Capital structure and size: new evidence across the broad spectrum of SMEs

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Abstract

Purpose – The purpose of this paper is to add to the existing literature by examining a number of hypotheses relating to the capital structure decision in relation to the firms' size, namely by distinguishing among micro, small and medium firms.

Design/methodology/approach – The paper examines the hypothesis that the factors determining capital structure are different for firms belonging to different size groups. The authors use a panel data model capturing the dynamic concept of capital structure.

Findings – The authors find that whereas the size of the firm does affect how much debt a firm will issue, it does not influence the relationship between the other regressors and debt usage.

Research limitations/implications – The paper examines the small and medium enterprises (SMEs). Does not examine the large firms.

Practical implications – During the last decade there has been a gradually increasing interest shown in the field of SMEs. These enterprises represent important parts of all economies in terms of both their total number and their job offer and job creation. For example, in the European Union (EU), in 2005, SMEs accounted for 99.8 percent of the total number of enterprises operating in EU-27, covering 66.7 of total employment in the non-financial business economy sector.

Social implications – This paper relates capital structure decision to firms' size distinguishing them among micro, small and medium firms.

Originality/value – The paper tests differences in capital structure determination among different size groups of enterprises in a dynamic framework for more than one year.

Keywords Capital structure, Small firms, Small enterprises, Small and medium firms, Micro

Paper type Research paper

1. Introduction

During the last decade there has been a gradually increasing interest shown in the field of small and medium enterprises (SMEs). These enterprises represent important parts of all economies in terms of both their total number and their job offer and job creation. For example, in the European Union (EU), in 2005, SMEs accounted for 99.8 percent of the total number of enterprises operating in EU-27, covering 66.7 percent of total employment in the non-financial business economy sector[1]. It is this realization of the importance of SMEs that has led to a recent boost in academic literature in SMEs. One of the first studies to deal with the contribution of SMEs to national economies, particularly in terms of employment, is provided by Birch (1979). He showed that small companies accounted for the majority of new jobs in the USA. Acs (1984) argued that

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newer and smaller firms entered sectors as "agents of change." Acs and Audretsch (1989) refer to the increased importance of small firms in the area of job generation and innovation introduction in business.

Consequently, much of the academic analysis has also turned to the vast area of SMEs. One of the major topics that has been analyzed is how SMEs finance themselves. Éndicatively, we can mention Weinberg (1994), Chittenden *et al.* (1995) and Berger and Udell (1995) and more recently Van Auken (2005) and Gregory *et al.* (2005). Several studies have explored the factors that determine the capital structure of SMEs. So far, the literature has first focussed on the capital structure determinants of the SMEs of a single country (see *inter alia* Holmes and Kent, 1991; Van der Wijst and Thurik, 1993; Sogorb-Mira, 2005; Bartholdy and Mateus, 2005; Lucey and Mac an Bhaird, 2006). Another class of studies attempt to analyze differences in SME capital structure determination among different countries (see *inter alia* Hall *et al.*, 2004; Joeveer, 2005; Daskalakis and Psillaki, 2008; Psillaki and Daskalakis, 2009).

However, all these studies do not consider the huge diversity within the broad category of SMEs, which contain micro, small and medium firms. Yet, there can be substantial differences among a medium firm with 150 or 200 employees and a micro firm with three or eight employees. Size does matter in access to finance. Beck *et al.* (2006) show that the probability that a firm rates financing as a major obstacle is 39 percent for small firms, 38 percent for medium-sized firms and 29 percent for large firms. According to the Observatory of European SMEs (2007), 21.9 percent of micro firms regard access to finance as a business constraint, whereas the percentages for small, medium and large enterprises are 21.7, 20.2 and 17.5 percent, respectively, concluding that the larger the enterprise, the less access to finance is seen as a problem. Even though the capital structure literature has pointed out that the size of the firm can be considered as an important determinant of capital structure, the issue whether firms belonging in different size groups may behave differently regarding their capital structure determination has not been thoroughly investigated, specifically within the broad definition of SMEs, which contains firms that may be very diverse. This diversity is highlighted by Ramalho and Silva (2007), who incorporate this differentiation in their analysis and reach interesting conclusions regarding the capital structure determination of micro, small, medium and large enterprises.

In this paper we distinguish among micro, small and medium firms and we test the hypothesis that the factors determining capital structure are different for firms belonging to different size groups. The variable used as a proxy for capital structure in most studies as well as in the present one is the debt ratio. The main factors expected to influence the capital structure and explored in many of the above-mentioned papers and which we also adopt, are firm profitability, asset structure, size and growth. We formulate the theoretical hypotheses for each one of those factors in Section 2. We partly follow the rationale of Ramalho and Silva (2007), separating our sample of SMEs into sub-samples of micro, small and medium firms, to investigate potential differences among them. They use information from published financial statements of Portuguese firms for the year 1999. However, capital structure is by definition a long-term concept that should be analyzed in a dynamic framework. We add a dynamic dimension in our analysis by using the panel data regression analysis procedure, covering a five-year period.

