

## Determinants of capital structure: New evidence from Portuguese small firms

### Determinantes da estrutura de capital: Evidências das pequenas empresas portuguesas

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#### Abstract

This paper studies the determinants of capital structure of 2,329 Portuguese small firms, decomposing total liabilities in long and short-term debt. The results of 2007-2011 panel data suggest that information asymmetry and agency problems seem to be important for small firms in accessing long-term debt. Greater size and a higher level of collateral are quite important in accessing long-term debt. Liquidity is positively associated with long-term debt, although it is negatively related to short-term debt. Higher profitability is related to lower levels of debt. When internal finance is insufficient, these firms seem to be strongly dependent on short-term debt, due to the difficulties in accessing long-term. The main conclusion of the current study is that the predictions of POT and TOT are followed by small firms in their capital structure, which is in accordance with the results of previous studies focusing on SMEs.

**Keywords:** capital structure; panel data models; small firms.

#### Resumo

Neste trabalho, analisamos os determinantes do endividamento das pequenas empresas portuguesas, utilizando os modelos de dados em painel e decompondo a dívida em médio/longo prazo e curto prazo. Os resultados obtidos sugerem que a informação assimétrica e os problemas de agência influenciam o acesso à dívida de longo prazo por parte destas empresas, assim como a dimensão e o nível de colateral. A liquidez está positivamente associada com a dívida de longo prazo e negativamente com a de curto prazo. Maior rentabilidade está relacionada com menor endividamento. Quando os fundos internos são insuficientes, as empresas parecem estar fortemente dependentes da dívida de curto prazo, dadas as dificuldades no acesso à de longo prazo. A principal conclusão deste trabalho é a de que os pressupostos da *pecking-order theory* e da *trade-off theory* se aplicam à estrutura de capital das pequenas portuguesas, o que está de acordo com os resultados obtidos em estudos anteriores sobre PME.

**Palavras-chave:** estrutura de capital; dados em painel; pequenas empresas.



## 1. Introduction

After publication of the famous work by Modigliani and Miller (1958), the topic of capital structure has inspired many researchers. Firms' capital structure decisions are one of the most researched topics in corporate finance. Modigliani and Miller (1958) argue that, under a set of assumptions (complete and perfect capital markets), capital structure does not affect firm value. Removing one or more of Modigliani and Miller's assumptions, many theories of capital structure have been proposed. Trade-off theory (hereafter TOT) and pecking-order theory (hereafter POT) are the main theories used to explain firms' financing decisions.

Micro and small firms face greater restrictions in obtaining external finance, namely a greater rejection rate of bank loans, and higher interest rates in comparison to larger firms (Doove, Gibcus, Kwaak, Smit & Span, 2014). Beck, Demirgüç-Kunt, Laeven and Maksimovic (2006), analysing USA firms, conclude that firm size is negatively related to the obstacles in accessing external finance. Besides the literature showing that firm size is a determinant of capital structure, the majority of studies analyze Small and Medium-Sized Enterprises (SMEs) as a whole, with the exception of some studies (López-Gracia & Aybar-Arias, 2000; Heshmati, 2001; Psillaki & Daskalakis, 2009). The main objective of this paper is to test trade-off and pecking-order theories in the field of small firms, taking into account their particular characteristics. Additionally, considering the arguments of several authors (Chittenden, Hall & Hutchinson, 1996; Bevan & Danbolt, 2004) that analysis of capital structure determinants based on total debt may mask significant differences between long-term and short-term debt, we also analyse the determinants of short-term and long-term debt.

In 2008, 343,151 of the 350,871 Portuguese non-financial firms were micro and small firms, providing 53% of total employment and representing 36.3% of total turnover (Instituto Nacional de Estatística [INE], 2010). To reach the objective of this study, we consider a sample of 2,329 small Portuguese firms with data taken from the Amadeus database, for the period between 2007 and 2011. As method of estimation, we use fixed effect panel data models. The results obtained show the existence of a negative relationship between profitability and debt, suggesting that small firms follow the predictions of POT in their capital structure decisions. Furthermore, a positive relationship was identified between size and debt, which can be interpreted in accordance with the predictions of TOT. In the current study, small firms with higher levels of liquidity seem to have higher levels of long-term debt, probably due to more favourable conditions in obtaining long-term debt. In general, the results suggest that POT and TOT are not mutually exclusive in explaining the capital structure decisions of small firms.

