ISCTE Business School
Instituto Universitário de Lisboa

DETERMINANTS OF CAPITAL STRUCTURE AND FINANCIAL CRISIS IMPACT: EVIDENCE FROM PORTUGUESE SMEs

Pedro Miguel Correia Proença

Dissertation submitted as partial requirement for the conferral of

Master in Accounting

Supervisor:
Prof. Doutor Raul Manuel Silva Laureano, Assistant Professor, ISCTE-IUL Business School, Department of Quantitative Methods

October 2012

Abstract

The objectives of this empirical work are to investigate the determinants of Portuguese SMEs capital structure, evaluate whether and how the impacts of those determinants affect the debt ratios and examine the effects of financial crisis and industry on Portuguese SMEs capital structure. The sample used considers the period 2007-2010, resulting in 12.857 Portuguese SMEs per year observations. Results suggest that liquidity, asset structure and profitability are the most important determinants explaining the capital structure of Portuguese SMEs. Short-term debt was found to be negatively related to liquidity, asset structure, size and profitability, while long-term debt was found to be related positively to asset structure, liquidity, size and growth and negatively to profitability. Furthermore, we noticed a downward tendency on companies' debt ratios levels during the financial crisis, which is statistically insignificant. Finally, we observed that industry plays an important role on Portuguese SMEs capital structure and debt ratios vary across industries. Still, through the clusters analysis we found two homogeneous groups of industries according to its debt ratios levels.

Key-words: Capital structure, financial crisis, Portuguese SMEs, clusters analysis

Resumo

Este estudo empírico tem como objectivos examinar os determinantes da estrutura de capital das pequenas e médias empresas portuguesas, procurando avaliar de que maneira o impacto desses determinantes afecta a estrutura de capital das PMEs, e ainda investigar quais os efeitos da crise financeira e do sector na estrutura de capital das PMEs portuguesas. A amostra utilizada considera o período 2007-2010, resultando em 12.857 PMEs portuguesas por ano. Os resultados obtidos sugerem que a liquidez, a estrutura do activo e a rentabilidade são os determinantes que melhor explicam a estrutura de capital das PMEs portuguesas. Nesse sentido, o endividamento de curto prazo está relacionado negativamente com a liquidez, estrutura do activo, dimensão e rentabilidade, enquanto que o endividamento de longo prazo está relacionado positivamente com a estrutura do activo, liquidez, dimensão e crescimento e ainda negativamente com a rentabilidade. Além disto, observamos uma tendência decrescente nos rácios de endividamento durante a crise finaceira, que se revelou estatisticamente insignificante. Finalmente, verificamos que os níveis de endividamente variam cosoante o sector de actividade e através da análise de clusters encontrámos dois grupos homogeneous de sectores de acordo com os rácios de endividamento.

Palavras-chave: Estrutura de capital, crise financeira, PMEs Portuguesas, análise de clusters

Acknowledgements

The preparation of this individual research paper was definitely one of the biggest challenges I had during my student life. Therefore, I would take this opportunity to express my sincere thanks to the people who have given encouragement and motivation to complete this project with success.

Firstly, I would like to thank my supervisor Prof. Raul Laureano for his treasured guidance and advice. I also want to show my appreciation to his availability, pro-activity and pertinent criticisms about the thematic addressed in this study during this long journey of work.

Secondly, I would like to express my greatest gratitude to my family and friends, who were abundantly helpful while giving motivation and encouraging at all times of challenges and achievements.

Many thanks!

List of Abbreviations

BdP – Banco de Portugal

CBF – Credit & Business Finance

CCP – Confederação do Comércio e Serviços de Portugal

EU – European Union

GVA – Gross Value Added

IIC - Instituto Informador Comercial

INE – Instituto Nacional de Estatística

LLP – Limited Liability Partnership

LTD – Long Term Debt

NDTS – Non debt tax shields

OLS – Ordinary Least Squares

POT – Pecking Order Theory

ROA – Return on Assets

ROS – Return on Sales

SME – Small and Medium Enterprise

STD – Short Term Debt

TD – Total Debt

INDEX

List of Tables

List of Figures

1. INTRODUCTION

The purpose of this introductory chapter is to provide an overview of the whole study. Firstly, this chapter presents a short, and admittedly incomplete, introduction to the importance of SMEs into the Portuguese economy and to the capital structure problematic as well as the motivations to study this problematic. This is followed by the objectives proposed with this study and also by the methodology applied. Lastly, this chapter provides an explanation about how this study is structured.

1.1. Problem Statement and Motivation

Nowadays, the Portuguese economy is expected to increase the competitive of companies in order to raise exportations, generate jobs and consequently reduce its budget deficit. Therefore, it is essential to have a long term plan for the future to give the best answer to the economic and social crisis faced by the country.

Given the importance of SMEs into the Portuguese economy, it is relevant to investigate how firms finance its assets and explore which determinants affect companies' capital structure, as it can influence the companies' value and the return of shareholders. Therefore, this study is expected to update the existing literature within the reality of Portuguese SMEs in a period of financial crisis.

The capital structure problematic started in 1958 with Modigliani and Miller. Since then, the capital structure field has attracted many researchers, who started exploring the different theories concerning capital structure into the large companies' reality, namely trade-off theory, pecking order theory and agency costs theory. More recently, the research on the determinants of capital structure started including the SMEs.

Based on the theories stated above, some empirical studies have been conducted to analyze the determinants of capital structure choice, being the literature very extensive on this field. Therefore, we turned the focus of this study to comparative studies

conducted with SMEs samples. The most important determinants explaining the companies' capital structure choice suggested by the literature are the following: asset structure, non-debt tax shields, size, profitability, growth, liquidity, cash-flow and industry.

More recently, the financial crisis of 2008 started to be an interesting topic in the capital structure field and this study represents one of the pioneering studies including the main effects of the financial crisis in the capital structure of SMEs emerging in the literature.

The first motivation of developing this study in the capital structure field is related to the importance of SMEs in the Portuguese economy, being relevant for the public in general to characterize the capital structure of those companies, as well as investigate its determinants. A second, and potentially more interesting, motivation of this research is the possibility to give an important contribute to the capital structure literature concerning the recent topic of the financial crisis of 2008 and how it affected the capital structure of SMEs.

1.2. Objectives

Given the pertinence of studying the capital structure choice in Portuguese SMEs, this study attempts to contribute to the existing literature by identifying which capital structure theory better explain the capital structure of SMEs in Portugal, which is related to the impact of some firm-specific determinants on companies' debt levels.

Second, this study intends to observe and measure the impact of the financial crisis of 2008 on Portuguese SMEs' capital structure.

Additionally, the third objective of this study is to explore and evaluate the impact of industry on capital structure of SMEs in Portugal as well, by investigating how its debt ratios vary among industries.

1.3. Methodological Approach

With the purpose to reach the proposed objectives, we estimated a model to investigate about the determinants of capital structure choice through the OLS regression method. Furthermore, we will also investigate the financial crisis impact on the Portuguese SMEs' capital structure. With regards to third objective, we run a cluster analysis with

the purpose to explore the presence of homogeneity among industries concerning the capital structure.

In order to develop these quantitative analyses the sample used was taken from the "Amadeus" database website (Amadeus, 2011) and contains the detailed financial information, namely balance sheet and income statement accounts, financial ratios and some descriptive information of 12.857 Portuguese SMEs for the period 2007-2010.

1.4. Structure

This dissertation contains 5 chapters: besides this introduction, the chapter 2 presents the literature review that revises the most relevant empirical work about capital structure done by researches and tries to explore the relationship between debt ratios and capital structure's determinants. Subsequently, chapter 3 presents the formulated hypotheses, describes the data sample and the variables used and lastly, the methodology used to identify the determinants of capital structure and to find homogenous groups of industries. Afterwards, chapter 4 presents the obtained results through descriptive and inferential statistics, correlation coefficients, linear regression analysis, clusters analysis and also the discussion of the results obtained. Finally, chapter 5 describes the main conclusions and contributes about this empirical study, presents some limitations faced in this empirical work and gives some suggestions for future research.

2. LITERATURE REVIEW

In order to understand capital structure as a whole, this chapter provides an overview of its meaning. Second, this chapter describes the SMEs' context in Portugal and their importance into the Portuguese economy and the evolution, as well as the impact of financial crisis of 2008 on the Portuguese SMEs financing policy. Furthermore, this chapter also debates the main theories of capital structure and review the capital structure determinants suggested by previous empirical studies. Additionally, we consider the impact of such determinants on STD and LTD, which is followed by the possible impact of industry on companies' capital structure.

2.1. Capital Structure Overview

Companies have two forms to finance its assets: equity, debt or more frequent, both.

Equity states to the money which was invested by the shareholders and it gives more stability because it doesn't obligate to an effective payment. This payment will be profitability expected by the shareholders, however if it doesn't reach the shareholders expectations the company won't be necessarily in a situation of bankruptcy.

On the other hand, the term debt refers to the money invested in the companies by the creditors, which represents an obligation and an effective payment, generally associated to an interest rate and maturity date. Moreover, issuing debt will consequently raise the risk and the potential return of equity (Esperança and Matias, 2005).

Debt can be subdivided in short-term debt and long-term debt according to its maturity. Thus, the short-term instruments are more relevant when companies have working capital needs and small equipment purchase, while the long-term instruments have more importance when making new investments and purchasing new equipment (Esperança and Matias, 2005).

According to Esperança and Matias (2005), Table 1 shows the most common instruments of the different forms of financing, namely equity, short and long-term debt.

Table 1: Instruments of Financing

Forms of Financing	Instruments
Equity	- Issuing new equity - Credit from shareholders - Generated funds
STD (maturity: less than 1 year)	- Credit from suppliers - Overdraft - Factoring - Credit card - Line of credit
LTD (maturity: greater than 1 year)	- Credit from fixed asset's suppliers - Leasing - Long term loan

Source: *Esperança and Matias (2005: 194-201)*

The way a company finances its assets through some combination of equity and debt, states to its capital structure. Myers, one of the most prestigious researchers in the field, assumed "there is no universal theory of the debt-equity choice, and no reason to expect one" (Myers, 2001: 81). Therefore, the capital structure choice varies according to some factors, such as industry, tax policies, type of asset, costs of financial distress, doubt about the future, company's life cycle and borrowing decisions (Mota et al., 2006).

In accordance with Borges et al. (2007) and Esperança and Matias(2005), the main indicators related to capital structure are the equity ratio, debt ratio and solvability. These ratios determine the level of equity and debt while companies finance their assets, as well as the capacity of them to pay their debt[1].

Table 2 shows the capital structure's indicators and its formulas. As can be predicted, "Equity + Total Debt = 1" according to the balance sheet equation.

Table 2: Capital Structure Indicators

Capital Structure's Indicators	Formulas
Equity ratio	$\frac{Equity}{Total\ assets}$
TD ratio	$\frac{Total\ liabilities}{Total\ assets}$
STD ratio	$\frac{Current\ liabilities}{Total\ assets}$
LTD ratio	$\frac{Non\ current\ liabilities}{Total\ assets}$
Solvability	$\frac{Equity}{Total\ liabilities}$

Source: *Borges et al. (2007) and Esperança and Matias (2005)*

[1] These ratios can be presented in absolute value or in percentage when multiplied by 100.

The equity ratio varies among 0 and 1 and indicates the relative proportion of equity used to finance a company's assets. Thus, when this ratio is close to 1, it means there's a low dependence on creditors and consequently it lowers the financial costs.

On the other hand, the debt ratio also varies among 0 and 1 but it indicates the relative proportion of debt used to finance a company's assets. Furthermore, this ratio can be subdivided in short and long term debt. The higher the ratio, the more dependence on creditors and consequently the greater risk will be associated. If this ratio shows a result greater than 1, it means the company has negative equity and there's a possibility of bankruptcy.

Ultimately, the solvability analyses the company's capability to respond to its financial obligations. A higher ratio will bring more security to the creditors due to the fact that the companies would be able to liquidate their debts. If the result is lower than 0.5, it means that the company depends too much on their creditors, which represents a higher risk to the creditors. In order to increase the solvability, the companies should increase the proportion of equity.

2.2. SMEs' Current Context

On 6 May 2003, the European Commission has updated the definition of SME. Thus, new thresholds were adopted in order to suit different categories of SME and take better account of the various types of relationship between companies. In Portugal, the IAPMEI[2] also adopted the new European community classification of SMEs dimension. The new thresholds adopted are shown in the following Table 3.

Table 3: The New Thresholds to Define SMEs

Company's Size	Head Count	Annual Turnover	or Annual Balance Sheet
Micro	< 10	<= 2 million	<= 2 million
Small	< 50	<= 10 million	<= 10 million
Medium	< 250	<= 50 million	<= 43 million

Source: *European Commission (2003) and IAPMEI (2003)*

Many statistics from the Statistical Yearbook of Portugal done by INE (2011), evidence the importance of SME's in the Portuguese economy as well as it is usual to hear from

[2] IAPMEI - Portuguese Institute to support the SMEs activity.

many economists and managers that SMEs represent the engine of the Portuguese economy, as they are a major source of entrepreneurial skills, innovation and employment.

Furthermore, the most recent statistics from INE (2008) and IAPMEI (2008)[3] state that according to the new thresholds adopted by the European community to suit different categories of SME, there were 349,756 Portuguese SMEs. Nevertheless, those SMEs represented around 99% of all Portuguese enterprises and provided around 72% of all jobs (Table 4).

Table 4: Number of SMEs, Employment and GVA in Portugal and Europe

SMEs	Portugal, 2008	Europe, 2010
Entreprises		
Number	349,756	20,796,192
%	99.7%	99.8%
Employment		
Number	2,178,493	87,460,792
%	72.5%	66.9%
Gross value added (GVA)		
EUR Millions	201,700	3,492,979
%	57.9%	58.4%

Source: *IAPMEI (2008) and Eurostat (2010)*

Table 4 compares the statistic of SMEs in Portugal to the Europe. The table clearly shows that statistics from Portugal are fairly stable with those from Europe; however in employment terms, the Portuguese SMEs play a more important role in that country by providing around 73% of all jobs, more 5% than in Europe.

In general, the Portuguese SMEs are characterized to be on the legal form of Limited Liability Partnerships (LLPs)[4] or Corporations[5], being the majority LLPs (Económico, 2012). According to the Portuguese law, companies on the legal form of Corporations are obligated to have their financial statements audited at all while the majority of LLPs don't need to get their financial statements approved by an auditor.

According to Holmes and Kent (1991) and Pontes and Laureano (2012), SMEs are characterized by being more averse to take risk through borrowing money from outside

[3] www.ine.pt or www.iapmei.pt
[4] In Portugal those companies are denoted by "Sociedades Limitadas" or "LDA"
[5] In Portugal those companies are denoted by "Sociedades Anónimas" or "S.A."

financers, as the most of the times the managers are also the businesses' owners and the risk is not shared by multiple investors.

In line with ENSR Enterprise Survey (2002), following the lack of skilled labor, 13 % of the European SMEs consider access to finance as the major constraint on their business performance. Basically, the access of SMEs to the capital market is limited, has many entrepreneurs cannot finance their business only with equity, being the bank credit the most recurrent form of financing in the European economy.

Concerning the SMEs' capital structure, INE (2008) states that debt constituted the main source of Portuguese SMEs financing, representing 72% of the whole investment, being segregated according to its maturity. Hence, the short-term debt represented 56% while the long-term debt represented only 16%. Such statistics, are in accordance with EU Commission (2003) which states that due to liquidity limitations, many SMEs are not able to pay their suppliers before they are paid by their customers, so the importance of short-term financial debt is usually higher for SMEs than for large companies, a characteristic that correlates to the require of SMEs for more working capital needs.

2.3. The Impact of Financial Crisis on SMEs

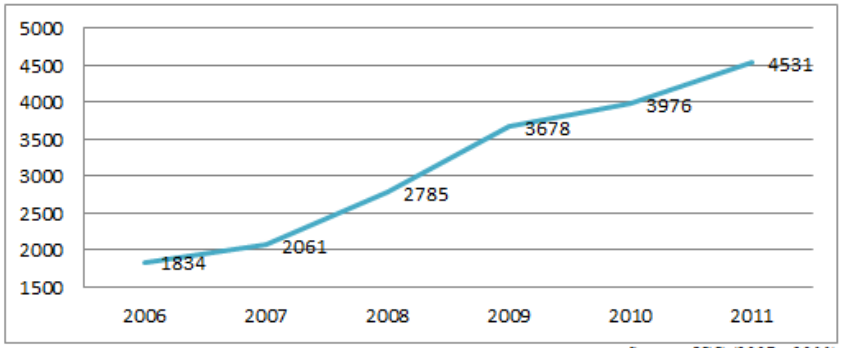
According to Kenc and Dibooglu (2010), the financial crisis that hit Europe in 2007/2008, resulted from the undercapitalization of the banking sector due to the poor risk management practices and untidy financial regulations and supervisions by banks while giving credit to the families and companies. Moreover, Atici and Gursoy (2011) argue that financial crisis has deepened, and widened in September 2008, by the bankruptcy of Lehman Brothers Bank in USA.

Still according to Atici and Gursoy (2011), the liquidity shortage and trust erosion among banks blocked interbank transactions, which aggravated the companies' difficulty to pay its liabilities being hard for them to access debt from outside financers due to the high transactions costs of financing externally.

Despite the great importance of SMEs in the European and Portuguese economy as mentioned previously, this scenario of financial crisis increased the number of companies defaulting on its debt, including SMEs (EU Commission, 2011 and ICC, 2007-2010).

As it can be seen from the Figure 1, the number of Portuguese enterprises defaulting on its debt has been growing. However, this increase was stronger after the financial crisis with a 35.1 and 32.3 percent of growing in 2008 and 2009 respectively.