To our knowledge, this is the first attempt to test differences in capital structure determination among different size groups of enterprises in a dynamic framework of more than one year. The structure of the paper is as follows. Section 2 discusses how

the existing capital structure theories can be applied in the context of SMEs. In Section 3 we present our data and we develop our model. Section 4 presents the empirical results and section 5 concludes the paper.

2. Capital structure theories and formulation of hypotheses

2.1 Introduction

The seminal work of Modigliani and Miller (1958) provides the foundation of the theoretical development of the capital structure scientific field. Thereafter, several approaches have been developed, mainly based on the relaxation of the very restrictive assumptions that the theory of Modigliani and Miller was based upon. Theories of capital structure were initially developed based on the characteristics of large enterprises. Both theoretical and empirical developments in capital structure theory have focussed on large listed firms. However, the theoretical analysis of capital structure can also be applied in the small firm context, with some necessary modifications.

Bearing in mind that the capital structure theory was developed focussing on large firms, some of the determinants are expected to have little or even different effect on small firms. For example, Pettit and Singer (1985) argue that tax considerations are of little attention for SMEs because these firms are less likely to generate high profits and are therefore less likely to use debt for tax shield purposes, while Mac an Bhaird and Lucey (2010) also refer to the fact that debt tax shields are less valuable to SMEs. On the other hand, the theoretical arguments that postulate relationships between debt ratio as the dependent variable and profitability, asset structure, size and growth as determining factors are quite relevant for small companies and we will focus our analysis on each one of them, in order to formulate the testable hypotheses.

2.2 Capital structure and profitability

The relationship between a company's debt ratio and its profitability can be either positive or negative and indeed there exist theories that support both instances. It is the results of the empirical analysis that will lend support to one vs the other:

H1. Profitability will be negatively related to debt.

This hypothesis is supported by the pecking order theory, initiated by Myers (1984) and Myers and Majluf (1984). According to the theory, firms will first choose internally generated funds to finance new projects; if additional funds are needed, they will turn to debt rather than new equity. The explanation is provided under the concept of asymmetric information, according to which managers possess more information about the firm's future prospects than investors. Internal financing avoids the scrutiny of suppliers of capital. If additional funds are needed then debt is preferred because debt issues are regarded as a positive signal by investors who possess less information than managers.

Ang (1991), Holmes and Kent (1991) and Watson and Wilson (2002) emphasize that the pecking order theory can be easily applied within the SME framework. There are two main reasons that favor the existence of a pecking order finance pattern for SMEs. First, under the asymmetric information approach, SME opaqueness leads to high information costs which is translated in high costs for external finance, leading small firms to use internal financing as their primary source of funds. Second, SMEs are often managed by owners whose main objective is to minimize the intrusion in their business and thus avoid external finance in favor of internal funds. In case external

finance is needed, debt means lower level of intrusion and lower risk of losing control and decision-making power than new equity. Thus, according to the pecking order theory, more profitable firms that generate higher earnings are expected to use less debt than less profitable firms:

H1bis. Profitability will be positively related to debt.

The relationship between profitability and debt can also be examined within the trade-off theory framework, which states that the optimal capital structure is shaped through a balancing procedure between the benefits of debt, like tax shield benefits, and the negative consequences that debt may induce, like potential financial distress problems (Myers, 1977; Harris and Raviv, 1991). Within this framework, a positive relationship between debt and profitability is expected. Furthermore, a relatively high profitability leads to higher free cash flows of the firm and thus higher agency costs of equity; so, a higher level of debt should be used to discipline the behavior of management. Obviously, both of the above rationales are relevant for larger companies, thus we expect *H1bis* to either be rejected across our sample or to be supported for the subsample of medium firms only.

2.2 Capital structure and asset structure
The asset structure of the firm is of great importance for its access to debt financing. Again, there exist theoretical arguments in favor of either a positive or negative relationship between the debt structure of a firm and the ratio of tangible assets to total assets. Below we present each one of them:

H2. Tangible assets will be positively related to debt.

The agency costs theory was initiated by Jensen and Meckling (1976). Agency costs may emerge either between managers and shareholders (agency costs of equity), or between shareholders and debtholders (agency costs of debt). In both cases the main reason is the conflict of interests between each group; in the first case, managers may have different personal objectives to fulfill than owners, and in the second case, owners may use debt differently from what debtholders would provide their capital for. Agency costs must be carefully considered within the SME context. As owners are, most likely, the managers of their firms as well, agency costs of equity are in practice nonexistent. However, agency costs of debt can be severe, as Van der Wijst (1989) and Ang (1992) note. Van der Wijst and Thurik (1993) suggest that fixed assets are generally considered to offer more security than current assets. Among the fixed assets, tangible assets offer the higher levels of security to lenders than intangible assets. Thus, firms with more tangible assets in their asset structure are expected to have better access to bank credit and subsequently to use more debt. This hypothesis is also supported by the existence of high levels of asymmetric information present in SME's, which may induce lenders to require guarantees materialized in collateral (Myers, 1977; Harris and Raviv, 1991):

H2bis. Tangible assets will be negatively related to debt.