The remainder of this paper is organized as follows. In section 2, the literature review is presented and research hypotheses are formulated. Section 3 presents the methodology used. The results are presented in section 4. Finally, section 5 presents the conclusion and implications.

## 2. Literature review and research hypotheses

Recent research on firms' capital structure has been synthesized into the frameworks of TOT and POT. TOT includes fiscal issues, financial distress and conflicts of interest. It

assumes that firms have a target debt level (Taggart, 1977; Jalilvand & Harris, 1984). Various authors (López-Gracia & Sánchez-Andújar, 2007; López-Gracia & Sogorb-Mira, 2008) consider that the target debt ratio depends on a firm's characteristics. TOT predicts an optimal capital structure that maximizes the advantages of debt tax-shields and minimizes bankruptcy costs (Shyam-Sunder & Myers, 1999; Fama & French, 2002; Frank & Goyal, 2008). Debt allows firms to benefit from debt tax-shields (Modigliani & Miller, 1963; DeAngelo & Masulis, 1980) and reduce the free cash flow problem between managers and shareholders (Jensen & Meckling, 1976; Jensen, 1986; Stulz, 1990). However, there are disadvantages associated with debt: agency costs, which arise mainly from the potential conflicts between managers/owners and creditors (Jensen & Meckling, 1976; Myers, 1977) and financial distress costs (Robichek & Myers, 1966; Kraus & Litzenberger, 1973; Scott, 1976; Kim, 1978).

POT, proposed by Myers (1984) and Myers and Majluf (1984), provides a theoretical foundation for the proposition of Donaldson's 1961 study, regarding the financing practices of a sample of large firms. Donaldson concludes that firms, in the long-term, establish a growth rate compatible with the generation of internal funds (Donaldson, 1961).

In accordance with POT, firms do not intend to reach an optimal debt ratio. Instead, capital structure is the result of cumulative funding needs. Firms follow a hierarchical order in the choice of financing sources, which is based on funding costs. Asymmetric information and agency problems between managers/owners and external investors generate costs (Hall, Hutchinson & Michaelas, 2000). Therefore, firms would prefer to use internal funds, followed by debt. When those financing sources are exhausted, firms will issue equity.

According to Holmes and Kent (1991), the majority of small firms do not issue equity, because they are outside the stock market and their owners are reluctant to open up the firm's capital to external investors, to avoid diluting their ownership interest and control.

Beck, Demirgüç-Kunt and Maksimovic (2008) investigated whether the financing patterns of small firms differ from those of large firms. Using a firm-level survey database, covering 48 countries (80% of observations concern SMEs), their results show that small firms finance their investments through a lower proportion of external finance. Many small firms begin their activities undercapitalized with inadequate financial resources. Additionally, small firms, unlike their larger counterparts, are unable to raise capital in the public debt and equity markets (Ang, 1991).

Subsequently, we analyse the determinants of small firms' capital structure decisions as well as their relationships with capital structure theories.

## **2.1 Firm size**

In accordance with TOT, firm size is positively associated with the level of leverage. Taking bankruptcy costs into account, Scott (1976) argues that larger firms are more prone to obtain debt, because they have a high value of assets granting their capacity to pay off the debt and interest. Furthermore, larger firms are more diversified, implying a lower risk for creditors (Ang, 1992). Considering the scale effect of bankruptcy costs, Gruber and Warner (1977) and Ang, Chua and McConnell (1982) argue that those costs tend to be lower for larger firms.

Barnea, Haugen and Senbet (1981) argue that agency problems will tend to be more severe whenever the level of asymmetric information is greater. Problems of asymmetric

information and moral hazard will be greater for small firms, because of the lack of financial disclosure and their owner-managed nature. Therefore, lenders will be unwilling to lend long-term to small firms on favourable terms (Chittenden *et al.*, 1996). To overcome those problems, SMEs tend to issue short-term debt (Heyman, Deloof & Ooghe, 2008). Pettit and Singer (1985) argue that debt costs may be higher for small firms, but equity costs are even higher for those firms than for larger firms. Consequently, small firms frequently have a higher level of short-term debt than larger firms.

