

Reintroducing Industry Effects in Capital Structure Determination of SMEs

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Abstract

Following recent literature on the specific field of industry effects on capital structure determination (Kumar et al., 2017; Daskalakis et al., 2022), the main purpose of this paper is to reintroduce the importance of industry effects in the determination of financial leverage, focusing on SMEs. In this paper, we investigate whether SMEs capital structure is determined differently across different industries. We construct a three-stage econometric model, built around industry differentiations in capital structure determination, aiming to investigate the following two aspects: a) the relationship between the debt ratio and specific capital structure determinants, taking the industry factor under consideration, b) any potential differentiation in capital structure determinants across the selected industries. We not only show that the different capital structure determinants affect financial leverage in different ways across industries (different signs), but we also show that the level of intensity is different (statistically different coefficients) even in case the signs are the same.

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1. Introduction

Capital structure determination is among the most popular research fields in corporate finance. The theoretical foundations of capital structure were initially laid having the large companies in mind. Yet, small and medium enterprises (SMEs) are considered the «driving force» for modern economies worldwide, by promoting innovative activities, which lead to the production of new products, value-added services, and employment growth. For example, 99.8% of all enterprises in the EU are SMEs, providing 64.4% of total employment and 51.8% of total added value. Therefore, there is no doubt that SMEs' contribution in the economy is important, and a large part of the academic research has turned to explore the field of the determinants of SMEs performance.

Researchers quickly realized that SMEs access to finance and respective capital structures are determined relatively different when compared to larger firms (Hall et al., 2004). Studies first started looking at SMEs capital structure determinants for a single country (Van der Wijst and Thurik, 1993; Sogorb-Mira, 2005) and gradually continued to investigate various differences in the determination of SMEs' capital structure across countries or/and across macroeconomic states (Hall et al., 2000; Psillaki and Daskalakis, 2009; Daskalakis et al., 2017). However, very little is known about any potential SMEs capital structure differentiations across industries. Specifically, there is only a handful of papers (Hall et al., 2000; Degryse et al., 2010) that investigate capital structure differentiation across industries. But these studies are limited in the sense that they do show industry differentiation without however analysing further this piece of evidence. This is pointed out by Kumar et al. (2017), who explore the status of studies on capital structure determinants in the past 40 years and note that the impact of leverage on various industries is yet to be examined. Indeed, Daskalakis et al. (2022), based on Kumar et al. (2017) explore whether, and how, capital structure determinants differ across industries, using a panel data sample of the 6,000 largest Greek companies, and find that capital structure determinants do differ in terms of magnitude and direction across industries, concluding that industry specifications should be investigated more thoroughly when exploring the capital structure determination puzzle.

In this paper, we build a three-stage econometric model, specifically focused to explore in detail whether and how capital structure determinants affect SMEs' financial leverage in different ways across industries. We not only show that firms belonging in different industries shape their capital structure differently, but we also explore whether the coefficient of each and every capital structure determinant is statistically different across industries. This is the main purpose of this paper, namely, to explore whether SMEs that belong in different industries shape their capital structure in different ways. To the best of our knowledge, this is the first study to focus on industry differentiations in a capital structure determination context, in such depth, in the area of SMEs. Our results suggest that industry specificities do affect capital structure determination, since variables coefficients are different across industries.

The remainder of this paper is structured as follows. In Section 2, we review the literature of the existing theory and provide the empirical hypotheses used in the study. Section 3 presents the data used, the econometric model and the definition of variables, followed by the discussion of the results in Section 4. Finally, Section 5 summarises the results and suggested areas for further research as well.

2. Capital Structure Theory and Empirical Hypotheses

The core question of capital structure theory is whether capital structure has a real impact on firm value. From the seminal irrelevance propositions of Modigliani and Miller (1958) and thereafter, there have always been efforts to capture different aspects of how capital structure is shaped in different business environments. A couple of years later the same authors (Modigliani and Miller, 1963) showed the importance of the different tax treatment of debt, that led to the theoretical notion that capital structure should be as leveraged as possible. A stream of different theoretical approaches and empirical investigations followed, ranging from the asymmetric information axiom of Myers (1984), and Myers and Majiluf (1984), to the agency costs implications of Jensen and Meckling (1976), Myers (1977) and Harris and Raviv (1990), the signaling approach of Ross (1977), the product/input market interactions of Brander and Lewis (1986) and Titman (1984), and the corporate control considerations of Harris and Raviv (1988).

The previous studies conclude with different theoretical approaches regarding the determination of capital structure. According to Myers (2001), there is no universal theory accepted and practically applied of the debt-equity choice and financing strategy. and denotes that a fact or a statistical finding is often a result of two or more competing capital structure theories. Rather, different determinants, viewed in a context of different theoretical approaches, lead to different financing choices and thus different capital structures. In this context, in the sub-sections that follow, we examine the main capital structure determinants in the context of SMEs and conclude the literature section by including the industry factor. This SME perspective is of great importance, because the capital structure theory was developed focusing on large firms, while, as Torres and Julien (2005) denote, small business is specific. For example, Petit and Singer (1985) and Mac an Bhaird and Lucey (2010) argue that tax considerations are of less importance for SMEs because these firms are less likely to generate high profits and are therefore less likely to use debt for tax shield purposes.

