ISCTE Business School
Instituto Universitário de Lisboa

STUDY ON DEBT MATURITY OF PORTUGUESE SMEs
2009-2011

Sérgio Guimarães Monteiro da Costa

Dissertation submitted as partial requirement for the conferral of MSc in Finance

Supervisor:

Prof. Doutor Luís Laureano, Assistant Professor, ISCTE-IUL Business School, Department of Finance

October 2013

Acknowledgements

The preparation of a dissertation, as I have come to understand, is a long and mind-boggling process offering numerous challenges but also the opportunity to grow as a student and person. This demanding requirement of the Master degree can only be accomplished with the guidance and support of distinct people which I would like to take this opportunity to thank.

In particular, I would like to express my deep gratitude to my supervisor, Professor Luís Miguel da Silva Laureano, for his patient guidance, precious knowledge and availability which allowed elevating the quality level of my dissertation.

I would also like to thank "Informa D&B" for the professionalism and availability giving me access to the database used in this empirical work.

I can never thank my parents enough for their continuous love, support and encouragement during the past few months. Specially, I would like to express my very great appreciation to my father for the time and precious critiques given. Finally, to all my family and friends which in one way or another provided me the confidence and motivation to finish this additional step in my student life.

Abstract

The purpose of this empirical work is to understand the reasoning behind debt maturity choices from Portuguese SMEs and to see if those choices are made based on the existent debt maturity theories proposed by the finance literature. We consider an important period for the Portuguese economy where the country was starting to feel the effects of the 2008 financial crisis and where companies, especially small ones, had to make smart long time decisions about their debt levels and maturities in order to survive future tough austerity policies. With a sample of 2,000 Portuguese SMEs for the time period between 2009 and 2011, using panel data methodology, we run two sample mean comparison t-tests as well as fixed effects model regression in order to study the debt maturity determinants within SMEs. An increasing trend was found on average debt maturity during the three years on analysis. Our study showed partially consistent results with Diamond´s (1991) theory where intermediate quality firms choose to issue more long term debt while high quality firms tend to issue more short term debt. Smaller firms (those more affected by asymmetric information) tend to use debt of shorter maturities. Furthermore, we find evidence supporting the clientele argument where firms affected by higher tax rates have longer debt maturities. Finally, firms with more growth opportunities are using more short term debt.

JEL Classification: G30, G32

Keywords: Debt Maturity; Panel Data; SMEs; Financial Crisis.

Resumo

O propósito deste estudo empírico é procurar entender as razões das escolhas das PME Portuguesas relativamente às maturidades das respetivas dívidas e verificar se elas encontram eco nas teorias sobre maturidade da dívida propostas pela literatura financeira. Estudámos um período da economia Portuguesa - período do início das repercussões da crise financeira de 2008 – em que as empresas, especialmente PME, foram forçadas a tomar penosas decisões de longo prazo sobre o nível e maturidade das respetivas dívidas, para conseguirem sobreviver à política de austeridade que se adivinhava. Com uma amostra de 2,000 PME – anos de 2009 a 2011, utilizámos a metodologia em dados de painel com comparações de médias baseadas em testes t e o modelo de efeitos fixos para as regressões, para verificar quais os fatores determinantes explicativos das diferentes maturidades da dívida dessas PME. Encontrámos uma tendência de crescimento na maturidade da dívida média nos anos em análise. Os resultados são parcialmente consistentes com a teoria de Diamond (1991), segundo a qual empresas de qualidade média tendem a contrair mais dívida de longo prazo, enquanto empresas de baixa e alta qualidade, tendem a contrair mais dívida de curto prazo. Empresas de menor dimensão (normalmente mais afetadas por informação assimétrica) tendem a utilizar mais dívida a curto prazo. Além disso, detetámos provas consistentes com o "clientele argument", segundo o qual empresas afetadas por taxas de imposto mais altas, contraem dívida com prazos mais longos. Finalmente, empresas com mais oportunidades de crescimento tendem a utilizar mais dívida a curto prazo.

Classificação JEL: G30, G32.

Palavras-chave: Maturidade da dívida, Dados de Painel, PMEs, Crise Financeira.

Executive Summary

Time has shown the importance of firms choosing the maturities of liabilities in order to avoid problems such as overinvestment, underinvestment, risk-shifting, liquidity and signaling.

While most studies focus on large publicly traded firms where information is available for the public, our emphasizes is on small and medium sized enterprises (SMEs) which, because of difficulty in obtaining information, sometimes are left behind in the finance literature, although being SMEs the ones who most contribute to job and business creation in most countries.

This dissertation studies debt maturity within Portuguese SMEs and tries to explain through firm specific variables the debt maturities chosen by small and medium sized enterprises. With variables such as leverage, asset maturity, capital expenditures, liquidity, taxes, return on equity, free-cash-flow, cash, Altman´s *Z* score, research and development, financial flexibility and size, we follow the most significant debt maturity hypotheses in the financial literature such as the matching, liquidity risk and signaling, agency costs, information asymmetry and taxes hypothesis with the purpose to understand SMEs behaviors regarding the maturity of their liabilities. We will first analyze the descriptive statistics and correlation matrix regarding the dependent variable (debt maturity) and each explanatory variable and then run a fixed effects regression model to understand the behavior of each explanatory variable with the dependent one. The dataset was obtained from "Informa D&B" and consists of financial information for 2,000 Portuguese SMEs for the time period between 2009 and 2011.

The descriptive statistics shows an increasing trend for average debt maturity among the 2,000 firms in our dataset, meaning that Portuguese SMEs are being able to get longer debt maturities. Nonetheless, the major part of their debt is of short term which was predictable because of the size, liquidity and default risks which usually affects their relations with financial institutions, thus being only able to borrow in the short term to allow for constant evaluations from those who concede credit. Furthermore, we run two sample mean comparison t-tests in order to check if there are significant differences in average debt

maturity for subgroups of the sample. Some interesting results were found, firms who are more financially independent, or in other words, have less debt in their balance sheets, use shorter debt maturities than those who are more leveraged, larger firms have higher average debt maturity than smaller ones and firms with negative yearly Net Income have higher average debt maturity than those with positive yearly Net Income.