The existence of asymmetric information between lenders and borrowers is one of the most common imperfections in the credit market. This is more problematic in small firms due to the poor quality of their financial information (López-Gracia & Aybar-Arias, 2000). Empirical studies on the capital structure of small firms have identified a positive relationship between firm size and total leverage (Sogorb-Mira 2005; Serrasqueiro, Armada & Nunes, 2011; Degryse, Goeij & Kappert, 2012). Several authors (Chittenden *et al.*, 1996; Michaelas, Chittenden & Poutziouris, 1999; Hall, Hutchinson & Michaelas, 2004) find a negative effect of firm size on short-term debt, but other studies (Michaelas, Chittenden & Poutziouris, 1999; Bhaird & Lucey, 2010; Degryse *et al.*, 2012) identify a positive relationship between size and long-term debt.

*Hypothesis 1: Firm size is positively related to debt.*

*Hypothesis 1a: Firm size is positively related to long-term debt.*

*Hypothesis 1b: Firm size is negatively related to short-term debt.*

## **2.2 Asset Structure**

According to Myers (1993), distress costs are directly affected by a firm's asset structure, given that tangible assets support more debt than intangible assets. Harris and Raviv (1990) argued that a higher value of tangible assets is related to greater debt capacity. Tangible assets can be used as collateral in the case of firm bankruptcy, protecting creditors' rights. Apart from this advantage, tangible assets may also be used to reduce agency problems (Degryse *et al.*, 2012). Michaelas *et al.* (1999) claim that firms with valuable tangible assets, which can be used as collateral, have easier access to debt and probably higher levels of debt than firms with low levels of tangible assets.

Asset tangibility also mitigates problems of information asymmetry. POT predicts a positive relationship between asset tangibility and leverage, considering that a higher level of tangible assets increases the possibility of collateral and lessens problems of information asymmetry between SMEs managers/owners and creditors (Michaelas *et al.*, 1999; Sogorb-Mira, 2005).

Empirical studies on the capital structure of small firms tend to find a positive relationship between asset tangibility and total leverage (Sogorb-Mira 2005; Serrasqueiro *et al.*, 2011; Degryse *et al.*, 2012). Several authors identify a negative effect of asset tangibility on short-term debt but a positive one on long-term debt (Chittenden *et al.*, 1996; Hall *et al.*, 2004; Sogorb-Mira 2005).

*Hypothesis 2: Tangible assets are positively related to debt.*

*Hypothesis 3: Tangible assets have a stronger positive effect on long-term debt than on short-term debt.*

### **2.3 Liquidity**

TOT predicts a positive relationship between liquidity and leverage. Bankruptcy costs tend to be higher for firms with low levels of liquidity, and so they will face more obstacles in obtaining debt (Degryse *et al.*, 2012). According to POT, there is a negative relationship between debt and liquidity, because firms with high levels of liquidity have more internal funds, and therefore tend to borrow less. De Jong, Kabir and Nguyen (2008) consider that in the presence of asymmetric information, accumulated cash and other liquid assets serve as internal sources of funding that firms will use first instead of debt.

*Hypothesis 4: Liquidity is negatively related to debt.*

### **2.4 Profitability**

According to TOT, the most profitable firms have greater debt capacity, and can take advantage of debt tax-shields (MacKie-Mason, 1990; Fama & French, 2002). The most profitable firms are probably more able to fulfil their responsibilities, regarding the repayment of debt and interest, which contributes to less likelihood of bankruptcy.

On the contrary, POT predicts an inverse relationship between profitability and the level of debt. According to POT, profitable firms will finance their investments with internal funds. They move to external finance only when internal funding is insufficient. Additionally, firms prefer debt to equity (Myers, 1984; Chittenden *et al.* 1996). Michaelas *et al.* (1999), using panel data for U.K. small firms over a ten-year period (1986-1995), find that profitability affects the structure of debt maturity in SMEs, providing evidence of the preference for short-term financing over long-term in small businesses.

These empirical studies on capital structure determinants found a negative relationship between profitability and debt ratio.

*Hypothesis 5: Profitability is negatively related to debt.*

### **2.5 Growth opportunities**

TOT predicts a negative relationship between growth opportunities and leverage. As shown by Myers (1977), the underinvestment problem becomes more acute in firms with high levels of growth opportunities. Myers (1977) argues that firms with high levels of investment opportunities face difficulties in obtaining debt because the expected costs of financial distress are higher for firms in this situation. Firms with greater growth opportunities have a lower level of debt, given that these firms face higher agency problems between managers/owners and creditors, because the former have great incentives to under-invest (Myers, 1977; Smith & Warner, 1979). Additionally, according to TOT, growth opportunities have no value in the case of firm bankruptcy, and so bankruptcy costs associated with recourse to debt are greater in firms with high growth opportunities.