Figure 1: Number of Portuguese Enterprises in Insolvency, 2006 - 2011

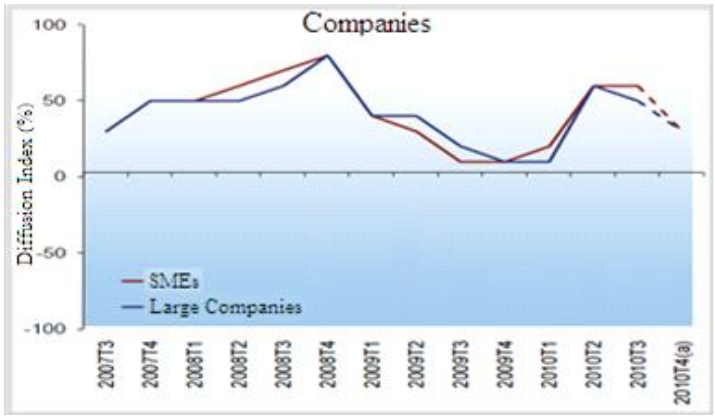


Source: *ICC (2007 - 2011)*

More recently, statistic from CCP (2012) evidence that after the financial crisis, around 86% of the Portuguese SMEs have got worst conditions of bank financing, when compared with the previous year. In practice, 75% of those companies got their amounts of credit reduced by the bank, whereas 87% of the Portuguese SMEs had their banks requiring more collateral for its credits.

Additionally, also the Credit Market Survey done by BdP in 2010, evidence a strong downward tendency on the credit supply to SMEs after the fourth quarter of 2008, which coincides with the bankruptcy of Lehman Brothers Bank. However, starting in early 2010 this trend reversed and the credit supply to SMEs started to increase maidenly as can be in Figure 2.

Figure 2: Credit Supply to SMEs and Large Enterprises, 2007 - 2010



Source: *Banco de Portugal (2010)*

Nowadays, under the actual conjecture with high tax rates and high spreads charged by government and banks respectively, the advantage of issuing debt is reduced by the high

risk taken; therefore, managers and shareholders from the Portuguese SMEs are very reluctant of the business financing due to the current economic and social crisis (Económico, 2012).

2.4. Capital Structure Theories

According to Myers (2001), the problematic about how and why companies choose theirs capital structure started in 1958 with the work of Modigliani and Miller (1958).

Since pioneering work done by these two researchers on capital structure field, the choice of capital structure was something that companies should not care too much about because the authors conclude that company's value is not dependent on choice of capital structure.

However, assuming the existence of "interest tax shield", Modigliani and Miller (1963) conclude that capital structure can change company's value through taking advantage of the benefits of debt tax shields, and then companies would maximize its value by issuing debt instead of using internal capital.

Following the research done by Modigliani and Miller, emerged three conflicting theories of capital structure named: static trade off, pecking-order and agency cost theories.

2.4.1. Static Trade-off Theory

The static trade-off theory of capital structure is related to the tax based theory and it states that companies should seek to raise their debt as much as possible (Miller, 1988) in order to obtain the optimal level of company's debt. However there are some empirical studies (e.g. Stiglitz, 1988; Kraus and Litzenberger, 1973) which show that there is a trade-off between tax shield advantage and leverage related costs, thus debt cannot be indeterminately used as a source of financing.

Warner (1977) and Brealey and Myers (1992) studied these leverage related costs, concluding that such costs increase with the debt issue, reducing the company's value. Such costs occur when companies have difficulty to pay their debt obligations and are associated to the financial distress and the bankruptcy cost, existing direct and indirect

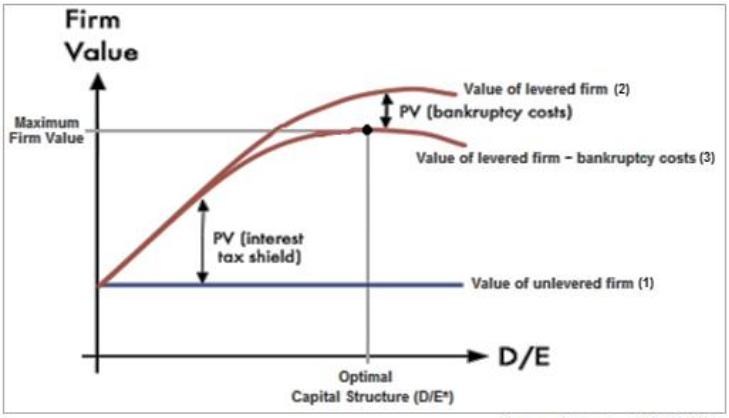
costs. Such financial distress and bankruptcy costs are very hard to calculate and to determine when they occur.

The direct costs are determined by legal and administrative costs as they are incurred in bankruptcy process, when selling the liquidated assets and shutting down operations.

On the other hand, the indirect costs are related to the difficulty of managing a company over its bankruptcy process, and one example of these costs is the cost of losing customers.

The Figure 3 balances the tradeoff between firm value and its capital structure. It can be seen that debt has a positive effect on firm value, due to the deductible tax of interest payments as mentioned earlier.

Figure 3: Tradeoff between Firm Value and Capital Structure



Source: *Mota et al. (2006: 156)*

However, if we consider the effect of bankruptcy cost, the value of levered firm decreases that amount. Nevertheless, every firm will have a different optimal capital structure according to some factors cited before. Formally,

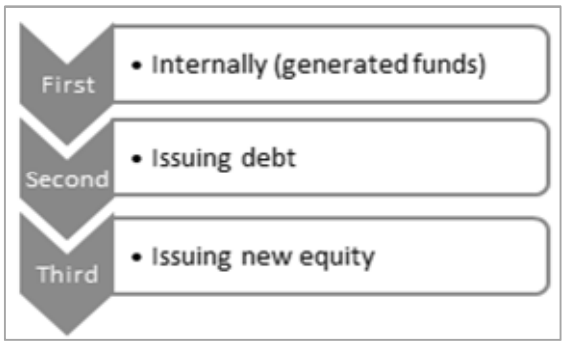
- *(1) = EBIT (1-tax rate)*
- *(2) = EBIT (1-taxe rate) + debt.tax rate*
- *(3) = EBIT (1-t) + debt.tax rate - bankruptcy costs*

Therefore, according to static trade-off theory, companies are expected to achieve an optimal capital structure and a target debt ratio in order to maximize the value of the company by balancing the tax benefits with the leverage costs (Myers, 1984). "In this context, issuing equity instead of debt means moving the company away from the optimum and should therefore be taken as a bad news" (Rasiah and Kin, 2011: 151).

2.4.2. Pecking Order Theory (POT)

After taking a look at how firms structure their balance sheets, Myers (1984) realized that companies prefer to finance new investments following a pecking order: first internally generated funds such as retained earnings (equity), then with debt, and finally with issuing new equity (Figure 4).

Figure 4: Companies' Financing Preferences According to POT



Several other empirical studies (e.g Fama and French, 1988) support the pecking order theory, stating that leverage is negatively related to profitability, which comes together with the pecking order assumption that debt is only issued when internal funds are insufficient to finance new investments.

In the information-asymmetry world, Majluf and Myers (1984) argue that companies like financing internally better than financing externally, as well as, Myers (2001) assume that managers get doubtful about issuing equity, because it might be a signal that the stock price will come down.

Therefore, in view of this theory, there are two kinds of equity, one at the top (internal) of the pecking order and one at the bottom (external), thus, an optimal structure is hard to get (there is no target debt-equity mix) (Myers, 1984).

2.4.3. Agency Cost Theory

Sometimes the ownership and the control of the companies are separated. Jensen and Meckling (1976: 5) argue that "If both parties to the relationship are utility maximizers, there is good reason to believe that the manager will not always act in the best interests of the shareholder". Therefore, the agency cost theory of capital structure proposes that companies would decide their capital structure by reducing the costs from the conflicts between the parties involved (manager, shareholder and creditors).

The conflict between managers and shareholders gets worse when companies generate relevant free cash flow. Consequently, when managers have the control over the use of free cash flows, they may waste it or invest it in unprofitable projects instead of giving out dividends to shareholders. In order to reduce the agency costs between managers and shareholders, companies increase their amount of debt to motivate managers to work harder and to take better investment decisions (Jensen, 1986; Stulz, 1990).

On the other hand, if the company issues a large amount of debt over the target debt ratio, it will bring the agency costs between shareholders and creditors. Consequently, companies have to be prudent and careful about how much debt they issue as "the conflict between shareholders and debt holders will become worse when the firm keeps on borrowing money from creditors" (Rasiah and Kin, 2011: 155).

Also, Myers (1977) argued that companies are expected to use more debt and more equity when an overinvestment or an underinvestment happens respectively.

Basically, the agency cost theory comes together with the trade-off theory as companies issue debt to reduce the agency costs between managers and shareholders until a certain amount to not bring agency cost between shareholders and creditors. The certain amount is going to be the target debt ratio and therefore, those companies which are above the target debt ratio are expected to reduce their debt (underinvestment) as well as companies which are below the target debt ration are expected to increase their debt (overinvestment).

Assuming that the agency cost theory supports the trade-off theory, and the agency costs between managers, shareholders and creditors are irrelevant in SME's as these companies have the ownership and the control together the most of the times (Poza et al., 2004; Russo, 2005).

2.5. Capital Structure Determinants

Based on the theories mentioned above, several empirical studies have been conducted to analyze which factors affect the capital structure of companies in general. Hence, the factors suggested by the literature are: asset structure, non-debt tax shield, size, profitability, growth, liquidity, cash-flow and industry (e.g. DeAngelo and Masulis, 1980; Jensen, 1986; Titman and Wessels, 1988; Stulz, 1990; Rajan and Zingales, 1995; Ozkan, 2001; Myers, 2003; Esperança, 2003; Vieira and Novo, 2010; Cabaço, 2010).

2.5.1. Asset Structure

According to the definition, asset structure regards to the segregation of the economic resources owned by a company in tangible or intangible. Simply stated, tangible assets have a physical form while intangible assets cannot be seen, touched or physically measured. In practice, examples of tangible assets are buildings and equipment whilst intangible assets include such items as patents and copyrights.

Following on from the trade-off theory, Scott (1977) and Titman and Wessels (1988) propose that firms with tangible assets that can be used as collateral in the case of company failure with their debt obligations are expected to issue more debt. Thus, for those companies which have higher levels of collateral it is easier to access banking debt or other outside financing source. Titman and Wessels (1988) and Harris and Raviv (1990) also say that firms with lots of tangible assets will have higher liquidation value and consequently more debt.

Giving the assets as the collateral for issuing debt, contribute to companies increase their debt because it reduces creditors' risk in loaning money and companies have more accessibility to debt, as the more collateral given, the less probability of failure (Veira and Novo, 2010).

More recently, many researchers also studying the capital structure of SMEs in Europe suggest a positive relationship between tangible assets and LTD (e.g. Michaelas, 1999; Hall, 2000; Vieira and Novo, 2010). Concerning the sign of the relationship between tangible assets and STD results are disputed, as some researchers suggest a positive sign (e.g. Michaelas, 1999; Esperança, 2003), while others a negative sign (e.g. Hall, 2000; Vieira and Novo, 2010).

2.5.2. Non Debt Tax Shields (NDTS)

In accordance with DeAngelo and Masulis (1980), the tax deductibility of interest payments may be the main benefit of debt; however the determination of the optimal level of debt would be influenced by the existence of other NDTS such as depreciation, provision, allowances for doubtful accounts and others.

Nowadays, the high spreads charged by the banks to the small firms may limit the fiscal advantages of issuing debt because it doesn't reward the high risk taken. Instead of issuing debt, these firms seek for other NDTS (Esperança, 2003).

Furthermore, DeAngelo and Masulis (1980) suggested that companies perceive the non-debt tax shields deductions as a substitute for the tax deductibility of interest payments, which reflects in a negative the relationship between the NDTS and debt.

In recent years, the majority of empirical results obtained in the literature show a negative relationship between NDTS and LTD, although the results obtained for STD seem to be not statistical significant. (e.g. Michaelas, 1999; Esperança, 2003; Mira and Garcia, 2003). Nevertheless, a recent study done by Vieira and Novo (2010), suggests a positive relationship between NDTS and LTD and a negative relation between NDTS and STD.

2.5.3. Size

As well as the asset structure and the NDTS attributes, the size of companies is another feature that may influence the companies' capital structure. Titman and Wessels (1988), argued that the size of companies is positively related to debt ratio. In reality, Warner (1977) said that a large company has lower transactions costs of financing externally than a small company, making it harder for the small companies to access debt and keeping them away from outside financing.

In general, large companies follow a strategy of diversified business, enabling them to have stable earnings reducing the risk of bankruptcy and contributing to meet their debt obligations (Warner, 1977; Marsh, 1982).

In accordance with Gallo and Vilaseca (1996), SMEs firms are averse to risk because they are less leveraged and prefer to use more self-financing, although there are advantages of financing externally demonstrated by trade-off theory.

Some studies conducted for the reality of SMEs in Europe evidence there is a positive relationship between size and LTD, but a negative relationship between size and STD due the transactions costs of issuing short term debt be generally lower than issuing long-term debt (e.g. Michaelas, 1999; Hall, 2000; Esperança, 2003). Additionally, Vieira and Novo (2010) also found a positive association between size and LTD while the association between size and STD appeared as not statistically significant.

2.5.4. Profitability

As mentioned before, the pecking order theory proposed by Myers (1984) states that companies have a hierarchical order for their financing decision: first internally with generated funds, then externally by issuing debt, and as a last option with issuing new equity.

Thus, the pecking order theory doesn't go along with the Modigliani and Miller's (1963) prediction, since under the pecking order theory, companies don't take advantage of the debt tax shields benefits as they prefer to finance internally rather than externally due to higher risk faced by external financing costs (Fama and French, 1988).

Moreover, in small companies where normally the managers are also the businesses' owners, the risk is not shared by multiple investors and managers will be more averse to take risk through borrowing money from outside financers (Holmes and Kent, 1991).

Following the general trend in the literature of SMEs, the vast majority of researchers show a negative relationship between profitability and debt ratios (e.g. Michaelas, 1999; Hall, 2000; Esperança, 2003; Mira and Garcia, 2003; Cabaço, 2010; Veiria and Novo 2010).

2.5.5. Growth

Growth refers to an indicator that measures the growth of an investment or project, leading to a profit (e.g. sales growth, asset growth, EBIT growth). Such indicator, represent a good tool for investor, creditors and shareholders to evaluate the company's health.

Concerning this attribute, prior studies are controversial and there is no consensus in the relationship between growth and debt ratios.

According to Ross (1977), the expected relationship between growth and debt is positive as high growth will tell the creditors that the company is not going to bankruptcy and they recognize it by giving them favorable terms of credit.

Furthermore, Jensen (1986) and Stulz, (1990) state that the problem of overinvestment (disciplining managers' behavior) and the recognition of companies' growth by the creditors, granting credit easier, are the causes of a positive relationship between growth and debt showed by prior empirical studies.

On the other hand, Hovakimian et al. (2001) assumed that growth are negatively related to debt, as companies like to finance growth through retained profits better than debt, being the problem of underinvestment pointed as the reason (Raja and Zingales, 1995; Fama and French, 2002).

Moreover, Myers (1977) says that investment in growth will increase the agency costs with people inside and outside the company and it cloud discourage from borrowing money outside and consequently to a negative relationship between growth and debt. Still according to Myers (2003), firms with great growth tend to borrow less than firms with more tangible assets, because growth cannot be used as tangible assets.

Furthermore, small firms will be more averse to take risk through borrowing money from outside financers as the risk is not shared by multiple investors as it happens in a large company and consequently, would like to finance growth internally with generated funds (Holmes and Kent, 1991).

In a recent past, many researchers show a positive relationship between growth and debt ratios. (e.g. Michaelas, 1999; Hall, 2000; Esperança, 2003; Mira and Garcia, 2003; Cabaço, 2010).

2.5.6. Liquidity

According to the definition, the liquidity ratio is a financial ratio that measures the company's ability to meet its short-term liabilities and is therefore a test of short-term solvency.

The research evidence suggests that liquidity has a negative impact on debt ratios (Ozkan, 2001). This negative relationship goes along with the pecking other theory, so firms with higher liquidity ratios would use them to finance their investments. Furthermore, as mentioned in chapter 2.2 the Portuguese SMEs are characterized by using more STD than LTD in order to face its working capital problems, which means that lower liquidity ratios will consequently indicate a higher dependence on STD to companies meet its present obligations (EU Commission, 2003).

On the other hand, in accordance with CBF (2012) the most cause of businesses to default on its debts is the lack of liquidity (no cash), so lower liquidity ratios may be perceived by the outside creditors as such company is likely to default. At the same

time, Urbano (2011) and Laureano et al. (2012) found that firms with high liquidity ratios would have a preference to issue LTD instead of STD.

2.5.7. Cash-flow

As mentioned previously in chapter 2.4.3, the conflict between managers and shareholders gets worse when companies generate relevant free cash flow. Basically, the affectation of the free cash flow is the fundamental problematic of agency relations between managers and shareholders.

Jensen (1986) and Stulz (1990) indicate that companies with high cash flows tend to issue more debt in order to discipline and motivate the managers to work harder and to take the right investment decisions instead of wasting those cash flows in projects at below the cost of capital.

More recently, Mira and Garcia (2003) studying the reality of SMEs in Spain found a negative relationship between cash-flow and debt in accordance with the POT which suggests that companies have a preference for financing its investments with internal generated funds instead of accessing externally debt.

Taking into account, the Poza et al. (2004) and Russo (2005) argument that agency problems tend to be insignificant in SMEs because the managers are the companies' owners the most of the times, we would expect a negative association between cash-flow and debt ratios, as suggested by Mira and Garcia (2003).

2.5.8. Industry

There has been a long research related to the association between industry in which a company operates and its capital structure, Harris and Raviv (1991) and Jordan et al. (1998) assumed that companies from the same industry have more in common with each other than companies from different industries, and these industries tend to keep their debt levels over time. More recently, Michaelas (1999) point out that the industry effect is bigger on short term debt ratios compared to long term debt ratios in all industries.

Furthermore, in accordance to Lev (1969), the industry in which a company operates is a determinant of its capital structure, argument which is also agreed by to Harris and

Raviv (1991) and Hall (2000). Moreover, Ang (1991) admitted that industry plays an important role in the capital structure field as SMEs tend to use an "industry average" to define its capital structure due to the fact that SMEs' manager don't have the knowledge and financial management skills due to its absence of resources.

On the other hand, Myers (1984) and Jordan et al. (1998) contrasted this theory assuming that each company has its own debt ratio, as well as, small companies operate in niche markets, reducing the importance of "industry average". In other words, the industry in which a company operates doesn't explain its capital structure.

A more recent line of theoretical research, done by Hall (2000), Esperança (2003) and Degryse (2009) stresses the importance of industry to capital structure within the SMEs reality. Hence, these authors found empirical evidence that industry plays an important role in the capital structure of SMEs, pointing that debt ratios vary among industries and capital structures are significantly different across industries.