2.1 Firm size and debt

One of the capital structure determinants, most frequently used in the literature, is firm size. Large firms show lower cash flow volatility, are usually more diversified and have better and cheaper access to external funds, so that their debt capacity is much larger when compared to smaller firms (Smith and Warner, 1979; Ang et al. 1982; Fama and French, 2002). Furthermore, information costs are lower for larger firms because of better quality of financial information. Thus, larger firms are

expected to show higher levels of financial leverage. Psillaki and Daskalakis (2009) did find a positive relationship between size and leverage for Greek, French, Italian and Portuguese SMEs, while similar results were evidenced on UK SMEs (Michaelas et al., 1999). Therefore, our first hypothesis is formulated:

H1: Firm size (SI) will be positively related to debt.

2.2 Profitability and debt

According to the pecking order theory, most companies prefer to finance their investments first with internal funds (retained profits) and second with external funds (Donaldson; 1961, Myers; 1984, Myers and Majiluf; 1984, Frank and Goyal; 2003). In case internal funds are not enough and additional (external) funds are needed, the company would prefer to first issue debt and would only issue equity as a last resort. The pecking order theory was developed upon the assumption of information asymmetry between owners/managers and investors. Specifically, firms prefer to raise funds with the lowest asymmetric information cost which gradually increases when we move from retained earnings to new debt issues and new equity issues.

The pecking order theory seems to be more applicable in the SME framework (Ang; 1991, Holmes and Kent; 1991). SMEs managers are usually the owners of the firm, and they prefer internal than external funds for their financing options. The use of internal fund allow them to retain control of their firm avoiding lenders meddling and, worst, new shareholders. Consequently, in case of insufficient internal funds, SMEs will prefer debt to new equity. Moreover, SMEs face high information costs due to the prevalence of credit rationing in a context of high information asymmetry and opaqueness for SMEs (McNamara et al., 2017). These information costs are considered to be nil for internal funds and very high when raising external funds. Myers (1984) and Myers and Majluf (1984), supported the negative relationship between profitability and debt, and that successful companies with high profitability do not need external debt to finance their investments but internal funds created by retained earnings. Titman and Wessels (1988) state that firms with a high index of profitability tend to maintain a low index of debt, while Psillaki and Daskalakis (2009), and Hall et al. (2000) conclude that internal cashflows are the preferred form of new investment financing for SMEs. Our second hypothesis is formulated as following:

H2: Profitability (PR) will be negatively related to debt.

2.3 Tangibility and debt

The agency conflicts between shareholders and managers (agency costs of equity) and between shareholders and debtholders (agency costs of debt) come into view when the manager benefits are opposing those of shareholders and debtholders. In the first case, the free cash flow theory of Jensen (1986) focus on managers' choices

for investments below the cost of capital and/or the waste of cash on organizational inefficiencies. In the second case, shareholders may use debt differently from what debtholders expected for, something that brings us to what Myers (1977) explained as underinvestment problem and the demand of risk premium by debtholders in case of negative returns of an investment. For SMEs, shareholders are mostly the managers, thus agency costs of equity are considered to be very few or non-existent. On the other hand, agency costs of debt are expected to be severe, fueled by the relatively higher levels of opaqueness that SMEs inherently have. According to Van der Wijst (1989) the existence of agency costs of debt between SMEs shareholders-managers and lenders is an inhibitory factor for debt financing. Van der Wijst and Thurik (1993) suggest that fixed assets offer more security than current assets due to their permanent nature, and that tangible assets are preferred as collateral than intangible assets due to their higher level of security to lenders. For these reasons, asset tangibility is expected to lead to higher financial leverage (Michaelas et al., 1999; Sogorb-Mira, 2005). Our third hypothesis is thus:

H3a: Tangible assets (TAN) will be positively related to debt.

On the other hand, literature can also relate asset tangibility with lower leverage levels for SMEs. For example, Daskalakis and Psillaki (2008) find a negative relationship between tangible assets and SMEs' leverage explaining that large holdings of tangible assets may imply that a firm has already found a stable source of return which provides more internally generated funds and discourages it from turning to external financing. Debt type may also lead to different relationship signs. Hall et al., (2004) and Sogorb-Mira (2005) find a positive correlation between long-term debt and asset structure but a negative one between short-term debt and asset structure. This happens because fixed assets are pledged as collateral for the long-term debt, thus short-term debt is covered by current assets. Based on the above literature approach, we construct a supplement hypothesis as follows:

H3b: Tangible assets (TAN) will be positively related to long-term debt and negatively related to short-term debt.

