below.

#### 3.2. Dependent Variables

We used the debt to assets as the dependent variable. The indicators of this variable are in the table 1:

<i>Variable</i>	<i>Indicator</i>
<i>Debt to Asset</i>	$Y_1 = \text{Liability} / \text{Total Liquid Assets}$
	$Y_2 = \text{Long Term Liability} / \text{Total Liquid Assets}$
	$Y_3 = \text{Current Liability} / \text{Total Liquid Assets}$

*Table 1 - Dependent variable and correspondent indicators*

### 3.3. Independent Variables

Based on the methodology of Jorge and Armada (2001), we selected six independent variables: size, growth, profitability, asset structure, fiscal advantages and business risk:

<b>Variable</b>	<b>Indicator</b>
<b>Size</b>	$X_1 = \text{Total Liquid Assets}$
<b>Growth</b>	$X_2 = \text{Growth rate of Total Liquid Assets Value}$
<b>Profitability</b>	$X_4 = \text{EBITDA/ Total Liquid Assets}$
<b>Asset Structure</b>	$X_5 = \text{Tangible Assets/ Total Liquid Assets}$
<b>Fiscal Advantages</b>	$X_7 = \text{Depreciations /EBITDA}$
<b>Business Risk</b>	$X_8 = \text{Std Deviation of Growth of Operating Revenue}$

*Table 2 - Independent Variables and correspondent indicators*

Initially, for each variable we used some indicators from the evidence of Jorge and Armada (2001) research. For the size variable, Jorge and Armada used the number of workers, the volume of sales and the value of asset. We selected the value of asset, since we do not have the information about the workforce in the firm during the selected years. We used the logarithm value of this indicator for the model.

This paper uses the growth rate of assets in each year as a key indicator when discussing the growth of a firm. To measure profitability, this paper uses the ratio between earnings before interest, taxes, depreciations and amortizations (EBITDA) and the asset value.

For asset structure variable, we used the indicator measure with the tangible assets. In the fiscal advantages we use only one indicator, same as Jorge and Armada research, the ratio between depreciations with earnings before interest, taxes, depreciations and amortizations (EBITDA). In the research, the authors also used the ratio between R&D and net sales. Due to the limitation in the income statements, where the value of R&D was not specified, we decided to use only one indicator for this variable.

Finally, for the business risk variable, we use as indicator the standard deviation of the growth of the operating revenue.

### **3.4. Hypothesis**

The determinants of capital structure are related, in a direct or indirect way, to operational characteristics of the firm. The hypotheses raised in this work were formulated in accordance with several of the previously discussed academic authors and their beliefs regarding each variable.

Regarding the size this factor is assumed to have a positive relation with leverage. According to Remmers (1974) larger companies are viewed in the market as being more trustful by creditors. Therefore, larger companies have more access to loans and other external funds than small business firms. There is also a tendency of these firms to diversify their capital structure. In sum, this factor will have a positive relation with the capital structure of a firm.

*Hypothesis 1: Size has a positive relation with leverage level of a firm.*

In the view of Titman and Wessels (1988), growth has a positive relation with leverage. As we present before in one of the theories, when a firm is in the expansion stage, internal cash flows are not enough for the current operations so there is a tendency to seek more debt for their capital structure.

Almost all of the research in this matter concluded that companies with higher growth tend to have more debt in their capital structure. So, this variable will have a positive relation with leverage.

*Hypothesis 2: Growth has a positive relation with leverage level of a firm.*

In line with Pecking Order theory firms prefer internal funds to external ones (Myers & Majluf, 1984). Therefore, a high profit company will have more retaining earnings, and it will prefer this type of funds to debt.

Having this in consideration, profitability will have a negative relation with leverage.

*Hypothesis 3: Profitability has a negative relation with leverage level of a firm.*

Regarding the asset composition, and in the view of Titman and Wessels (1988), there are two hypotheses and these depend on the tangibility of the assets. For tangible assets, we believe that it has a positive relation with leverage. These assets have a quantifiable value in the market and this value is accepted by all investors. So, they serve as a guarantee/collateral in credit operations. Consequently, firms with more tangible assets in their structure will



have more leverage. Therefore, tangible assets will have a positive relation with the value of debt in the company.

*Hypothesis 4: Tangible assets have a positive relation with leverage level of a firm.*

Concerning fiscal advantages, Jorge and Armada (2001) believed in a positive relation with leverage. There is an incentive to increasing debt in firms with profit. As supra, after all the deductions of costs in the profit, companies pay corporate tax. If the debt is higher, it will decrease the profit before tax. With a lower profit, the firm will pay less corporate tax. But, excessively debt will lead to loss. So, firm needs to balance this increase in debt, until it is beneficial regarding the taxes that the firm needs to pay. Therefore, fiscal advantages have a positive relation with leverage.