3. EMPIRICAL STUDY: HYPOTHESES AND METHODOLOGY

This work assumes the positivist paradigm of research since it searches for describing certain phenomena, while keeping the independency of the researchers and it applies quantitative tools, adapting to social sciences methods used in exact sciences, in order to find causality relationships (Davila and Oyon, 2008).

Consequently, this chapter presents the hypotheses to be tested and provides a full description of the sample and the variables which have been used to conduct this empirical study. It also provides a description of the methodology and assumptions applied to this study about SMEs' capital structure.

3.1. Hypotheses

According to Myers (2011: 81), "there is no universal theory of the debt-equity choice and no reason to expect one". However, it is important to characterize the debt levels of Portuguese SMEs and understand which determinants play an important role on capital structure of SMEs in Portugal, as it can influence not only the companies' value, as well as the return a company earns for its shareholders.

Based on the Poza et al. (2004) and Russo (2005) argument, that agency problems in SMEs are irrelevant because these companies are characterized by having manage and control together the most of the times, this study only explores the two most relevant theories behind the capital structure field: trade-off and pecking order theories.

Therefore, the trade-off theory states that companies should seek to raise their debt as much as possible in order to obtain the optimal level of debt, by balancing the tax benefits with the bankruptcy costs. On the other hand, the pecking order theory predicts that companies have preferences when financing their asset and debt is only issued when internal funds are insufficient to finance new investments.

Consequently, concerning the first research objective the following group of fourteen hypotheses was formulated[6].

In accordance with the literature, there seems to be evident that tangible assets have a positive association with LTD (e.g. Michaelas, 1999; Hall, 2000; and Vieira and Novo, 2010). On the other hand, the results shown for STD are contradictory about the association of tangible asset with this debt ratio. However, a recent line of theoretical research, done by Vieira and Novo, (2010) suggest that SMEs in Portugal with higher portions of tangible assets tend to have lower levels of STD.

H1.a: *asset structure is positively related to LTD*

H1.b: *asset structure is negatively related to STD*

Towards to NDTS, the vast majority of the literature suggests a negative relationship between NDTS and LTD, as well as lack of statistical evidence when concerning STD (e.g. Michaelas, 1999; Esperança, 2003; Mira and Garcia, 2003). Nevertheless, a recent study done by Vieira and Novo (2010) contradicts the vast literature by suggesting a positive association between NDTS and LTD and a negative relation between NDTS and STD. Hence, we would expect NDTS to have a negative relationship with debt ratios.

H2.a: *NDTS are positively related to LTD*

H2.b: *NDTS are negatively related on STD*

According to Titman and Wessels (1988), size of companies is positively related to debt. Since then, there has been a long research over this topic and the consensus in previous empirical study show that SMEs are expected to have a positive relationship between size and LTD, but a negative to STD (e.g. Michaelas, 1999; Hall, 2000; Esperança, 2003; Vieira and Novo, 2010).

H3.a: *size is positively related to LTD*

H3.b: *size is negatively related to STD*

[6] This study only wants to explore and evaluate the impact of capital structure determinants on STD and LTD, since Hall (2000) showed that TD masks two opposite effects of STD and LTD. However, the results presented for TD are merely illustrative.

Profitability is directly related to pecking order theory which predicts a hierarchical order for companies financing decision as discussed earlier in chapter 2.4.2. Hence, the most of the results obtained by the vast majority of researchers in SMEs field are consistent and show a negative relationship between profitability and debt ratios (e.g. Michaelas, 1999; Hall, 2000; Esperança, 2003; Mira and Garcia, 2003; Cabaço, 2010; Veiria and Novo, 2010).

H4.a: *profitability is negatively related to LTD*

H4.b: *profitability is negatively related to STD*

Regarding to growth, although the literature does not present a consensus concerning the relationship between this attribute and debt, in a recent past, many researchers suggest a positive relationship between growth and debt ratios. (e.g. Michaelas, 1999; Hall, 2000; Esperança, 2003; Mira and Garcia, 2003; Cabaço, 2010).

H5.a: *growth is positively related to LTD*

H5.b: *growth is positively related to STD*

Based on the literature review done, we would expect the liquidity ratio to have different impacts on capital structure choice depending on the maturity of debt ratios. Hence, previous studies suggest a negative relationship between liquidity and STD (e.g. Ozkan, 2001; EU Commission, 2003) which contrasts with a positive relationship between the LTD suggested by Urbano (2011) and Laureano et al. (2012).

H6.a: *liquidity is positively related to LTD*

H6.b: *liquidity is negatively related to STD*

As mentioned earlier in chapter 2.4.3, the affectation of the free cash flow is the fundamental problematic of agency relations between managers and shareholders. Thus, in order to discipline and motivate the managers, Jensen (1986) and Stulz (1990) argue that companies with high cash flows tend to issue more debt. However, according to Poza et al. (2004) and Russo (2005), these agency problems tend to be insignificant in SMEs because manage and control are together the most of the times. Therefore, we consider the argument of Jensen (1986) and Stulz (1990) within the SMEs reality, as we would expect a negative association between cash-flow and debt ratios, as suggested by Mira and Garcia (2003).

H7.a: *cash-flow is negatively related to LTD*

H7.b: *cash-flow is negatively related to STD*

Given the current economic and social crisis experienced in Portugal in recent years and considering that SMEs are the engine of its economy, since they create new jobs and increase the exportation as previously mentioned in chapter 2.2, arises the interest of knowing what was the impact of financial crisis on SMEs' capital structure in Portugal, which is related to the second objective.

Hence, based on statistical work done by EU Commission (2011) and ICC (2007-2010) we verified the number of companies defaulting on its debt, including SMEs increased with the scenario of financial crisis. Furthermore, as addressed in chapter 2.3, a survey done by BdP (2010) evidence a strong downward tendency on the credit supply to SMEs after the financial crisis of 2008. Moreover, some of those companies claim got worst conditions of bank financing, when compared with the previous year. In view of the mentioned earlier facts, the following hypothesis of investigation was formulated:

H8: *Does financial crisis have an influence on the capital structure of Portuguese SMEs?*

Related to the third objective, Ang (1991) states that most of the times the managers/owners of SMEs don't have the knowledge and financial management skills to decide its capital structure. Thus, it would be convenient to characterize debt ratios level of SMEs among industries, in order to identify an "industry average debt target" to help SMEs while determining its capital structure. Furthermore, Hall (2000), Esperança (2003) and Degryse (2009) found empirical evidence that capital structures are significantly different across industries. Therefore, the following hypothesis was formulated regarding the industry effects on SMEs' capital structure:

H9: *industry effects have an influence on the capital structure of Portuguese SMEs?*

3.2. Methodology

3.2.1. Sample

The sample used in this study was taken from the AMADEUS Database which is available in its website[7] and includes only Portuguese SMEs according to the new definition of SME as stated in chapter 2.2. The sample selected contains the detailed financial information, namely balance sheet and income statement accounts, financial ratios as well as some descriptive information of medium and small sized companies from Portugal for the period 2007-2010. Despite AMADEUS provide data information for several countries, the data extracted only includes the Portuguese SMEs, since these represent the focus of this study.

Initially, a sample with 29.778 companies satisfying data requirements was reached, which was reduced after making some adjustments and eliminating outliers. As verified in studies of Mira and Garcia (2003), Esperança (2003) and Urbano (2011), companies which were technically bankrupt by exhibiting a negative equity and companies showing inconsistent values or missing information were removed from the sample.

After all the adjustments made, the final sample includes financial information of 12.857 Portuguese SMEs for the period 2007-2010 and covers all industries according to the criteria of economic activities from the European Union (NACE code)[8].

Comparing the sample used in this study with the samples used in prior studies of Portuguese SMEs (Table 5), it is apparent the sample used in this study has the advantage of including a greater number of companies and covers more industries. Additionally, this sample also presents a more recent period of analysis, which allow us to update the topic and explore the impact of financial crisis of 2008.

Table 5: Authors and Samples Used in Previous Studies of Portuguese SMEs

Study	Sample	Period	Source	Notes
Esperança et al. (2003)	995 companies	1992 - 1996	BdP	Only include manufactoring firms.
Cabaço (2010)	198 companies	2005 - 2008	SABI*	Only include the biggest SMEs from Portugal.
Veira and Novo (2011)	51 companies	2000 - 2005	SABI*	Noting to point.

(*) Analysis System of Iberian Balances

[7] https://amadeus.bvdinfo.com(charged service)

[8] See Appendix 1

3.2.2. Data

3.2.2.1. Dependent Variables: Capital Structure Indicators

In this study, the three dependent variables used to measure the financial debt, i.e., the capital structure, are the total debt to assets (TD) and its ratios decomposed according to its maturity as short term debt (STD) and long term debt (LTD).

Therefore, STD is related to the current liabilities, which usually includes credit cards, bank overdrafts, lines of credit and liabilities to suppliers. On the other hand, LTD is related to non-current liabilities such as long term bank loans and other long term liabilities as hire purchase or leasing (e.g. Michaelas, 1999; Hall, 2000; Mira and Garcia, 2003; Esperança, 2003; Cabaço, 2010; Veiria and Novo, 2010).

The three dependent variables based on their book value are shown in Table 6.

Table 6: Dependent Variables - Capital Structure Indicators

Dependent Variables	
TD ratio	$\frac{Total\ liabilities}{Total\ assets}$
STD ratio	$\frac{Current\ liabilities}{Total\ assets}$
LTD ratio	$\frac{Non\ current\ liabilities}{Total\ assets}$

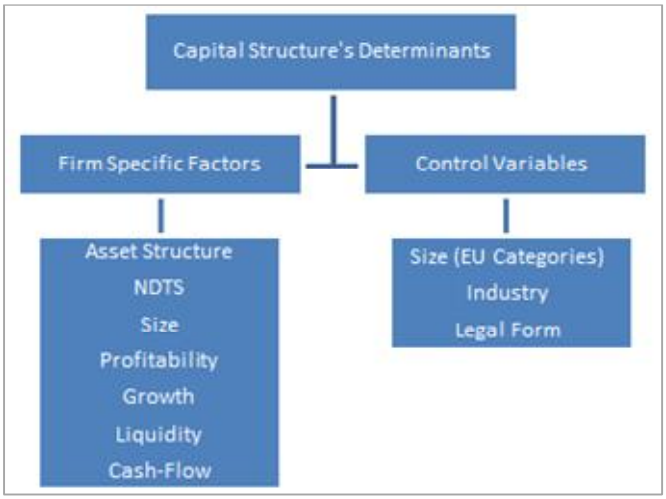
Note: All variables are expressed in absolute value.

Although in chapter 2.2 have been presented indicators of equity and solvency, it was decided not to include these as dependent variables since they are directly correlated with total debt ratio which would result in identical results with opposite signs. Therefore, it was decided to follow previously studies above stated at choosing the total debt ratio in deterioration of equity and solvency as it represents the companies' indebt in reality.

3.2.2.2. Independent Variables: Capital Structure Determinants

In order to test the formulated hypotheses supported in the literature review, we use the following independent variables, classified in two dimensions (Figure 5): firm specific factors and control variables.

Figure 5: Independent Variables - Capital Structure's Determinants



Firm specific-factors are quantitative variables which derive from accounting data of companies' financial statement. These variables are used by financial statements' readers and can vary according to company's performance. In this study, firm-specific variables include the following:

- **Asset Structure:** Scott (1977) and Titman and Wessels (1988) argued that firms with more tangible assets are expected to issue more debt as it can be used as collateral in the case of company failure. The asset structure variable is calculated through the division of tangible fixed asset by total asset (e.g. Michaelas, 1999; Hall, 2000; Mira and Garcia, 2003; Esperança, 2003; Cabaço, 2010; Veiria and Novo, 2010).

$$Asset\ Structure = \frac{Tangible\ Fixed\ Asset}{Total\ Asset}$$

- **Non-Debt Tax Shield (NDTS):** According to DeAngelo and Masulis (1980), companies with more NDTS deductions as depreciations, provisions and allowances for doubtful accounts are expected to issue less debt. Since then, other authors have suggested this idea by saying that companies perceive non-debt tax shields as a substitute of interest deduction (e.g. Michaelas, 1999; Mira and Garcia, 2003; Esperança, 2003). As AMADEUS database does not contain other available NDTS deductions information than depreciation accounts, we use the ratio between depreciations to total asset to measure this variable.

$$Non-debt\ tax\ shields = \frac{Depreciations}{Total\ Asset}$$

- **Size:** As mentioned previously in chapter 2.5.3, size is considered an important determinant of capital structure. In accordance with the recent literature of capital structure, this variable can be measured as natural logarithm of annual turnover or the natural logarithm of total assets. In this study, it was decided to adopt the most widely used measure to calculate this variable, namely the natural logarithm of the book value of total assets. (e.g. Mira and Garcia, 2003; Esperança, 2003; Vieira and Novo, 2010).

$$Size = Ln\ (book\ value\ of\ total\ assets)$$

- **Profitability:** Concerning the profitability variable, the general trend in the literature of SMEs show a negative relationship between profitability and debt ratios as stated in chapter 2.5.4. However, when measuring this variable the ratio used by the authors varies between the ratios of return on assets (ROA) (e.g. Michaelas, 1999; Mira and Garcia, 2003; Esperança, 2003; Cabaço, 2010; Vieira and Novo, 2010) and return on sales (ROS) (e.g. Hall, 2000). In this study was decided to use the ROA to calculate the profitability ratio.

$$Return\ on\ Asset\ (ROA) = \frac{Net\ Income}{Total\ Asset}$$

- **Growth:** As discussed in the chapter 2.5.5, prior studies are controversial and there is no consensus in the relationship between growth and debt. Even when measuring this variable, authors suggest different ways to calculate it. Therefore, Michaelas (1999), Cabaço (2010) and Vieira and Novo (2010) used the growth rate of total assets, while Hall (2000) suggests the growth rate of sales. In this case, we followed Hall (2000) by using the annual growth rate of sales to measure this variable, as we consider that this ratio better explain the growth of companies' activity.

$$Growth\ Opportunities = \frac{\text{Sales(n)} - \text{Sales(n} - 1)}{Sales(n-1)}$$

- **Liquidity:** Concerning the liquidity variable, prior studies are controversial and there is no consensus in the relationship between liquidity and debt ratios. According to its definition, the liquidity ratio measures the company's ability to meet its short-term liabilities; hence this variable is calculated through the ratio

of current assets to current liabilities as used by Mira and Garcia (2003) and Urbano (2011).

$$Liquidity = \frac{Current\ Assets}{Current\ Liabilities}$$

- **Cash Flow:** As previously stated, in order to discipline managers and reduce the agency problems, companies with high cash flow tend to issue more debt (Jensen, 1986; Stulz, 1990). However, according to Poza et al. (2004) and Russo (2005) argument, the agency problems between managers and shareholders tend to be insignificants in SMEs, since the managers are the businesses owners the most of the times. Moreover, Mira and Garcia (2003) suggested a negative relationship between cash-flow and debt ratios. In order to measure this variable, we standardized the cash-flow value given by the Amadeus database, as we could not use the natural logarithm because of the existence of negative values.

$$Cash\ Flow = Z\ (cash - flow)$$

Control variables are characterized by being constant, unchanged and qualitative**.** Although the literature does not suggest them at all, it was decided to include them in this study. Therefore, we consider three control variables:

- **Size:** assumes micro, small and medium according to the new definition of SMEs stated above in chapter 2.2;
- **Legal form:** takes Corporation or LLP;
- **Industry:** varies among ten different industries as showed in the Table 7.

Table 7: Industry Variable (NACE code[9])

Nominal Scale
Agriculture, forestry, fishing and mining
Manufactoring
Construction
Wholesale and retail trade
Accommodation and food service activities
Transport, communication and storage
Financial and insurance activities
Education, health, entertainment and social work
Administrative, technical and scientific activities
Other service activities

[9] See Appendix 1

3.2.3. Data analyses

In order to characterize the debt levels of Portuguese SMEs and analyze which is the relationship between debt ratios and the determinants above mentioned, this study uses different statistic techniques applied to a sample of 12.857 Portuguese SME for each year of the period 2007-2010.

First, with the purpose of characterizing the debt levels of Portuguese SMEs, it was developed a univariate description. Furthermore, we also examine the relationship between debt level and capital structure determinants by using the Pearson correlation and F-test or t-test for quantitative and qualitative variables respectively. While using the test one-way ANOVA (F-test) we did not verified all the assumptions, namely the homogeneity of variances. Alternatively, we used the robust test of Welch to compare the average values of three or more independent groups. When we just have two independent groups, we used the t-test to compare the average values between groups.

In order to explain the companies' debt ratios, it was decided to apply the Ordinary Least Squares (OLS) regression which was also used by Mira and Garcia (2003) and Cabaço (2010). Therefore, we used the regression analyses to test the hypotheses formulated above and examine the capacity of the different independent variables to explain the companies' capital structure. Hence, the regression models[10] developed are present by the following three equations, one for each dependent variable (STD, LTD and TD):

- $(STD)_i = \beta_{0i} \pm \beta_1(\text{Firm Specific Factors})_i \pm \beta_2(\text{Control Variables})_i + \varepsilon_i$
- $(LTD)_i = \beta_{0i} \pm \beta_1(\text{Firm Specific Factors})_i \pm \beta_2(\text{Control Variables})_i + \varepsilon_i$
- $(TD)_i = \beta_{0i} \pm \beta_1(\text{Firm Specific Factors})_i \pm \beta_2(\text{Control Variables})_i + \varepsilon_i$

As such, i represents the company/year, while the β represents the parameters to estimate (one for each independent variable, plus β0 for the intercept), which measures the effect of each independent variable on the dependent variables. Finally, the ε symbolizes the error term.

For each dependent variable were estimated three models. Thus, related to the first objective, in Model 1 we run the regression to identify the capability of capital structure determinants to explain the companies' capital structure. Furthermore, concerning the

[10] The multiple regression assumptions were verified.

second objective, in Model 2 we test the impact of financial crisis of 2008 on companies' capital structure by re-estimating the Model 1 but including a new variable, namely crisis dummy variable, which equals 1 if the period time is 2007-2008 (before crisis) and 0 if the period time corresponds to 2009-2010 (after crisis). Lastly, regarding to the third objective, in Model 3 we test the impact of industry on capital structure by adding to the regression model the industry dummies which equals 1 for each industry and 0 for the other industries; therefore we only included nine industry dummies by excluding the Other service activities from the model, which is the reference category.