According to the fixed effects regression model, firms with lower default probability and thus better quality, tend to issue more short term debt while firms with medium default probability prefer to borrow with longer maturities, which is partially consistent with Diamond´s (1991) tradeoff theory. Firms who are more affected by asymmetric information (smaller firms) borrow with shorter debt maturities. The match hypothesis, which affirms that firms should match debt and assets maturities in order to avoid the problem of not having available cash when time comes to pay for liabilities and also to avoid the problem of having to pay debt obligations when the firm´s assets are no longer producing cash flows, is not verified in our study. In other words, Portuguese SMEs do not match their debt and assets maturity and our explanation for this result is that most of the companies in our dataset are micro sized firms who are forced by financial institutions to borrow in the short term because of their size, lack of transparency and default probability, which makes it hard for those companies to follow the matching principle. We also found that firms with less physical assets, those with more growth opportunities, prefer to borrow with shorter debt maturities, a result consistent with Myers (1997) prediction. Finally, our last relevant finding suggests evidence to support the clientele argument proposed by Scholes and Wolfson (1992), Portuguese SMEs supporting higher tax rates tend to issue more long term debt. The same was found by Antoniou *et al*. (2006) for German firms.

In conclusion, Portuguese SMEs do follow some of the most relevant financial theories regarding the choice of debt maturity such as the liquidity risk, information asymmetry and tax hypotheses. This means that SMEs in Portugal take into account firm-specific factors when deciding the maturities of their liabilities.

Index:

1. Introduction 1
2. Literature Review: Debt Maturity Theories 3
2.1 SMEs and Debt Maturity: International and the Portuguese Context 3
2.2 Debt Maturity Theories 6
2.2.1 Match Hypothesis 6
2.2.2 Information Asymmetry and Agency Costs Hypotheses 7
2.2.3 Signaling and Liquidity Risk Hypotheses 9
2.2.4 Tax Hypothesis 11
3. Empirical Study: Hypotheses and Methodology 12
3.1 Hypotheses 12
3.2 Methodology 13
3.3 Sample 14
3.4 Data 14
3.4.1 Dependent Variable 14
3.4.2 Proxies for Debt Maturity Hypotheses 15
3.4.2.1 Leverage 15
3.4.2.2 Free Cash Flow 16
3.4.2.3 Firm Size 17
3.4.2.4 Growth Options 18
3.4.2.4.1 Tangibility 18
3.4.2.4.2 R&D 18
3.4.2.4.3 CAPEX 19
3.4.2.5 Asset Maturity 19
3.4.2.5.1 Financial Flexibility 19
3.4.2.5.2 AMT 20
3.4.2.6 Firm´s Quality 20
3.4.2.6.1 Return on Equity 20
3.4.2.6.2 Liquidity 21
3.4.2.7 Taxes 21

3.4.2.8 Cash 22
3.4.2.9 Firm Risk 22
3.5 Descriptive Statistics 24
4. Empirical Study: Results 33
4.1 Correlation Analysis 33
4.2 Regression Analysis 34
4.2.1 Z score Analysis 35
4.2.2 Size Analysis 36
4.2.3 Asset Maturity Analysis 36
4.2.4 Tax Analysis 37
4.2.5 Liquidity Analysis 38
4.2.6 Capital Expenditures Analysis 39
5. Discussion and Conclusions 39

References 43

Appendix 46

List of Tables

Table 1 - European Commission's definition of SME. 17

Table 2 - Explanatory Variables and respective expected sign. 24

Table 3 - Descriptive statistics for the dependent variable debt maturity (*DMT*) for each year for the full sample. 25

Table 4 - Median and average debt maturities for micro, small and medium sized enterprises separately for the sample period 2009-2011. 27

Table 5 - Average debt maturity for high and low Financial Independent firms 28

Table 6 - Average debt maturity for firms with positive and negative Net Income for each year. 29

Table 7 – Average debt maturity for each *Z*-score group and for each year from 2009 to 2011. 29

Table 8 – Average debt maturity for each size group according to the European Commission definition of SME for the time period between 2099 and 2011. 30

Table 9 - Average debt maturity for micro, small and medium sized companies according to the number of employees 31

Table 10 - Median and average debt maturity for high and low Asset Maturity firms. 32

Table 11 - Average debt maturity for each economic activity. 46

Table 12 - Descriptive statistics of all variables for the full sample from 2009 to 2011. 47

Table 13 - Fixed effects regression. 49

Table 14 – Two sample mean comparison t-tests for average debt maturity for both high and low leveraged firms 50

Table 15 - Two sample mean comparison t-tests for average debt maturity for firms with positive and negative Net Income. 51

Table 16 - Two sample mean comparison t-tests for average debt maturity for the smallest and the largest firms. 51

Table 17 - Anova single factor test for average *DMT* for the three different *Z* score groups 2009-2011. 52

Table 18 – Anova single factor test for average *DMT* for each size group 2009-2011. 52

Table 19 – Two sample mean comparison t-tests for average debt maturity for both high and low *AMT* 2009-2011. 53

Table 20 - Pearson correlation matrix for firm level variables for the whole sample for the time period between 2009 and 2011. 54

Table 21 – Variable definitions 55

List of Figures

Figure 1 - Annual rate of change for credit granted to SMEs and to larger enterprises. 5

Figure 2 – Average debt maturity for SMEs and non financial firms of the PSI20. 26

Figure 3 - Average debt maturity for each economic activity. 33

Figure 4 – Corporate tax rates for Portugal and Germany 2009-2011. 39

ISCTE Business School

MSc in Finance

Thesis:

STUDY ON DEBT MATURITY OF PORTUGUESE SMEs 2009-2011

1. Introduction

One subject that has been drawing attention in the finance world is the debt maturity structure of firms. It is not only enough to choose the leverage ratio that a firm wants to apply but it has also to decide about the maturities liabilities will take in order to reach the optimal capital structure. Recent studies have shown the importance of debt maturity in periods of credit and liquidity shocks like during the 2007-2008 financial crisis where the debt maturity structure of industrial firms was put to the test and shown to have serious impacts on companies (Almeida *et al*., 2011).