On the other hand, large holdings of tangible assets may mean that the firm uses a stable source of income which provides more internally generated funds and leads

firms to use less debt, under the pecking order financing theory. As a matter of fact, Klapper *et al.* (2002), Hall *et al.* (2004) and Sogorb-Mira (2005) find a negative relationship between short-term debt and the relative size of tangible assets and a positive relationship between long-term debt and the relative size of tangible assets. Daskalakis and Psillaki (2008) find a negative relationship between the size of tangible assets and the firm's leverage, but they do not differentiate between short- and long-term debt. Thus tangibility may be negatively related to leverage.

2.3 Capital structure and size
Another firm characteristic that affects capital structure determination is the size of the firm. It is widely accepted that size is a proxy for financial robustness considerations. Our third hypothesis relates capital structure to firm size within each subgroup of our sample. Again, both a positive and a negative relationship can be postulated by theory and tested empirically:

   H3. Size will be positively related to debt.

Warner (1977) and Pettit and Singer (1985) denote that larger firms tend to be more diversified and go bankrupt less often than smaller ones. Furthermore, information costs are lower for larger firms because of better quality (accuracy and transparency) of financial information. Psillaki and Daskalakis (2009) find a positive relationship between size and leverage for Greek, French, Italian and Portuguese SMEs. Panno (2003) and Ojah and Manrique (2005) also find a positive relationship between size and financial leverage for English and Spanish firms, respectively:

   H3bis. Size will be negatively related to debt.

In contrast to *H3*, Rajan and Zingales (1995) note that firms' size could serve as a proxy for the information to outside investors, leading to a higher preference for equity for larger firms. Thus, there may also be a negative relationship between size and debt. Give that our work focusses on SME's, for most of which public equity is not an option, we expect our data to support *H3* rather than *H3bis*.

2.4 Capital structure and firm growth
Another widely known capital structure determinant is the growth of the firm. There are arguments stipulating either a positive or a negative relationship:

   H4. Growth will be negatively related to debt.

Myers (1977) argues that firms with growth potential are considered as risky firms with volatile earnings that face difficulties in raising debt capital with favorable terms. Furthermore, firms themselves may be reluctant to take on large amounts of debt as their higher investment opportunities would lead them to avoid the disciplining effect of debt payments (Jensen, 1986). Thus, these firms are expected to have lower leverage:

   H4bis. Growth will be positively related to debt.

However, high-growth firms are also most likely to exhaust internal funds and require additional capital (Michaelas *et al.*, 1999). Raising equity may be difficult and time

consuming especially for smaller firms, thus debt may be a good alternative. This is in line with Acs and Isberg (1996) who found that innovation for small firms is associated with higher levels of debt. Furthermore, Ramalho and Silva (2007) also found a positive relationship between growth and debt for large and small firms. Thus, growth may lead to more debt in the firm's capital structure.

An additional hypothesis explored in this paper is whether the capital structure determinants described above may affect the financing decisions of firms differently for each size group. In the following section we describe our data and develop our model in order to provide answers to this issue.

3. Data and model
3.1 Data and variable definitions
We use a panel of data of Greek SMEs over the period 2003-2007. As per standard practice, we exclude firms from the financial and investment sector and insurance companies. Data were extracted from the Hellastat database. Companies with missing data in any one of the years or variables used in our study were removed from the sample. We next separate our sample into sub-samples of micro, small and medium firms on the basis of employment according to the new definition of the European Commission (recommendation 2003/361/EC) as from January 1, 2005. Thus, our data consist of 1,018 SMEs, containing 120 micro firms (less than nine employees), 642 small firms (ten to 49 employees) and 256 medium firms (50-249 employees). We also confirmed that our SMEs sample is representative of the total population of the Greek SMEs, according to the geographic criterion, thus covering all prefectures of Greece[2].

The dependent variable that we use is the debt to assets ratio ($DR_{i,t}$). The debt ratio is defined as the ratio of total liabilities divided by the total assets of the firm (e.g. Rajan and Zingales, 1995). Total liabilities contain both long-term and short-term liabilities. The use of the debt ratio as the model's dependent variable assumes that other forms of financing, such as trade credit, are used to finance the firm and not just for working capital purposes. This is verified by several studies in the field of SMEs' capital structure determination. Petersen and Rajan (1997) say that trade credit functions as substitute for long-term bank loans and as supplement for short-term bank lending when credit from financial institutions is unavailable. Carbó-Valverde *et al.* (2008) find that financially constrained firms do use trade credit for investments.