2.4 Non-debt tax shields and debt

According to the trade-off theory, the optimal capital structure is an equilibrium procedure between the tax benefits of debt and the costs of financial distress. The benefits of the tax deduction by debt have driven many researchers to the assumption that firms should prefer debt to equity. Debt tax shields imply that highly profitable firms would have the incentive to use more debt than those less profitable (De Angelo and Masulis, 1980). However, there is little expectation that the determinant of tax benefits will affect SMEs similarly; Petit and Singer (1985) support that since SMEs do not generate high profits, the incentive to use debt as a tax shield is lower. On the other hand, given that small firms have limited access to

debt financing, alternative non-debt tax shields could prove more important to SMEs, as the use of such non-debt tax shields could be considered as a possible alternative for lower tax burdens, so that high non-debt tax shields could lead to low debt levels (DeAngelo and Masulis, 1980; Titman and Wessels, 1988). Thus, our next hypothesis is:

H4: Non-debt tax shields (NDTS) will be negatively related to debt.

2.5 Risk and debt

Higher volatility (i.e., in earnings, cash flows etc.) implies an environment of higher uncertainty in which the anticipation of management actions is limited and increases agency costs. According to the pecking order theory, earnings volatility increases the financial risk of a firm which eventually leads to lower levels of debt (Scott 1977; Weiss 1990). Myers (1977) also suggests that earnings volatility increases financial borrowing costs and makes firms more reluctant on debt. Titman and Wessels (1988) find a negative relationship between risk and debt, mentioning that more risky firms face more difficulty regarding debt issuance. Krishnan and Moyer, (1996), also conclude that firms with high operating risks use less debt, since higher operating risk increases the probability of financial distress and bankruptcy costs. From the previous discussion, we expect:

H5: Risk will be negatively related to debt.

2.6 Industry characteristics

As regards industry specifications and capital structure determination, many researchers have pointed out that capital structures differ across industries. Myers (1984) suggests that since asset risk, asset type, and requirements for debt vary across industries, it is expected that debt ratios vary across industries as well. Harris and Raviv (1991) suggest that, provided that external financing differs among industries, it is reasonable that leverage index will differ, too. Michaelas et al. (1999) test the influence of industry effects on U.K. SMEs' capital structure and suggest that the total level of debt is industry dependent. According to Psillaki et al. (2010), different industries are distinguished by different modes of operations, and this explains the different risk levels across industries. Degryse et al. (2010) tested the variation of capital structure across five industries of Dutch SMEs and found that different industries exhibit different degrees of leverage. Similarly, Hall et al. (2000) reported a study of a one-year (1995) sample of 3.500 unquoted UK SMEs examining ten industries and showed that leverage ratios vary across industries and so do the determinants of the capital structure as well. Last, as already mentioned in the introduction, Daskalakis et al. (2022) use a sample of the 6,000 largest Greek companies and do find that capital structure determinants behave differently across industries. The only study that explores differences in the coefficients of the variables across industries, is that of Daskalakis et al. (2022), and they do so in a

sample of large companies. We apply the rationale of Daskalakis et al. (2022) in our study, focusing on SMEs. Thus, our hypotheses are:

H6: Industry effects have an influence on the capital structure of SMEs.

H7: The relationship of hypotheses H1-H5 vary across industries.

3. Data and the empirical model

3.1 The Sample

We use a panel of data of 17,254 Greek SMEs over the period 2009-2014 operating in four different industries. The choice of Greece does not restrict results and conclusions from being generalized to economies with similar characteristics. For example, Psillaki and Daskalakis (2009) investigate capital structure determination for SMEs in four European countries, find similarities in the determinants of capital structure across their sample countries, and conclude that firm rather than country factors explain differences in the intensity of capital structure.

As regards the time period covered, we needed to use a relatively mid- to long-term period of uniform features. We thus chose the specific period of 2009-2014 since it can clearly be characterized as a uniformly recessionary period for the Greek economy (Daskalakis et al. 2017). Specifically, the years that followed were characterized by a series of events that did not provide a stable (even in terms of a steady recession) environment in the mid-term. For example, 2015 was characterized by significant political turmoil in Greece, that even led to capital control measures in summer 2015, then a relatively stable period of two years followed, before entering the COVID recession. In this context, the period 2009-2014 can be considered as stable, even in its recessionary nature, in the sense that no internal fluctuations of the relative business environment existed. Regarding the SMEs' definition we adopt the European Commission SME definition of 2003³ in which SMEs are defined as companies that employ fewer than 250 employees, have either an annual turnover not exceeding 50 million euros or an annual balance sheet total not exceeding 43 million euros. Following the standard practice, we exclude firms operating in the financial and investment sector, insurance, and real estate companies as well, due to their specific nature of financial statements. Data have been extracted by the ICAP database, and firms that do not have observations for four subsequent years have been excluded. We remove outliers in a percentage of 1% to minimize their effect in our sample. The four industries we use are: Manufacturing, Trade, Tourism and Services. Regarding the sector categorization we adopt the Statistical classification of economic activities in the European Community⁴. Manufacturing and trade are highly competitive industries with tendency to exports. Tourism is an industry with high international competitiveness

³ Recommendation 2003/361/EC, May 6; 2003 (Revised user guide to the SME definition-2020)

⁴ Statistical Classification of Economic Activities in the European Community, (NACE - Nomenclature statistique des activités économiques dans la Communauté européenne) Rev. 2 (2008)

and high positive impact on the country's GDP in all macroeconomic states. It is characterized by seasonality and constantly growing prospects. The services industry predominately consists of small or micro firms and relatively to the three other industries it is mostly dependent on human capital rather than on fixed assets. All four industries cover cumulatively most of the economic activity in Greece. Table 1 describes our dataset.