Another example was the financial crisis that occurred in emerging markets in the 90´s which were caused in part by the mismatch of debt and assets maturities (Sachs *et al*., 1996).

Empirical work about this thematic has been developed mainly targeting large and quoted firms in different countries. Our motivation to choose the particular case of SMEs is that we believe that those firms are not just an imitation of larger firms but in a smaller size. They are completely different types of firms with different structures and specific characteristics thus worthy of being tested to understand if their differences also present different results when explaining their debt maturity structures.

When we think about business in Europe, the first thing that comes to our mind is the big multinationals and their huge expansion plans. But those companies do not paint the right picture about European economy. Actually, the back bone of Europe are the small and medium sized enterprises who run 99% of the European economy contributing to two in

every three jobs in the private sector and, more surprisingly, nine out of ten SMEs in Europe are micro firms with less than ten employees (European Commission, 2013).

According to the "Instituto Nacional de Estatística" (INE)[1], in 2009 there were 348,552 SMEs in Portugal which represent 99.7% of all non financial business.

The objective is to understand if Portuguese SMEs follow the reasoning behind debt maturity theories like agency costs of debt hypothesis, information asymmetry hypothesis, signaling hypothesis, tax hypothesis and match hypothesis. We document an increase of the use of long term debt in Portuguese SMEs during the time period (2009-2011); our results show evidence partially consistent to Diamond´s (1991) tradeoff theory; firms more affected by information asymmetry issue debt of shorter maturities; low liquid firms tend to issue more short term debt when their tax expense is higher; we confirm the tax clientele argument (Scholes and Wolfson, 1992) for Portuguese SMEs except those with low liquidity; and we also found that firms with less physical assets, those with more growth opportunities, prefer to borrow with shorter debt maturities, a result consistent with Myers (1997) prediction.

Using information of 2,000 Portuguese SMEs obtained from "Informa D&B" database for the period of 2009-2011, we perform our empirical study supported on descriptive statistics, correlation matrix analysis, averages comparisons using t-test and linear regressions using panel data methodology.

We did not find any evidence indicating that firms with more free cash flow available suffer from the overinvestment problem (Jensen, 1986) which was an expected result since the great majority of SMEs do not have management and ownership separated, they have usually the same owner/manager. Also, there was no evidence that led us to believe of a relation between cash holdings and the use of short term debt. Furthermore, Portuguese SMEs do not seem to use leverage as a tool to avoid both the risk shifting and the underinvestment problem.

[1] Instituto Nacional de Estatística (INE) is the National Statistical Institute of Portugal.

We will present a literature review concerning debt maturity theories defended by the most significant authors in Chapter 2. Chapter 3 will describe the variables used to test the hypotheses that will be studied and the methodology followed. The most significant results found in our analysis will be presented in Chapter 4. Chapter 5 will conclude with the most relevant findings in our study and steps for future research.

2. LITERATURE REVIEW: DEBT MATURITY THEORIES

Introduced by Modigliani and Miller (1958), the Capital Structure Irrelevance Principle stated that in perfect market conditions, the decision about capital structure would be irrelevant and would not affect the firm value. This theory was later developed by Stiglitz (1974) who extended this thinking not only for the debt to equity ratio but also to other financial policies like debt maturity choice, concluding that it is also irrelevant in perfect market conditions although admitted that this theory would not stick for imperfect market conditions. Our study will focus on the debt maturity problematic.

This chapter will give an overview of the most significant studies made so far about the problematic of debt maturity and will also explain the importance of SMEs in the Portuguese economy and the relevance of debt maturity structure for this type of firms.

2.1. SMEs and Debt Maturity: International and the Portuguese Context

Most empirical studies concerning debt maturity structure focus on large publicly traded firms (Custódio *et al*., 2012; Barclay and Smith 1995; Stohs and Mauer, 1996) while micro, small and medium sized firms are somehow forgotten. That was exactly one of the motivations to this study on Portuguese SMEs.

Several characteristics make small SMEs different from large firms and interesting to study debt maturity structure:

a) Small firms have the advantage of being more flexible - having less fixed assets when compared to large firms, allows them to easily enter in more growth opportunities;

b) In smaller firms, the manager and the owner are usually the same person, which helps to avoid the overinvestment or free cash flow problem that will be discussed in the subsection 2.3.2.;

c) Smaller sized firms have to report less information to lenders than larger firms, which gives rise to information asymmetries between firms and credit suppliers, leading financial institutions to be more careful when lending to small firms because of lack of transparency;

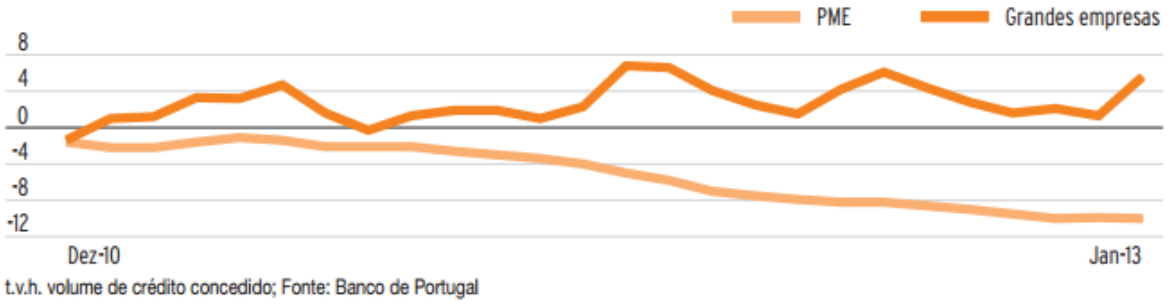
d) Asset maturity is shorter in smaller firms, mostly because the industry where they are integrated usually do not require investments in assets of longer maturities;

e) Small firms do not have easy access to capital markets, so they rely more on the banking system to obtain credit (European Commission, 2011); debt obtained from financial institutions, like banks, is normally of shorter maturity than debt coming from bond issues or public debt; SMEs choose bank debt (instead of public debt) because is easier to renegotiate, is cheaper and requires less information than bond issues (Denis and Mihov, 2002); larger firms prefer the latter.