*Hypothesis 5: Fiscal advantages have a positive relation with leverage level of a firm.*

In line with Toy et al. (1974), business risk will have a negative relation with leverage in a firm. With a higher risk in the business, the firm's ability of facing its future costs may be compromised. Hence, in the investors' view, a firm with more risk can be less trustful to a credit operation. In line with this though, business risk will have a negative relation with leverage in the firm.

*Hypothesis 6: Business Risk has a negative relation with leverage level of a firm.*

### **3.5. The Model**

In order to test the hypotheses raised, we used a panel data model that contains three multiple linear regressions due to the three indicators that measure the debt level:

$$Y_1 = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \varepsilon_{it} \quad (1)$$

$$Y_2 = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \varepsilon_{it} \quad (2)$$

$$Y_3 = \alpha + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + \beta_6 X_{6it} + \varepsilon_{it} \quad (3)$$

Regarding the above equations, we consider  $i = 1, 2 \dots 50$  for the total of firms during  $t = 1984, 1985, 1986, 1987, 1988$ . As referred supra, we have three dependent variables, each one correspond to one equation, and each  $\beta$  is an unknown parameter, coefficient for the independent variables. The last parameters considered is the standard error  $\varepsilon$ , *and it represent the difference* between the actual and the estimated value for each dependent variable.

The model was estimated using the Ordinary Least Squares (OLS), Fixed Effect (FE) and Random Effect (RE) methods. The OLS considers a constant effect and an error factor, and it assumes that the independent variables are not correlated. The FE method is a statistical model where all variables are non-random values. It considers multiples  $\alpha$  - constant value for each individual - and assumes that each firm is not correlated.

Finally, the RE method assumes a non-correlation between an independent variable with the dependent ones. In opposition to FE method, there are no constant values in the model.

The main purpose of this model is to analyze each variable separately and identify the most significant for the capital structure and the relation that each factor has with the level of leverage of a firm.

## ***4. Analysis and Discussion of Empirical Results***

This section will present the estimation results of the empirical model. Before an overall analysis of other interesting results, one will first examine the main descriptive statistics of all variables.

### ***4.1. Descriptive Statistics and Correlation Analysis***

Table 3 presents the descriptive statistics of the variables considered in this study. We can highlight the main indicators for debt – in average the total debt represents 57% of the total assets, 17% for long term debt and 40% for short term debt.

In line with the above results, average of the short term debt is more than the double of long term debt. It could be related to the lack of dynamism of Portuguese capital markets. Moreover, the confidence of Portuguese companies in the banking system is evident in these results, showing the tradition of the loan operations as ways of financing.

In Table 4, there is a summarized table with the correlations between variables. In the dependent variables, the correlation between total liabilities and profitability is negative and statistically significant. In case of the long term debt, there is a positive and significant statistically correlation with size and asset structure, and on other hand, a negative correlation with profitability. For current debt, we can highlight a negative and significant statistically correlation with asset structure.

Concerning the correlation in the independent variables, we can highlight some statistically significant correlations. For asset value, there is a negative

significant statistically correlation with profitability. For profitability variable, there is a correlation with asset value, as referred above in this variable. In case of growth of asset, fiscal advantages and business risk variables, one do not observe any statistically significant correlation. Finally for asset structure, there is a positive and statistically significant correlation with asset value.

## **4.2. Results**

One used the three methods describe in the previous section for the three dependent variables. For each case, the appropriated method will be interpreted to explain the influence of the independent variables in the debt level of a firm - the F, Breusch-Pagan and Hausman test were used.

Table 5 to 7 present the results of regressions  $Y_1$ ,  $Y_2$ , and  $Y_3$ , considering the OLS, the FE and the RE, as well as the results of F, Breusch-Pagan and Hausman tests.

The results show that the most suitable model for regressions  $Y_1$  and  $Y_3$  was the FE method, and RE method for regression  $Y_2$ . Moreover, we will analyze the results based on these methods.

Table 5 show the result for  $Y_1$  - ratio between value of liability and total asset – the FE method, with an R square of 0.765, suggests that the size and asset structure factor are related to debt level of a firm, with a statistically significant. Nevertheless, the size had a negative relation with leverage of 22.5%; which is opposite to what would be the expected. The results concerning the asset structure for these estimations are in line with the previous finding, with a

positive relation with leverage of 26%. For the other independent variables, there is no significant statistically value.

