DETERMINANT FACTORS OF CAPITAL STRUCTURE: AN APPLICATION TO THE PORTUGUESE MARKET

FATORES DETERMINANTES DA ESTRUTURA DE CAPITAL, UMA APLICAÇÃO AO MERCADO PORTUGUÊS

FACTORES DETERMINANTES DE ESTRUCTURA DE CAPITAL, UNA APLICACIÓN AL MERCADO PORTUGUÉS

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ABSTRACT

This paper employs the models of trade-off and pecking order using a panel data of non-financial firms in the Portuguese market over a time period of 10 years (1996/2005), by means of the estimation method of generalized least squares (GLS). It's found that the debt attributes used in this paper were found to reflect the utmost importance in determining the capital structure, disregarding the economic risk (volatility) factor, since the results obtained are not supported by the current financial literature. The results obtained suggest that tangibility assets, growth assets and profitability are negatively related to debt. In turn, the factors firm's size, non-debt tax shields and liquidity have an inverse relationship towards the first three attributes.

Keywords: Capital Structure, pecking order model, trade-off model, determinant factors.

RESUMO

Este artigo utiliza os modelos de troca e ordem hierárquica usando os dados de firmas não financeiras no mercado português sobre um horizonte de tempo de 10 anos (1996/2005), por meio do método de estimativa dos mínimos quadrados generalizado (GLS). Neste trabalho determina-se que os atributos da dívida reflectem a importância extrema em determinar a estrutura capital, negligenciando o factor do risco económico (volatilidade), desde que os resultados encontrados não permitem apoio na literatura financeira actual. Os resultados sugerem que
os activos de tangibilidade, activos de crescimento e o lucro se relacionam de forma negativa com a dívida. Por sua vez, os factores como a dimensão da empresa, o imposto de dívida e liquidez têm uma relação inversa com os primeiros três atributos.

Palavras Chave: Estrutura de Capital, modelo de escolha de ordem, modelo de troca, factores determinantes.

** RESUMEN **

Este artículo analiza los modelos de intercambio y orden jerárquico de empresas no financieras del mercado portugués a través de datos de un periodo de 10 años (1996/2005), por medio del método de estimación de los mínimos cuadrados generalizado (GLS). En este análisis se determina que los atributos de la deuda reflejan la importancia extrema en la determinación de la estructura capital, desatendiendo el riesgo económico (la inestabilidad), desde que los resultados obtenidos no permiten apoyo en la bibliografía financiera actual. Los resultados sugieren que los activos tangibles, activos de crecimiento y ganancias se relacionan de forma negativa con la deuda. Por otro lado, factores como la dimensión de la empresa, el impuesto de deuda y de liquidez tienen una relación inversa con los tres primeros atributos.

Palabras-Chave: Estructura de capital, modelo de selección de orden, modelo de intercambio, factores determinantes.

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1 INTRODUCTION

The increasing globalization of the world's economy, reflected in the integration of markets, particularly the financial sector, is based on a growing competitiveness of firms in all industries. The definition of the capital structure and the factors that determine it are essential to survival, performance and creating value for firms.

In this context, the capital structure refers to the way the firm finances its assets and investments, namely the composition of its financing from equity and debt capital. The decision about financing is critical for the firm, since it will have an impact on determining its value. It should be noted that the decisions regarding the choice between alternative financing should always focus on maximizing the firm's value.

However, the capital structure is still a controversial topic in financial literature. In the last five decades this issue has drawn great attention to organizations and particularly to entrepreneurs, investors, creditors, governments and academic community. The discussion about the capital structure of the firm revolves around the existence of an optimal capital structure of firms and on what would be the attributes that drives it.

The research of Modigliani and Miller (1958) on capital structure is among the most famous in financial literature until to date, and has been intensely discussed by researchers in this area. The main issue is to identify if the firm's financing influences not its value. However, there are two major theoretical currents of opinion that polarize the debate about the relevance of the capital structure for the development of the firm's value.

The first current stems from Durand (1952), which argues that the capital structure, affects the firm's value. It states that the cost of capital debt remains stable until a certain level of debt, from which changes due to the increased risk, to emphasize the existence of an optimal capital structure.