Table 1: Industry definition and database structure

Industry	Sectors (Nace)	Number of firms	Percentage
Manufacturing	Food, Distillery, Tobacco, Textile, Clothing, Wood, Paper, Chemicals, Metals, Computer, Electrical equipment, Furniture	4.160	24,1
Trade	Wholesale and retail	6.809	39,5
Tourism	Hotels and accommodation Food and Catering	3.451	20,0
Services	Postal, Publish, Telecommunication, Legal and accounting, Management advisory, Architecture and technical, Advertising and marketing, Building and industrial cleaning services, Administrative and support services	2.834	16,4
Total		17.254	100

Notes: Industry companies sorted by Eurostat according to the Statistical classification of economic activities (Nace).

3.2 The Variables

We use three types of financial leverage as our dependent variable: short-term debt ratio (STDR), long-term debt ratio (LTDR) and total debt ratio (TDR), following Hall *et al.* (2000) and Degryse *et al.* (2010). STDR and LTDR are short- and long-term debt to total assets, while TDR is the sum of the short-term plus long-term debt to total assets.

We build the set of our independent firm-specific variables following the empirical hypotheses in section 2. Thus, our first explanatory variable is size (SI), measured as the natural logarithm of total assets (Hall *et al.*, 2000; Talberg *et al.*, 2008). The second explanatory variable we use is the firm's profitability (PRO) defined as the ratio EBITDA (Earnings before Interest, Taxes, Amortization and Depreciation) divided by total assets (Titman and Wessels, 1988; Fama and French, 2002; Degryse, Goeij, and Kappert, 2010). Our third variable is tangibility (TAN), proxied as the ratio of tangible assets divided by total assets (Titman and Wessels 1988; Frank and Goyal 2003). Our next variable is non-debt tax shields (NDTS), measured as the ratio of total depreciation to total assets (Titman and Wessels 1988; Degryse *et al.* 2010). Our last firm-specific determinant is risk (RISK), which is measured as the

squared deviation of each year's earnings before taxes from the period average (Psillaki and Daskalakis, 2009), We use dummy variables to capture the industry type. We use book values on our firm-specific variables since there are no market values for SMEs, as none of them included in our sample is listed. Table 2 shows how our variables are measured, as well as their expected relationships with leverage, according to the literature.

Table 2: Testing theories and the related set of assumption

Independent Variables	Measure	Expected effect
Non-Debt Tax Shields (NDTS)	Ratio of total depreciation to total assets	- Trade-off Theory
Profitability (PRO)	Earnings before interest and taxes to total assets	+ Trade-off Theory - Pecking Order Theory
Risk (RISK)	Squared deviation of each year's earnings before taxes from the period average	- Pecking Order Theory
Size (SI)	Natural logarithm of total assets	+ Trade-off Theory + Pecking Order Theory
Tangibility (TAN)	Ratio of tangible assets to total assets	+ Trade-off Theory + Pecking Order Theory

3.3 The Econometric Model

We use a typical balanced panel data model. The use of panel data enables us to process large numbers of cross-sectional units for a few periods while it reduces collinearity among the explanatory variables, enhancing the efficiency of econometric estimates (Arellano and Bond, 1991). At the same time, panel data consider the heterogeneity that characterizes firms, something crucial for our study as our main interest is to examine the existence of firm and industry effects regarding the capital structure across industries. Last, panel models allow the presence of dynamic effects between variables (Hsiao, 2007).

We apply a three-stage approach, where the main focus is to explore industry differentiations in capital structure determination, as described in more detail in the three subsections that follow. In stage 1, we run a pooled regression model using dummy variables to capture industry differentiations. In stage 2, we run separate models for each individual industry. In stage 3, we apply the Wald test to investigate cross-sectional variable coefficients variations across industries.

3.3.1 The pooled regression model

We construct a pooled regression model applied to the entire dataset, and we apply industry dummy variables to capture industry specificities. The pooled regression model is:

$$DR = \alpha + \beta_1(NDTS) + \beta_2(PRO) + \beta_3(RISK) + \beta_4(SIZE) + \beta_5(TAN) + \beta_6z_1 + \beta_7z_2 + \beta_8z_3 + u_{it} \quad (1)$$

where α is a regression constant, β_i are the regression coefficients, u_{it} is the random error term, z_n are the dummy variables, where $n=1$ for Manufacturing, $n=2$ for Trade, $n=3$ for Tourism, and all zero for Services. Given that our sample consists of values with high variance, we apply the EGLS (Estimated Generalized Least Squares) / Cross-section weights method. This method takes heteroscedasticity and multicollinearity into consideration.