In Portugal, in the last few years since the financial crisis in 2007/2008, times have been tough for SMEs. The struggle of the government to cut public spending while trying to motivate private investment at the same time is not revealing the expected results. According to Silva (2011), since September 2008 (time when the Lehman Brothers went bankrupt) until September 2011 (time of the release of this news) the credit granted to SMEs was constant between 1.6 and 2 billion Euros, which compared to the period before the crisis, is one third less than what was normally granted to SMEs in Portugal. The government appeals for SMEs across the country to invest more while managers and owners of those firms complain of lack of favorable credit and fiscal conditions: arguments and discussions go back and forward.

Figure 1 shows the annual rate of change for credit granted to SMEs (in light orange) and to big enterprises (dark orange) between December 2010 and January of 2013. What we can see is a decrease in the credit given to SMEs while larger companies have easier access to credit. Financial institutions explain this lack of credit granted to SMEs with their lack of equity compared to larger firms. Statistics support that argument - according to Peixoto (2013) 29.1% of SMEs in Portugal had their liabilities maturing in January 2013 and 12.9% of them failed debt repayments while in the same period there were 17.8% large firms which had to repay their debts and only 2.3% of them could not do it.

Figure 1 - Annual rate of change for credit granted to SMEs (in light orange) and to big enterprises (dark orange) between December 2010 and January of 2013. Source: Banco de Portugal.



t.v.h. volume de crédito concedido; Fonte: Banco de Portugal

According to INE (2011), in 2009 there were 348,552 SMEs in Portugal (99.7% of all non financial business). Of those, about 10% were exporters and contributed to 40% of the total SME´s turnover in the country. It is clear the importance of exportation, being the most successful way that SMEs have to survive the recession.

The government tried to address some of the most common SMEs problems (reduction of national and international demand, access to credit and low equity). The way the government did that was by:

a) Creating lines of credit specifically for SMEs (PME Investe[2]) while at the same time making sure firms pay their taxes and social contributions and by reinforcing equity;

[2] PME Investe is a line of credit with the purpose of facilitating the access of SMEs to bank loans by providing lower interest rates and by reducing the risk of banking operations through the use of guaranty

b) Implementing specific programs to help those who export (INOVExport[3]).

Concerning how SMEs finance themselves, short term debt represents more than half of the total debt and even more for exporters, according to INE.

2.2 Debt Maturity Theories

Besides deciding on the debt to equity ratio that maximizes firm value, financial economics has proven the importance of debt maturity choice explaining why some firms borrow short and others long term. The following main theories try to explain this: matching of asset and debt maturities, agency cost, information asymmetry, signaling and liquidity risk hypotheses and tax hypothesis.

2.2.1 Match Hypothesis

Several authors, like Morris (1976) and Myers (1977), studied the theme and all concluded that firms should match debt maturities with asset maturities, either: (a) to avoid the problem of not having available cash when time comes to pay for liabilities, in the case that debt has shorter maturity than assets; or (b) to avoid the problem of having to pay debt obligations when the firm´s assets are no longer producing cash flows, in the case of debt having longer maturity than assets.

Myers (1977) states that the underinvestment problem, a result of the conflict of interests between shareholders and creditors induced by risky debt, could be minimized by matching debt and assets maturities.

Since then, several empirical studies confirmed this hypothesis. Gonzalez (2012) studied a sample of 39,603 small, medium and large Spanish firms and found a significant and

mechanisms. After the second semester of 2008 six lines of credit were created and a total of 9.092 million Euros were available to SMEs

[3] INOVExport is a program which aims to introduce specialists in the area of international commerce in SMEs in order to stimulate exportation and internationalization.

positive relation between asset maturity and debt maturity. Also Stohs and Mauer (1996), analyzing 328 industrial firms, found evidence consistent with the matching hypothesis. Studies like Barclay *et al.* (2003) and Scherr and Hulburt (2001) also found similar results.

2.2.2 Information Asymmetry and Agency Costs Hypothesis

The most relevant study concerning the information asymmetry hypothesis is Myers (1984) work who, based on an argument in Myers and Majluf (1984), concludes for the existence of a pecking order whereby firms, when in need of financing, do prefer to raise internal funds and, if that is not possible, they choose to issue debt instead of equity. The reasoning behind this thinking is that when managers have more or better information about the company than outside investors, markets penalize the issuing of new equity based on the belief that the reason for the company to issue new equity is because the current stock price is overvalued. Thus investors will adjust the price they are willing to pay for new shares of the firm (offering a lower price).

Therefore, the best choice of external finance would be to issue debt as it gives the idea of confidence that the new investment will be successful and that the current share price is undervalued.

As stated by López-Gracia *et al*. (2010), SMEs are a perfect fit to look for agency costs because:

a) They are not very transparent, which allows information asymmetry between managers and creditors;
b) They are usually highly in debt and have more growth opportunities than larger firms, which leads to the overinvestment or underinvestment problems discussed in Myers (1977);
c) They have less fixed assets, which can lead to the risk-shifting problem discussed in Jensen and Meckling (1976).

Agency costs arise from the conflict of interests between two parties. The first one to mention is between managers and shareholders. According to Jensen and Meckling (1976), managers and shareholders are both utility maximizers so managers will sometimes perform in a way to maximize their own wealth, which may not be the most suitable for the shareholders, i.e., not increasing the firm's value. This problem, defined as the overinvestment or free cash flow problem by Jensen (1986), usually occurs when there is a great amount of free cash flow, which gives more freedom to managers to use them in low-return investments instead of giving them out as dividends to shareholders.

One way to solve this problem is to issue debt: "Debt creation, without retention of the proceeds of the issue, enables managers to effectively bond their promise to pay out future cash flows" (Jensen, 1986: 3).

The free cash flow problem is not as usual in SMEs like it is in large firms because they normally are family owned where management and ownership is together, manager/owner always acting in a way to maximize the firm's value (Poza *et al.*, 2004). On the other hand, because SMEs are usually highly leveraged, agency costs of debt are common and worth looking at.