The second current which has been developed by Modigliani and Miller (1958), which based on a set of assumptions, which argue that the way that the firm is financed is irrelevant to its value. The firm's capital cost is similar to any level of debt and, therefore, there should be an optimal structure which would lead to the maximization of the firm's value.
Much of the research carried out to identify the factors determining the capital structure, are based mainly on trade-off, pecking order and agency models (e.g., Voulgaris et al., 2004; Tong and Green, 2005; Fama and French, 2005; Frank and Goyal, 2006, and Pindado et al., 2006). Therefore, Ramos and Silva (2005) argued further that the current models on the determinants of the financing structure also use non-financial factors to explain the capital structure of firms. This leads to the model of strategic positioning that states that the financing process as a determinant of capital structure is influenced by a firm's strategy, for which we highlight the studies of Williamson (1988), Harris and Raviv (1991) and Balakrishnan and Fox (1993).

Titman and Wessels (1988) and Rajan and Zingales (1995), in their work on the determinants of capital structure in the U.S. and G7 (U.S., Japan, Germany, France, Italy, UK and Canada), using factor analysis tested the following attributes: tangibility, growth, size, volatility, profitability, uniqueness, and industry classification. The authors concluded that the level of the firms' short and long term debt presents a negative relationship with factor uniqueness, profitability and growth, and positive for the tangibility factor.

Therefore, the study for the U.S. market also indicates that small firms obtain lower borrowing costs compared to the costs of issuing shares. Moreover, firms with higher levels of profitability tend to accrue less debt and this result is consistent with the pecking order model. However, in the markets of the G7, the results show the existence of a similar level of leverage among firms (Rajan and Zingales, 1995, quoted in Chen 2004).

In this section we present the main concepts and models of capital structure, including the model of trade-off and pecking order, the model based on the costs of bankruptcy and agency and asymmetric information. These models have been constantly used to explain the behaviour of the capital structure of firms (Shyam-Sunder and Myers, 1999, Frank and Goyal, 2006, Fama and French, 2006; and Kayhan and Titman, 2007).

Thus, studies in several markets on the determinants of capital structure (e.g., the Portuguese market, Swiss, Chinese, Slovenian and Spanish) indicate that the factors profitability, non-debt tax shields and volatility are negatively related with the level of debt, whereas for the factors of assets' growth, firm's size and assets' composition, the results are contradictory. Liquidity, activity sector, and uniqueness are attributes little used in the research
about the determinants of capital structure (see, Jorge and Armada, 2001; Drobetz and Fix, 2003; Chen, 2004; Sogorb-Mira, 2005; Ramalho and Silva, 2006; Berk, 2006; and Huang and Song, 2006).

This paper examines the main determinants of capital structure, i.e., determines and analyzes the relationship between the assets' growth, profitability, liquidity, non-debt tax shields, firm's size, assets' composition, volatility and short term debt, medium and long-term debt, debt to equity ratio and total debt of non-financial firms in the Portuguese market, in a ten years timeframe (1996 to 2005). The investigation focuses on all non-financial sectors of the economy, based on information from the balance of the Central Bank of Portugal.

To analyze the determinant factors and their influence on the capital structure of non-financial firms in the Portuguese market, it will be used a panel data, similar to the one used on the research developed by Jorge and Armada (2001) and Drobetz and Fix (2003). The estimation method used was the generalized least squares, using the multiple linear regression models as in Thies and Klock (1992).

This paper is organized as follows. Section 2 describes the assumptions and the model analysis. Section 3 presents the data and contextual setting of empirical research. Section 4 it's presented the main findings, implications, recommendations and clues for future research.

2. METHODOLOGY

As stated previously regarding the relationship between debt and its attributes, this section seeks to define a priori assumptions to test the base model of the pecking order, trade-off, as explanatory models of the capital structure of firms. Additionally, it aims to establish an analysis' model of the presented attributes.

H1: Firms with significant growth opportunities should have major problems of disinvestment associated with the financing debt. That is, for firms that have growth options, the cost of debt should be increased so that it didn't encourage a higher level of debt (Myers, 1984; Jensen, 1986; and Stulz, 1990). Thus, according to the model of trade-off, it is expected a negative relationship between
assets' growth and debt. The basic idea of this assumption is that firms don't issue debt for intangible growth opportunities, given the high costs of bankruptcy.

H2: Firms with high risk and high growth potential, which don't have sufficient resources to self-finance, have opted for higher financial leverage (Myers, 1984; Sogorb-Mira and Lopez-Gracia, 2003; and Berk, 2006). However, according to the pecking order model, we expect an inverse relationship regarding the first assumption.