The first determinant of capital structure we consider is the asset structure of the firm ($AS_{i,t}$). We measure the asset structure as the ratio of tangible assets divided by the total assets of the firm (e.g. Titman and Wessels, 1988; Rajan and Zingales, 1995; Frank and Goyal, 2003). The second determinant of capital structure we use is the size of the firm ($SIZE_{i,t}$). We measure firm size as the natural logarithm of sales revenue. This measure is the most common proxy for size (e.g. Titman and Wessels, 1988; Rajan and Zingales, 1995; Ozkan, 2001). The use of the natural logarithm is preferred so as to smooth the differences that may arise because of large variation in size among firms. The next regressor is profitability ($PROFIT_{i,t}$). We measure profitability as earnings before interest and taxes divided by total assets (e.g. Fama and French, 2002; Titman and Wessels, 1988). Finally, we consider the effect of growth ($GROWTH_{i,t}$) on the firm's capital structure. We measure growth as the annual percentage change on total assets. We prefer total assets than earnings, as earnings can be highly volatile and distort our results. Note that due to the calculation of the growth variable, we lose one year of observations. Thus, the actual period we cover is 2004-2007.

3.2 The model
We use a two-stage model. In the first stage, we separate our sample of SMEs to three sub-samples, namely the micro firms sub-sample, the small firms sub-sample and the medium firms sub-sample. Then we analyze how the main factors of capital structure determination (profitability, asset structure, size, growth) affect capital structure for each group, to catch any differences regarding the direction of the relationship between the debt ratio and the regressors, for each group. To do so, we use a typical balanced panel model, which contains large numbers of cross-sectional units and only a few periods (four years). The use of a model based on panel data incorporates a dynamic concept in the capital structure issue. It also reduces collinearity among the explanatory variables thus improving the efficiency of econometric estimates. The hypothesis that is tested independently for each sample is that the capital structure of the firm expressed by the ratio of total liabilities to total assets depends upon its asset structure, size, profitability and growth rate:

$$DR_{i,t} = \beta_0 + \beta_1 AS_{i,t} + \beta_2 SIZE_{i,t} + \beta_3 PROFIT_{i,t} + \beta_4 GROWTH_{i,t} + \varepsilon_{i,t}$$

where $DR_{i,t}$ is the debt ratio of firm i at time t; $AS_{i,t}$ the asset structure of firm i at time t; $SIZE_{i,t}$ the size of firm i at time t; $PROFIT_{i,t}$ the profitability of firm i at time t; $GROWTH_{i,t}$ the percentage change in earnings of the firm i between time t and t-1; and $\varepsilon_{i,t}$ the error term.

In the second stage we test whether the magnitude of the coefficients of the regressors from the first stage is different among groups, to catch any differences on the relative contribution of each variable that denotes differences in financing behavior among groups. To do so, we apply an *F*-test by pooling the data for all three sub-groups together to estimate a panel model which restricts the coefficients of the capital structure determinants to be the same for all firms. We then form the *F*-statistic appending the information obtained from the (unrestricted) individual sub-sample models. The *F*-statistic for this test is given by:

$$F = \frac{(RSS_{SMEs} - RSS_{Micro} - RSS_{Small} - RSS_{Medium})/2k}{(RSS_{Micro} + RSS_{Small} + RSS_{Medium})/(n - 3k)}$$

where RSS_{SMEs} is the residual sum of squares for the restricted model of all SMEs; RSS_{Micro} the residual sum of squares for the model containing only micro firms; RSS_{Small} the residual sum of squares for the model containing only small firms; RSS_{Medium} the residual sum of squares for the model containing only medium firms; n number of observations; and k number of variables.

4. Empirical results and comparisons
4.1 Descriptive statistics
Table I shows the descriptives of our sample, by size-group and for the total sample of SMEs. We observe that there are no important differences in the average values of the ratios used, among the categories of the companies.

In particular, the average value of the debt ratio, our dependent variable, is similar for all groups, although medium firms have on average lower debt ratios. Specifically, all groups of SMEs rely more on liabilities than equity to finance their activities, as

their debt ratio ranges from 60 percent for medium firms to 64 percent for micro and small firms, resulting in an average of 63 percent for all SMEs. The same observation applies to profitability, where again the profitability of medium firms is marginally lower. Specifically, the profitability ratio for medium firms is 4 percent, while the corresponding ratio for micro and small firms is 5 percent, resulting in an average ratio for all SMEs at 5 percent. Another interesting observation is that micro and medium firms seem to rely relatively more on tangible assets (tangible assets ratio of 36 and 39 percent, respectively) compared with small firms that have a tangible assets ratio of 32 percent. Analyzing the size of the firms, measured by the natural logarithm of revenues, figures show that larger firms in terms of employment have higher revenues as well, which is expected. Finally, relatively smaller companies are growing at a higher rate. The growth rate of micro and small companies is 15 percent, while the growth rate for medium firms is 11 percent. The overall growth rate for all SMEs shapes at 14 percent.