Firms can increase the amount of debt in order to decrease agency costs between managers and shareholders, i.e., debt will force managers to carefully invest free cash flows in order to repay the interest and principal, thus reducing manager's control over the company and conflicts between them and shareholders (Jensen, 1986). Once a company starts increasing its debt, what usually happens is that, while agency conflicts between managers and shareholders tend to decrease, conflicts between shareholders and financing institutions – mostly banks in the case of SMEs - start to increase. Therefore, the debt to equity ratio must be carefully decided in order to maximize the value of the company, while decreasing agency costs of free cash flow without creating agency costs of debt.

Myers (1977) argues about the underinvestment problem which is a result of the conflict of interests between shareholders and creditors induced by risky debt. In this case, what happens is that sometimes firms pass up positive net present value projects because they require issuing risky debt which leads to a decrease in market value of the firm which is

supported by the firm's shareholders. So, their decision will be to issue no risky debt, passing up the new and valuable investment opportunity. The problem can be minimized, according to Myers (1977), by reducing leverage or by using more short term debt, allowing debt renegotiations before growth options are exercised. So, for Myers (1977), firms with more growth opportunities should use more short term debt to avoid the underinvestment problem.

Still concerning agency costs of debt, Jensen and Meckling (1976) find that there is another significant problem to discuss. Defined as the "Asset substitution or risk-shifting problem", it happens when shareholders switch from low risk projects to riskier ones. The reasoning behind this is that shareholders will be able to increase their possible gains while creditors will be shouldering the higher risk, thus supporting much of the costs if the project goes wrong. Using more short term debt would resolve this problem by allowing creditors to check upon the financials of the firm more often.

Companies with more fixed assets are more easily and efficiently monitored by creditors, unlike companies with more intangible assets. The latter reveal higher management´s freedom and a higher probability of changes in investment strategies, leading to an increase in monitoring costs. Thus, companies with short asset maturity will be more vulnerable to the risk-shifting problem (Easterwood and Kadapakkam, 1994).

2.2.3 Signaling and Liquidity Risk Hypothesis

The Signaling hypothesis supports the idea that managers send signals to investors through their financial acts, in order to minimize information asymmetries.

According to Flannery (1986), firms are able to reveal if they are high or low quality firms by choosing a certain type of debt maturity (long or short). The reasoning behind this is that high quality firms will choose debt with shorter maturities and by doing this they are able to be "judged" by creditors sooner than if they issue long term debt which will only delay their evaluation, thus increasing uncertainty about their future state. These firms want to be

evaluated sooner because they believe to be in a good state and want to take advantage of that to obtain better financing conditions.

On the other hand, low quality firms will want to delay their assessment by financial institutions in order to try to improve their true state in that time. If they choose shorter maturity debt, creditors will penalize them by offering poorer financing conditions, every time they have to refinance.

This need to show the true value to creditors comes from the fact that financial institutions are not able to understand if they are dealing with low or high quality firms, thus high quality ones will end up paying more than they would if their true state was known and low quality firms will pay less than what they should bear. That is why it is common for low quality firms to sometimes mimic high quality firm´s behavior, or in other words, issue short term debt so they can be viewed as high quality ones when they really are not. There is also the fact that the financial institutions that lend to very low quality firms will only accept short term lending.

Diamond (1991) argues about the interaction between signaling and liquidity risk caused by short term debt, which while reducing borrowing costs also increases the risk of the company lacking liquidity to meet its short term obligations. That interaction will lead high and low quality firms to issue short term debt, while medium quality firms will prefer to issue long term debt. High quality firms which are highly liquid and do not suffer from the risk of bad refinancing conditions, will want to take advantage of refinancing their debt more often with lower costs (better refinancing conditions). Low quality firms, which have poor liquidity, are imposed by financial institutions to borrow on the short term in order to allow for often supervisory and thus to decrease the risk for those financial institutions. Finally, medium quality firms which are more or less stable, but fearing of not having sufficient liquid resources to meet their obligations on the short term, will try to issue long term debt in order to obtain more time to achieve better conditions on renegotiating their debt.

Barclay and Smith (1995) show evidence of Diamond´s (1991) theory, i.e., both the highest rated and the lowest rated firms issue more short term debt, while companies with medium rated credit risk issue more long term debt.

2.2.4 Tax Hypothesis

The tax hypothesis is of high importance in the economic thinking since the early 60´s with Modigliani and Miller (1963) showing that debt financing was preferable than equity financing due to the deductibility characteristic of debt. Although this is true, if companies finance themselves with too much debt, bankruptcy costs will overcome the advantages of the tax shield from debt financing.

Kane *et al.* (1985) included taxes in their calculation of the optimal debt maturity and found out that firms increased their debt maturities when: a) flotation costs[4] raises, in order to have more time to amortize those costs, and b) the tax shield from debt financing decreases, again because the firm needs a longer maturity to amortize flotation costs. Thus, predicting a negative relation between debt maturity and the tax advantage from debt, and a positive relation with flotation costs.

Brick and Ravid (1985) argue that when the yield curve has a positive slope, then the interest of issuing long term debt will be higher than those of short term debt but only in early years, while lower in later years, which will lead to savings in the expected tax liabilities on the long run. Thus, firms should borrow with longer maturities when the slope of the yield curve is positive and borrow short term when the slope is negative in order to increase the firm´s market value.

But then, in 1990, Lewis (1990) observed that Brick and Ravid (1985) were assuming that companies chose their debt to asset ratio before their debt maturity structure. In his study he concludes that if the level of debt and debt maturity are chosen at the same time, then debt maturity structure would not matter.

[4] Flotation costs are those incurred by a publicly traded company when it issues new securities. (www.investopedia.com)

In their book, Scholes and Wolfson (1992) use the tax clientele argument to explain a positive relation between the firm´s marginal tax rates and their debt maturities. As they explain, firms with higher marginal tax rates will naturally choose longer debt maturities in order to take advantage of tax shields. Antoniou *et al.* (2006), in their empirical study on debt maturity structure, found evidence of the clientele argument proposed by Scholes and Wolfson (1992), as German companies showed a positive and significant relation between the effective tax rate and debt maturity.