H3: Firms with greater profitability should have a higher level of debt due to tax benefits and lower bankruptcy expected costs, as proposed by the trade-off model (Fama and French, 2002; and Frank and Goyal, 2005). The foundation of this assumption is based on assumptions of tax benefits, expected costs of bankruptcy and problems of monitoring.

H4: The financing of firms through retained resources reflects the preference in the pecking order model, since it doesn't generate asymmetry of information to the market, and in case of an investment opportunity, the same resources may be used for new projects with positive net present value (NPV). However, when firms have positive results are expected to have capacity to meet the commitments. In turn, the high fixed costs related to issuance of new debt may lead firms to adjust the capital structure regularly (Myers, 1984 and Frank and Goyal, 2003). Accordingly, as the debts are paid with results generated and the adjustment of the level of leverage does not occur immediately, it is expected a negative value between the profitability attribute and debt.

H5: Firms with higher incidence in net assets that are more easily convertible into monetary means, should have a higher level of leverage since they have a cash reserve readily usable (Trade-off model). Therefore, this major liquidity particularly the case of fixed assets is also a major security for creditors (Ozkan, 2001; Sogorb-Mira and Lopez-Gracia, 2003; and Mota and Custodio, 2006).

H6: In light of the pecking order model, liquidity is negatively related to the level of debt. That is, as firms prefer financing through internally generated resources, then, tend to create liquidity reserves from retained earnings in order to finance future investments, thereby reducing the need for external funds (Myers and Majluf, 1984; quoted by Ramalho and Silva, 2006).

H7: Tax advantages regarding depreciations, restorations and tax credits are substitutes for tax benefits of financing with debt.
capital, so, according to the trade-off model, it determines negatively the firm's level of debt (De Angelo and Masulis, 1980; Ross, 1985; and Drobetz and Fix, 2003). The negative relationship between debt and the ratio defined by depreciation of fixed assets and earnings before interest and taxes based mainly on whether the depreciation of fixed assets doesn't give rise to cash flows out of the firm and their values are readily convertible into current financial management.

H8: The trade-off model and bankruptcy cost assume that there is a positive relationship between debt and the firm's size. However, according to these models, the larger is the firm's size the greater is the possibility of the firm to run into debt. One of the main reasons is that the firms with these characteristics are subject to lower cost of bankruptcy and asymmetry of information, lower volatility in its cash flows and capacity to diversify the portfolio of securities (Harris and Raviv, 1990; Fama and French, 2002; and Huang and Song, 2006).

H9: Companies with more fixed assets tend to have a higher level of debt. According to the expectations of the trade-off model, debt is positively related to the level of fixed assets of the firm due to sign guarantees that it may give to creditors in case of settlement of company (Rajan and Zingales, 1995; and Drobetz and Fix, 2003). Additionally, according to the model of agency proposed by Jensen and Meckling (1976) fixed assets also act as protection against creditor's risky strategies promoted by the shareholders.

H10: According to the trade-off and pecking order models, it's expected a negative relationship between the volatility of cash flows of the firm and its level of debt. The existence of a negative value, according to the first model, is due to firms with greater volatility in its cash flows have an increased probability of going bankrupt and, therefore, the tax deduction associated with debt is more uncertain. Hence, the second model considers that firms with greater volatility in their cash flows tend to maintain a lower level of debt due to the cost of debt resulting from this decision (DeAngelo and Masulis, 1980; Kremp et al., 1999; Jorge and Armada, 2001; Drobetz and Fix, 2003; Gaud et al., 2005; and Ramalho and Silva, 2006).

In this study, will be used a proxy of debt by book value, using four alternative definitions of the debt as dependent variables, as in the investigations of Rajan and Zingales (1995), Jorge and Armada (2001) and Drobetz and Fix (2003):
\begin{align*}
Y_1 &= \frac{\text{Total debt}}{\text{Total net assets}} \\
Y_2 &= \frac{\text{Medium / Long term debt}}{\text{Total net assets}} \\
Y_3 &= \frac{\text{Short term debt}}{\text{Total net assets}} \\
Y_4 &= \frac{\text{Total debt}}{\text{Equity}} \\
\end{align*}