On the table 6 are presented the results regression considered the  $Y_2$  – ration between long-term liability and asset – with a statistically significant Breusch-Pagan test. The test suggests that the appropriated model for this regression is the Random Effects Method. The results reveal that there is a statistical significance between size and asset structure. For size the relation is minimum, a positive relation of 6.5%. On the other hand, asset structure had a positive relation with the leverage level, in a value of 40.7%. For the other independent variables, there is no significant statistically value.

For the last dependent variable  $Y_3$  – ratio between current liability and asset – with an R square of 0.745, the appropriated method is the Fixed Effects Method. The method shows a statistical significance only with size. For this variable there is a negative relation with leverage – 27.7%, similar to the results for first dependent variable. For the other independent variables, there is no significant statistically value.

Concerning the expectations, we find a relation between size and asset structure with the debt level of a firm. In regard to the effect of size, we find a negative relation with leverage, opposite to previous findings. In the case of asset structure, we find a positive relation with long term liabilities, but a negative effect when compared with short-term debt.

For the other variables, growth, fiscal advantages and business risk, we do not find a statistical relation with the level of leverage of a firm, similar to results of Jorge and Armada (2001).

Related the above results with the formulated hypothesis, we conclude that only a hypothesis proved to be true, the positive relation between asset structure and the debt level of a firm. Referring the others hypothesis, we did not find any significant relation between debt level and growth, fiscal advantages or business risk, which was contrary to the expectations. Finally, for the size hypothesis, previous studies showed a positive and significant relation between this variable and debt level. In this study, the result between these two variables showed to be a significant and negative relation.

## ***Conclusions***

In this research, one aimed at contributing to the literature of level of leverage in capital structure and its variables, covering the five-year period between 1984 and 1988. In the first chapters, we reviewed briefly the relevant literature in the capital structure decisions. Subsequently, we formulated the hypotheses for each factor and the expected relation with leverage.

Thus, this dissertation aims to fill an existing gap in the selected years about the factors that influence the capital structure decisions for Portuguese companies.

The results provided by the multiple linear regression model suggest that there are some factors with no influence in the level of leverage of a firm, referring to level of growth, fiscal advantages and business risk. Moreover, asset structure variable showed a positive relation with the leverage level. This result supports some previous empirical studies on this area (Titman & Wessels, 1988).

On the opposite side, we have dimension factor with a negative relation with leverage. This result is opposite to other previous studies in this area (Remmers et al., 1974). The same happens with profitability variable. We expected a negative relation with leverage, according to the pecking order, and the result showed a small positive relation with the debt level in a firm.



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## Appendix

**Table 3**

	<i>N</i>	<i>Minimum</i>	<i>Maximum</i>	<i>Mean</i>	<i>Std. Deviation</i>
<b>Dependent Variables</b>					
Y1	250	0.04	1.18	0.57	0.21
Y2	250	0.00	0.72	0.17	0.17
Y3	250	0.04	1.06	0.40	0.20
<b>Independent Variables</b>					
X1	250	6.61	9.34	7.72	0.48
X2	250	-5.70	3.04	0.10	0.47
X3	250	-0.20	2.17	0.19	0.22
X4	250	0.00	0.87	0.36	0.18
X5	250	-5.92	5.88	0.48	0.88
X6	250	0.00	0.49	0.05	0.06
Valid N (listwise)	250				