Firms with higher growth opportunities have greater funding needs. In accordance with POT, when internal finance is exhausted, firms prefer debt to external equity to fund growth opportunities associated with a greater risk than investment in assets in place (Baskin 1989; Shyam-Sunder & Myers, 1999; Ramalho & Silva, 2009). These authors state

that firms with good growth opportunities increase debt when internal funds are insufficient. Therefore, POT forecasts a positive relationship between growth opportunities and debt. Empirical studies on SMEs tend to identify a positive relationship between growth opportunities and leverage (Michaelas *et al.*, 1999; Degryse *et al.*, 2012).

*Hypothesis 6: Growth opportunities are positively related to debt.*

## **2.6 Taxes**

According to Modigliani and Miller (1963), in the presence of tax on corporate income, firms should fund as much as possible of their investment through debt (greater marginal tax rate implies greater tax benefits). Those authors consider that debt generates tax-shields, but ignore important aspects, namely, that firms can obtain tax benefits alternatively to debt tax-shields and that debt increases the probability of bankruptcy. However, firms may increase their leverage ratio until the level that does not significantly increase the inherent costs of financial distress. In this framework, Scott (1976) argues for a positive relationship between level of debt and corporate tax rate.

Constand, Osteryoung and Nast (1991) and Michaelas *et al.* (1999) found no significant effects of corporate tax on level of leverage. Degryse *et al.* (2012) conclude that the tax rate has a significant negative effect on total and long-term debt, but a slightly positive effect on short-term debt.

*Hypothesis 7: Effective tax rate is positively related to debt.*

## **2.7 Non-debt tax shields**

According to DeAngelo and Masulis (1980), non-debt tax shields, such as deductions allowed by depreciation and amortization as well as investment tax credit could substitute the role of tax savings permitted by debt. This implies that a firm with a high level of non-debt tax shields will probably have a lower level of debt than a firm with low non-debt tax shields. TOT forecasts a negative relationship between non-debt tax shields and debt. Constand *et al.* (1991) and Degryse *et al.* (2012) do not identify a significant effect of non-debt tax shields on debt ratio. However, Jordan, Lowe and Taylor (1998) and Michaelas *et al.* (1999) conclude that non-debt tax shields have a negative effect on total debt.

*Hypothesis 8: Non-debt tax shields are negatively related to debt.*

## **3. Methodology**

### **3.1 Database and variables**

In the present study we use data gathered from the Amadeus database supplied by Bureau van Dijk's, containing economic and financial information on European firms. The firms forming the research sample meet the definition established by the European Commission for small firms (Commission of the European Communities [CEC], 2003, Recommendation Nr. C(2003) 1422), according to which, a business unit is considered a small firm when: i) it

employs fewer than 50 people; and ii) its turnover or total annual balance sheet does not exceed € 10 million.

We remove financial and insurance firms (due to their specific financial behaviour and uniqueness), and firms without employees or turnover. We remove all entries which show unreasonable values, namely, when the percentage of fixed assets over total assets exceeds 100% and/or equity presents negative values. The data set has been restricted to observations including all the variables, and also where these variables have a complete record over the period of analysis. The final sample contains 2,329 small firms. The data obtained refers to the period from 2007 to 2011, and so we have a panel made up of 11,645 observations. Table 1 presents the research variables and their respective measures. The proxies of the determinants of capital structure, as independent variables, have been used in various earlier studies (e.g. Degryse *et al.* 2012).

Table 1. Measurement of variables

Variables	Measurement
Debt ( $LEV_{i,t}$ )	Ratio between Debt and Total Assets
Short-term Debt ( $SLE_{i,t}$ )	Ratio between Short-term Debt and Total Assets
Long-term Debt ( $LLE_{i,t}$ )	Ratio between Long-term Debt and Total Assets
Size ( $SIZE_{i,t}$ )	Natural logarithm of Total Assets
Liquidity ( $LIQ_{i,t}$ )	Ratio between (Debtors-Creditors) and Total Assets
Asset Structure ( $TANG_{i,t}$ )	Ratio between Tangible Assets and Total Assets
Profitability ( $PROF_{i,t}$ )	Ratio between Earnings Before Interest and Taxes and Total Assets
Growth Opportunities ( $GO_{i,t}$ )	Ratio between ( $Total Assets_{i,t} - Total Assets_{i,t-1}$ ) and $Total Assets_{i,t-1}$
Effective Tax Paid ( $TAX_{i,t}$ )	Ratio between Tax Paid and Earnings Before Tax
Non-Debt Tax Shields ( $NDTS_{i,t}$ )	Ratio between Depreciations and Amortizations and Total Assets

Source: Authors.