4.2 Regression results
In this section we apply our two-stage model of analyzing capital structure determination of SMEs by investigating: whether and how each independent variable is related with the debt ratio for each group of micro, small and medium firms; and whether there are any substantial differences in the capital structure choices across each group.

First we analyze whether and how each independent variable is related with debt for each group. The estimation method that we use is the pooled estimated generalized least squares (EGLS) using cross-section weights. This method accounts for cross-sectional heteroscedasticity in the estimation of the model coefficients and at the same time provides standard errors which are robust to serial correlation. However, there is a drawback which is that the estimated coefficients are not corrected for serial correlation problems, which is evident from the Durbin-Watson value. Table II presents the results of the regression for the micro, small and medium sub-samples, as well as for the unrestricted SMEs sample, which contains all firms. All regressors are significant for all sub-samples and the adjusted R^2 is also considerably high.

We find a negative relationship between profitability and debt. This result supports H1 that firms that generate relatively high internal funds tend to avoid debt financing. It seems that the pecking order theory is applied within the context of our sample of SMEs and holds for all sub-samples. Thus, first, SMEs seem to be opaque enough to produce high information costs, translated as high costs for external finance and thus leading firms to use internal financing as their primary source of funds and second, owners seek mainly to minimize the intrusion in their business and thus avoid external finance in favor of internal funds.

		Micro	Small	Medium	SMEs
Distribution by size	No.	120	642	256	1,018
	%	11.79	63.06	25.15	100
Leverage ratio	Avg.	0.64	0.64	0.60	0.63
Profitability ratio	Avg.	0.05	0.05	0.04	0.05
Tangible assets ratio	Avg.	0.36	0.32	0.39	0.34
Size (log revenues)	Avg.	14.19	15.17	15.83	15.25
Growth	Avg.	0.15	0.15	0.11	0.14

Table I.
Descriptives

Dependent variable: debt ratio
Method: pooled EGLS (cross-section weights)
Period SUR (PCSE) standard errors and covariance (df corrected)

	Micro	Small	Medium	SMEs
Constant	−0.039	−0.062	−0.333***	0.133***
	(−0.33)	(−1.60)	(−3.30)	(4.25)
Profitability	−0.200**	−0.430***	−0.493***	−0.334***
	(−2.20)	(−11.41)	(−7.16)	(−10.85)
Asset structure	−0.251***	−0.362***	−0.134***	−0.299***
	(−8.65)	(−29.31)	(−6.17)	(−31.74)
Size	0.055***	0.055***	0.063***	0.039***
	(6.71)	(23.01)	(10.48)	(20.13)
Growth	0.067***	0.063***	0.099***	0.080***
	(4.55)	(10.04)	(6.70)	(13.72)
Weighted statistics				
Adjusted R^2	0.958	0.982	0.959	0.981
Durbin-Watson statistic	0.492	0.391	0.392	0.385
F-statistic	2,768.60	34,404.66	6,025.14	53,977.77
Sum^2 residual	21.045	83.452	40.804	153.12

Notes: *t*-Statistics in parentheses. **,***Statistical significant at 95 and 99 percent, respectively

Table II.
Regression results

Asset structure is significant and negatively correlated in all cases. This result supports *H2bis* that firms that rely more on tangible assets tend to use less debt than firms with relatively fewer tangible assets. In our interpretation of this empirical finding, we have to keep in mind that while theoretical arguments in favor of *H1* suggest that banks may prefer to lend firms with more tangible assets, it is the firms themselves that decide on their capital structure. Hence, this result leads us to the conclusion that firms view tangible assets as a stable source of return which provides more internally generated funds and leads firms to use less debt, following the pecking order financing theory.

The size of the firm is significant and positively related in all cases. Thus, *H3* is supported and larger firms are associated with higher debt ratios, as found by other studies and supported by theoretical considerations. Size is confirmed to be a proxy for financial robustness, that is supported by the hypothesis that larger firms are more diversified and thus bear lower risk of facing financial distress problems.

Finally, growth is significant and positively related to debt for all groups of firms. Thus, *H4bis* is supported, leading us to the conclusion that high-growth firms are also most likely to exhaust internal funds and use debt as a good alternative in their search for additional capital, as raising equity may be difficult and time-consuming for smaller firms.

The main conclusion of the preceding analysis is that there seem to be similarities in the determinants of capital structure across our sub-samples of different firm size, as the signs of the coefficients are the same for the statistically significant variables. However, even if the direction of the relationship is the same, structural differences may still arise due to possible differences in the magnitude of the coefficients in the group regressions.