Moreover, due to sample size used and according to Hair et al. (2010), researchers should always be alert concerning the possibility of sample size to affect the statistical tests, which means that by increasing sample size, smaller effects will appear as statistically significant when in fact those effects are insignificant. Taking this advice in consideration and in order to identify the problematic of sample sized, it was decided to develop the statistical tests for smaller random samples of 10% and 1% of the whole sample. Thus, the whole sample contains 51.428 observations, 10% of the sample contains 5.101 observations and lastly, 1% of the sample contains 512 observations. In this study, whenever a variable is not significant in any of the regression models and hypotheses tests developed, we consider the impact of that variable as not significant[11].

Still regarding the third objective and with the purpose of creating homogeneous groups of industries with similar capital structure, we use the multivariate statistic method – clusters analysis. Accordingly, the variables STD and LTD were standardized in order to ensure both variables have the same weight in the final solution, i.e., the variable with large values (STD) will not contribute more to the distance measure than the variable with small values (LTD).

Additionally, in this study in particular and considering the large size sample used, we use the optimizing method of k-means to identify which is the composition of k homogeneous groups. However this method presumes that the number of groups has to be chosen in advanced (Hair et al., 2010).

Assuming there is not a perfect method to determine the number of groups to consider in the clusters analysis, we previously perform hierarchical cluster analysis using Ward's method and applying squared Euclidean distance as the distance or similarity

[11] In Model 3, we did not take in consideration the results obtained with reduced samples of 10% and 1% of the whole sample, as the number of companies per industry was greatly reduced which provoked the results distortion.

measure. This helps to determine the number of groups to define, with maxima internal cohesion and maxima external separation (Nunes and Barros, 2010). Hence, the dendrograms[12] obtained from the Ward method (a visual representation of the distance at which clusters are combined), pointed to a solution of two groups, which were then considered in the optimizing method of k-means (k =2).

Finally, the k-means clustering analysis was performed for the years 2007 and 2010 in a comparative perspective between different periods: "before crisis" and "after crisis", which is also related to the second objective.

[12] See Appendix 2.

4. EMPIRICAL STUDY: RESULTS

In order to understand which determinant have impact on companies' capital structure, in this chapter we conducted and empirical work which is segregated in four sections. First, the main descriptive statistics for all variables and for the entire sample are analyzed in order to understand debt ratios evolution in the period 2007 – 2010. Second, we use the Pearson Correlation and hypotheses test with the purpose of investigating the impact of each explanatory variable on capital structure. Third, we use an OLS regression model in order to verify which independent variables are more important while explaining the companies' capital structure. At last, we use the clusters analyses in order to identify homogenous groups of industries according to its debt ratios.

4.1. Sample Characterization

Table 8 presents the sample of 12.857 firms according to its industry. As it can be seen, the wholesale and retail trade (36%), manufacturing (29%) and construction (13%) are the most representative industries in the sample, which represents 78% of the firms. On the other hand, the least representative industries in terms of firms are the other service activities, agriculture, forestry, fishing and mining, financial and insurance activities and education, health, entertainment and social work, each one represents less than 5% of the total.

Regarding the firm's size EU category, this study only approaches the reality of micro, small and medium sized firms. As such, micro-sized firms represent 18% of the sample with 2.263 companies, small-sized firms are the most representative category of size with 9.027 firms which means 70% of the sample and finally with 1.567 appears the medium-sized firms representing only 12% of the sample (see Figure 6).

Table 8: Sample of Portuguese SMEs According to Industry and Size

Industry	Micro		Small		Medium		Total	
	Count	%	Count	%	Count	%	Count	%
1. Agriculture, forestry, fishing and mining	89	4%	253	3%	31	2%	373	3%
2. Manufactoring	174	8%	2.763	31%	787	50%	3.724	29%
3. Construction	114	5%	1.305	14%	225	14%	1.644	13%
4. Wholesale and retail trade	1.559	69%	2.954	33%	172	11%	4.685	36%
5. Accommodation and food service activities	20	1%	464	5%	89	6%	573	4%
6. Transport, communication and storage	49	2%	412	5%	97	6%	558	4%
7. Financial and insurance activities	129	6%	66	1%	12	1%	207	2%
8. Education, health, entertainment and social work	32	1%	264	3%	46	3%	342	3%
9. Administrative, technical and scientific activities	93	4%	468	5%	91	6%	652	5%
10. Other service activities	4	0%	78	1%	17	1%	99	1%
Total	**2.263**	**100%**	**9.027**	**100%**	**1.567**	**100%**	**12.857**	**100%**

Concerning the company's legal form, it can be seen from the Figure 7 that 20% of the sample represent corporations with 2.606 companies and the others 80% are composed by LLPs which means 10.251 companies. Basically, the corporations companies are obligated to get their financial statement approved by an external entity while the LLPs companies don't have that obligation the most of the times. So, these results suggest that majority of micro, small and medium sized companies in Portugal are represented by LLPs companies which mean they don't have the obligation of getting its financial statements approved by an external entity.

Figure 6: Sample of Portuguese SMEs According to its Size (EU categories)

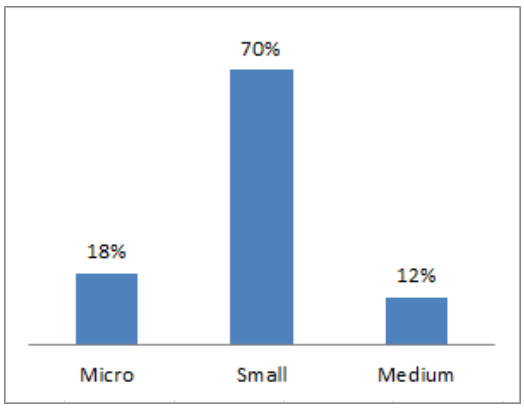
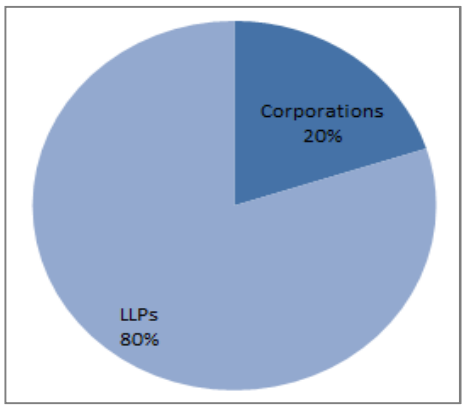


Figure 7: Sample of Portuguese SMEs According to its Legal Form



4.2. Debt Ratios

Table 9 provides the evolution of the average debt ratios over the period of analysis 2007 – 2010. As such, it can be observed a substantial decrease in the STD ratio contrasting with the little upward tendency showed by LTD ratio over the period 2007 -

2009. Thus, STD ratio goes from 52% in 2007 to 47% in 2010, while LTD ratio keeps unchanged at 17% in 2007 and 2010, but registers a little increase of 1% and 2% in 2008 and 2009 respectively. Such phenomenon suggests an impact of financial crisis on companies' debt maturity. The total debt ratio shows a downward tendency which goes along with the difficulties faced by the SMEs while accessing debt over this period of financial crisis. Lastly, the downward of 5% on the total debt ratio between 2007 (69%) and 2010 (64%) may reflect the real impact of financial crisis over the companies' capital structure.

Turning our focus to the comparison of dependent variables, it can also be seen from Table 9 that STD ratio represents a higher portion of the whole debt (average value around 50%) than LTD ratio (average value around 17%), which suggests a preference of SMEs concerning the debt maturity while financing externally.

Table 9: Average Debt Ratios, 2007 - 2010

Variable	2007	2008	2009	2010	Average
STD	52%	50%	48%	47%	49%
LTD	17%	18%	19%	17%	17%
TD	69%	68%	67%	64%	67%

Table 10 provides the more descriptive statistics for the dependent variables for the whole samples from 2007 to 2010. As previously stated, on average companies have 49% of STD, while the median value indicates that 50% of the observations show a STD ratio equal or above 48%. If we observe the LTD statistics we found a minimum value of 0% and a maximum of 99%, moreover we also verify that LTD values are highly dispersed (standard deviation around 18%), however 50% of the observations show a LTD ratio equal or below 13%. In terms of TD, the minimum value is 0,78% which means that every single company from the sample has issued debt, being the maximum value of 100%.

Table 10: Descriptive Statistics of the Debt Ratios, 2007 - 2010

Variable	Count	Mean	Std. Dev.	Min.	P 05	P 25	Median	P 75	P 95	Max.
STD	51.428	49,38%	20,40%	0,00%	17,69%	33,80%	48,46%	64,37%	84,11%	99,97%
LTD	51.428	17,40%	17,54%	0,00%	0,00%	0,91%	13,08%	28,20%	51,51%	99,19%
TD	51.428	66,78%	18,48%	0,78%	31,11%	55,13%	69,83%	80,85%	92,27%	100,00%

In Table 11, it is possible to see the Pearson correlation coefficients between debt ratios, while using the whole sample. Thus, as it can be seen there is no any strong correlation between dependent variables (near to ± 1). However, we found a moderate relationship

between STD and LTD (Pearson = -0,534) which suggest that STD and LTD are negatively related. Furthermore, we also found a positive relationship between TD with STD and LTD (Pearson = 0,597 and 0,359, respectively), although this relationship tend to be stronger for STD. Such results, are also obtained when reducing the sample to 10% and 1% of the total observations[13].

Table 11: Correlation Coefficients between Debt Ratios, using the Whole Sample

	STD	LTD	TD
STD	1		
LTD	-0,534(***)	1	
TD	0,597(***)	0,359(***)	1

(***) significant at the 0,1% level.

4.3. Impact of Capital Structure Determinants on Debt Ratios

Table 12 presents the main descriptive statistics for the independent or explanatory variables for the whole sample over the period of analysis 2007 to 2010. Thus, it can be seen that tangible assets correspond on average to 29% of total assets, being the median value equals to 24%. The mean value for NDTS is 5%, such value suggests the low weight of depreciation on total assets. Furthermore, we also found that NDTS values reveal a high dispersion (standard deviation around 3%), being the minimum and maximum values equal to 0% and 20%, respectively. In terms of profitability over assets (ROA), the values are highly dispersed (standard deviation around 6%), ranging from -49% to 87% and the mean value reached 3% for the period from 2007 to 2010. In terms of size, the total assets has an average value of 2.550€ ranging from 32€ to 54.994€. In what growth is concerned, on average is 8% being the smallest value equal to -100% and the major to 369%. Median value indicates that 50% of the observations have a growth rate equal or above 3%. Concerning liquidity ratio, the mean value touched 157%, ranging from 0% to 553%. Moreover, 50% of the observations show a liquidity ratio equal or above 136% which means that on average SMEs from Portugal tend to have liquidity enough to meet their short-term obligations. Finally, the cash-flow values show an average value equal to 150€ and a median value indicates that 50% of the observations have a cash flow above 85€. Moreover, the cash-flow values also present a high dispersion with a minimum and maximum values of -2.611€ and 15.362€.

[13] See Appendix 3 and 4.

Table 12: Descriptive Statistics of Independent Variables of Debt Ratios, 2007-2010

Variable	Count	Mean	Std. Dev.	Min.	P 05	P 25	Median	P 75	P 95	Max.
Asset Structure	51.428	28,50%	22,33%	0,00%	1,77%	10,27%	23,54%	41,91%	73,46%	99,88%
NDTS	51.428	4,52%	3,49%	0,00%	0,57%	1,94%	3,63%	6,17%	11,70%	19,81%
ROA	51.428	2,71%	6,48%	-49,77%	-5,64%	0,28%	1,55%	4,58%	13,74%	86,79%
Total Assets	51.428	2.549,52 €	2.778,42 €	31,71 €	321,83 €	842,71 €	1.605,80 €	3.186,52 €	7.933,54 €	54.994,34 €
Growth	51.428	8,31%	35,17%	-99,93%	-31,17%	-8,08%	3,22%	16,95%	62,12%	368,85%
Liquidity	51.428	156,78%	85,00%	0,00%	52,32%	104,85%	136,41%	189,40%	330,33%	553,87%
Cash flow	51.428	150,34 €	268,43 €	-2.610,90 €	-35,22 €	36,19 €	85,61 €	186,41 €	562,54 €	15.362,21 €

Note: Values in Euros are expressed in thousands

With the purpose of examining the correlation and the impact of independent variables on debt ratios, we used the Pearson correlation when the independent variable is quantitative, and the Welch test or t-test for independent samples when it is qualitative.

From the Table 13, it is possible to see that we did not found any strong correlation between debt ratios and independent variables, being the strongest correlation equals to -0,589 between STD and Liquidity. Although it reveals a moderate correlation, it is consistent with Urbano (2011) argument that companies with high liquidity ratios would not have a preference for STD. Moreover, we found all the correlation coefficients significant at the 0,1% level when using the whole sample.

Still in Table 13, it is possible to see that there is weak relationship between STD and Asset Structure (Pearson = -0,305), which is in line with Hall (2000), who suggested a negative relationship as tangible assets are not used as collateral for STD. Concerning LTD, we also found a weak positive relationship with Asset Structure (Pearson = 0,339) as well as a weak negative relationship with ROA (Pearson = -0,195). Such results are coincident with the majority researchers as Esperança (2003) and Mira and Garcia (2003). Finally, the correlation matrix also reveals a moderate negative association between TD and Liquidity (Pearson = -0,481) as well as ROA (Pearson = -0,304) which reflects the mixed effects of such variables on STD and LTD suggested by Hall (2000).

Table 13: Correlation Coefficients between each Independent Variable and Debt Ratios, using the Whole Sample

	STD	LTD	TD
Asset Structure	-0,305(***)	0,339(***)	-0,015(***)
NDTS	-0,087(***)	0,056(***)	-0,044(***)
ROA	-0,107(***)	-0,195(***)	-0,304(***)
Size	-0,151(***)	0,150(***)	-0,024(***)
Growth	0,105(***)	-0,014(***)	0,103(***)
Liquidity	-0,589(***)	0,178(***)	-0,481(***)
Cash flow	-0,170(***)	-0,016(***)	-0,203(***)

(***) significant at the 0,1% level; (**) significant at the 1% level; (*) significant at the 5% level; (+) significant at the 10% level;

Furthermore, when reducing the sample size to 10% and 1% of the whole sample, some Pearson coefficients have turned insignificant at the 10% level, namely NDTS, growth and cash-flow variables for LTD and size variable for TD[14], although all the correlations were very weak. Even for the still significant correlations some of them changed the level of significance to 1%, 5% or even 10%. In summary, such correlation coefficients appear as statistically significant while using a large sample when in fact those effects are insignificant while using a smaller sample[15].

As mentioned previously, to examine the impact of qualitative independent variables on debt ratios, we used the robust test of Welch to compare average values of three or more independent groups and the t-test in case of two independent groups.

Table 14 provides the debt ratios average for the companies' size, according to the EU categories, namely Small, Micro and Medium. When using the whole sample, the Welch test is significant at the 0,1% level. However, when applying the Welch test for smaller samples, it tends to lose significance. Thus, the estimates obtained suggest that companies from different size categories have on average different debt ratios, excluding the TD ratio which appears as not significant when using 1% of the sample. Such results are in line with the theory which predicts that large companies would have more LTD and small companies would have more STD. In summary, we found statistical evidence to state that companies from different size categories have on average different STD and LTD values.

Table 14: Average Debt Ratios According Company's Size[16]

Size (EU Categories)	STD	LTD	TD
1. Micro	51,41%	15,61%	67,03%
2. Small	49,26%	17,67%	66,92%
3. Medium	47,13%	18,49%	65,62%
Welch (2;51425)	*82,747(***)*	*60,324(***)*	*15,215(***)*
Welch (2;5098)	*8,751(***)*	*7,976(***)*	*3,3820*
Welch (2;509)	*2,464(+)*	*4,529(+)*	*1,3490*

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

From table 15, it can be seen the average values of debt ratios according to company's legal form. In general, when using the whole sample, we found a statistical significant evidence to support that average values of debt ratios are different according to

[14] See Appendix 5 and 6.
[15] As mentioned in the methodology chapter, whenever a variable is not significant in any of the regression models and hypotheses tests developed, we consider the impact of that variable as not significant.
[16] The average values on the table were obtained with the whole sample.

company's legal form. However, when applying the statistical test for smaller samples of 10% and 1% of the whole sample, we did not found any statistic evidence to state that average values of debt ratios are different for Corporations or LLPs.

Table 15: Average Debt Ratios According Company's Legal Form

Legal Form	STD	LTD	TD
1. Corporation	45,68%	18,69%	64,37%
2. LLP	50,32%	17,07%	67,40%
t (51426)	*-21,082(***)*	*8,486(***)*	*-14,649(***)*
t (5099)	*-7,408(***)*	*1,662(+)*	*-6,268(***)*
t (510)	*-1,054*	*-0,383*	*-1,528*

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Furthermore, in Table 16 below it can be seen the average values of debt ratios for the different industries when using the whole sample. In this case, it is worth pointing out that we found statistic evidence at the 0,1% of significance, to ensure that average values of debt ratios are significantly different between the ten industries, which suggest that industry has an influence on the debt ratios. Hence, the average values of STD ratio vary among 39,60% for Financial and insure activities and 52,37% for Construction. Moreover, the average values for LTD ratio show a minimum value of 14,83% for Administrative, technical and scientific activities and a maximum value of 24,83% for Accommodation and food service activities. This estimate are in line with Hall (2000), Esperança (2003) and Degryse (2009) who stated that industry play an important role of companies capital structure and that debt ratios vary across.

Table 16: Average Debt Ratios across Industries

Industry	STD	LTD	TD
1. Agriculture, forestry, fishing and Mining	41,95%	20,82%	62,77%
2. Manufactoring	47,64%	17,96%	65,60%
3. Construction	52,37%	17,93%	70,30%
4. Wholesale and retail trade	52,02%	15,31%	67,33%
5. Accommodation and food service activities	37,86%	24,83%	62,70%
6. Transport, communication and storage	51,48%	17,03%	68,51%
7. Financial and insurance activities	39,60%	24,14%	63,73%
8. Education, health, entertainment and social work	42,94%	21,93%	64,88%
9. Administrative, technical and scientific activities	52,24%	14,83%	67,07%
10. Other service activities	47,29%	20,14%	67,43%
Welch (9;51418)	*181,963(***)*	*83,919(***)*	*62,498(***)*
Welch (9;5091)	*24,938(***)*	*10,768(***)*	*8,991(***)*
Welch (9;502)	*3,613(***)*	*2,545(**)*	*1,2100*

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

4.4. Determinants Effects on Capital Structure

In order to investigate which determinants explain the Portuguese SMEs' capital structure and exploit the impact of financial crisis on capital structure, we used the OLS regression model for each debt ratios.