3.3.2 The separate regression model

We next estimate a regression model for each industry separately. As previously, we apply the same panel data method. The regression model is:

$$DR = \alpha + \beta_1(NDTS) + \beta_2(PRO) + \beta_3(RISK) + \beta_4(SIZE) + \beta_5(TAN) + u_{it} \quad (2)$$

where α is a regression constant, β_i is regression coefficients, u_{it} is the random error term.

3.3.3 The Wald test to investigate cross-sectional variations across industries

We then apply the Wald Test to investigate the existence of cross-sectional variation in the estimated coefficients for each firm-specific variable. By doing so, we improve the investigation of whether the relationship of hypotheses H1-H5 differ across industries. The estimation of the Wald test succeeds with the method of interaction effects (Jaccard *et al.*, 1990). In contrast to the case of three continuous variables, for example, where the interest is focused in the effect of the two independent variables (X1 and X2) on a dependent variable (Y), and the form of a least squares regression is moving towards the model below,

$$Y = \alpha + b_1'X_1 + b_2'X_2 + e \quad (3)$$

where:

α = the least squares estimate of the intercept,

b_1' and b_2' = the least squares estimates of the population regression coefficients for X1 and X2, respectively,

e = residual term.

For capturing interaction effects a multiplicative term is formed, $X_1 X_2$, which includes the interaction effect, producing a three-term equation such as:

$$Y = a + b_1X_1 + b_2X_2 + b_3X_1X_2 + e \quad (4)$$

The standard errors for regression coefficients in equation (3) reflect estimates of sampling error across levels of the independent variables. In contrast, the standard errors for regression coefficients in equation (4) are conditional and reflect sampling error at particular levels of the independent variables which means that b_1 reflects the influence of X_1 on Y when X_2 equals zero, and b_2 reflects the influence of X_2 on Y when X_1 equals zero. The coefficient b_3 represents an interaction effect in that it estimates the change in the slope of Y on X_1 given a one unit change in X_2 . Thus, our regression model is formed as follows:

$$\begin{aligned} DR = & a + b_1(ndts) + b_2(pro) + b_3(risk) + b_4(size) + b_5(tan) + b_6(z_1) + \\ & b_7(z_2) + b_8(z_3) + b_9(ndts * z_1) + b_{10}(ndts * z_2) + b_{11}(ndts * z_3) + \\ & b_{12}(pro * z_1) + b_{13}(pro * z_2) + b_{14}(pro * z_3) + b_{15}(risk * z_1) + \\ & b_{16}(risk * z_2) + b_{17}(risk * z_3) + b_{18}(size * z_1) + b_{19}(size * z_2) + \\ & b_{20}(size * z_3) + b_{21}(tan * z_1) + b_{22}(tan * z_2) + b_{22}(size * z_3) + e \quad (5)^5 \end{aligned}$$

where:

z_n = the dummy variables: $n=1$ for Manufacturing, $n=2$ for Trade, $n=3$ for Tourism.

Based on the Wald test criterion, we examine the null hypothesis where all the coefficients of the determinants are equal across the industries, which in our case is formulated as above:

Null hypothesis: $C(n) = C(n + 1) = C(n + 2)$

where n reflects the increasing number of every independent variable (x_i) multiplied with each dummy (z_i), coming next to an F-distribution. For this reason, we apply five null hypotheses for every debt ratio in order to examine each variable separately. If the p-value is under the level of the statistical significance set ($p < 0.05$), then the null hypothesis is rejected and the relationship for at least one industry is different.

4. Empirical results and industry comparisons

4.1 Sample descriptives and correlation coefficients

Table 3 reports the sample descriptives by industry. Not surprisingly, the services industry has the lowest debt ratio compared to the three other industries, perhaps because it also has the lowest levels of size and tangible assets as well.

⁵ Z_n are the dummy variables, where $n=1$ for Manufacturing, $n=2$ for Trade, $n=3$ for Tourism

Manufacturing and trade companies show the highest leverage ratio as they constantly need funds for machinery and continuous supply of stocks, respectively. Average values for profitability are negative for trade and tourism and marginally positive for manufacturing and services. Earnings volatility shows high industry variation as it shows high gaps between mean and median values, thus the high values of the standard deviation. Regarding the NDTs all four industries are at similar levels.