Regarding the proxy of capital structure, we use total debt ( $LEV_{i,t}$ ). Additionally, in order to carry out a decompositional analysis of the total debt ratio, we, also consider as dependent variables, long-term debt ( $LLE_{i,t}$ ) and short-term debt ( $SLE_{i,t}$ ). Based on the studies mentioned before, debt is measured by its book value and the explanatory variables are the measures presented in Table 1.

### 3.2 Estimation model

The possibility of determining firms' individual effects mitigates the problem of the absence of possible variables relevant in explaining the dependent variable.

Using an OLS regression, firms' non-observable individual effects are not controlled, and heterogeneity, a consequence of not considering those effects, may cause the estimates to be biased and inconsistent (Wooldridge, 2002).

To check the relevance of non-observable individual effects we use the Lagrange Multiplier (LM) test. This tests the null hypothesis of non-relevance of non-observable individual effects, against the alternative hypothesis of relevance of non-observable individual effects. The results of the LM test indicate we can reject the null hypothesis, at 1% significance. Therefore, an OLS regression will not be the most appropriate way to evaluate

the relationship between debt and its determinants, since we do not consider the heterogeneity of companies.

However, there may be correlation between firms' non-observable individual effects and debt determinants. Non-observable individual specific effects are identically and independently distributed and do not vary over time. These effects could include managerial incentives, productivity and skills or factors which are specific to the firm, e.g. entry barriers and competitiveness of the industry. If there is no correlation between companies' non-observable individual effects and capital structure determinants, the most appropriate way to evaluate is by using a panel model of random effects. If there is correlation between firms' individual effects and capital structure determinants, the most appropriate estimation method is a panel model admitting the existence of fixed effects. To test for the possible existence of correlation we use the Hausman test. The results of the Hausman test allow us to reject the null hypothesis of absence of correlation between companies' non-observable individual effects and debt determinants, at 1% significance. In turn, time-specific effects vary over time, but are the same for each firm at any given point in time. These effects include factors that influence firms, namely inflation and interest rates (Sogorb-Mira & López-Gracia, 2003).

We test for the existence of first and second order autocorrelation, considering estimation of the relationships between determinants and total, short and long-term debt, using fixed effect panel models. The results, whether we consider total, short-term or long-term debt, indicate rejection of the null hypothesis of non-existence of first-order autocorrelation, but we cannot reject the null hypothesis of non-existence of second-order autocorrelation.

Given the relevance of the correlation between non-observable individual effects and the determinants of debt, and the existence of first-order autocorrelation, we may conclude that the most correct way to estimate the relationships between debt determinants is by using a fixed effect panel model, consistent with the existence of first-order autocorrelation. Thus, estimation of the relationships between determinants and total debt, long-term debt and short-term debt, using panel models of fixed effects, can be presented in the following way:

$$LEV_{i,t} = \beta_0 + \beta_1 NDTS_{i,t} + \beta_2 PROF_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 TANG_{i,t} + \beta_5 GO_{i,t} + \beta_6 TAX_{i,t} + \beta_7 LIQ_{i,t} + d_t + e_{i,t} + \mu_{i,t} \quad (1)$$

$$LLE_{i,t} = \beta_0 + \beta_1 NDTS_{i,t} + \beta_2 PROF_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 TANG_{i,t} + \beta_5 GO_{i,t} + \beta_6 TAX_{i,t} + \beta_7 LIQ_{i,t} + d_t + e_{i,t} + \mu_{i,t} \quad (2)$$

$$SLE_{i,t} = \beta_0 + \beta_1 NDTS_{i,t} + \beta_2 PROF_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 TANG_{i,t} + \beta_5 GO_{i,t} + \beta_6 TAX_{i,t} + \beta_7 LIQ_{i,t} + d_t + e_{i,t} + \mu_{i,t} \quad (3)$$

in which:  $i$  represents each of the firms,  $t$  represents the period of time,  $LEV_{i,t}$  is total debt,  $LLE_{i,t}$  is long-term debt,  $SLE_{i,t}$  is short-term debt,  $NDTS_{i,t}$  is non-debt tax shields,



$PROF_{i,t}$  is profitability,  $SIZE_{i,t}$  is size,  $TANG_{i,t}$  is asset structure,  $LIQ_{i,t}$  is liquidity,  $TAX_{i,t}$  is the effective tax rate,  $GO_{i,t}$  corresponds to growth opportunities;  $d_t$  are year dummy variables that measure the impact of possible macroeconomic alterations on firm debt,  $e_{i,t}$  is the error which is assumed to have normal distribution and  $\mu_{i,t}$  measures non-observable effects.