In their empirical study, Barclay and Smith (1995) did not find any evidence of taxes affecting debt maturity choice while Stohs and Mauer (1996) found mixed support for the tax hypothesis.

3. Empirical Study: Hypotheses and Methodology

3.1 Hypotheses

Based on the several existing theories on debt maturity described above and giving the specific characteristics of SMEs, we identify the following hypotheses:

H_1 = Firms match the maturity of existing assets with the maturity of their debt;

H_2 = Firms with higher information asymmetries use more short term debt;

H_3 = Very high and low quality firms issue more short term debt;

H_4 = Firms with more growth opportunities will have more short term debt;

H_5 = Firms with higher tax rates will have more long term debt;

H_6 = Firms more affected by agency costs of debt will have more short term debt.

3.2 Methodology

We will start by analyzing the descriptive statistics on debt maturity to understand its trend in the sample period; although being a small one, it is curious to see the increasing trend in a time where Portugal was experiencing tough times. Splitting the sample into different subgroups, and comparing the average debt maturity in each group will help us to understand if there are unusual behaviors from firms with respect to the use of distinct debt maturities. The criteria used to subdivide firms into specific categories was the median of each variable, separating those above and bellow the median values for each variable except in the case of Z score where we use specific values, explained in section 4.2.1, to divide the sample. In order to check the significance of differences in average debt maturities between each subgroup we will run two sample mean comparison t-tests in the case of comparing two averages and the Anova simple factor test when there are three different averages.

The empirical study will use panel data methodology in order to study the determinants of debt maturity of SMEs. All tests and analysis were made using the statistical software Stata 12.0 and Microsoft Office Excel.

We run the Bresch and Pagan (1980) test to choose between pooled effects or random effects model. The pooled regression hypothesis is rejected [$\chi^2(1) = 2563.08$; $p < 0.0000$].

We then run the Hausman (1978) test in order to understand which method, random or fixed effects model, best suits our model. The random effects model is rejected [$\chi^2\ (11) = 38.51$; $p < 0.0001$].

Using the fixed effects model, we run the regression with all explanatory variables for the years of 2009, 2010 and 2011. Again, we divide the full sample into distinct subgroups, using the same criteria as stated above, in order to see if the dependent variable (debt maturity) behaves differently for each subgroup.

3.3 Sample

The sample used consists of 2,000 Portuguese SMEs from "Informa D&B" database. From those 2,000 firms we rejected two which had no assets, leaving us with a final sample of 1,998 SMEs.

The 1,998 SMEs consist in 1,920 micro sized, 64 small sized and 14 medium sized companies based on the definition of SMEs from the European Commission relatively to the number of employees in each firm. If we observe Table 11 with respect to the average debt maturity and number of observations in each economic activity, we see that almost one fourth of our SMEs belong to the "wholesale and retail trade; repair of motor vehicles and motorcycles" economic activity and around 17% are in the "professional, scientific and recreation" economic activity being the two with more SMEs in our sample followed by "accommodation and food service activities" and "construction" economic activities, with 233 and 208 firms each year respectively (please see Table 11 in the Appendix).

3.4 Data

3.4.1 Dependent Variable: Debt Maturity

Guedes and Opler (1996) use the maturity of incremental debt issues: it is their understanding that this way they can better understand some theories such as signaling, tax and liquidity risk hypotheses because "these models rely on transient informational asymmetry between managers and investors" (Guedes and Opler, 1996:1810).

Titman and Wessels (1988) use the ratios of long term debt to Total Assets and short term debt to Total Debt, but this prevent us from understanding the variation in debt maturities caused by firm´s specifics (Barclay and Smith, 1995).

Another way, the one we will use due to the available data, is to measure debt maturity as the proportion of total debt that has a certain maturity (Barclay and Smith 1995; Scherr and Hulburt, 2001; Custódio *et al.*, 2012) which enables us to separate the debt maturity

decision from the leverage decision (Barclay and Smith, 1995). In the present study and due to the available data in the balance sheet, we will be using the proportion of debt maturing in more than one year. Therefore, the ratio will be as follows:

$$DMT = \frac{Debt\ maturing\ in\ more\ than\ one\ year}{Total\ debt} \quad (1)$$

3.4.2 Proxies for Debt Maturity Hypothesis

3.4.2.1 Leverage

The leverage variable will be important to control for the underinvestment problem (Myers, 1977) which happens when, in the case of highly in debt firms, shareholders pass up positive NPV projects because they bear all the risks but benefit from only a small part of the possible gains of the project, while creditors benefit from a larger part of the gains if the project is successful.

Leverage will be also very important when studying the asset substitution or risk shifting problem, which occurs when shareholders of a firm in debt shift from low to high risk projects (Jensen and Meckling, 1976). In fact, if creditors are financing a considerably bigger part of the new project, the owner/manager will have the incentive to enter in a high risk project: if it is successful, he will increase his wealth; but if it goes the wrong way, creditors are the ones to bear most of the risk inherent to such high risk project.

As stated by Myers (1977), reducing leverage would be one of the ways to reduce or eliminate the underinvestment problem because it improves the liquidity of a firm which is important when considering a new investment.

Firms with higher liquidity risk (due to high levels of debt) will try to get longer debt maturities; however, financial institutions will only offer shorter debt maturities to those firms showing higher risks of insolvency.

Several empirical studies included Leverage as an explanatory or control variable in their models and the results are similar in each one. Stohs and Mauer (1996), Scherr and Hulburt (2001), Leland and Toft (1996), Barclay and Smith (1995), and Custódio *et al*. (2012) found a positive relation between leverage and debt maturity, which means that firms increase their debt maturities when their leverage ratio is higher. In this study we define leverage as:

$$LEV = \frac{Total\ debt}{Total\ assets} \quad (2)$$

3.4.2.2 Free Cash Flow:

Keeping up with López-Gracia *et al*. (2010), we will be using the Free Cash Flow variable (*FCF*) in order to control for the overinvestment problem. As per above referred, managers will sometimes perform in a way to maximize their own wealth, which may not be the most suitable for the shareholders, i.e., not increasing the firm's value. This conflict of interests is frequently a consequence of available free cash flow which increases the manager´s freedom to invest.