Table 3: Descriptive Statistics

MANUFACTURING								
	NDTS	PRO	RISK	SIZE	TAN	LTDR	STDR	TDR
MEAN	0.033	0.001	1.23×10^{13}	13.770	0.343	0.095	0.127	0.222
MEDIAN	0.024	0.002	2.03×10^9	14.666	0.316	0.000	0.048	0.155
MAX	1.226	1.381	7.54×10^{16}	22.640	1.000	0.157	0.216	0.270
MIN	0.000	-6.989	0.000	0.000	0.000	0.000	0.000	0.000
STD	0.037	0.017	6.23×10^{14}	41.785	0.246	2.280	9.390	9.390
TRADE								
	NDTS	PRO	RISK	SIZE	TAN	LTDR	STDR	TDR
MEAN	-0.002	12.868	3.32×10^{12}	0.204	0.019	0.066	0.142	0.207
MEDIAN	0.005	14.157	9.85×10^8	0.118	0.010	0.000	0.022	0.089
MAX	0.899	4.617	7.00×10^{16}	0.227	0.040	0.183	0.226	0.300
MIN	-152.530	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STD	7.450	20.650	3.52×10^{14}	1.000	4.070	15.010	10.080	15.010
TOURISM								
	NDTS	PRO	RISK	SIZE	TAN	LTDR	STDR	TDR
MEAN	-0.025	12.323	1.50×10^{11}	0.620	0.043	0.106	0.054	0.161
MEDIAN	0.000	13.740	3.62×10^8	0.730	0.032	0.000	0.000	0.005
MAX	0.435	4.814	3.99×10^{14}	0.326	0.077	0.202	0.233	0.312
MIN	-35.500	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STD	11.090	20.070	4.46×10^{12}	1.000	4.900	4.870	22.220	22.220
SERVICES								
	NDTS	PRO	RISK	SIZE	TAN	LTDR	STDR	TDR
MEAN	0.001	11.421	4.94×10^{13}	0.192	0.033	0.047	0.065	0.112
MEDIAN	0.011	13.039	6.02×10^8	0.071	0.012	0.000	0.000	0.000
MAX	0.926	5.034	3.35×10^{17}	0.257	0.083	0.196	0.155	0.252
MIN	-86.690	0.000	0.000	0.000	0.000	0.000	0.000	0.000
STD	4.920	22.830	2.90×10^{15}	1.000	5.190	12.300	4.040	12.300

Table 4 shows the correlation coefficients between all variables. As expected, there is a strong correlation between long/short-term debts and total debt. The other correlation coefficients are weak, indicating the non-existence of multicollinearity.

Table 4: Correlations among variables employed in regressions

	NDTS	Profitability	Risk	Size	Tangibility	LTDR	STDR	TDR
NDTS	1							
Profitability	-0.139 (0.000)	1						
Risk	0.009 (0.000)	-0.008 (0.009)	1					
Size	0.142 (0.000)	0.021 (0.000)	0.018 (0.000)	1				
Tangibility	0.244 (0.000)	-0.022 (0.000)	0.014 (0.000)	0.382 (0.000)	1			
LTDR	0.053 (0.000)	-0.024 (0.000)	0.012 (0.000)	0.205 (0.000)	0.265 (0.000)	1		
STDR	0.037 (0.000)	-0.028 (0.000)	0.001 (0.784)	0.214 (0.000)	-0.019 (0.000)	0.038 (0.000)	1	
TDR	0.061 (0.000)	-0.037 (0.000)	0.007 (0.182)	0.290 (0.000)	0.153 (0.000)	0.663 (0.000)	0.773 (0.000)	1

Note: Correlation is significant at the 0.05 level

4.2 The pooled regression model results

Table 5 shows the pooled regression model results. R-squared statistics are high for all three forms of debt. As regards the firm-specific variables, we can see that all variables are statistically significant (at 5%). As regards the analysis of individual statistically significant variables, asset tangibility and risk do not show the same sign across all debt types. Specifically, larger companies tend to have more debt, highly profitable firms tend to show lower levels of debt, as do companies with high non-debt-tax-shields. On the other hand, it is worth noting that higher levels of asset tangibility lead to higher levels of long-term debt, but lower levels of short-term debt. Despite the positive relationship between risk and long/short term debt, we found an expected negative relationship between risk and total debt implied by the pecking order theory perspective, given that riskier firms are less encumbered. All these results are in line with the literature, as analysed in the respective section. As regards industry dummies, trade and tourism are statistically significant at a 0.05 level, while manufacturing is marginally statistically insignificant only for total debt, however statistically significant in a 0.10 level, which implies that there are indeed differentiations across industries in capital structure determination.