#### 4. Results

##### 4.1 Descriptive statistics and correlation matrix

The descriptive statistics are presented in Table 2.

Table 2. Descriptive statistics

Variables	Mean	Median	S.D.	Min	Max
LEV <sub>i,t</sub>	0.62245	0.66553	0.21914	0.00000	0.99983
SLE <sub>i,t</sub>	0.40985	0.39337	0.23449	0.00000	0.99875
LLE <sub>i,t</sub>	0.21260	0.15297	0.21765	0.00000	0.98875
SIZE <sub>i,t</sub>	2.80720	2.84030	0.53055	0.79945	4.41602
LIQ <sub>i,t</sub>	0.11257	0.08229	0.22441	-0.74419	0.97584
TANG <sub>i,t</sub>	0.40541	0.37445	0.25028	0.00106	0.99467
PROF <sub>i,t</sub>	0.03937	0.03358	0.08686	-1.34730	0.80674
GO <sub>i,t</sub>	0.10087	0.01891	0.75853	-0.86107	1.79000
TAX <sub>i,t</sub>	0.19218	0.19011	0.23440	-0.99375	0.99899
NDTS <sub>i,t</sub>	0.04889	0.03659	0.048846	0.00000	0.99930

Note: Variables are defined in Table 1.

Source: Authors.

According to the results, the main financing source of small Portuguese firms is debt, considering that the average total debt ratio is about 62.25%. These firms have more short-term than long-term debt (66% of total debt is short-term debt). The results are in accordance with Hall *et al.* (2004), short-term debt being the main financing source of small Portuguese firms.

Over the period 2007-2011, the average size of small firms is approximately 641,500€. The average of tangible assets represents about 41% of total assets. Average profitability, over the period of analysis, is almost 4%. Growth opportunities average about 10.1%. The average tax rate of Portuguese small firms is about 19%. The average of non-debt tax shields is about 4.9%.

Table 3 shows the results of the correlation matrix. Considering that the correlations presented before are not far from 30%, the problem of collinearity between independent variables is not particularly relevant in this study (Gujarati & Porter, 2010/1992).

Table 3. Correlation matrix

Variables	LEV <sub>i,t</sub>	SLE <sub>i,t</sub>	LLE <sub>i,t</sub>	SIZE <sub>i,t</sub>	LIQ <sub>it</sub>	TANG <sub>i,t</sub>	PROF <sub>i,t</sub>	GO <sub>i,t</sub>	TAX <sub>i,t</sub>	NDTS <sub>i,t</sub>
LEV <sub>i,t</sub>	1									
SLE <sub>i,t</sub>	0.4468*	1								
LLE <sub>i,t</sub>	0.5036*	-0.548*	1							
SIZE <sub>i,t</sub>	0.358**	0.084	0.2288*	1						
LIQ <sub>it</sub>	-0.269*	-0.163*	-0.095*	0.035	1					
TANG <sub>i,t</sub>	0.3000*	-0.0409	0.3200*	0.2216*	-0.355*	1				
PROF <sub>i,t</sub>	-0.151*	-0.0692	-0.0743	-0.0852	0.2238*	-0.187*	1			
GO <sub>i,t</sub>	0.0002	-0.0086	0.0085	-0.026	-0.0147	0.0493	0.0769	1		
TAX <sub>i,t</sub>	-0.0564	0.0778	-0.128*	-0.0283	0.1167*	0.201**	0.02905*	-0.0524	1	
NDTS <sub>i,t</sub>	0.0996*	0.0423	0.0423	-0.3357*	-0.1271	-0.0524	0.0803	-0.1137*	0.0701	1

Notes: 1. Variables are defined in Table 1.  
2. \*\*Statistically significant at 1% level; \* Statistically Significant at 5% level.

Source: Authors.

#### 4.2 Determinants of debt and discussion of the results

Table 4 presents the results of the panel data models, regarding the relationships between determinants and total debt, long-term debt and short-term debt. Analysing the results of the F test, we conclude that we can reject the null hypothesis that the explanatory variables, together, do not explain the explained variable, and so the determinants selected in this study can be considered explanatory of the debt.