With the purpose to give robustness to the found result and avoid the sample sized effect on the explanatory variables significance, we ran the regression models for smaller samples, namely 10% and 1% of the whole sample[17]. Table 17 provides the results obtained for the Model 1 while using the whole sample, being the ending equations of the models as:

$$\widehat{STD}_i = 107{,}32 - 0{,}525\ Asset\ Structure_i + 0{,}053\ NDTS_i - 0{,}186\ ROA_i - 1{,}949\ Ln(Size)_i + 0{,}026\ Growth_i - 0{,}186\ Liquidity_i - 0{,}205\ Z\_Cash\ Flow_i + 1{,}162\ Small\ Size_i + 2{,}330\ Medium\ Size_i - 2{,}448\ Type(Corporation)_i$$

$$\widehat{LTD}_i = -17{,}873 + 0{,}358\ Asset\ Structure_i - 0{,}158\ NDTS_i - 0{,}514\ ROA_i + 2{,}165\ Ln(Size)_i + 0{,}033\ Growth_i + 0{,}076\ Liquidity_i - 0{,}425\ Z\_Cash\ Flow_i - 0{,}690\ Small\ Size_i - 1{,}937\ Medium\ Size_i - 1{,}248\ Type(Corporation)_i$$

$$\widehat{TD}_i = 89{,}447 - 0{,}166\ Asset\ Structure_i - 0{,}105\ NDTS_i - 0{,}699\ ROA_i - 0{,}216\ Ln(Size)_i + 0{,}059\ Growth_i - 0{,}110\ Liquidity_i - 0{,}631\ Z\_Cash\ Flow_i + 0{,}472\ Small\ Size_i + 0{,}393\ Medium\ Size_i - 3{,}696\ Type(Corporation)_i$$

In terms of economic relevance, all the independent variables used in the regression equations appear as statistically significant when explaining the dependent variables. However, when running the regression with smaller samples we noticed that some of those variables lose significance which suggests that we are facing the sample size problematic, as smaller effects will appear as statistically significant when in fact those effects are insignificant. Broadly speaking, liquidty (stand. β = -0,774) and asset structure (stand. β = -0,575) are the most important determinants affecting the STD ratio. For the LTD ratio, the most important determinants explaining this ratio are asset structure (stand. β = 0,456), liquidity (sand. β = 0,367) and ROA (stand. β = -0,190). Lastly, the most relevant determinants explaining the TD ratio are liquidity (stand. β = -0,506), ROA (stand. β = -0,245) and asset structure (stand. β = -0,201).

[17] As mentioned in the methodology chapter, whenever a variable is not significant in any of the regression models and hypotheses tests developed, we consider the impact of that variable as not significant.

Table 17: Regression Results for the Whole Sample (Model 1)[18]

Independent Variables		Dependent Variables STD	LTD	TD
Constant	*Coeff. β*	107,320	-17,873	89,447
	t-statistic	178,54(***)	-23,61(***)	118,40(***)
Asset Structure	*Coeff. β*	-0,525	0,358	-0,166
	Standardized β	-0,575	0,456	-0,201
	t-statistic	-186,97(***)	101,37(***)	-47,18(***)
NDTS	*Coeff. β*	0,053	-0,158	-0,105
	Standardized β	0,009	-0,031	-0,020
	t-statistic	2,74(**)	-6,53(***)	-4,36(***)
ROA	*Coeff. β*	-0,186	-0,514	-0,699
	Standardized β	-0,059	-0,190	-0,245
	t-statistic	-18,22(***)	-39,96(***)	-54,53(***)
Ln (Size)	*Coeff. β*	-1,949	2,165	0,216
	Standardized β	-0,093	0,120	0,011
	t-statistic	-25,36(***)	22,37(***)	2,236(*)
Growth	*Coeff. β*	0,026	0,033	0,059
	Standardized β	0,044	0,066	0,112
	t-statistic	16,88(***)	17,10(***)	30,56(***)
Liquidity	*Coeff. β*	-0,186	0,076	-0,110
	Standardized β	-0,774	0,367	-0,506
	t-statistic	-277,49(***)	89,78(***)	-130,82(***)
Z_Cash flow	*Coeff. β*	-0,205	-0,425	-0,631
	Standardized β	-0,010	-0,024	-0,034
	t-statistic	-2,75(**)	-4,52(***)	-6,72(***)
Size EU (Small=Yes)	*Coeff. β*	1,162	-0,690	0,472
	Standardized β	0,026	-0,018	0,012
	t-statistic	7,99(***)	-3,77(***)	2,59(**)
Size EU (Medium=Yes)	*Coeff. β*	2,330	-1,937	0,393
	Standardized β	0,037	-0,036	0,007
	t-statistic	10,52(***)	-6,95(***)	1,410
Legal Form (Corp.=Yes)	*Coeff. β*	-2,448	-1,248	-3,696
	Standardized β	-0,048	-0,029	-0,080
	t-statistic	-16,79(***)	-6,80(***)	-20,17(***)
Adj. Coeff. (R^2)		66,0%	27,0%	34,5%
F (10 ;5 14 17)		9.978,4(***)	1.905,0(***)	2.714,3(***)
Durbin Watson		1,959	1,975	1,937
Std. Error of the Estimate		11,896	14,982	14,951

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Concerning the adjusted coefficient of determination (R^2), the developed models for each dependent variables presented in Table 17, explain 66,0% of the STD ratio variance, 27,0% of the LTD ratio variance and 34,5% of TD ratio variance. These results are in line with those obtained by Hall (2000), Esperança (2003) and Cabaço (2010).

Moreover, the values obtained for Durbin–Watson statistic and VIF statistics indicate that the OLS assumptions of errors independence and absence of multicollinearity between independent variables are verified respectively.

[18] The results obtained for 10% and 1% of the sample are presented in Appendix 7 and 8.

In accordance with the Model 1 (Table 17), each determinant of capital structure is related to debt ratios differently. The different impacts of each determinant of capital structure on debt ratios are discussed below:

- **Asset Structure:** The estimated coefficients obtained for asset structure reveal a negative significant association with STD and TD, contrasting with a positive significant association with LTD at the 0,1% level of significance. Even when applying a smaller sample to give robustness result the estimated coefficient keep being significant at the 0,1% level of significance. On average, an increase of 1 pp in asset structure leads to an increase of 0,358 pp in LTD ratio and a decrease of 0,525 pp on STD ratio and of 0,166 on TD, keeping everything else constant.

- **NDTS:** The association between debt ratios and NDTS has controversial impacts depending on debt maturity. Therefore, NDTS has a positive association with STD (β = 0,053), which is statistically significant at the 1% level of significance when using the whole sample. On the other hand, the association with NTDS and LTD (β = -0,158) or TD (β = -0,105) is negative, which is also significant at the 0,1% level for the whole sample. However, when reducing the sample size, the association between NDTS and STD turns negative and all the associations between NDTS and debt ratios appear as insignificant at the 10% level of significance.

- **ROA:** The profitability ratio (ROA) shows a negative association with the three debt ratios, providing significant estimated coefficients at the 0,1% level. These results are in line with the pecking order theory which suggests that companies prefer to finance its assets internally rather than externally. In accordance with the results, on average an increase of 1 pp in ROA indicates to a decrease of 0,186 pp, 0,514 pp and 0,699 pp on STD, LTD and TD ratios respectively, keeping everything else constant. The results obtained, keep appearing as significant at the 0,1% level of significance when using smaller samples, except those for STD ratios which appear as not significant when using 1% of the sample.

- **Ln (Size):** The results for the three debt ratios show different signs for the estimated coefficients of Ln(Size). Thus, Ln(Size) has a negative association

with STD (β = -1,949) at the 0,1% level of significance. On the other hand, LTD (β = 2,165) and TD (β = 0,216) ratios show a positive association with Ln(Size), at the 0,1% and 5% levels of significance respectively. When running the model for smaller samples, the association between Ln(Size) and STD keeps appearing significant at the 0,1% level, while the association with LTD loses significance at the 1% level, and the association with TD ratio appears as not significant at the 10% level of significance.

- **Growth:** The estimated coefficients obtained for growth reveal a significant positive association with the three debt ratios at the 0,1% level of significance. These results, suggest that on average, an increase of 1 pp in growth leads to an increase of 0,026 pp in STD ratio, 0,033 pp in LTD ratio and 0,059 pp in TD ratio. However the association with LTD lose significance at the 5% level and with STD appears as not significant at the 10% level when reducing the sample size.

- **Liquidity:** For liquidity, it was found a negative and significant relation between this ratio and STD and TD ratios at the 0,1% level, with a β of -0,186 and -0,110 respectively. In contrast, the estimates for LTD reveal a positive significant relation with liquidity ratio at the 0,1%, with a β of 0,076. In accordance with these results, on average, an increase of 1 pp in liquidity ratio leads to an increase of 0,076 pp in LTD ratio and a decrease of 0,186 pp on STD ratio and of 0,110 on TD, keeping everything else constant. Such results also appear as significant at the 0,1% level when using smaller samples.

- **Cash Flow (standardized):** The estimates obtained show negative relations between debt ratios and cash flow (standardized) which are significant at the 0,1% level of significance for LTD and TD and at the 1% level of significance for STD. In this case, the β coefficients are equal to -0,205, -0,425 and -0,631 for STD, LTD and TD respectively. When reducing the sample size, the association between cash flow (standardized) and the three debt ratios loses significance and appears as not significant at the 10% level of significance.

- **Size (EU categories):** In order to investigate the impact of company's size on capital structure, we introduced two dummy variables which take a value of 1

for small and medium sized companies. When running the model with the whole sample, the estimates obtained for both size dummies show a positive relation with STD and TD, while a negative relation with TD. However, when using a smaller sample the results lose significance and only the relation between small companies dummy with TD appears as significant at the level of 10% of significance. It suggests that on average, small sized companies tend to have higher TD ratios (more 0,472 pp than micro sized companies).

- **Legal form:** Finally, it was found a significant negative relation between companies' legal form and debt ratios at the 0,1% level when using the whole sample. Such explanatory variable reaches the value 1 if the observation is a "Corporation" and 0 for "LLP". These results suggest that on average corporations tend to have lower debt rations than LLPs. However, when reducing the sample size the association between companies' legal form with STD and TD keep appearing as significant at the 10% level of significance, while with LTD appears as not significant at the 10% level of significance.

4.5. Crisis Impact on Capital Structure

How stated before in the methodology chapter we also developed a regression model which includes a dummy variable to study the impact of financial crisis on capital structure of Portuguese SMEs (Model 2). This dummy variable takes a value 1 if the observations are in the period 2007-2008 (before crisis) and 0 for the observations in the period 2009-2010 (after crisis).

Table 18 shows a positive and significant coefficients for the association between crisis and all the debt ratios at the 0,1% level. These results are in line with the tendency registered by the debt ratios over the period from 2007 to 2010. As mentioned in chapter 4.2, over the period from 2007 to 2010, the STD and TD ratios had a downward tendency while LTD showed a little upward tendency. The results obtained suggest that on average, over the period before crisis (2007/2008) the STD, LTD and TD ratios tend to be higher in 1,268 pp, 0,420 pp and 1,688 pp respectively, keeping everything else constant.

However, when reducing the sample size to 10% and 1% of the whole sample, all the associations between crisis and debt ratios appear as not significant at the 10% level of significance[19]. Therefore, although the model developed give weak support to assume that after crisis, companies have reduced substantially its debt ratios levels, for the positive, but insignificant relation found, there are few explanations, such as the reduction in credit supply to SMEs or the increased difficulty in accessing debt externally by SMEs after the fourth quarter of 2008 as previously mentioned in chapter 2.3.

After including the variable crisis, the developed models for each dependent variables presented in Table 18, show an adjusted coefficient of determination (R2) equal to 66,1% for STD, 27,0% for LTD and 34,7% of TD. Thus, when comparing to the previous Model 1, we observe that the capacity of independent variables to explain the variance of STD and TD increased 0,1% and 0,2% respectively. On the other hand, the adjusted coefficient of determination (R2) to explain the variance of LTD kept unchanged. Furthermore, also the beta coefficients and the standardized beta coefficients remain the same compared to the previous model.

[19] As mentioned in the methodology chapter, whenever a variable is not significant in any of the regression models and hypotheses tests developed, we consider the impact of that variable as not significant.

Table 18: Regression Results for the Whole Sample (Model 2)[20]

Independent Variables		Dependent Variables STD	LTD	TD
Constant	*Coeff. β*	106,475	-18,153	88,322
	t-statistic	176,15(***)	-23,82(***)	116,28(***)
Asset Structure	*Coeff. β*	-0,524	0,359	-0,166
	Standardized β	-0,574	0,457	-0,201
	t-statistic	-187,08(***)	101,41(***)	-47,11(***)
NDTS	*Coeff. β*	0,043	-0,161	-0,118
	Standardized β	0,007	-0,032	-0,022
	t-statistic	2,24(*)	-6,65(***)	-4,90(***)
ROA	*Coeff. β*	-0,191	-0,515	-0,706
	Standardized β	-0,061	-0,190	-0,247
	t-statistic	-18,68(***)	-40,05(***)	-55,06(***)
Ln (Size)	*Coeff. β*	-1,922	2,174	0,252
	Standardized β	-0,092	0,121	0,013
	t-statistic	-25,03(***)	22,45(***)	2,61(**)
Growth	*Coeff. β*	0,024	0,032	0,056
	Standardized β	0,041	0,064	0,106
	t-statistic	15,35(***)	16,60(***)	28,87(***)
Liquidity	*Coeff. β*	-0,185	0,076	-0,109
	Standardized β	-0,772	0,368	-0,503
	t-statistic	-276,52(***)	89,81(***)	-129,93(***)
Z_Cash flow	*Coeff. β*	-0,202	-0,424	-0,627
	Standardized β	-0,010	-0,024	-0,034
	t-statistic	-2,71(**)	-4,51(***)	-6,69(***)
Size EU (Small=Yes)	*Coeff. β*	1,165	-0,689	0,477
	Standardized β	0,026	-0,018	0,012
	t-statistic	8,03(***)	-3,76(***)	2,61(**)
Size EU (Medium=Yes)	*Coeff. β*	2,312	-1,943	0,369
	Standardized β	0,037	-0,036	0,007
	t-statistic	10,46(***)	-6,97(***)	1,33
Legal Form (Corp.=Yes)	*Coeff. β*	-2,481	-1,259	-3,739
	Standardized β	-0,049	-0,029	-0,081
	t-statistic	-17,03(***)	-6,85(***)	-20,43(***)
Crisis (2007/2008=Yes)	*Coeff. β*	1,268	0,420	1,688
	Standardized β	0,031	0,012	0,046
	t-statistic	11,92(***)	3,13(**)	12,62(***)
Adj. Coeff. (R^2)		66,1%	27,0%	34,7%
F (11;5 14 16)		9.109,1(***)	1.732,9(***)	2.489,7(***)
Durbin Watson		1,964	1,975	1,943
Std. Error of the Estimate		11,880	14,981	14,928

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

[20] The results obtained for 10% and 1% of the sample are presented in Appendix 9 and 10.

4.6. Industry Effects on Capital Structure

In order to study the effects of industry on companies' capital structure, we developed a regression model which includes 9 dummies variables, one for each industry (Model 3). Broadly speaking, the regression model turned out to be statistically significant for pretty much all the industry variables employed in this model considering the whole sample of 12.857 companies for the period from 2007 to 2010.

In terms of STD, we observe a negative and significant relation at the 0,1% level with the following industries, namely agriculture, forestry, fishing and mining (β = -2,768), accommodation and food service activities (β = -6,542), financial and insurance activities (β = -8,927) and education, health, entertainment and social work (β = -2,764). These results suggest that a company from the industries previously stated and not from the other service activities industry tend to have a lower STD ratio in the proportion of beta coefficient.

Concerning the LTD, we found a significant negative association at the 0,1% level between agriculture, forestry, fishing and mining industry (β = -4,066). On the other hand, we observe a significant positive relation between LTD and financial and insurance activities industry (β = 3,429), which suggest that a company from this industry tend to have a higher LTD ratio.

Turning our focus to the TD ratio, the estimates obtained reveal significant and negative associations with the following industries, namely agriculture, forestry, fishing and mining (β = -6,833), manufacturing (β = -3,152), accommodation and food service activities (β = -6,301), financial and insurance activities (β = -5,498). Once again, one company from the industries stated before and not from the other services industry tend to have lower levels of TD.

For the other independent variables and the adjusted coefficient of determination, the obtained estimates show similar values with those obtained in model 1. In this case, we did not take in consideration the results obtained with reduced samples of 10% and 1% of the whole sample, as the number of companies per industry was greatly reduced which provoked the results distortion.