In turn, as explanatory variables, we selected those that best suited the economic and financial information available in our sample and are given respectively in the financial literature:

\begin{align*}
X_1 &- \text{Assets' growth (AG)}: \\
\text{AG1} &= \Delta \% \text{ of total net assets}; \quad \text{AG2} = \frac{\Delta \% \text{ of sales and benefits of service}}{\Delta \% \text{ of total net assets}} \\
X_2 &- \text{Profitability (P)}: \\
\text{P1} &= \frac{\text{Operating income}}{\text{Total assets}}; \quad \text{P2} = \frac{\text{Earnings before interest, tax and depreciation}}{\text{Total net assets}} \\
X_3 &- \text{Liquidity (L)}: = \frac{\text{Current assets}}{\text{Current liabilities}} \\
X_4 &- \text{Non-debt tax shields (ND)}: = \frac{\text{Depreciation to total assets}}{\text{Earnings before interest, tax and depreciation}} \\
X_5 &- \text{Firm size (Fs)}: \\
\text{Fs1} &= \text{Natural logarithm of Sales and Benefits of Service}; \quad \text{and} \\
\text{Fs2} &= \text{Number of workers}. \\
X_6 &- \text{Assets' composition (AC)}: = \frac{\text{Fixed assets}}{\text{Total net assets}}
\end{align*}
\( X \_7 \) - Volatility (V):

a) Coefficient of variation of earnings before interest, tax and depreciation =

\[
depr = \sqrt{\frac{\sum_{t=1}^{n} (r_t - \bar{r})^2}{n-1}}
\]

b) where: \( t \) = time dimension; \( n \) = number of observations;

\[
r_t = \frac{\text{Earnings before interest, tax and depreciation of year } t}{\text{Total net assets of year } t}
\]

\( \bar{r} \) = Arithmetic average of \( r_t \).

c) \( \sigma \) Sales growth =

\[
\sigma = \sqrt{\frac{\sum_{t=1}^{n} (x \_t - \bar{x})^2}{n-1}}
\]

where: \( t \) = time dimension; \( n \) = number of observations;

\( x \) = Sales and benefits of services;

\( \bar{x} \) = Arithmetic average of sales and benefits of services;

\( \sigma \) = Standard deviation.

In the present study it will be used a multiple linear regression model, under which we will explain the relationship between the dependent variable (debt) and the explanatory variables (determinants factors). In other words, according to this model, it is considered that the level of debt of a firm is closely related to the attributes of debt. In this context, there is a formulation of the following models:

\[
Y_{1i,t} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \beta_5 x_{5i} + \beta_6 x_{6i} + \beta_7 x_{7i} + \epsilon_{1i,t} \quad (1)
\]

\[
Y_{2i,t} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \beta_5 x_{5i} + \beta_6 x_{6i} + \beta_7 x_{7i} + \epsilon_{2i,t} \quad (2)
\]

\[
Y_{3i,t} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \beta_5 x_{5i} + \beta_6 x_{6i} + \beta_7 x_{7i} + \epsilon_{3i,t} \quad (3)
\]

\[
Y_{4i,t} = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \beta_3 x_{3i} + \beta_4 x_{4i} + \beta_5 x_{5i} + \beta_6 x_{6i} + \beta_7 x_{7i} + \epsilon_{4i,t} \quad (4)
\]
where:

$Y_{1,t}$ = Total debt (total DEBT);
$Y_{2,t}$ = Medium/Long term debt (mit DEBT);
$Y_{3,t}$ = Short-term debt = (st DEBT);
$Y_{4,t}$ = Debt to equity ratio;
$\beta_0$ and $\beta_1$ = Regression coefficients to estimate;
$x_1$ = Assets' growth (AG);
$x_2$ = Profitability (P);
$x_3$ = Liquidity (L);
$x_4$ = Non-debt tax shields (ND);
$x_5$ = Firm size (Fs);
$x_6$ = Assets' composition (AC);
$x_7$ = Volatility (V);
$\varepsilon$ = It is the residual, with expected value zero, constant variance, and not correlated with the explanatory variables of the models;
$i$ = Number of sectors of activity (13);
i = Number of years (10).

According to the classification of fixed and random effects of dynamic models with panel data (e.g., Hamilton, 1994; and Greene, 2003), the four models above can be characterized as models with random effects, since the effects of institutional changes, macroeconomic and temporal effects, as well as the investment financing factors, by the fact of not being easily observed or measured, are represented in the form of a normal random variable.