The results show a positive relationship between size and total debt, suggesting that larger firms have greater debt. Furthermore, larger firms seem to rely more on short-term debt as well as long-term debt. Probably, larger firms access long-term debt on more favourable terms due to a greater bargaining power with creditors (Grunert & Norden, 2012). These results seem a consequence of information asymmetry and agency problems, which are particularly important for small firms, contributing to the obstacles they face in accessing debt. Based on these results, we cannot reject *hypothesis 1*. These results agree with previous studies about SMEs (Sogorb-Mira 2005; Bhaird & Lucey 2010; Degryse *et al.* 2012), which conclude that agency problems and asymmetric information in relationships between SMEs and creditors contribute to unfavourable conditions for SMEs when accessing debt.

In this study, we identify positive and statistically significant relationships between long-term debt, short-term debt and size. Therefore, we do not reject *sub-hypothesis 1a*, corroborating the results of other studies (Michaelas *et al.*, 1999; Bhaird & Lucey, 2010; Degryse *et al.*, 2012), which identify a positive effect of size on long-term debt. However, we reject *sub-hypothesis 1b*, given there is not a negative effect of firm size on short-term debt. Thus, we do not corroborate the results of other studies (Michaelas *et al.*, 1999; Hall *et al.*, 2004; Matias, Baptista & Salsa, 2015). The results obtained in the current study regarding the relationships between total debt, long-term debt and short-term debt and size are according to the principles of TOT and POT.

Table 4. Determinants of small firms' capital structure

Independent Variables	Dependent Variable: LEV <sub>i,t</sub> Fixed Effects AR(1)	Dependent Variable: LLE <sub>i,t</sub> Fixed Effects AR(1)	Dependent Variable: SLE <sub>i,t</sub> Fixed Effects AR(1)
<i>LIQ</i> <sub>i,t</sub>	-0.06852*** (0.00766)	0.04604*** (0.01656)	-0.12149*** (0.01692)
<i>NDTS</i> <sub>i,t</sub>	0.05969** (0.02497)	0.05023 (0.05378)	0.00507 (0.05495)
<i>PROF</i> <sub>i,t</sub>	-0.31443*** (0.01042)	-0.16798*** (0.02339)	-0.14221*** (0.023857)
<i>SIZE</i> <sub>i,t</sub>	0.38891*** (0.01164)	0.13958*** (0.02353)	0.18976*** (0.02403)
<i>TANG</i> <sub>i,t</sub>	-0.01727* (0.00997)	0.05056** (0.02179)	-0.06925** (0.02226)
<i>GO</i> <sub>i,t</sub>	-0.00227** (0.00098)	-0.00239 (0.00226)	0.002585 (0.00231)
<i>TAX</i> <sub>i,t</sub>	-0.00507 (0.00344)	-0.00071 (0.00774)	-0.007411 (0.00791)
CONS	-0.48578*** (0.01647)	-0.19000*** (0.04667)	0.12063*** (0.04770)
Observations	11,645	11,645	11,645
F(N(0,1))	231.58**	14.61**	34.76**
m1(N(0,1))			
m2(N(0,1))			
R <sup>2</sup>	0.2492	0.1292	0.1192

- Notes: 1. Variables are defined in Table 1.  
 2. F test has normal distribution N(0,1) and tests the null hypothesis of overall insignificance of the estimated parameters.  
 3. m1 test is a test for first order autocorrelation of residuals and is distributed as N(0,1), with the null hypothesis being no first order autocorrelation.  
 4. m2 test is a test for second order autocorrelation of residuals and is distributed as N(0,1), with the null hypothesis being no second order autocorrelation.  
 5. Standard deviations in brackets.  
 6. \*\*\* significant at 1% significance; \*\* significant at 5%; \* significant at 10%.  
 7. Estimations include time dummy variables.

Source: Authors.

According to the results presented in Table 4, the relationship between leverage and tangible assets depends on the type of debt. Tangible assets have a negative effect on total debt and short-term debt, but they have a positive effect on long-term debt. These results allow us to reject hypothesis 2, but we cannot reject hypothesis 3. The positive relationship between long-term debt and tangible assets suggests that small firms need collateral to mitigate the information asymmetry and agency problems these firms face in their relationships with creditors. Thus, SMEs with more assets in place are more likely to obtain long-term debt. SMEs without fixed assets have less collateral, and therefore tend to raise more short-term debt. These results suggest that SMEs are forced to borrow short-term debt, due to the impossibility of obtaining long-term debt on favourable conditions. Chittenden *et al.* (1996), Bevan and Danbolt (2004) and Matias *et al.* (2015) obtain similar results for the relationship between tangible assets and leverage.