Table 19: Regression Results for the Whole Sample (Model 3)[21]

Independent Variables		Dependent Variables STD	LTD	TD
Constant	*Coeff. β*	108,772	-17,721	91,050
	t-statistic	128,15(***)	-16,54(***)	85,27(***)
Asset Structure	*Coeff. β*	-0,507	0,368	-0,139
	Standardized β	-0,555	0,469	-0,168
	t-statistic	-169,89(***)	97,76(***)	-36,96(***)
NDTS	*Coeff. β*	0,038	-0,150	-0,112
	Standardized β	0,007	-0,030	-0,021
	t-statistic	1,96(*)	-6,08(***)	-4,54(***)
ROA	*Coeff. β*	-0,183	-0,515	-0,698
	Standardized β	-0,058	-0,190	-0,245
	t-statistic	-17,95(***)	-40,02(***)	-54,42(***)
Ln (Size)	*Coeff. β*	-1,963	2,206	0,243
	Standardized β	-0,094	0,122	0,013
	t-statistic	-25,36(***)	22,58(***)	2,49(*)
Growth	*Coeff. β*	0,026	0,030	0,057
	Standardized β	0,045	0,061	0,108
	t-statistic	17,27(***)	15,84(***)	29,62(***)
Liquidity	*Coeff. β*	-0,186	0,076	-0,110
	Standardized β	-0,774	0,367	-0,506
	t-statistic	-278,50(***)	90,02(***)	-131,06(***)
Z_Cash flow	*Coeff. β*	-0,216	-0,417	-0,633
	Standardized β	-0,011	-0,024	-0,034
	t-statistic	-2,91(**)	-4,45(***)	-6,77(***)
Size EU (Small=Yes)	*Coeff. β*	0,941	-0,822	0,119
	Standardized β	0,021	-0,021	0,003
	t-statistic	6,17(***)	-4,27(***)	0,62
Size EU (Medium=Yes)	*Coeff. β*	2,026	-2,030	-0,004
	Standardized β	0,032	-0,038	0,000
	t-statistic	8,67(***)	-6,88(***)	-0,01
Legal Form (Corp.=Yes)	*Coeff. β*	-2,031	-1,382	-3,412
	Standardized β	-0,040	-0,032	-0,074
	t-statistic	-13,84(***)	-7,46(***)	-18,49(***)
Agriculture, forestry, fishing and Mining	*Coeff. β*	-2,768	-4,066	-6,833
	Standardized β	-0,023	-0,039	-0,062
	t-statistic	-4,13(***)	-4,80(***)	-8,10(***)
Manufactoring	*Coeff. β*	-1,380	-1,772	-3,152
	Standardized β	-0,031	-0,046	-0,077
	t-statistic	-2,29(*)	-2,33(*)	-4,15(***)
Construction	*Coeff. β*	-1,421	2,246	0,824
	Standardized β	-0,023	0,043	0,015
	t-statistic	-2,30(*)	2,88(**)	1,06
Wholesale and retail trade	*Coeff. β*	-1,154	-0,984	-2,138
	Standardized β	-0,027	-0,027	-0,056
	t-statistic	-1,90(+)	-1,285	-2,80(**)
Accommodation and food service activities	*Coeff. β*	-6,542	0,241	-6,301
	Standardized β	-0,066	0,003	-0,070
	t-statistic	-10,13(***)	0,295	-7,75(***)
Transport, communication and storage	*Coeff. β*	-1,027	0,074	-0,953
	Standardized β	-0,010	0,001	-0,011
	t-statistic	-1,59	0,091	-1,17
Financial and insurance activities	*Coeff. β*	-8,927	3,429	-5,498
	Standardized β	-0,055	0,025	-0,037
	t-statistic	-12,19(***)	3,71(***)	-5,97(***)
Education, health, entertainment and social work	*Coeff. β*	-2,764	0,326	-2,438
	Standardized β	-0,022	0,003	-0,021
	t-statistic	-4,09(***)	0,38	-2,88(**)
Administrative, technical and scientific activities	*Coeff. β*	-1,416	-0,059	-1,474
	Standardized β	-0,015	-0,001	-0,018
	t-statistic	-2,21(*)	-0,07	-1,83(+)
Adj. Coeff. (R^2)		66,5%	27,7%	35,3%
F (19;51408)		5.363,1(***)	1.037,9(***)	1.478,9(***)
Durbin Watson		1,961	1,980	1,941
Std. Error of the Estimate		11,814	14,912	14,862

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Note: Other servive activite is the reference industry used.

[21] The results obtained for 10% and 1% of the sample are presented in Appendix 11 and 12.

4.7. Identification of Homogeneous Groups of Industries

Related to the third objective, we develop a cluster analysis with the whole sample with the purpose to detect the presence of homogeneity among different industries. Thus, we tried to aggregate different industries in groups characterized by having a similar capital structure profile, i.e. similar debt ratios (STD and LTD). Additionally, this method is observed in 2007 and 2010 in a comparative perspective between periods of "before crisis" and "after crisis".

As mentioned previously in the methodology chapter, we used a hierarchical cluster analysis to determine the number of homogeneous groups to consider as there is not an ideal method of classification to apply the data. This approach gives a dendrogram chart for each period which is useful to anticipate the ideal number of groups and its composition. The observation of the dendrogram chart seems to indicate clearly 2 groups of industries to consider[22].

Based on this intuitive value, we use the 2-means clusters methodology to classify industries in two groups according to its average values of STD and LTD ratios. The results obtained are presented in Table 20.

Table 20: Industries Distribution per Cluster, 2007 -2010

Cluster	2007 (*before crisis*)	2010 (*after crisis*)
Cluster 1	1. Agriculture, forestry, fishing and Mining 5. Accommodation and food service activities 7. Financial and Insurance Activities 8. Education, Health, Entertainment and Social Work	1. Agriculture, forestry, fishing and Mining 5. Accommodation and food service activities 7. Financial and Insurance Activities 8. Education, Health, Entertainment and Social Work
Cluster 2	2. Manufactoring 3. Construction 4. Wholesale and retail trade 6. Transport, Communication and Storage 9. Administrative, technical and scientific activities 10. Other service activities	2. Manufactoring 3. Construction 4. Wholesale and retail trade 6. Transport, Communication and Storage 9. Administrative, technical and scientific activities 10. Other service activities

As it can be seen from the Table 21, it is conclusive that there are no changes in the composition of the two clusters when comparing 2007 with 2010. Nevertheless, the visual results do not characterize each group of industries according to its capital structure and its determinants. In order to obtain those results, it was needed to calculate the variables' average values of each cluster. In addition with the STD and LTD ratio,

[22] See Appendix 2

that allows the internal validation of the clusters, we also used the asset structure, ROA and liquidity variables[23] to characterize each group of industries and to validate the groups externally.

The results obtained for 2007 and 2010 can be seen from the Table 21 and Table 22 respectively.

Table 21: Average Values of Each Variable per Cluster, 2007

2007 (*before crisis*)		
Cluster	**1**	**2**
Industry	1. Agriculture, forestry, fishing and Mining 5. Accommodation and food service activities 7. Financial and Insurance Activities 8. Education, Health, Entertainment and Social Work	2. Manufactoring 3. Construction 4. Wholesale and retail trade 6. Transport, Communication and Storage 9. Administrative, technical and scientific activities 10. Other service activities
STD	43%	53%
LTD	23%	16%
Asset Structure	47%	29%
ROA	3%	4%
Liquidty	128%	145%

As mentioned before, the composition of the two clusters when comparing 2007 with 2010 remain the same. However, there is a downward tendency on the debt ratios average. In cluster 1, the STD ratio average goes from 43% in 2007 to 38% in 2010, as well as the LTD ratio average decreases from 23% in 2007 to 21% in 2010. In cluster 2, the STD ratio average decreases from 53% in 2007 to 48% in 2010, while the LTD ratio average keeps the same in 2007 and 2010 with a value of 16%. This downward tendency on the debt ratios goes in line with the actual conjuncture over the financial crisis period where companies have difficulties to access external debt.

Moreover, the profitability variable (ROA) also evidences a downward tendency over the financial crisis period which can be interpreted as the companies' difficulties to generate internal fund over crisis periods. As it can be seen from Table 21 and 22, in cluster 1 the profitability ratio average goes from 3% in 2007 to 2% in 2010, as well as the cluster 2 also register a reduction of 2% in the profitability ratio average between 2007 and 2010 from 4% to 2%.

[23] It was decided to only include the asset structure, ROA and liquidity variables to validate the groups externally, as in the regression model developed these variables were the most important determinants explaining the capital structure of companies.

In regards, to the asset structure variable there is a reduction on the average values in both clusters. Thus, in cluster 1 the weight of tangible assets on the total assets goes from 47% to 43% in 2007 and 2010 respectively and in cluster 2 from 29% to 27% in 2007 and 2010. These results are consistent with the reduction in new investments done by the companies over the financial crisis which is in line the downward tendency on the credit supply to SMEs registered in 2008.

In terms of liquidity, both clusters show an upward tendency on the average values when comparing the period before crisis and after crisis. Hence, cluster 1 registers and increase of 9% on the average value of liquidity from 128% in 2007 to 139% to 2010. Likewise, the clusters 2 also show an increase of 14% on the average value of liquidity from 145% in the period before crisis to 159% in the period after crisis. This upward tendency on the liquidity ratio contradicts the problems of SMEs to face its short term obligations during the financial crisis. However, these results can be explained by increased balances of short-term customer due to the term of receipt wider during financial crisis periods. Moreover, the stock balances also used to increase in financial crisis periods as a consequence of the sales reduction.

Table 22: Average Values of Each Variable per Cluster, 2010

2010 (*after crisis*)		
Cluster	**1**	**2**
Industry	1. Agriculture, forestry, fishing and Mining 5. Accommodation and food service activities 7. Financial and Insurance Activities 8. Education, Health, Entertainment and Social Work	2. Manufactoring 3. Construction 4. Wholesale and retail trade 6. Transport, Communication and Storage 9. Administrative, technical and scientific activities 10. Other service activities
STD	38%	49%
LTD	21%	16%
Asset Structure	43%	27%
ROA	2%	2%
Liquidty	139%	159%

Then, we present a brief description of the main average characteristics concerning the capital structure of each cluster in 2007 and 2010:

- **Cluster 1**: *Agriculture, forestry, fishing and Mining; Accommodation and food service activities; Financial and Insurance Activities; and Education, Health, Entertainment and Social Work*. This cluster is characterized for presenting average values for STD and LTD around 40% and 22%

respectively. This cluster also shows higher levels of tangible assets and lower levels profitability and liquidity when compared to the cluster 2.

- **Cluster 2**: *Manufactoring; Construction; Wholesale and retail trade; Transport, Communication and Storage; Administrative, technical and scientific activities; and Other service activities*. This cluster has a greater number of industries and is characterized by showing average values for STD and LTD around 51% and 16% respectively. For the other characteristics presented this cluster evidence lower levels of tangible assets than cluster 1, as well as, higher levels of profitability and liquidity.

4.8. Discussion and Hypotheses Verification

From the estimated coefficients obtained in the regression model (Model 1 – Table 17), is possible to observe the relationship between debt ratios and each explanatory variable. Accordingly, the estimated coefficients sign reveal the impact of each independent variable on debt ratios which can be positive, negative or not significant. The obtained results allow us to accept or reject the research hypotheses formulated in chapter 3.1.

Table 23 provides the expected impacts of capital structure determinants on debt ratios according to the literature review and the obtained sign for the relation between debt ratios and independent variables.

Table 23: Expected Impacts of Determinants on Debt Ratios

Explanatory Variables	STD		LTD	
	Expected sign	Observed sign	Expected sign	Observed sign
Asset Structure	-	-	+	+
NDTS	-	+	+	-
ROA	-	-	-	-
Size	-	-	+	+
Growth	+	+	+	+
Liquidity	-	-	+	+
Cash Flow	-	-	-	-

The results obtained in this study reveal a positive relationship between asset structure and LTD. These results confirm that firms with higher levels of tangible assets are expected to issue more long-term debt as tangible assets can be used as collateral. Such

results can be interpreted within the trade-off theory and support Titman and Wessels (1988) and Scott (1977) argument that firms with assets that can be used as collateral in the case of company failure with their debt obligations are expected to issue more debt. On the other hand, we found a negative association between asset structure and STD, which tells that companies with higher levels of tangible assets have less need to access STD, in order to meet their obligations. Moreover, this negative association also suggests that companies tend to use current assets as collateral for STD as it can be converted in cash easily. To conclude, the results obtained for STD and LTD are in line with those found by Hall (2000) and Vieira and Novo (2010). In practice, we are allowed to accept the hypotheses H1.a and H1.b.

Concerning the NDTS, the results found in this study are in line with the expectations as we found a negative relationship between NDTS and LTD, just as Michaelas (1999), Esperança (2003) and Mira and Garcia (2003). However, the estimates obtained give weak support to the theory which predicts that companies with more NDTS like depreciations, provisions and allowance for doubtful accounts tend to have lower ratios of LTD. In terms of STD, the results found suggest a positive association between NDTS and STD, which contraries the results reached by Vieira and Novo (2010). Thus, the results do not corroborate the hypothesis H2.a and H2.b by appearing as not significant.

The variable size was measured in two ways, namely through the natural logarithm of size and according to the new thresholds of EU by suiting different categories of SME[24]. Thus, when using the different categories of SMEs, the estimates found suggest a positive and negative association between size and STD and LTD respectively, however these estimates reveal not significant. Therefore, these results contradict those found by Michaelas (1999), Hall (2000), Esperança (2003) and Vieira and Novo (2010). On the other hand, when using the natural logarithm of size to measure the companies' size, the results found reveal opposite signs by showing a negative and positive relationship with STD and LTD respectively. These results support the size theory introduced by Warner (1977), which states that large companies have lower transactions costs of financing externally than a small company, making it easier for the large companies to access debt externally. The negative relationship between size and STD provides evidence of the difficulties faced by smaller firms when accessing LTD which results in a STD

[24] Micro, small and medium sized companies. See chapter 2.2

preference. This time, such results are consistent with those obtained by the authors mentioned above and provide strong support to confirm the hypotheses H3.a and H3.b.

The significant negative relationship between debt ratios and profitability confirm the pecking order prediction proposed by Myers (1984) that companies have a hierarchical order for their financing decision: first internally with generated funds, then externally by issuing debt, and as a last option with issuing new equity. These results suggest that small companies prefer to finance its investments internally rather than externally due to higher risk of financing externally as argued Fama and French (1988). These results provide enough support to confirm the hypothesis H4.a and H4.b, which are in line with the vast majority of researches (e.g. Michaelas, 1999; Hall, 2000; Esperança ,2003; Mira and Garcia, 2003; Cabaço, 2010; Veiria and Novo, 2010). Moreover, the results also show a preference of short-term debt rather than long-term debt as the effect of profitability on LTD is bigger than on STD which goes along with the results obtained by Michaelas (1999).

In this study, the variable growth showed a positive sign in the relation with debt ratios; however such results appear as not statistically significant for the STD. Although there is no consensus in the relationship between growth and debt ratio, the results obtained in this study are in line with prior studies done by Michaelas (1999), Hall (2000), Esperança (2003), Mira and Garcia (2003) and Cabaço (2010) which support the Ross (1977) argument that high growth will tell the creditors that the company is not going to bankruptcy and they recognize it by giving them favorable terms of credit. Therefore the obtained results confirm the hypothesis H5.a and do not allow us to accept the hypothesis H5.b.

The results found in this study show a strong relationship between debt ratios and liquidity. However, the results evidence a negative and positive sign for the relationship between STD and LTD ratios respectively. These results are in line with Urbano (2011) and Laureano et al. (2012), who claimed that firms with high liquidity ratios would have a preference to issue LTD instead of STD. The negative relationship between liquidity and STD reveals that Portuguese SMEs with high liquidity problem tend to issue STD to face its short-term obligations. Therefore, the results obtained allow us to accept the hypotheses H6.a and H6.b.

Regarding to the cash-flow variable, a negative relationship between this variables and debt ratios was found. Thus, these results are in line with Mira and Garcia (2003), who

stated that in accordance with pecking order theory, companies with higher generated funds have a preference for financing its investments with those internal generated funds instead of accessing externally. When developing the robustness test by reducing the sample size, the impact of cash-flow on debt ratios reveals as not significant. In conclusion, the obtained results do not confirm the hypothesis H7.a and H7.b.

Following on the results mentioned above, we did not find a better theory to explain the capital structure of Portuguese SMEs. Thus, the results obtained suggest that trade-off and pecking order theories play an important role on capital structure of SMEs in Portugal. These results are in controversy with Vieira and Novo (2010), who stated that pecking order theory is clearly the best theory explaining the capital structure of Portuguese SMEs.

The variable crisis shows a positive relation with debt ratios, which means that after financial crisis companies tend to reduce their debt levels. These results can be explained by the reduction of credit supply to Portuguese SMEs after the fourth quarter of 2008 and by the increasing difficulties of SMEs in accessing credit after the financial crisis with high spreads charged by banks. These results are consistent with those obtained by Urbano (2011) and with those obtained in the clusters analysis where is possible to see an evident downward tendency on the debt level ratios from 2007 to 2010. In accordance with these results, we are suggested to accept the hypothesis H8 which predicts an impact of financial crisis on debt ratios, however when reducing the sample size the impact of crisis on debt ratios appears as not significant, and so then H8 is rejected.

Finally, the results obtained in Model 3 and in the clusters analysis confirm that on average, debt ratios vary across industries. These results are in line with those obtained by Hall (2000), Esperança (2003) and Degryse (2009) who argued that capital structures are significantly different across industries. Moreover, in the cluster analysis we corroborate the results obtained in the regression analysis by finding two homogeneous groups of industries according to its capital structures. Therefore, the results found in this study confirm hypothesis H9, that industry plays a significant role on companies' capital structure.

5. CONCLUSION

In this chapter, we intend to expose the main conclusions derived from this study and the relevance of this study to Portuguese SMEs, to the public in general and to the scientific knowledge. Still in this chapter, we present the limitations of this study as well as the suggestions for future research.

5.1. General Conclusions

This empirical work proposes to investigate the determinants of the capital structure of the Portuguese SMEs. Hence, asset structure, non-debt tax shields, size, profitability, growth, liquidity, cash-flow and legal form were identified as the determinants of capital structure and their relationship with debt ratios was tested to determine the impact of such determinants on capital structure. Another objective of this work was to verify the impact of industry and financial crisis on Portuguese SMEs capital structure.

Based on a sample of 12.857 SMEs from Portugal for the period 2007-2010, the results indicate that liquidity, asset structure and profitability are the most important determinants affecting companies' capital structure. The negative relationship between debt ratios (STD and LTD) and profitability, suggests that Portuguese SMEs have a preference to finance its investments internally rather than externally due to higher risk faced by external financing cost which is in line with the pecking order theory.

Therefore, according to the first objective we found the following conclusions:

We observe different signs for the relation between asset structure and STD and LTD, which reveal negative and positive respectively. These findings are consistent with the trade-off theory which suggests that companies with higher levels of tangible assets are expected to issue more debt, as those tangible assets can be used as collateral in case of failure.

Additionally, the results obtained for the variable size indicate two opposite signs for the association to debt ratios as were predicted. Thus, size has a negative and positive

impact on STD and LTD respectively. These results suggest that larger companies have a preference for LTD as they have lower transactions costs of financing externally. Furthermore, large companies follow a strategy of diversified business, enabling them to have stable earnings reducing the risk of bankruptcy and contributing to meet their debt obligations.