We will follow De Miguel and Pindalo (2001) and López-Gracia *et al*. (2010), using the ratio of cash flow to total assets multiplied by the ratio of one to growth where growth is the ratio of sales in year "t" to sales in year "t-1". The reason to utilize an inverse to growth opportunities is to calculate the cash flow that is not spent in investment opportunities. Debt, especially long term debt, would help to minimize this problem as it controls manager´s freedom by imposing the payment of loan interests and the principal. Thus we will be expecting a positive relation between *FCF* and *DMT*.

$$FCF = \frac{cash\ flow}{total\ assets} * \frac{1}{growth} \quad (3)$$

Where

$$growth = \frac{sales_t}{sales_{t-1}}$$

3.4.2.3 Firm Size:

Scherr and Hulburt (2001) use the age and size of the firms as proxies for information asymmetry. In fact,

a) Smaller firms reveal less information about themselves, thus having more information asymmetry and issuing more short term debt as a consequence;

b) Debt obtained from financial institutions (like banks) is normally of shorter maturity than debt coming from bond issues or public debt; and because bank debt is easier to renegotiate, is cheaper and requires less information than bond issues, smaller firms like SMEs choose it in detriment of public debt. Large firms prefer the latter.

The size variable is regularly used in empirical studies on debt maturity as an inverse proxy for information asymmetry. Smaller firms tend to reveal less information about themselves which tends to increase information asymmetries and the use of short term debt (Scherr and Hulburt, 2001). Therefore, we expect to find a positive relation between size and debt maturity.

Size will be measured in two different ways:

1. The first one follows the regulation adopted by the European Commission and IAPMEI:

Table 1 – European Commission's definition of SME.

Company category	Employees	Turnover or	Balance sheet total
Medium-sized	< 250	≤ € 50 m	≤ € 43 m
Small	< 50	≤ € 10 m	≤ € 10 m
Micro	< 10	≤ € 2 m	≤ € 2 m

2. The second measure will be the natural logarithm of the book value of total assets, used in several empirical studies such as López-Gracia *et al.* (2010), and Scherr and Hulburt (2001).

$$SIZ = Ln(book\ value\ of\ total\ assets) \quad (4)$$

3.4.2.4 Growth Options:

3.4.2.4.1 Tangibility

We will use Tangibility (*TAN*) as an inverse proxy for growth opportunities and have the expectation of finding a positive relation with debt maturity (Scherr and Hulburt, 2001). Firms with more tangible assets are able to use them as guaranty which lowers the concerns of creditors and consequently allows for better credit conditions, more specifically, access to longer debt maturities. So, firms with higher levels of tangibility are expected to have more long term debt. We will adopt the ratio of Property, Plant and Equipment to Total Assets used in Custódio *et al*. (2012).

$$TAN = \frac{Property, plant\ and\ equipment}{Total\ Assets} \quad (5)$$

3.4.2.4.2 R&D

The investment in Research and Development (*RD*) will be a proxy for growth options since it represents the investment made by the firm with the objective of finding new investment opportunities which will enhance the future value of the company. Higher *RD* represents more growth opportunities and following Myers (1977), firms with more growth opportunities should use more short term debt. Thus, we will be expecting a negative relation with debt maturity. The ratio used is based on the one used also in Custódio *et al.* (2012) for U.S. firms:

$$RD = \frac{Investment\ in\ Research\ and\ Development}{Total\ Assets} \quad (6)$$

3.4.2.4.3 CAPEX

The third and final proxy we will use for growth options will be the ratio of capital expenditures to total assets and we define it as *CAPX*. Firms who invest more in upgrading their physical assets are normally larger in size and are expected to have less growth opportunities, so *CAPX* will be working as an inverse proxy for growth options and we expect to find a positive relation with *DMT* for the same reason that firms with higher *TAN* are expected to borrow with longer maturities, firms with more tangible assets are able to get better financing conditions by giving as guarantee those same assets. This was also used as a proxy for growth options in Custódio *et al.* (2012).

$$CAPX = \frac{Capital\ Expenditures}{Total\ assets} \quad (7)$$

3.4.2.5 Asset Maturity:

Important to control for the asset substitution problem, asset maturity has been used in several empirical studies on debt maturity for small firms like Scherr and Hulburt (2001) and García and Martínez (2007). Scherr and Hulburt (2001) calculate it through "the sum of each asset´s book value, divided by total asset book value, times its maturity in months".

3.4.2.5.1 Financial Flexibility

We will be following García and Martínez (2007) who use an expression taken from Ju and Jen (2003) on their study about the tradeoff model of debt maturity. The financial flexibility of firms measures "the weighted average asset maturity on the total of their assets " (Garcia and Martinez 2007:9) and they expect that firms with shorter asset maturity are more financially flexible because their assets mature earlier allowing firms to enjoy enough liquidity to repay short term debt. So, their expectation is that the higher the financial flexibility ratio (longer asset maturity), the longer the expected debt maturity.

$$FF = p1 * \frac{Net\ Fixed\ Assets}{Annual\ Depreciation} + p2 * \frac{Receivables}{Sales} + p3 * \frac{Stock}{Sales} + p4 \quad (8)$$

Where p1, p2, p3 and p4 are the proportions of fixed assets, clients, stock and the rest of current assets, respectively, of the total assets (García and Martínez 2007).

3.4.2.5.2 AMT

Another asset maturity variable will be introduced in our study. Following Stohs and Mauer (1996) and Gonzalez (2012) we will use the ratio of property, plant and equipment (PPE) to the annual depreciation. The underlying thinking of this ratio is that longer asset maturities will depreciate at a slower rate. We define it as *AMT*.

$$AMT = \frac{PPE}{Annual\ Depreciation} \quad (9)$$

In order to verify the Match Hypothesis, we will check if Portuguese SMEs, from the database, match their debt and asset maturities by comparing *AMT* (asset maturity) and *FF* (financial flexibility) with *DMT* (debt maturity) thus we are expecting to find a positive relation between each of the explanatory variable and *DMT*.