Thus, we move to the second stage of our analysis in which we investigate whether there are any substantial differences in the capital structure choices across each group. To test this, we apply an *F*-test by pooling the data for all three sub-groups together to

estimate a panel model which restricts the coefficients of the capital structure
determinants to be the same for all firms. The F test is 0.78 which is not significant at
conventional levels, meaning that the null hypothesis cannot be rejected. Thus, there
does not seem to be any difference in the magnitude of the regressor coefficients,
regarding their contribution to the debt ratio. This leads us to the conclusion that firm
size does not seem to significantly affect the relationship between the regressors and
the debt ratio. Firms belonging to different size groups seem to behave similarly
regarding the relationship between the debt they use and their profitability, size, asset
structure and growth. Thus, capital structure seems to be determined similarly across
all sub-groups of the broad SMEs category.

5. Discussion and conclusions

During the last decades there has been an increasing interest in studies focussing
on the SMEs sector, driven by the recognition that SMEs are important engines of
economic growth. However, all these studies do not consider the huge diversity within
the broad category of SMEs, which contain micro, small and medium firms. Academic
literature has proven that size does matter in access to finance. Thus, size is indeed an
important factor in capital structure determination; yet, the issue whether firms
belonging in different size groups may behave differently regarding their capital
structure determination has not been thoroughly investigated.

Ramalho and Silva (2007) incorporate this differentiation in their analysis and reach
interesting conclusions regarding the capital structure determination of micro, small,
medium and large enterprises. We partly follow the rationale of Ramalho and Silva
(2007), separating our sample of SMEs into sub-samples of micro, small and medium
firms, following the new definition of the European Commission, to investigate
potential differences among them. We add a dynamic dimension in our analysis by
using the panel data regression analysis procedure, covering a five-year period.

Our main objective is to investigate whether the factors determining capital
structure are different for firms belonging to different size groups. We use a two-stage
model. In the first stage, we separate our sample of SMEs to three sub-samples, namely
the micro firms sub-sample, the small firms sub-sample and the medium firms
sub-sample. Then we analyze how the main factors that have been thoroughly tested
so far in the literature (profitability, asset structure, size, growth) affect capital
structure for each group, to catch any differences regarding the direction of the
relationship between the debt ratio and the regressors among groups. In the second
stage we test whether the magnitude of the coefficients of the regressors from the first
stage is different among groups, to catch any differences on the relative contribution of
each variable that would imply differences in financing behavior among groups.

Regarding the first stage of our analysis, the results show that the firms' debt ratio
is negatively related to profitability and asset structure and positively related to size
and growth, for all size-groups. Thus, we conclude that firms that generate relatively
high internal funds tend to avoid debt financing; firms that rely more on tangible
assets tend to use less debt than firms with relatively fewer tangible assets; larger
firms show higher debt ratios; and high-growth firms are also most likely to exhaust
internal funds and use debt as a good alternative in their quest for additional capital.
These results and conclusions are consistent with the findings of other studies
regarding the relationship between these determinants and leverage of SMEs.

Regarding the second stage of our analysis, we then test whether the magnitude of
the coefficients of the regressors from the first stage is different among groups, to catch

any differences on the relative contribution of each variable that denotes differences in financing behavior among groups. We conclude that firm size does not seem to affect the relationship between the regressors and the debt ratio. Thus, we conclude, what we believe to be the main finding of our study and a significant contribution to the SMEs capital structure determination literature, that even though size is an important regressor on capital structure determination, firms belonging to different size groups seem to behave similarly regarding the relationship between the debt they use and their profitability, size, asset structure and growth.

These conclusions can be used by consultants and financial institutions to develop financial products for the smaller firms within the SMEs broad definition (i.e. for micro and small firms). Bearing in mind that, for several reasons (such as opaqueness, lack of collateral) smaller firms seem to have limited access to finance, by showing that SMEs determine their capital structure similarly, regardless of their size, the academic analysis that has so far reached interesting conclusions that apply mostly to larger firms, can be considered as being suitable for smaller firms as well, regarding the main determinants of capital structure. In terms or research implications of our findings, and bearing in mind that smaller firms do still seem to have a more difficult access to financing, we believe that future research should focus more on behavioral aspects of both micro entrepreneurs and funders. Behavioral finance could provide interesting insights to capital structure determination and access to finance for micro and small enterprises.

Our study has several limitations that indicate the way for potential future research. First, we use a balanced sample that leads to strong selection or survival ship bias; SMEs that were not able to survive during our five-year dataset are not included in our analysis. Larger national studies could examine differences or similarities by sectors and by geographic region. Furthermore, our time period (2003-2007) covers a period of continuous growth. It would be interested to investigate whether our results have been altered under the scope of the financial and economic crisis. Finally, a cross-country comparison would also provide useful results.

Notes

1. Statistics in focus 31/2008, EUROSTAT, enterprises by size class-overview of SMEs in the EU.

2. Details on testing representativeness are provided in Appendix.

References

Acs, Z. (1984), *The Changing Structure of the US Economy Lessons from the Steel Industry*, Praeger, New York, NY.