In terms of liquidity, we noticed a positive association between LTD and liquidity which reveals that Portuguese SMEs with higher liquidity levels have a preference of issuing LTD. On the other hand, our findings show a significant negative relation between STD and liquidity, which confirms that when companies have difficulties to face its short term obligations, in a consequence of liquidity problem they have a preference to raise STD in order to meet those liquidity problems.

The results obtained for the variable growth reveal a positive association with LTD, meaning that higher rates of growth will tell the creditors that the company is not going to bankruptcy and they recognize it by giving favorable terms of credit.

Another determinants as non-debt tax shields, cash-flow and legal form do not appear to influence the capital structure of Portuguese SMEs, which means that those variables do not play an important role on Portuguese SMEs capital structure.

In summary the results obtained suggest that trade-off and pecking order theories play an important role on capital structure of SMEs in Portugal.

In accordance to the second objective, we verified the financial crisis impact on capital structure. Thus, our results show a downward tendency on Portuguese SMEs debt ratios after the financial crisis period. However, these trends are not significant.

Finally, with regards to third objective the results obtained confirm that industry plays an important role on companies' capital structure and consequently suggests that on average, debt ratios vary across industries. Additionally, through the clusters analysis we found two homogeneous groups of industries according to its capital structure.

5.2. Importance of the Study

Although the literature is very extensive on this field, this empirical study tries to fill some gaps in the literature, by following on the future research notes done in other studies. Firstly, the sample chosen includes financial information for a large number of

Portuguese SME covering all industries according to the criteria of economic activities from the European Community (NACE).

Due to sample sized used in this study and access to vast conjunct of financial information, this study gives an important contribute to the Portuguese SMEs, public in general and scientific knowledge by doing a deeper approach focused on the financial crisis and industry impact on Portuguese SMEs' capital structure and by using different statistic techniques as the cluster analysis.

Nowadays, the financial crisis of 2008 is a very recent topic in the literature and this study represents one of the some pioneering studies including the main effects of the financial crisis in the capital structure field emerging in the literature.

5.3. Limitations and Future Research

As for other studies, this empirical study also brings its limitations, which may be considered as a suggestion for future research. Firstly, although the study considers the main variables applied in the capital structure subject, it does not mean that there are no other variables playing a role in the field. Therefore, this study does not consider variables as the knowledge of managers, specific behavioral factors of managers or level of exportations that may play an important role in the capital structure field.

While examining the impact of financial crisis on capital structure, dummy variable were used to differentiate the two periods: "before crisis" and "after crisis". However, due to limitation in the longevity of sample, the impact of financial crisis was not evident enough as was expected. Thus, future research to be undertaken in this subject should concentrate in analyzing the financial crisis impact by increasing the longevity of the sample.

Another recommendation for future research is to study the impact of financial crisis in different countries of Europe and compare the results between countries, in order to investigate how the financial crisis affected the capital structure of SMEs in different European countries.

Finally and taking into account the large sample used, data mining techniques could be useful to find and discover new knowledge on the capital structure field. Thus, we suggest the usage of a CART (regression decision tree) to predict capital structure, as this technique can evaluate the effect of the interaction between different explanatory variables on the debt ratios.

REFERENCES

Amadeus (2011), Database of comparable financial information, https://amadeus.bvdinfo.com/version-20121022/home.serv?product=amadeusneo

Ang, J.S. (1991), Small Business Uniqueness and the Theory of Financial Management, *Journal of Small Business Finance*, 1, 1-13.

Atici G., G. Gursoy (2011), Financial Crises and Capital Buffer: Evidence from the Turkish Banking Sector, *Banks and Bank Systems International Research Journal*, 6(1).

Banco de Portugal (2010), Inquérito aos bancos sobre o mercado de crédito, Outubro.

Borges A., A. Rodrigues and J. Morgado (2007), *Contabilidade e Finanças para a Gestão*, Lisboa, 3ºEdição: Áreas Editora.

Brealey, R.A. and S.C. Myers (1992), *Princípios de Finanças Empresariais*. Lisboa: Mcgraw-Hill de Portugal

Cabaço, D. (2010), *A Estrutura de Capitais das PMEs em Portugal e Espanha.* Dissertação de Mestrado em Gestão, UE.

CBF – Credit & Business Finance (2012), The main causes of business failure, http://www.cbfb.co.uk/help-and-faqs/the-main-causes-of-business-failure

CCP – Confederação do Comérico e Serviços (2012), Barómetro PME, *Comércio e Serviços*.

Davila, T. and Oyon, D. (2008), Cross-paradigm collaboration and the advancement of management accounting knowledge, *Critical Perspectives on Accounting*, 19(6): 887–893.

DeAngelo, H. and R.W. Masulis (1980), Optimal Capital Structure under Corporate and Personal Taxation, *Journal of Financial Economics*, 8, 3-29.

Degryse, H., P. Goeij and P. Kappert (2009), The Impact of Firm and Industry Characteristics on Small Firms' Capital Structure: Evidence From Dutch Panel Data, *EBC Working Paper No. 2009-03*

Diário Económico (2012), Revista PME Líder 2012, http://economico.sapo.pt/public/uploads/banners/PME2012.pdf

ENSR Survey (2002), http://ec.europa.eu/enterprise/policies/sme/files/analysis/doc/ensr_2002_tables/survey_tables_ensr_2002_country_en.pdf

Esperança J. and F. Matias (2005), *Finanças Empresariais*, Lisboa, Dom Quixote.

Esperança, J.P., A.M. Gama and M. Azzim, (2003), Corporate debt policy of small firms: an empirical (re)examination, *Journal of Small Business and Enterprise Development*, 10, 62 – 80.

EU Commission (2003), Observatory of European SMEs and access to finance, *Enterprise Publications.*

EU Commission (2011), Are EU SMEs recovering? – Annual Report on EU SMEs 2010/2011.

Fama, E.F. and K.R. French (1988), Taxes, financing decisions and firm value, *The Journal of Finance*, 53(2), 819-844.

Fama, E.F and K.R. French (2002), Testing trade-off and pecking order predictions about dividends and debt, *Review of Financial Studies*, 15, 1-33.

Gallo, M. A. and A. Vilaseca (1996), Finance in Family Business. *Family Business Review*, 9, 387–401.

Hair, J, W. Black, J.W. Babin e R. Anderson (2010), *Multivariate Data Analysis*, 7ª edition, Pearson Prentice Hall.

Hall, G., P.J. Hutchinson and N. Michaelas (2000), Industry Effects on the Determinants of Unquoted SMEs' Capital Structure, *International Journal of the Economics of Business* 7, 297-312.

Harris, M. and A. Raviv (1990), Capital structure and the informational role of debt, *The Journal of Finance*, 45(2), 321-349.

Harris, M. and A. Raviv (1991) The Theory of Capital Structure, *Journal of Finance*, 46(1), 297-355.

Holmes, S. and P. Kent (1991), An Empirical Analysis of the Financial Structure of Small and Large Australian Manufacturing Enterprises, *Journal of Small Business Finance*, 1(2), 141 - 54.

Hovakimian A, T. Opler and S. Titman (2001), Debt–equity choice. *Journal of Financial and Quantitative Analysis*, 36, 1-24.

IAPMEI (2008), PME na Estrutura Empresarial Nacional, http://www.iapmei.pt/iapmei-faq-02.php?tema=7

ICC – Instituto Informador Comercial (2007-2011), Insolvência de Empresas, http://www.iic.pt/

INE (2008), Estudos sobre Estatísticas Estruturais das Empresa, http://www.acde.pt/downloads/documentosonline/EmpPeqMedDims2007_2008.pdf

INE (2011), Anuário Estatístico de Portugal 2010, *Edição de 2011*

Jensen M. and W. Meckling (1976), Theory of the Firm: Managerial Behavior, Agency Costs, and Capital Structure, *Journal of Financial Economics*, 3, 305-360.

Jensen, M.C. (1986), Agency Costs of Free-Cash-Flow, Corporate Finance, and Takeovers, *American Economic Review*, 76, 323-329.

Jordan, J., J. Lowe, and P. Taylor (1998), Strategy and Financial Policy in UK Small Firms, *Journal of Business Finance and Accounting*, 25(1), 1-27.

Kenc T. and S. Dibooglu (2010), The 2007-2009 financial crisis, global imbalances and capital flows: Implications for reform, *Economic Systems*, 34(1), 3-21.

Kraus, A. and R.H. Litzenberger (1973), A state-preference model of optimal financial leverage, *The Journal of Finance*, 28 (4), 911-922.

Laureano L, H. Urbano and R. Laureano (2012), Debt maturity structure: evidence from Greece, Ireland, Italy, Portugal and Spain", Proceedings *of the XXII Jornadas Luso-Espanholas de Gestão Científica*, 1-15.

Lev, B. (1969), Industry Averages as Targets for Financial Ratios, *Journal of Accounting Research*, 7, 290-99.

Majluf, N.S. and S.C. Myers (1984), Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have, *Journal of Financial Economics*, 13(2), 187-221.

Marsh, P. (1982), The choice between equity and debt: An empirical study, *Journal of Finance,* 37, 121-144.

Michaelas, N., F. Chittenden and P. Poutziouris (1999), Financial Policy and Capital Structure Choice in UK SMEs: Empirical Evidence from Company Panel Data, *Small Business Economics*, 12, 113-30.

Miller, M. (1988), The Modigliani-Miller Propositions after Thirty Years, *Journal of Economic Perspectives*, 2(4), 99- 121.

Mira, F. and J. Gracia (2003), Pecking Order versus Trade-off: An empirical approach to the Small and Medium Enterprise Capital Structure, IVIE Working Paper, Universidad Cardenal Herrera.

Modigliani, F. and M.H. Miller (1958), The Cost of Capital, Corporate Finance, and the Theory of Investment. *American Economic Review*, 48(3), 261-275.

Mota A.G., C.S. Barroso, J.P. Nunes and M.A. Ferreira (2006), *Finanças Empresariais: Teoria e Prática*, Lisboa, 2ºEdição: Publisher Team.

Myers, S.C. (1977), Determinants of Corporate Borrowings, *Journal of Financial Economics*, 5, 147–175.

Myers, S.C. (1984), The capital structure puzzle, *The Journal of Finance*, 39(3), 575-583.

Myers, S.C. (2001), Capital Structure, *Journal of Economic Perspectives*, 15(2), 81-102.

Myers, S.C. (2003), Financing of Corporations, *Handbooks of the Economics of Finance*, 1, 216-253.

Nunes A. and E. Barros (2010), Caracterização territorial do desemprego registado em Portugal: Aplicação da análise de clusters, *Economia Global e Gestão*, 15(3), 9-26.

Ozkan, A. (2001), Determinants of capital structure and adjustment to long run target: evidence from UK company panel data, Journal of Business Finance & Accounting, 28(1-2), 175-198.

Pontes S. and R. Laureano (2012), Proposta de Teoria de Suporte ao Relato Financeiro Diferenciado, *Proceedings of the XV Encuentro AECA 'Nuevos caminos para Europa: El papel de las empresas y los gobiernos'*, 1-22.

Poza, E. and R. Kishida (2004), Does the family business interaction factor represent a resource or a cost?, *Family Business Review*, 17(2), 99–118.

Rajan, R. and L. Zingales (1995), What do we know about capital structure? Some evidence from international data, *The Journal of Finance*, 50, 1421-47.

Rasiah, D. and P.K. Kim (2011), A Theoretical Review on the use of the Static Trade off Theory, the Pecking Order Theory and the Agency Cost Theory of Capital Structure, *International Research Journal of Finance and Economic*, 63.

Ross G. (1977), The determination of financial structure: the incentive signaling approach. *Bell Journal of Economics & Management Science*; 8, 23–44.

Russo, J. (2005), Gestão – Conceito das PMEs, *Revista OTOC*, 30, Julho/Setembro.

Scott, J. (1977), A theory of optimal capital structure, *Bell Journal of Economics*, 32, 33-54.

Stiglitz, J.E. (1988), Why financial structure matters, *Journal of Economic Perspectives*, 2(4), 121-127.

Stulz, R. (1990), Managerial discretion and optimal financing policies, *Journal of Financial Economics*, 26, 3-27.

Titman, S. and R. Wessels (1988), The determinants of capital structure choice, *The Journal of Finance*, 43, 1-19.

Urbano, H. (2011), *Debt Maturity Structure Across Europe: Evidence From Greece, Ireland, Italy, Portugal And Spain*, Dissertation - Master in Management, ISCTE.

Vieira E.S. and A.J. Novo (2010), *A estrutura de capital das PMEs: evidência do mercado português*, Estudos do ISCA – Série IV (2).

Warner J.B. (1977). Bankruptcy costs: Some evidence, *Journal of Finance,* 32, 337-347.

APPENDIXES

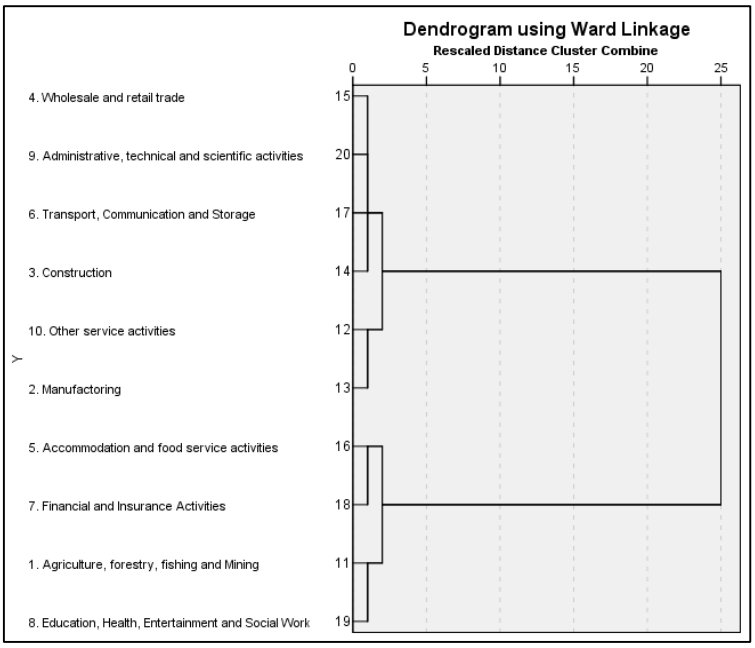
List of Appendixes

Appendix 1 – Industries According to NACE code

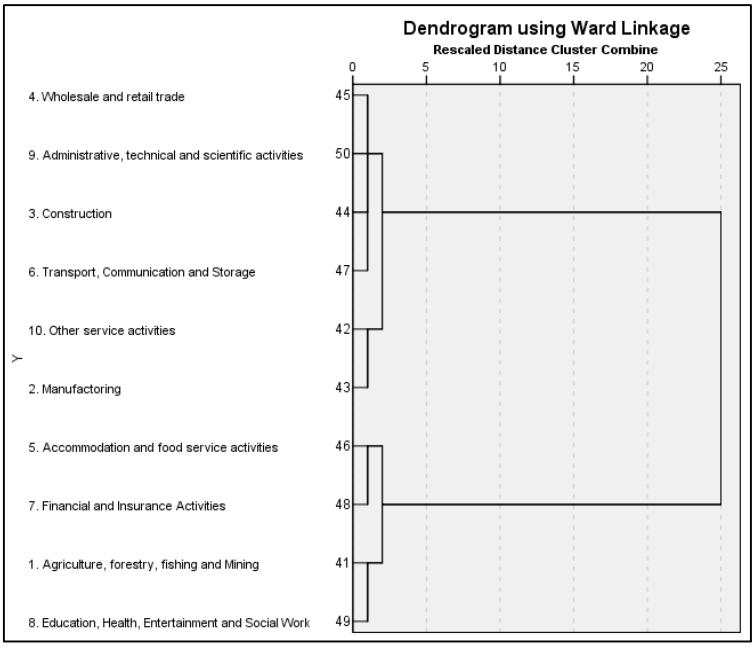
NACE Code	
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage; waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of motor vehicles and motorcycles
H	Transporting and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defense; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other services activities
T	Activities of households as employers; undifferentiated goods - and services - producing activities of households for own use
U	Activities of extraterritorial organizations and bodies

Appendix 2 - Dengodrams obtained from Ward method, 2007 and 2010

2007 – before crisis:



2010 – after crisis:



Appendix 3 - Correlation Coefficients between Debt Ratios, using the 10% Sample

	STD	LTD	TD
STD	1		
LTD	-0,538(***)	1	
TD	0,606(***)	0,344(***)	1

(***) significant at the 0,1% level.

Appendix 4 - Correlation Coefficients between Debt Ratios, using the 1% Sample

	STD	LTD	TD
STD	1		
LTD	-0,529(***)	1	
TD	0,632(***)	0,323(***)	1

(***) significant at the 0,1% level.