*Table 3 - Descriptive statistics of all variables*

*Source: Own research*

**Table 4**

		Y1	Y2	Y3	X1	X2	X3	X4	X5	X6
<b>Dependent Variables</b>										
Y1	Pearson Correlation	1.000	0.444**	0.683**	0.104	-0.056	-0.149*	0.124	-0.100	-0.021
	Sig. (2-tailed)		0.000	0.000	0.100	0.374	0.018	0.051	0.116	0.740
	N	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
Y2	Pearson Correlation	0.444**	1.000	-0.350**	0.282**	0.016	-0.151*	0.452**	-0.067	0.029
	Sig. (2-tailed)	0.000		0.000	0.000	0.802	0.017	0.000	0.292	0.645
	N	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
Y3	Pearson Correlation	0.683**	-0.350**	1.000	-0.120	-0.072	-0.033	-0.238**	-0.048	-0.043
	Sig. (2-tailed)	0.000	0.000		0.058	0.260	0.608	0.000	0.452	0.502
	N	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
<b>Independent Variables</b>										
X1	Pearson Correlation	0.104	0.282**	-0.120	1.000	0.090	-0.128*	0.169**	0.068	0.068
	Sig. (2-tailed)	0.100	0.000	0.058		0.154	0.042	0.007	0.286	0.285
	N	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
X2	Pearson Correlation	-0.056	0.016	-0.072	0.090	1.000	0.001	0.017	0.006	-0.110
	Sig. (2-tailed)	0.374	0.802	0.260	0.154		0.985	0.789	0.919	0.083
	N	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
X3	Pearson Correlation	-0.149*	-0.151*	-0.033	-0.128*	0.001	1.000	-0.057	-0.085	0.061
	Sig. (2-tailed)	0.018	0.017	0.608	0.042	0.985		0.369	0.180	0.336
	N	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
X4	Pearson Correlation	0.124	0.452**	-0.238**	0.169**	0.017	-0.057	1.000	0.019	-0.008
	Sig. (2-tailed)	0.051	0.000	0.000	0.007	0.789	0.369		0.767	0.905
	N	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
X5	Pearson Correlation	-0.100	-0.067	-0.048	0.068	0.006	-0.085	0.019	1.000	0.047
	Sig. (2-tailed)	0.116	0.292	0.452	0.286	0.919	0.180	0.767		0.458
	N	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00
X6	Pearson Correlation	-0.021	0.029	-0.043	0.068	-0.110	0.061	-0.008	0.047	1.000
	Sig. (2-tailed)	0.740	0.645	0.502	0.285	0.083	0.336	0.905	0.458	
	N	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00	250.00

Table 4 - Correlations between all variables

Source: Own research

\*\*p &lt; 0,01 \*p &lt; 0,05

**Table 5**

<i>Dependent Variable: Y1</i>			
<i>Independent Variables</i>	OLS	RE	FE
<i>Constant</i>	0.277 (0.218)	1.079*** (0.325)	2.229*** (0.489)
<i>X1 Total Liquid Assets</i>	0.038 (0.028)	-0.075* (0.042)	-0.225*** (0.062)
<i>X2 Growth rate of Total Liquid Assets Value</i>	-0.029 (0.028)	0.002 (0.018)	0.014 (0.018)
<i>X3 EBITDA/ Total Liquid Assets</i>	-0.136** (0.061)	0.035 (0.040)	-0.018 (0.040)
<i>X4 Tangible Assets/ Total Liquid Assets</i>	0.125* (0.075)	0.267*** (0.095)	0.260** (0.120)
<i>X5 Depreciations /EBITDA</i>	-0.028* (0.015)	-0.019* (0.010)	-0.016 (0.010)
<i>X6 Std Deviation of Growth of Operating Revenue</i>	-0.060 (0.213)	-0.211 (0.144)	-0.132 (0.147)
<i>N Observations</i>	250	250	250
<i>R2</i>	0.059		0.765
<i>F test</i>	11.902***		
<i>Breusch-Pagan test</i>		197.071***	
<i>Hausman test</i>		19.734***	

Table 5 - Model with Dependent Variable Y1

Source: Own research

\* $p < 0,1$ ; \*\* $p < 0,05$ ; \*\*\* $p < 0,01$

**Table 6**

<i>Dependent Variable: Y2</i>			
<i>Independent Variables</i>	OLS	RE	FE
<i>Constant</i>	-0.497*** (0.150)	-0.474** (0.225)	-0.383 (0.377)
<i>X1 Total Liquid Assets</i>	0.071*** (0.020)	0.065** (0.029)	0.052 (0.048)
<i>X2 Growth rate of Total Liquid Assets Value</i>	-0.002 (0.020)	-0.004 (0.013)	-0.003 (0.014)
<i>X3 EBITDA/ Total Liquid Assets</i>	-0.084** (0.042)	-0.023 (0.030)	-0.012 (0.031)
<i>X4 Tangible Assets/ Total Liquid Assets</i>	0.385*** (0.052)	0.407*** (0.067)	0.414*** (0.093)
<i>X5 Depreciations /EBITDA</i>	-0.019* (0.010)	-0.003 (0.008)	-0.000 (0.008)
<i>X6 Std Deviation of Growth of Operating Revenue</i>	0.080 (0.147)	0.044 (0.107)	0.045 (0.114)
<i>N Observations</i>	250	250	250
<i>R2</i>	0.270		0.771
<i>F test</i>	8.659***		
<i>Breusch-Pagan test</i>		171.703***	
<i>Hausman test</i>		6.240	