Acs, Z. and Audretsch, D. (1989), "Editor's introduction", *Small Business Economics*, Vol. 1 No. 1, pp. 1-5.

Acs, Z. and Isberg, C. (1996), "Capital structure, asset specificity, and firm size: a transaction cost analysis", in Helmstadter, E. and Perlman, M. (Eds), *Behavioral Norms, Technological Progress, and Economic Dynamics: Studies in Schumpeterian Economics*, University of Michigan Press, Ann Arbor, Michigan, pp. 285-298.

Ang, J. (1991), "Small business uniqueness and the theory of financial management", *Journal of Small Business Finance*, Vol. 1 No. 1, pp. 1-13.

Ang, J. (1992), "On the theory of finance for privately held firms", *The Journal of Small Business Finance*, Vol. 1 No. 3, pp. 185-203.

Bartholdy, J. and Mateus, C. (2005), "Debt and taxes: evidence from bank-financed small and medium-sized firms", EFA 2005 Moscow Meetings Paper.

Beck, T., Demirgüç-Kunt, A., Laeven, L. and Maksimovic, V. (2006), "The determinants of financing obstacles", *Journal of International Money and Finance*, Vol. 25 No. 6, pp. 932-952.

Berger, A. and Udell, G. (1995), "Relationship lending and lines of credit in small firm finance", *Journal of Business*, Vol. 68 No. 3, pp. 351-381.

Birch, D. (1979), *The Job Generation Process*, MIT Program on Neighborhood and Regional Change, Cambridge, MA.

Carbó-Valverde, S., Rodríguez-Fernández, F. and Udell, G. (2008), "Bank lending, financing constraints and SME investment", Working Paper No. 2008-04, Federal Reserve Bank of Chicago, Chicago, IL, pp. 1-42.

Chittenden, F., Hall, G. and Hutchinson, P. (1995), "Small firm growth, access to capital markets and financial structure: a review of issues and an empirical investigation", *Small Business Economics*, Vol. 8 No. 1, pp. 59-67.

Daskalakis, N. and Psillaki, M. (2008), "Do country or firm factors explain capital structure? Evidence from SMEs in France and Greece", *Applied Financial Economics*, Vol. 18 No. 2, pp. 87-97.

Fama, E. and French, K. (2002), "Testing tradeoff and pecking order predictions about dividends and debt", *Review of Financial Studies*, Vol. 15 No. 1, pp. 1-33.

Frank, M. and Goyal, V. (2003), "Testing the pecking order theory of capital structure", *Journal of Financial Economics*, Vol. 67 No. 2, pp. 217-248.

Gregory, B., Rutherford, M., Oswald, S. and Gardiner, L. (2005), "An empirical investigation of the growth cycle theory of small firm financing", *Journal of Small Business Management*, Vol. 43 No. 4, pp. 382-392.

Hall, G., Hutchinson, P. and Michaelas, N. (2004), "Determinants of the capital structure of European SMEs", *Journal of Business Finance and Accounting*, Vol. 31 No. 5, pp. 711-728.

Harris, M. and Raviv, A. (1991), "The theory of capital structure", *The Journal of Finance*, Vol. 46 No. 1, pp. 297-355.

Holmes, S. and Kent, P. (1991), "An empirical analysis of the financial structure of small and large Australian manufacturing enterprises", *Journal of Small Business Finance*, Vol. 1 No. 2, pp. 141-154.

Jensen, M. (1986), "Agency costs of free cash flow, corporate finance, and takeovers", *American Economic Review*, Vol. 76 No. 2, pp. 323-329.

Jensen, M. and Meckling, W. (1976), "Theory of the firm: managerial behavior agency costs and ownership structure", *Journal of Financial Economics*, Vol. 3 No. 4, pp. 305-360.

Joeveer, K. (2005), "What do we know about the capital structure of small firms?", Working Papers No. 283, The Center for Economic Research and Graduate Education – Economic Institute (CERGE-EI), Prague.

Klapper, L., Sarria-Allende, V. and Sulla, V. (2002), "Small and medium-sized enterprise financing in Eastern Europe", World Bank Policy Research Working Paper 2933.

Lucey, B. and Mac an Bhaird, C. (2006), "Capital structure and the financing of SMEs: empirical evidence from an Irish survey", available at: http://ssrn.com/abstract=905845 (accessed May 2006).

Mac an Bhaird, C. and Lucey B. (2010), "Determinants of capital structure in Irish SMEs", *Small Business Economics*, Vol. 35 No. 3, pp. 357-375.

Michaelas, N., Chittenden, F. and Poutziouris, P. (1999), "Financial policy and capital structure choice in UK SMEs: empirical evidence from company panel data", *Small Business Economics*, Vol. 12 No. 2, pp. 113-130.