However, it is worth of notice that we have chosen the proxy of debt by book value, (historical information on the balance sheets and statements of income) derived from the database of the Balance of Central Bank of Portugal. Therefore, we have elaborated a model of multiple linear regression segmented into four parts (total debt, medium/long-term debt, short term debt and debt to equity ratio), according to the number of dependent variables, using the estimation method of generalized least squares.
3. EMPIRICAL RESULTS

Indeed, for the research in question we used aggregate data by sector of activity, (e.g., Wright, 2004; and Frank and Goyal, 2006), covering all sectors of non-financial firm, except governmental institutions, international organizations and other extra territorial institutions, as well as production activities regarding households with employees, according to the Portuguese Classification of Economic Activities.

Since we have analyzed annual aggregated data by sector of activity (observations by various firms for several moments over time) the estimation with panel data is the most appropriate method for the study. Thus, the use of panel data allows us to analyze a greater amount of information, typify the responses of different firms to certain events at different times, reducing the colinearity between the attributes of debt, having major flexibility and efficiency on the estimates.

Additionally, we used the method of estimation of the generalized least squares (GLS) to determine the estimators for the regression coefficients, by minimizing the sum of the squares estimation of waste.

This way, in order to ascertain the determinants of capital structure in the Portuguese market, we selected a sample of 162,831 non-financial firms, distributed in 13 sectors.

We found evidence that the non-financial firms have on average 58% of equity and 42% of debt capital, over the period 1996 to 2005.

A previous study carried out by Jorge and Armada (2001) using a sample of 93 non-financial firms between 1990 to 1995, obtained results that indicated a capital structure of 52% of debt capital and 48% of equity. Also, Silva et al. (1995) quoted by Barros (2007), based on a sample of 117 firms observed in 1994 and 1995, found results that show an average mix of 60% of debt capital and 40% of equity. These results contrast significantly with those obtained in this study. Consequently, we can say that the situation of financing policy has been reversed in the Portuguese capital market during the period under analysis.
Table 1: Distribution of capital structure between 1996/2005

<table>
<thead>
<tr>
<th></th>
<th>totalDEBT</th>
<th>stDEBT</th>
<th>mitDEBT</th>
<th>Debt to equity ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>42%</td>
<td>24%</td>
<td>18%</td>
<td>73%</td>
</tr>
<tr>
<td>Maximum</td>
<td>70%</td>
<td>46%</td>
<td>24%</td>
<td>233%</td>
</tr>
<tr>
<td>Minimum</td>
<td>30%</td>
<td>11%</td>
<td>14%</td>
<td>44%</td>
</tr>
</tbody>
</table>

Table 1 shows that non-financial firms included in the sample are financed, to a large extent, by means of equity (around 58%). Thus, in case of firms' bankruptcy if there is a need to dispose of all assets to settle their debts, they just have to be negotiated on average by 42% of its book value so that all debts are reimbursed to creditors enabling firms the capacity of debt without necessarily increasing the risk of credit.

Notice that from the analysis to the context of debt of non-financial firms in the Portuguese market, the level of short term debt exceeds the long-term during the period under review (see, Figure 1). According to the Financial Stability Report of the Bank of Portugal (2006) and these results, it is assumed that in addition to other sources of financing (debenture loan and leasing), the short-term bank loan is the firms' largest item of capital financing towards the benefits that the method offers regarding flexibility in terms of negotiating interest rate, reimbursement deadlines and the amounts involved in the operation.

![Figure 1: The annual ratios of the capital structure](image)

However, the significant level of financial leverage for the short term leads to the conclusion that non-financial firms in the market present major pressures regarding liquidity and have poor negotiable power with suppliers, given that the Portuguese business scene is characterized mainly by small and medium firms.
We find a situation of absence of heteroscedasticity for our models with reference to the total debt and short-term as dependent variables. The same can't be said for the model using the medium and long term debt and debt to equity ratio as dependent variables, in which the model illustrate the existence of heteroscedasticity, therefore there was a need to correct the estimators.