The empirical results show that the impact of liquidity on total debt and short-term debt is negative and statistically significant at the 1% level (Table 4). These results suggest that small firms with higher levels of liquidity have more long-term debt, but lower levels of

total debt and short-term debt. These results are in accordance with the predictions of POT, i.e., firms with higher levels of liquidity have more internal funds, namely free cash flow, which they can use to fund their needs. Therefore, firms with greater liquidity borrow less. However, there is a positive and statistically significant relationship between liquidity and long-term debt. This result is consistent with the predictions of TOT, according to which firms with greater liquidity have greater debt capacity. On the basis of these results, we partially reject *hypothesis 4*. Michaelas *et al.* (1999) obtain positive relationships between liquidity and short-term, long-term and total debt.

Profitability is negatively related to leverage, providing evidence of POT, given that more profitable firms tend to use less total, long-term and short-term debt to fund their needs. Based on these results, we cannot reject *hypothesis 5*. The negative relationships between profitability and total, long-term and short-term debt suggest that small firms prefer internal to external finance. Small firms with higher levels of profitability have more internal funds available and need to borrow less. In addition, we find that profitability has a greater impact on long-term debt ( $\beta=-0.16798$ ) than on short-term debt ( $\beta=-0.14221$ ), suggesting that as internal funds become available, long-term debt will be the first type of leverage to be replaced. A negative relationship between profitability and leverage is also reported by various studies (Constand *et al.*, 1991; Chittenden *et al.*, 1996; Michaelas *et al.*, 1999; Sogorb-Mira, 2005; Serrasqueiro *et al.*, 2011; Degryse *et al.*, 2012).

Growth opportunities have a negative and statistically significant relationship with total debt (Table 4). Therefore, we reject *hypothesis 6*. This result suggests that firms with high levels of growth opportunities reduce their total debt. Roden and Lewellen (1995) conclude that growth opportunities have a negative and statistically significant relationship with total debt. These results are consistent with Heyman *et al.* (2008), but do not agree with the results of other studies about SMEs capital structure (Michaelas *et al.*, 1999; Degryse *et al.*, 2012).

The relationships between effective tax rate and total, short-term and long-term debt are not statistically significant. Therefore, the owners-managers of small firms do not appear to consider tax effects in their capital structure decisions. Consequently, our results do not provide support for *hypothesis 7* formulated in the framework of TOT. Constand *et al.* (1991) and Michaelas *et al.* (1999) also identify no significant effects of corporate tax on level of leverage.

The results show there is a positive and statistically significant relationship between non-debt tax shields and total debt. This result contradicts TOT. Thus, we reject *hypothesis 8*. The results of the current study do not corroborate those of Jordan *et al.* (1998) and Michaelas *et al.* (1999), who identify a negative relationship between non-debt tax shields and total debt.

## 5. Conclusion and implications

In this paper, we analyse Portuguese small firms' determinants of debt, decomposing total debt in long and short-term debt. To reach the main objective of this study, we consider a sample of 2,329 small Portuguese firms for the period between 2007 and 2011. As method of estimation, we use fixed effects panel models. This study makes a contribution to the

literature, given that the unit of analysis is small firms, unlike the majority of previous studies focusing on small and medium-sized firms.

Small firms face greater information asymmetry and agency problems with creditors, but the results regarding the relationships between determinant factors and those firms' capital structure seem to be similar to those identified by studies focusing on SMEs. In fact, the main conclusion of the current study is that the predictions of POT and TOT are followed by small firms in their capital structure, which is in accordance with the results of previous studies focusing on SMEs.

The empirical results of the current study provide various implications and suggestions for owners/managers and policy-makers. To small firms' owners/managers, we suggest establishing lasting and trusting relationships with creditors to mitigate asymmetric information and agency problems in order to obtain more favourable terms of credit. Considering the importance of small firms for the Portuguese economy, we suggest that policy-makers create special lines of credit and tax incentives to promote the growth of those firms that face difficulties in accessing external sources of finance.

To form a deeper understanding of capital structure decisions, we suggest future research should analyse small firms' capital structure decisions adopting a dynamic perspective, using dynamic estimators.

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