Table 5: Pooled Industry Regression Results

Explanatory Variables	Dependent variables											
	Long-term debt				Short-term debt				Total debt			
	Estimate	Std. error	t	Sign	Estimate	Std. error	t	Sign	Estimate	Std. error	t	Sign
Constant	0.098	0.004	24.363	0.000	0.153	0.002	51.179	0.000	-0.197	0.003	-64.774	0.000
NDTS	-0.312	0.012	-25.946	0.000	-0.307	0.009	-33.336	0.000	-0.369	0.005	-63.849	0.000
Profitability	-0.257	0.002	-86.928	0.000	-0.307	0.002	-153.407	0.000	-0.521	0.002	-208.413	0.000
Risk	2.02×10^{-15}	8.32×10^{-16}	2.427	0.015	8.09×10^{-16}	3.75×10^{-16}	2.155	0.031	-7.32×10^{-15}	7.95×10^{-16}	-9.209	0.000
Size	0.002	0.000	9.728	0.000	0.004	0.000	21.051	0.000	0.032	0.000	150.453	0.000
Tangibility	0.164	0.001	104.496	0.000	-0.107	0.001	-86.721	0.000	0.055	0.001	42.372	0.000
z1 Manu dum	-0.021	0.001	-17.493	0.000	0.0188	0.000	19.139	0.000	0.001	0.000	1.924	0.054
z2 Trade dum	-0.012	0.001	-10.477	0.000	0.040	0.000	43.192	0.000	0.030	0.000	38.168	0.000
z3 Tour dum	-0.020	0.001	-13.789	0.000	-0.008	0.001	-7.298	0.000	-0.024	0.001	-18.552	0.000
R-squared		0.747				0.621				0.934		
F-statistic		11327.25				8.627.881				89400.68		
Regression S.E.		0.155				0.154				0.202		
Residual SS		741.895				1007.73				2054.61		
DW stat		0.386				0.495				0.412		

Notes: Significant at the 5% level

4.3 The separate regression model results

Table 6 shows the pooled regression model results for each industry. R-squared statistics do vary across different industries and different debt types, but in most cases, they remain at good levels. The capital structure determinants are statistically significant at 5%, with the very few exceptions of tangibility, risk, and non-debt-tax-shields, and again not in all debt types, while for services the factor risk is statistically insignificant for all debt types.

In general, variables continue to maintain their signs across different debt types, but some interesting differentiations do come up. For example, a noticeable difference is that size now has a negative relationship with debt for the services industry, whereas tangibility is now negatively related to debt for all debt types for tourism and statistically insignificant only for total debt of manufacturing. Manufacturing, services, and trade are in line with the trend revealed in the pooled regression model, where asset tangibility was positively related with long-term debt, and negatively related to short-term debt. Other spotted industry differences are in the cases of tourism and trade, where size changes signs between long- and short-term debt. A similar case is spotted in the case of manufacturing where risk is positively related with long-term debt and negatively related to short-term debt. The main conclusion is that industry differentiations, which were implied by the significant dummies in the pooled regression model, do show to exist when we run the model again with industry restrictions.

Table 6: Separate Industry Regression Results

	Long-term debt				Short-term debt				Total debt			
	Estimate	Std. error	t	Sign	Estimate	Std. error	t	Sign	Estimate	Std. error	t	Sign
Panel A: Manufacturing												
Constant	0.105	0.006	15.697	0	0.105	0.007	14.978	0	-0.273	0.006	-39.158	0
NDTS	-0.549	0.02	-27.172	0	-0.49	0.014	-34.185	0	-0.792	0.023	-33.559	0
Profitability	-0.267	0.009	-27.688	0	-0.468	0.007	-62.842	0	-0.708	0.009	-71.321	0
Risk	9.56×10^{-16}	4.80×10^{-16}	-1.993	0.046	-3.28×10^{-15}	5.86×10^{-16}	-5.604	0	-4.24×10^{-15}	7.66×10^{-16}	-5.54	0
Size	0.001	0	4.379	0	0.01	0	21.227	0	0.039	0	81.004	0
Tangibility	0.132	0.003	40.707	0	-0.13	0.002	-45.944	0	0.006	0.003	1.692	0.09
R-squared		0.349					0.461			0.483		
F-statistic		1113.17					2312.54			2826.94		
Regression S.E.		0.14					0.14			0.185		
Residual SS		204.162					259.972			518.897		
DW stat		0.381					0.508			0.426		
Panel B: Trade												
Constant	0.261	0.005	52.188	0	0.138	0.007	19.006	0	-0.108	0.004	-26.99	0
NDTS	-0.556	0.023	-24.111	0	-0.504	0.03	-15.421	0	-0.877	0.028	-31.235	0
Profitability	-0.238	0.005	-43.541	0	-0.497	0.006	-81.476	0	-0.637	0.005	-123.602	0
Risk	5.44×10^{-17}	1.70×10^{-15}	0.032	0.974	4.69×10^{-15}	1.49×10^{-15}	3.151	0.001	-6.16×10^{-15}	2.77×10^{-15}	-2.219	0.026
Size	-0.009	0	-26.813	0	0.009	0	19.298	0	0.028	0	90.51	0
Tangibility	0.205	0.002	73.881	0	-0.129	0.003	-42.65	0	0.09	0.003	27.308	0
R-squared		0.557				0.32				0.765		
F-statistic		2885.106				1792.927				13980.16		
Regression S.E.		0.14				0.173				0.207		
Residual SS		226.041				575.893				917.057		
DW stat		0.444				0.481				0.435		