**Table 2: Level of significance of overall regression**

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>R square</th>
<th>Adjusted R square</th>
<th>Fobs</th>
<th>F c</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1</td>
<td>0,996</td>
<td>0,984</td>
<td>80,749</td>
<td>0,120</td>
</tr>
<tr>
<td>Y2</td>
<td>0,917</td>
<td>0,669</td>
<td>3,6980</td>
<td>0,228</td>
</tr>
<tr>
<td>Y3</td>
<td>0,869</td>
<td>0,477</td>
<td>2,2150</td>
<td>0,343</td>
</tr>
<tr>
<td>Y4</td>
<td>0,993</td>
<td>0,971</td>
<td>46,304</td>
<td>0,021</td>
</tr>
</tbody>
</table>

Given the available statistical evidence in Table 2, we can conclude that the determinants of capital structure included in the model explained on average 94% (coefficient of determination) of the variance of the observed level of debt, using a significance level of 5 %. This applies to the overall significance of regression, with four alternatives for the definition of debt.

**Table 3: Matrix of correlation coefficients of explanatory variables**

<table>
<thead>
<tr>
<th></th>
<th>AG</th>
<th>ND</th>
<th>P</th>
<th>L</th>
<th>Fs</th>
<th>AC</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ND</td>
<td>0,964</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>0,68</td>
<td>0,784</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L</td>
<td>-0,917</td>
<td>-0,943</td>
<td>-0,717</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fs</td>
<td>0,968</td>
<td>0,981</td>
<td>0,694</td>
<td>-0,917</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>AC</td>
<td>0,954</td>
<td>0,989</td>
<td>0,811</td>
<td>0,958</td>
<td>0,957</td>
<td>1</td>
</tr>
</tbody>
</table>

To better organize the results, the matrix of the explanatory variable coefficients referring to total debt is a dependent variable in this model since it is one of the most representative indicators of the overall leverage of firms.

In this context, it's important to refer that the independent variables of the model are highly correlated (see, Table 3), with greater emphasis on the variable assets'composition versus non
debt tax shields (0.989) and the firm’s size versus non-debt tax shields (0.981), highlighting the presence of imperfect multicollinearity given the existence of strong sample correlation between the explanatory variables.

Table 4 presents the significance of individual factors on determining the capital structure, as well as their relationship with the level of total debt and short-term, using the econometric program SPSS 15.1.

<table>
<thead>
<tr>
<th>Determinant Factors</th>
<th>totalDEBT</th>
<th>stDEBT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.9E+0.8</td>
<td>18.441</td>
</tr>
<tr>
<td>AG1</td>
<td>-1.855</td>
<td>-0.434</td>
</tr>
<tr>
<td>AG2</td>
<td>-0.186</td>
<td>-3.350</td>
</tr>
<tr>
<td>P1</td>
<td>0.286</td>
<td>3.728</td>
</tr>
<tr>
<td>P2</td>
<td>-0.646</td>
<td>-0.653</td>
</tr>
<tr>
<td>L</td>
<td>0.095</td>
<td>0.744</td>
</tr>
<tr>
<td>ND</td>
<td>0.097</td>
<td>1.866</td>
</tr>
<tr>
<td>Fs1</td>
<td>-1.201</td>
<td>-0.339</td>
</tr>
<tr>
<td>Fs2</td>
<td>1.453</td>
<td>14.354</td>
</tr>
<tr>
<td>Ac</td>
<td>-1.434</td>
<td>-17.390*</td>
</tr>
</tbody>
</table>

Significant at 5% level of confidence; ** significant at 10% level of confidence

Notice that from the analysis of these results stands out the model of total debt (totalDEBT), which puts in evidence four determinant factors (AG2, P1, Fs2 and Ac), statistically significant at 5% and 10% levels. The short-term model only shows a significant attribute (Fs2), with a confidence level of 10%. From the above, we may conclude that the effect of time, namely the debt’s maturity period regarding the underlying cost of capital is the fundamental reason for the difference of statistical results of both models.

Thus, the size attribute (Fs2) shows a positive relationship with the level of total debt of the firm and a negative relationship with the level of short-term debt. The assets’ growth factor (AG) and assets’ composition (Ac) show the existence of a negative relationship towards the total level of debt. Likewise, the profitability attribute (P) is positively associated with the total debt of non-financial firms in the market. While non-debt tax shields factor (ND) and the liquidity factor (L), according to the used indicators
(depreciation to total debt /EBIT, and Current assets/Current liabilities) and the nature of the results (see, Table 4), allow refuting the presumption that these are determinant factors on the capital structure.