Modigliani, F. and Miller, M. (1958), "The cost of capital, corporation finance and the theory of investment", *The American Economic Review*, Vol. 68 No. 3, pp. 261-297.

Myers, S. (1977), "Determinants of corporate borrowing", *Journal of Financial Economics*, Vol. 5 No. 2, pp. 147-175.

Myers, S. (1984), "The capital structure puzzle", *Journal of Finance*, Vol. 39 No. 3, pp. 575-592.

Myers, S. and Majluf, N. (1984), "Corporate financing and investment decisions when firms have information that investors do not have", *Journal of Financial Economics*, Vol. 13 No. 2, pp. 187-221.

Ojah, K. and Manrique, J. (2005), "Determinants of corporate debt structure in a privately dominated debt market: a study of the Spanish capital market", *Applied Financial Economics*, Vol. 15 No. 7, pp. 455-468.

Ozkan, A. (2001), "Determinants of capital structure and adjustment to long run target: evidence from UK company panel data", *Journal of Business Finance and Accounting*, Vol. 28 Nos 1/2, pp. 175-199.

Panno, A. (2003), "An empirical investigation on the determinants of capital structure: the UK and Italian experience", *Applied Financial Economics*, Vol. 13 No. 2, pp. 97-112.

Petersen, M. and Rajan, R. (1997), "Trade credit: theories and evidence", *The Review of Financial Studies*, Vol. 10 No. 3, pp. 661-691.

Pettit, R. and Singer, R. (1985), "Small business finance: a research agenda", *Financial Management*, Vol. 14 No. 3, pp. 47-60.

Psillaki, M. and Daskalakis, N. (2009), "Are the determinants of capital structure country or firm specific? Evidence from SMEs", *Small Business Economics*, Vol. 33 No. 3, pp. 319-333.

Rajan, R. and Zingales, L. (1995), "What do we know about capital structure? Some evidence from international data", *Journal of Finance*, Vol. 50 No. 5, pp. 1421-1460.

Ramalho, J. and Silva, V. (2007), "A two-part fractional regression model for the capital structure decisions of micro, small, medium and large firms", available at: http://ssrn.com/abstract=968017 (accessed February 2007).

Sogorb-Mira, F. (2005), "How SME uniqueness affects capital structure: evidence from a 1994-1998 Spanish data panel", *Small Business Economics*, Vol. 25 No. 5, pp. 447-457.

Titman, S. and Wessels, R. (1988), "The determinants of capital structure choice", *Journal of Finance*, Vol. 43 No. 1, pp. 1-19.

Van Auken, H. (2005), "Differences in the usage of bootstrap financing among technology-based versus nontechnology-based firms", *Journal of Small Business Management*, Vol. 43 No. 1, pp. 93-103.

Van der Wijst, D. (1989), *Financial Structure in Small Business, Theory, Tests and Applications*, Springer-Verlag, Berlin.

Van der Wijst, D. and Thurik, R. (1993), "Determinants of small firm debt ratios: an analysis of retail panel data", *Small Business Economics*, Vol. 5 No. 1, pp. 55-65.

Warner, J. (1977), "Bankruptcy costs: some evidence", *Journal of Finance*, Vol. 32 No. 2, pp. 337-347.

Watson, R. and Wilson, N. (2002), "Small and medium size enterprise financing: a note on some of the empirical implications of a pecking order", *Journal of Business Finance and Accounting*, Vol. 28 Nos 3/4, pp. 557-578.

Weinberg, J. (1994), "Firm size, finance, and investment", *Economic Quarterly*, Vol. 80 No. 1, pp. 19-40.

Appendix. Sample representativeness

The sample is representative of the population of all Greek SMEs, according to the geographic criterion, applying the χ^2 goodness-of-fit test. Specifically, we group the sample firms that belong

Geographic groups	Observed frequencies	Expected weighted frequencies	Residuals
East Macedonia and Thrace	51	47.8	3.2
Attica	336	367.3	−31.3
North Aegean	20	18.5	1.5
West Macedonia	33	28.7	4.3
West Greece	56	54.0	2.0
Epirus	32	31.0	1.0
Ionian Islands	33	30.4	2.6
Central Macedonia	181	175.2	5.8
Crete	68	60.9	7.1
South Aegean	42	43.8	−1.8
Peloponese	49	51.8	−2.8
Central Greece	54	46.3	7.7
Thessaly	63	62.2	0.8
Total	1,018		

Table AI.
Number of sample firms and weighted values of population firms belonging in each geographic group

χ^{2a}	6,511[a]
Degrees of freedom	12
p-Value	0.888

Note: [a]0 cell (0.00 percent) has expected frequency less than 5

Table AII.
Statistical test

in the same geographic group and we compare them with their weighted value of the population. Next, the χ^2 test is applied to test the differences between the observed and the expected weighted frequencies (Tables AI and AII).

The results show that the null hypothesis cannot be rejected. Thus the sample is representative of the population according to the geographic criterion.

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