	Long-term debt				Short-term debt				Total debt			
	Estimate	Std. error	t	Sign	Estimate	Std. error	t	Sign	Estimate	Std. error	t	Sign
Panel C: Tourism												
Constant	-0.373	0.011	-31.407	0	0.209	0.006	32.128	0	-0.622	0.01	-7.697	0
NDTS	-0.028	0.029	-0.943	0.345	0.105	0.012	8.785	0	0.225	0.025	8.881	0
Profitability	-0.619	0.005	-110.172	0	-0.272	0.009	-28.09	0	-0.653	0.014	-46.432	0
Risk	-4.68×10 ⁻¹⁴	1.03×10 ⁻¹⁴	-4.561	0	-2.08×10 ⁻¹⁴	5.49×10 ⁻¹⁵	-3.794	0	-5.96×10 ⁻¹⁴	6.35×10 ⁻¹⁵	-9.384	0
Size	0.046	0	54.996	0	-0.002	0	-5.353	0	0.066	0	92.401	0
Tangibility	-0.099	0.003	-25.246	0	-0.082	0.002	-34.293	0	-0.117	0.004	-26.699	0
R-squared		0.77				0.322				0.627		
F-statistic		4045.348				487.828				2634.669		
Regression S.E.		0.186				0.111				0.209		
Residual SS		211.044				63.731				341.755		
DW stat		0.324				0.496				0.366		
Panel D: Services												
Constant	0.261	0.005	52.188	0	0.138	0.007	19.006	0	-0.108	0.004	19.006	0
NDTS	-0.556	0.023	-24.111	0	-0.504	0.03	-16.421	0	-0.877	0.028	-16.421	0
Profitability	-0.238	0.005	-43.541	0	-0.497	0.006	-81.476	0	-0.637	0.005	-81.476	0
Risk	5.44×10 ⁻¹⁷	1.70×10 ⁻¹⁵	0.032	0.974	4.69×10 ⁻¹⁵	1.49×10 ⁻¹⁵	3.151	0.001	-6.16×10 ⁻¹⁵	2.77×10 ⁻¹⁵	3.151	0.026
Size	-0.009	0	-26.813	0	0.009	0	19.298	0	0.028	0	19.298	0
Tangibility	0.205	0.002	73.881	0	-0.129	0.003	-42.65	0	0.09	0.003	-42.65	0
R-squared		0.557				0.32				0.32		
F-statistic		2885.106				1792.927				1792.927		
Regression S.E.		0.14				0.173				0.173		
Residual SS		226.041				575.893				575.893		
DW stat		0.444				0.481				0.481		

4.4 The Wald test results

Table 7 presents the results of the Wald test. The p-values in the parentheses indicate that all variables are statistically significant. The variable coefficients are different for all variables in all debt types indicating that the relationship across industries and debt types differ significantly, thus our null hypothesis set in section 3 is rejected. Also, in the cases of ndts and risk we observe that the negative signs of coefficients are the same for all debt types. The Wald test clearly shows that variable coefficients do differ across industries, in a statistically significant way. This is a crucial outcome, since this shows that the different capital structure determinants affect financial leverage in different ways (different signs) and in different intensity levels (statistically different coefficients) companies that belong to different industries.

Table 7: Variation of industry effects across industries

	Long-term debt	Short-term debt	Total debt
NDTS	-0.2155	-0.8201	-0.8441
	0	0	0
Profitability	0.2748	-0.1608	-0.0,76
	0	0	0
Risk	-5.43×10^{-15}	-6.74×10^{-15}	-2.28×10^{-14}
	0	-0.022	0
Size	-0.0118	0.0056	-0.0039
	0	0	0
Tangibility	0.2338	-0.0247	0.1503
	0	0	0

Notes: This table presents the standard deviation of the estimates for four industries. The Wald tests indicate whether the individual estimates vary across industries.

5. Concluding remarks

The main objective of this paper is to investigate whether capital structure determinants affect capital structure of SMEs in different ways, across different industries. We follow a three-stage methodological approach, first running a pooled regression model using dummy variables for industries, second running separate models for each individual industry and third applying the Wald test to investigate cross-sectional variable coefficients variations across industries.

As regards the relationship of capital structure determinants with each individual industry, the results are generally consistent with the literature. Our results suggest that both agency and asymmetric information costs have an effect on the degree of long- and short-term debt in small firms. Size is positively related to debt, confirming that larger firms exhibit more leverage. Profitability is negatively related to leverage which is consistent with the predictions of the pecking order theory by

confirming that highly profitable SMEs use more internal funds than external financing. We also observe a positive relationship between asset tangibility and leverage, with the exception of tourism and a negative relationship between non-debt-tax-shields and leverage, again with the exception of tourism. Last, the relationship between risk and leverage varies across industries.

Our second conclusion is that there are differences in the determination of capital structure across industries verified not only from our four separated industry regressions but also when applying the Wald test. This indicates that different industries exhibit different degrees of debt and determine their capital structure differently. Thus, we provide evidence that in the case of Greek SMEs, the firm and industry-specific effects are of high importance for the diversity in the determinants of capital structure, which is in line with our benchmark research of Hall *et al.* (2000) and Degryse *et al.* (2010). On future research, it would be of interest to conduct comparison studies between large companies and SMEs, or even across countries, with the industry factor in focus, to further enlarge the academic literature on industry differentiations in capital structure determination.

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