It’s quite clear that the constant’s variable presents a significance of 5%. This suggests that there are other relevant factors on determining the capital structure omitted on this investigation due to difficulties in obtaining public information and measurement, therefore, not included in the tested models. As mentioned previously, they are: the factor of new financial investments, institutional changes effects, macroeconomic (inflation, interest rates, tax changes and investment incentives), temporal effects, business activity (characteristics of the business) and the factor of financial innovation (in terms of creating new instruments of debt).

Table 5: Relationship between the determinant factors of capital structure and the degree of debt

<table>
<thead>
<tr>
<th>Determinant factors</th>
<th>Expected results</th>
<th>Obtained results</th>
</tr>
</thead>
<tbody>
<tr>
<td>AG</td>
<td>(+/-)</td>
<td>(-)</td>
</tr>
<tr>
<td>P</td>
<td>(+/-)</td>
<td>(+/-)</td>
</tr>
<tr>
<td>L</td>
<td>(+/-)</td>
<td>(+)</td>
</tr>
<tr>
<td>ND</td>
<td>(-)</td>
<td>(+/-)</td>
</tr>
<tr>
<td>Fs</td>
<td>(+)</td>
<td>(+/-)</td>
</tr>
<tr>
<td>Ac</td>
<td>(+)</td>
<td>(-)</td>
</tr>
<tr>
<td>V</td>
<td>(+/-)</td>
<td>('*)</td>
</tr>
</tbody>
</table>

* Variable removed from the analysis process, because of historical value considered to be very close to zero

However, given the statistical evidence available on the firm's size, assets' growth, assets' composition and profitability, it is noteworthy that the mirrored results are consistent with the theory suggested by financial literature, as shown afterwards.

Through the analysis of the results displayed in Table 5, it is possible to see that the variable assets' growth, using the proxies of Δ% sales and benefits services/Δ% of total net assets and Δ% of total net assets as a measure of debt, corroborates the assumption according to which, firms that have growth options, cost of debt should be increased so that a higher level of debt isn't encouraged
(negative relationship between the degree of debt and attribute growth of total assets). This result is in accordance with the principles of the trade-off model defended by Myers (1984); Sogorb-Mira and Lopez-Gracia (2003); and Berk (2006). Thus, one can in fact say that firms with considerable growth opportunities in the market have the need for new investment and, therefore seek to maintain low levels of debt so that in case of need for capital, they can easily turn to the financial market.

So, we reject the assumption H2 that corroborates the positive view of the pecking order model, and agree with H1 which is in accordance with the trade-off model and cost of agency.

In the case of the return attribute, we found evidence that, on the one hand, firms with higher level of profitability choose to use a low ratio of debt due to high fixed costs related to the issuance of new debt (cost of capital, transaction and tax) and the assumption of adverse selection, which confirms the pecking order model (e.g., Donaldson, 1961; Myers, 1984; Frank and Goyal, 2003; and Kayhan and Titman, 2007).

On the other hand, given the tax benefits and lower cost of bankruptcy resulting from the expected decision of debt, the non-financial firms in the market tend to have higher levels of debt (using the proxy Operating income/Total net assets), both in short and medium and long term. In this context, stands out the fact that the operating results have great impact on the financing policy and firm’s investment, since its progression over time allows to gauge if the firm is able to generate funds sustainably based on their activity, to meet the existent debt servicing and/or eventual collapses. These conclusions are in line with the pattern of trade-off model and the results found by Fama and French (2003); and Frank and Goyal (2006). So, assumption H3 and H4 are acceptable according to the theoretical foundation as defined in section 2.

As for the liquidity factor, the results found in this study (positive relationship) confirm the assumptions described above (H5), according to which, firms with more liquid assets have higher levels of debt since they have a cash reserve readily usable. This result is contrary to the results found by Ramalho and Silva (2006) which indicate a negative relationship in the Portuguese market due to the liquidity ratio (Current asset/Current liability).

In this case we reject the assumption of the pecking order model (H6), regardless of the dependent variable definition used to measure the level of debt. In other words, under this model the
liquidity doesn't exercise great influence on the level of debt, although it represents a potential capacity of the firm's paying off its financial responsibilities.

The evidence found for the non-debt tax shields, using the short-term debt, points out that the tax advantages towards depreciations, restorations and tax credits are substitutes for tax benefits of debt capital financing, mirroring a negative relationship (H7). Based on this line of thought, as the depreciation doesn't result from the firm's cash flows due to not corresponding to a payment, but to a mitigation of costs it's considered an obvious advantage in relation to non-debt tax shields, since they are readily usable values on the financial management of the firm.