Appendix 5 - Correlation Coefficients between each Independent Variable and Debt Ratios, using the 10% Sample

	STD	LTD	TD
Asset Structure	-0,313(***)	0,326(***)	-0,035(***)
NDTS	-0,080(***)	0,05(***)	-0,041(***)
ROA	-0,107(***)	-0,186(***)	-0,296(***)
Size	-0,145(***)	0,165(***)	-0,003
Growth	0,104(***)	0,009	0,124(***)
Liquidity	-0,586(***)	0,205(***)	-0,453(***)
Cash flow	-0,167(***)	0,005	-0,181(***)

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Appendix 6 - Correlation Coefficients between each Independent Variable and Debt Ratios, using the 1% Sample

	STD	LTD	TD
Asset Structure	-0,283(***)	0,220(***)	-0,113(**)
NDTS	-0,106(**)	0,027	-0,093(*)
ROA	-0,061(+)	-0,206(***)	-0,258(***)
Size	-0,152(***)	0,143(***)	-,0370
Growth	0,131(**)	-0,018	0,129(**)
Liquidity	-0,602(***)	0,263(***)	-0,428(***)
Cash flow	-0,166(***)	-0,032	-0,214(***)

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Appendix 7 - Regression results for the 10% sample (Model 1)

Independent Variables		Dependent Variables STD	LTD	TD
Constant	*Coeff. β*	109,127	-22,360	86,767
	t-statistic	55,18(***)	-8,99(***)	34,52(***)
Asset Structure	*Coeff. β*	-0,530	0,355	-0,176
	Standardized β	-0,578	0,447	-0,212
	t-statistic	-59,67(***)	31,70(***)	-15,56(***)
NDTS	*Coeff. β*	-0,050	-0,088	-0,138
	Standardized β	-0,009	-0,018	-0,027
	t-statistic	-0,83	-1,15	-1,78(+)
ROA	*Coeff. β*	-0,192	-0,540	-0,732
	Standardized β	-0,061	-0,200	-0,259
	t-statistic	-5,80(***)	-12,97(***)	-17,40(***)
Ln (Size)	*Coeff. β*	-2,125	2,566	0,441
	Standardized β	-0,102	0,142	0,023
	t-statistic	-8,55(***)	8,20(***)	1,40
Growth	*Coeff. β*	0,020	0,045	0,065
	Standardized β	0,035	0,092	0,128
	t-statistic	4,25(***)	7,61(***)	10,88(***)
Liquidity	*Coeff. β*	-0,189	0,083	-0,106
	Standardized β	-0,776	0,395	-0,483
	t-statistic	-87,90(***)	30,69(***)	-38,77(***)
Z_Cash flow	*Coeff. β*	0,126	-0,108	0,018
	Standardized β	0,006	-0,006	0,001
	t-statistic	0,48	-0,331	0,054
Size EU (Small=Yes)	*Coeff. β*	1,811	-0,173	1,639
	Standardized β	0,041	-0,005	0,041
	t-statistic	4,05(***)	-0,306	2,88(**)
Size EU (Medium=Yes)	*Coeff. β*	3,036	-1,328	1,709
	Standardized β	0,049	-0,025	0,030
	t-statistic	4,41(***)	-1,532	1,95(+)
Legal Form (Corp.=Yes)	*Coeff. β*	-2,550	-2,457	-5,007
	Standardized β	-0,051	-0,057	-0,111
	t-statistic	-5,66(***)	-4,34(***)	-8,75(***)
Adj. Coeff. (R^2)		66,3%	28,3%	32,9%
F (10;5090)		1.003,9(***)	202,8(***)	251,6(***)
Durbin Watson		2,077	2,034	2,004
Std. Error of the Estimate		11,781	14,824	14,976

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Appendix 8 - Regression results for the 1% sample (Model 1)

Independent Variables		Dependent Variables STD	LTD	TD
Constant	*Coeff. β*	117,645	-22,988	94,658
	t-statistic	20,44(***)	-3,21(***)	12,98(***)
Asset Structure	*Coeff. β*	-0,505	0,293	-0,213
	Standardized β	-0,549	0,384	-0,257
	t-statistic	-17,23(***)	8,00(***)	-5,73(***)
NDTS	*Coeff. β*	-0,051	-0,261	-0,312
	Standardized β	-0,009	-0,057	-0,063
	t-statistic	-0,27	-1,096	-1,290
ROA	*Coeff. β*	-0,123	-0,479	-0,602
	Standardized β	-0,043	-0,203	-0,234
	t-statistic	-1,29	-4,02(***)	-4,97(***)
Ln (Size)	*Coeff. β*	-3,222	2,733	-0,490
	Standardized β	-0,158	0,162	-0,027
	t-statistic	-4,44(***)	3,02(**)	-0,532
Growth	*Coeff. β*	0,020	0,043	0,063
	Standardized β	0,039	0,099	0,134
	t-statistic	1,46	2,48(*)	3,59(***)
Liquidity	*Coeff. β*	-0,192	0,081	-0,111
	Standardized β	-0,806	0,409	-0,520
	t-statistic	-29,20(***)	9,84(***)	-13,38(***)
Z_Cash flow	*Coeff. β*	-0,398	-0,491	-0,889
	Standardized β	-0,019	-0,029	-0,048
	t-statistic	-0,479	-0,475	-0,846
Size EU (Small=Yes)	*Coeff. β*	0,268	3,247	3,515
	Standardized β	0,006	0,092	0,091
	t-statistic	0,199	1,94(+)	2,07(*)
Size EU (Medium=Yes)	*Coeff. β*	3,399	-0,733	2,666
	Standardized β	0,052	-0,013	0,045
	t-statistic	1,486	-0,257	0,920
Legal Form (Corp.=Yes)	*Coeff. β*	-2,464	-1,080	-3,544
	Standardized β	-0,047	-0,025	-0,076
	t-statistic	-1,68(+)	-0,590	-1,91(+)
Adj. Coeff. (R^2)		66,9%	24,9%	34,3%
F (10 ;501)		104,4(***)	18,0(***)	27,7(***)
Durbin Watson		1,976	2,073	2,156
Std. Error of the Estimate		11,146	13,888	14,117

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Appendix 9 - Regression results for the 10% sample (Model 2)

Independent Variables		Dependent Variables STD	LTD	TD
Constant	*Coeff. β*	107,988	-22,245	85,743
	t-statistic	54,41(***)	-8,88(***)	33,94(***)
Asset Structure	*Coeff. β*	-0,530	0,354	-0,175
	Standardized β	-0,577	0,447	-0,212
	t-statistic	-59,74(***)	31,69(***)	-15,52(***)
NDTS	*Coeff. β*	-0,065	-0,086	-0,151
	Standardized β	-0,011	-0,017	-0,029
	t-statistic	-1,07	-1,12	-1,95(+)
ROA	*Coeff. β*	-0,197	-0,540	-0,737
	Standardized β	-0,063	-0,199	-0,261
	t-statistic	-5,97(***)	-12,95(***)	-17,52(***)
Ln (Size)	*Coeff. β*	-2,091	2,563	0,471
	Standardized β	-0,100	0,142	0,025
	t-statistic	-8,43(***)	8,19(***)	1,49
Growth	*Coeff. β*	0,017	0,045	0,062
	Standardized β	0,030	0,093	0,122
	t-statistic	3,61(***)	7,61(***)	10,37(***)
Liquidity	*Coeff. β*	-0,188	0,083	-0,105
	Standardized β	-0,773	0,395	-0,480
	t-statistic	-87,60(***)	30,59(***)	-38,50(***)
Z_Cash flow	*Coeff. β*	0,151	-0,111	0,040
	Standardized β	0,007	-0,006	0,002
	t-statistic	0,58	-0,34	0,12
Size EU (Small=Yes)	*Coeff. β*	1,834	-0,175	1,659
	Standardized β	0,042	-0,005	0,042
	t-statistic	4,11(***)	-0,31	2,92(**)
Size EU (Medium=Yes)	*Coeff. β*	2,941	-1,318	1,623
	Standardized β	0,047	-0,024	0,029
	t-statistic	4,28(***)	-1,52	1,85(+)
Legal Form (Corp.=Yes)	*Coeff. β*	-2,578	-2,454	-5,032
	Standardized β	-0,052	-0,057	-0,112
	t-statistic	-5,74(***)	-4,33(***)	-8,80(***)
Crisis (2007/2008=Yes)	*Coeff. β*	1,736	-0,175	1,562
	Standardized β	0,043	-0,005	0,043
	t-statistic	5,19(***)	-0,41	3,67(***)
Adj. Coeff. (R^2)		66,5%	28,3%	33,1%
F (11;5089)		919,7(***)	184,3(***)	230,5(***)
Durbin Watson		2,088	2,034	2,008
Std. Error of the Estimate		11,751	14,825	14,957

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Appendix 10 - Regression results for the 1% sample (Model 2)

Independent Variables		Dependent Variables STD	LTD	TD
Constant	*Coeff. β*	117,405	-23,312	94,092
	t-statistic	20,34(***)	-3,24(***)	12,88(***)
Asset Structure	*Coeff. β*	-0,506	0,292	-0,215
	Standardized β	-0,549	0,383	-0,259
	t-statistic	-17,23(***)	7,96(***)	-5,78(***)
NDTS	*Coeff. β*	-0,056	-0,267	-0,323
	Standardized β	-0,010	-0,059	-0,066
	t-statistic	-0,29	-1,12	-1,34
ROA	*Coeff. β*	-0,129	-0,487	-0,616
	Standardized β	-0,045	-0,206	-0,240
	t-statistic	-1,34	-4,06(***)	-5,06(***)
Ln (Size)	*Coeff. β*	-3,228	2,725	-0,503
	Standardized β	-0,159	0,162	-0,028
	t-statistic	-4,44(***)	3,01(**)	-0,55
Growth	*Coeff. β*	0,020	0,042	0,062
	Standardized β	0,037	0,097	0,131
	t-statistic	1,41	2,42(*)	3,50(***)
Liquidity	*Coeff. β*	-0,192	0,081	-0,110
	Standardized β	-0,804	0,412	-0,516
	t-statistic	-28,96(***)	9,85(***)	-13,19(***)
Z_Cash flow	*Coeff. β*	-0,384	-0,473	-0,857
	Standardized β	-0,019	-0,028	-0,046
	t-statistic	-0,46	-0,46	-0,82
Size EU (Small=Yes)	*Coeff. β*	0,239	3,208	3,446
	Standardized β	0,006	0,091	0,090
	t-statistic	0,18	1,92	2,03(*)
Size EU (Medium=Yes)	*Coeff. β*	3,317	-0,845	2,472
	Standardized β	0,050	-0,016	0,042
	t-statistic	1,45	-0,30	0,85
Legal Form (Corp.=Yes)	*Coeff. β*	-2,400	-0,994	-3,394
	Standardized β	-0,046	-0,023	-0,073
	t-statistic	-1,63	-0,54	-1,82(+)
Crisis (2007/2008=Yes)	*Coeff. β*	0,620	0,835	1,454
	Standardized β	0,016	0,026	0,042
	t-statistic	0,61	0,66	1,13
Adj. Coeff. (R^2)		66,9%	24,8%	34,3%
F (11;500)		94,8(***)	16,4(***)	25,3(***)
Durbin Watson		1,977	2,075	2,162
Std. Error of the Estimate		11,153	13,896	14,113

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Appendix 11 - Regression results for the 10% sample (Model 3)

Independent Variables		Dependent Variables STD	LTD	TD
Constant	*Coeff. β*	111,986	-20,177	91,809
	t-statistic	39,67(***)	-5,67(***)	25,52(***)
Asset Structure	*Coeff. β*	-0,508	0,366	-0,142
	Standardized β	-0,553	0,462	-0,172
	t-statistic	-53,52(***)	30,56(***)	-11,75(***)
NDTS	*Coeff. β*	-0,051	-0,092	-0,144
	Standardized β	-0,009	-0,019	-0,028
	t-statistic	-0,83	-1,18	-1,82(+)
ROA	*Coeff. β*	-0,195	-0,535	-0,729
	Standardized β	-0,062	-0,197	-0,258
	t-statistic	-5,91(***)	-12,85(***)	-17,36(***)
Ln (Size)	*Coeff. β*	-2,155	2,661	0,505
	Standardized β	-0,103	0,148	0,027
	t-statistic	-8,64(***)	8,45(***)	1,59
Growth	*Coeff. β*	0,022	0,041	0,063
	Standardized β	0,039	0,084	0,124
	t-statistic	4,72(***)	6,89(***)	10,53(***)
Liquidity	*Coeff. β*	-0,188	0,083	-0,105
	Standardized β	-0,773	0,394	-0,481
	t-statistic	-87,96(***)	30,64(***)	-38,69(***)
Z_Cash flow	*Coeff. β*	0,151	-0,158	-0,007
	Standardized β	0,007	-0,009	0,000
	t-statistic	0,58	-0,49	-0,02
Size EU (Small=Yes)	*Coeff. β*	1,759	-0,096	1,663
	Standardized β	0,040	-0,003	0,042
	t-statistic	3,78(***)	-0,16	2,80(**)
Size EU (Medium=Yes)	*Coeff. β*	3,050	-1,301	1,749
	Standardized β	0,049	-0,024	0,031
	t-statistic	4,24(***)	-1,44	1,91(+)
Legal Form (Corp.=Yes)	*Coeff. β*	-2,123	-2,639	-4,762
	Standardized β	-0,043	-0,061	-0,106
	t-statistic	-4,69(***)	-4,63(***)	-8,26(***)
Agriculture, forestry, fishing and Mining	*Coeff. β*	-4,080	-8,779	-12,859
	Standardized β	-0,035	-0,086	-0,121
	t-statistic	-1,816(+)	-3,10(**)	-4,49(***)
Manufactoring	*Coeff. β*	-3,525	-4,302	-7,828
	Standardized β	-0,078	-0,110	-0,192
	t-statistic	-1,71(+)	-1,65(+)	-2,98(**)
Construction	*Coeff. β*	-3,116	-0,648	-3,764
	Standardized β	-0,052	-0,012	-0,069
	t-statistic	-1,48	-0,24	-1,41
Wholesale and retail trade	*Coeff. β*	-2,423	-3,521	-5,944
	Standardized β	-0,057	-0,097	-0,156
	t-statistic	-1,171	-1,35	-2,26(*)
Accommodation and food service activities	*Coeff. β*	-9,152	-1,066	-10,218
	Standardized β	-0,094	-0,013	-0,116
	t-statistic	-4,20(***)	-0,39	-3,68(***)
Transport, communication and storage	*Coeff. β*	-2,387	-1,704	-4,091
	Standardized β	-0,025	-0,020	-0,047
	t-statistic	-1,10	-0,62	-1,47
Financial and insurance activities	*Coeff. β*	-10,808	3,101	-7,707
	Standardized β	-0,075	0,025	-0,059
	t-statistic	-4,58(***)	1,04	-2,57(***)
Education, health, entertainment and social work	*Coeff. β*	-3,342	-5,014	-8,355
	Standardized β	-0,026	-0,046	-0,073
	t-statistic	-1,47	-1,75(+)	-2,89(***)
Administrative, technical and scientific activities	*Coeff. β*	-3,894	-2,070	-5,964
	Standardized β	-0,042	-0,026	-0,071
	t-statistic	-1,80(***)	-0,76	-2,16(*)
Adj. Coeff. (R^2)		66,9%	29,3%	33,9%
F (19;51408)		544,1(***)	112,4(***)	138,6(***)
Durbin Watson		2,075	2,033	2,009
Std. Error of the Estimate		11,670	14,721	14,870

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Note: Other servive activite is the reference industry used.

Appendix 12 - Regression results for the 1% sample (Model 3)

Independent Variables		Dependent Variables STD	LTD	TD
Constant	*Coeff. β*	126,020	-17,432	108,589
	t-statistic	17,00(***)	-1,85(+)	11,22(***)
Asset Structure	*Coeff. β*	-0,499	0,291	-0,208
	Standardized β	-0,541	0,382	-0,251
	t-statistic	-16,52(***)	7,56(***)	-5,28(***)
NDTS	*Coeff. β*	0,035	-0,301	-0,266
	Standardized β	0,006	-0,066	-0,054
	t-statistic	0,19	-1,25	-1,07
ROA	*Coeff. β*	-0,120	-0,492	-0,611
	Standardized β	-0,042	-0,208	-0,238
	t-statistic	-1,27	-4,10(***)	-4,97(***)
Ln (Size)	*Coeff. β*	-3,228	2,697	-0,532
	Standardized β	-0,159	0,160	-0,029
	t-statistic	-4,53(***)	2,97(**)	-0,57
Growth	*Coeff. β*	0,020	0,042	0,062
	Standardized β	0,038	0,095	0,130
	t-statistic	1,47	2,40(*)	3,46(***)
Liquidity	*Coeff. β*	-0,194	0,083	-0,112
	Standardized β	-0,816	0,419	-0,522
	t-statistic	-29,60(***)	9,88(***)	-13,03(***)
Z_Cash flow	*Coeff. β*	-0,415	-0,401	-0,816
	Standardized β	-0,020	-0,024	-0,044
	t-statistic	-0,51	-0,39	-0,77
Size EU (Small=Yes)	*Coeff. β*	1,252	2,893	4,145
	Standardized β	0,029	0,082	0,108
	t-statistic	0,91	1,65(+)	2,30(*)
Size EU (Medium=Yes)	*Coeff. β*	3,782	-0,349	3,433
	Standardized β	0,057	-0,01	0,058
	t-statistic	1,61	-0,12	1,12
Legal Form (Corp.=Yes)	*Coeff. β*	-1,892	-1,622	-3,514
	Standardized β	-0,036	-0,038	-0,075
	t-statistic	-1,31	-0,89	-1,87(+)
Agriculture, forestry, fishing and Mining	*Coeff. β*	-9,194	-5,373	-14,567
	Standardized β	-0,080	-0,057	-0,141
	t-statistic	-1,630	-0,75	-1,98(*)
Manufactoring	*Coeff. β*	-9,638	-5,939	-15,577
	Standardized β	-0,231	-0,172	-0,415
	t-statistic	-1,95(+)	-0,95	-2,42(*)
Construction	*Coeff. β*	-10,263	-3,883	-14,146
	Standardized β	-0,182	-0,083	-0,279
	t-statistic	-2,03(+)	-0,603	-2,14(*)
Wholesale and retail trade	*Coeff. β*	-7,596	-5,749	-13,345
	Standardized β	-0,189	-0,173	-0,370
	t-statistic	-1,53	-0,91	-2,06(*)
Accommodation and food service activities	*Coeff. β*	-25,010	8,790	-16,220
	Standardized β	-0,195	0,083	-0,141
	t-statistic	-4,30(***)	1,19	-2,14(*)
Transport, communication and storage	*Coeff. β*	-11,048	-6,164	-17,211
	Standardized β	-0,108	-0,073	-0,187
	t-statistic	-2,02(+)	-0,89	-2,41(*)
Financial and insurance activities	*Coeff. β*	-19,449	2,172	-17,278
	Standardized β	-0,125	0,017	-0,123
	t-statistic	-3,09(**)	0,27	-2,11(*)
Education, health, entertainment and social work	*Coeff. β*	-8,662	-8,818	-17,480
	Standardized β	-0,055	-0,068	-0,125
	t-statistic	-1,40	-1,12	-2,16(*)
Administrative, technical and scientific activities	*Coeff. β*	-9,386	-4,588	-13,974
	Standardized β	-0,106	-0,063	-0,176
	t-statistic	-1,76(+)	-0,65(*)	-2,00(*)
Adj. Coeff. (R^2)		68,8%	26,1%	34,2%
F (19;51408)		60,4(***)	10,5(***)	14,9(***)
Durbin Watson		1,999	2,085	2,157
Std. Error of the Estimate		10,819	13,779	14,122

(***) significant at the 0,1%level; (**) significant at the 1%level; (*) significant at the 5%level; (+) significant at the 10%level;

Note: Other servive activite is the reference industry used.