Table 6 - Model with Dependent Variable Y2

Source: Own research

\* $p < 0,1$ ; \*\* $p < 0,05$ ; \*\*\* $p < 0,01$

**Table 7**

<i>Dependent Variable: Y3</i>			
<i>Independent Variables</i>	OLS	RE	FE
<i>Constant</i>	0.774*** (0.207)	1.496*** (0.313)	2.612*** (0.488)
<i>X1 Total Liquid Assets</i>	-0.033 (0.027)	-0.132*** (0.040)	-0.277*** (0.062)
<i>X2 Growth rate of Total Liquid Assets Value</i>	-0.028 (0.027)	0.005 (0.078)	0.017 (0.018)
<i>X3 EBITDA/ Total Liquid Assets</i>	-0.052 (0.058)	-0.075 (0.040)	-0.006 (0.040)
<i>X4 Tangible Assets/ Total Liquid Assets</i>	-0.260*** (0.072)	-0.145 (0.092)	-0.154 (0.120)
<i>X5 Depreciations /EBITDA</i>	-0.010 (0.014)	-0.016 (0.010)	0.016 (0.010)
<i>X6 Std Deviation of Growth of Operating Revenue</i>	-0.140 (0.202)	-0.257* (0.142)	-0.177 (0.147)
<i>N Observations</i>	250	250	250
<i>R2</i>	0.074		0.745
<i>F test</i>	10.388***		
<i>Breusch-Pagan test</i>		184.683***	
<i>Hausman test</i>		15.882**	

Table 7 - Model with Dependent Variable Y3

Source: Own research

\* $p < 0,1$ ; \*\* $p < 0,05$ ; \*\*\* $p < 0,01$



**Table 8**

<i>List of Companies</i>	
1 ALCO - Algodoeira Comercial e Industrial, S.A.	26 Lisnave - Estaleiros Navais de Lisboa, S.A.
2 Celulose Beira Industrial (CELBI) S.A.	27 MABOR - Manufatura Nacional de Borracha, S.A.
3 Central de Cervejas, E.P.	28 Nacional - Companhia Industrial de Transformação de Cereias, S.A.
4 Cimpor - Cimentos de Portugal, EP	29 Nestle Produtos Alimentares, S.A.
5 Cinca - Companhia Industrial de Ceramica, S.A.	30 Oliveira & Ferreirinhas - Indústrias Metalúrgicas, S.A.
6 Coelima - Indústrias Têxteis, S.A.	31 Petróleos de Portugal, EP – Petrogal
7 Companhia de Celulose do Caima, S.A.	32 Petroquímica e Gás de Portugal, EP
8 Companhia Industrial de Resinas Sintéticas Cires, S.A.	33 Portucel - Empresa de Celulose e Papel de Portugal EP
9 Companhia Portuguesa do Cobre, S.A.	34 Produits et Engrais Chimiques du Portugal (SAPEC), S.A.
10 Construções Metalomecânicas Mague, S.A.	35 RAR - Refinarias de Açúcar Reunidas, S.A.
11 COTESI - Companhia de Têxteis Sintéticos, S.A.	36 Renault Portuguesa - Sociedade Industrial e Comercial, S.A.
12 Covina - Companhia Vidreira Nacional, S.A.	37 Salvador Caetano, Industrias Metalurgicas e Veiculos de Transporte, S.A
13 Crisal - Cristais de Alcobaça, S.A.	38 SECIL - Companhia Geral de Cal e Cimento, S.A.
14 EFACEC, Empresa Fabril de Máquinas Electricas, S.A.	39 Siderurgia Nacional, EP
15 F. Ramada, Aços e Industrias, S.A.	40 Siemens, S.A.
16 Fábrica Têxtil Riopete, S.A.	41 Sociedade Industrial de Vila Franca, S.A.
17 Fábricas Mendes Godinho, S.A.	42 Soja de Portugal, S.A.
18 Fábricas Triunfo, S.A.	43 Sonae - Indústria e Investimentos, S.A.
19 FINICISA - Fibras Sintéticas, SARL	44 Soporcel - Sociedade Portuguesa de Celulose, S.A.
20 Fisipe - Fibras Sintéticas de Portugal, S.A.	45 Sorefame - Sociedades reunidas de fabricações metálicas, S.A.
21 Ford Lusitana, S.A.	46 Standard Electrica, SARL
22 Hoechst Portuguesa, S.A.	47 Tabaqueira, EP
23 Iberol - Sociedade Ibérica de Oleaginosas, S.A.	48 Tagol - Companhia de Oleaginosas do Tejo, S.A.
24 INAPA	49 Têxtil Manuel Gonçalves, S.A.
25 Indústrias Têxteis Somelos, SARL	50 Unicer - União Cervejeira, EP

*Table 8 - List of Companies**Source: Own research*