Thus, the importance of non-debt tax shields attribute contrasts with the inferences mentioned in Jorge and Armada (2001), using the same proxy, and confirms the assumptions of the trade-off model quoted in De Angelo and Masulis (1980); Ross (1985); and Drobetz and Fix (2003).

Given the robustness of the results obtained on the attribute firm's size (see, Table 4) and the conjecture previously established on this factor (v.g., H8), we can highlight that the biggest firms in the market have major possibility of debt due to lower bankruptcy costs and asymmetry of information, lower volatility in its cash flows and ability to diversify the portfolio of securities.

Based on this understanding, the number of workers is a clear indicator of the firm's size unlike the natural logarithm of sales and benefits services, as cited by Barros (2007). In turn, the found result also validates the trade-off model and bankruptcy cost (e.g., Titman and Wessels, 1988; Harris and Raviv, 1990; Fama and French, 2002; and Huang and Song, 2006).

The expected positive relationship between debt and assets' composition (H9) is rejected in accordance with the used indicator (Fixed assets/Total net assets). In this context, we reject the conclusions obtained previously regarding the impact of fixed assets and level of debt (Rajan and Zingales, 1995; and Drobetz and Fix, 2003), and the regime of securitization of credit that allows firms with low risk assets to obtain financing on more favorable terms.

Certainly, in the period under review, one concludes that, contrary to what some authors argued above, these attributes tells us nothing about the firm's ability to reimburse any of their responsibilities, in the sense of continuity, since the fixed assets are
subject to a constant review, which may overstate its value on the balance sheet.

Using the coefficient of variation of earnings before interest, tax and depreciation, and the standard deviation of sales growth, as a proxy to the volatility factor, leads us to reject the assumption advocated by trade-off and the pecking order models, whereby there is a negative relationship between the volatility of cash flows of a firm and its level of leverage.

4. CONCLUSIONS

This study aimed mainly to identify the empirical determinants of capital structure which contributed to determine the level of debt of non-financial firms in the Portuguese market. In this context, after testing various alternative specifications, it appears that not all the attributes of debt are significant in determining the capital structure of non-financial firms in the market.

The results on the determinants of capital structure chosen in this research reflect a high degree of explanation when related to total debt and short term, taking the debt by book value as measure of debt. Contrary to what happens when the debt is related to medium and long term and debt to equity ratio. What leads us to conclude that, although such measures seemed appropriate to reflect on the factors considered as determinants of capital structure, the values obtained did not allow us to corroborate these ideas.

The market is characterized mainly by small and medium firms, with 58% of equity in its capital structure. As for the debt structure the short-term bank loans are dominant.

Thus, the assets' growth factor presents a negative relationship towards the total level of debt. Also, the return reflects a negative relationship given the cost of capital, as there is an inverse relationship with the benefits from the tax debt.

While the liquidity factor and non-debt tax shields doesn't reveal results statistically significant, they were selected by measuring its financial validation. Thus, the basic idea is that firms with more liquid assets have a higher level of debt (positive relationship) and the tax advantages towards depreciation, restorations and tax credits are substitutes for debt tax benefits with
debt capital (negative relationship), because they are readily usable values on the financial management of the firm.

Consequently, the assets' composition factor, contrary to what some authors claimed (positive relationship), in this study we have found evidence that allows us to gauge that the level of a firm assets' tangibility isn't capable of reimbursing any kind of financial responsibilities in the sense of continuity.

Finally, the results found on the economic risk factor cannot provide empirical support for the current financial literature. That is, according to the evidence found, it's assumed that the economic risk isn't a determinant of capital structure of non-financial firms during the period under review using the indicators (coefficient of variation of earnings before interest, tax and depreciation and standard deviation of sales growth).

This paper gives a new contribution to solutions regarding debt and management underlying risks, thus, contributing to a new vision for entrepreneurs, investors, managers, governments, creditors and the academic community in general, on decision-making process of firms' capital structure and the factors that determine it.

Given the significance of the constant model, it appears that, in addition to the determinants of capital structure selected, other attributes aren't considered relevant due to lack of public information. In this context, future similar work should strengthen the empirical results, possibly looking for a database that includes firms that have strategic developments relating to mergers and acquisitions and the possibility of introducing models in the analysis of leverage of the following attributes: the control of shareholders, the financing of new investments, the uniqueness, and investment incentives.

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