3.4.2.6 Firm´s Quality

3.4.2.6.1 ROE

Assuming that better quality firms have positive future abnormal earnings, Barclay and Smith (1995) use the future abnormal earnings as a proxy for the quality of firms in order to see if firms follow Diamond´s (1991) hypothesis, i.e., both high quality and very low quality firms issue more short term debt, while medium quality firms issue more long term

debt. Barclay and Smith (1995) define abnormal earnings in year "t+1" "as earnings per share in year t+1 (excluding extraordinary items and discontinued operations and adjusted for any changes in shares outstanding) minus earnings per share in year t, divided by the year t share price"(Barclay and Smith, 1995:618).

Due to the fact that we are working with unquoted firms and based on the available data, measuring the firm's quality will be done through the Return on Equity ratio (*ROE*) following Urbano (2011) study on debt maturity structure across Europe, and in so doing, we expect to find a negative relation with debt maturity:

$$ROE = \frac{Net\ Income}{Total\ Equity} \quad (10)$$

3.4.2.6.2 Liquidity

As stated above on section 2.2.3, Diamond (1991) believes in a tradeoff between liquidity risk and signaling. We control for liquidity (*LIQ*) measuring the firm's ability to cover its short term obligations by using the ratio of current assets to current liabilities:

$$LIQ = \frac{Current\ Assets}{Current\ Liabilities} \quad (11)$$

In doing so, we expect that highly liquid firms will prefer to issue short term debt thus expecting a negative relation between *LIQ* and *DMT*.

3.4.2.7 Taxes:

Stohs and Mauer (1996) used the ratio of income tax expense to pretax income to measure the firm´s tax rate, expecting a negative relation with debt maturity. A recent empirical work made by Antoniou *et al.* (2006) also used this measure to test the tax hypothesis. They studied debt maturity structure for French, German and UK companies and results for

the tax hypothesis were mixed. The statistics were insignificant for France and the UK and positive and significant for Germany, which followed the clientele argument of Scholes and Wolfson (1992).

From those different empirical work, results for the tax hypothesis are mixed and we find that is worthy of testing in our study.

We will follow the same ratio as the abovementioned authors, and the variable´s name will be *TAX*:

$$TAX = \frac{Income\ Tax\ Expense}{Pretax\ Income} \quad (12)$$

3.4.2.8 Cash:

Custódio *et al.* (2012) concluded that firms with higher cash holdings use more short term debt than lower cash holdings for industrial U.S. firms. We will check if this is the case for Portuguese SMEs.

$$CAX = \frac{Cash}{Total\ assets} \quad (13)$$

3.4.2.9 Firm Risk:

In order to measure a firm´s default risk and due to the fact that we do not have any other tool, like bond ratings, to measure it, we will follow Scherr and Hulburt (2001) and use Altman´s Z-score (1968) developed by analyzing a sample of firms who had declared bankruptcy and then matched them by with other "healthy" firms in the same industry and similar sizes.

The formula contains five business ratios weighted by coefficients. Altman´s Z-score was firstly created for publicly manufacturing firms with more than $1million worth in assets, but later some variations of the formula were created in order to adapt to privately held and

non manufacturing companies. We will use the Altman´s Z-score for privately held companies: the original formula contains one variable (market value of equity) which we do not have for our sample data, while the formula for privately held companies substitutes that variable for the book value of equity for which we have access in our database.

Altman´s Z score for private firms is as follows:

$$Z = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5 \quad (14)$$

Where:

$$X_1 = \frac{Current\ Assets - Current\ Debt}{Total\ Assets};$$

$$X_2 = \frac{Retained\ Earnings}{Total\ Assets};$$

$$X_3 = \frac{Earnings\ Before\ Interest\ and\ Taxes}{Total\ Assets};$$

$$X_4 = \frac{Book\ Value\ of\ Equity}{Total\ Debt};$$

$$X_5 = \frac{Sales}{Total\ Assets}.$$

Summarizing, the following table (Table 2) will show the signs we expect to find when studying the relation between each explanatory variable and debt maturity:

Table 2 – Explanatory Variables and respective expected sign.

Explanatory Variables	Expected Sign
LEV	+
RD	-
SIZ	+
CAPX	+
AMT	+
CAX	-
ROE	-
TAX	±
FF	+
Z	±
FCF	+
LIQ	-
TAN	+

3.5 Descriptive Statistics:

Looking to the yearly variation on the average debt maturity for the 1,998 sampled firms during the three years analyzed (please see Table 3 bellow), we found evidence of:

a) An increase from 26.5% in 2009 to 31.9% in 2011, meaning that firms used on average 5.4% more long term debt in their businesses. This was a surprising finding, considering the contraction of the Portuguese economy and at a time where credit supply is said to be scarce, mainly to SMEs;

b) The dispersion around the mean is significant, with a small increase during the three years period;

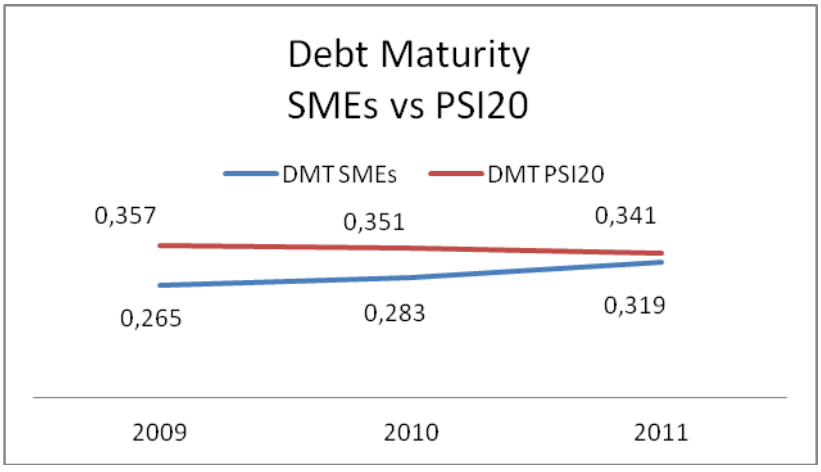
c) The median debt maturity, although following the same trend as the average, is significantly lower than the latter every year, indicating the presence of some upward extreme values.

Table 3 – Shows the descriptive statistics for the dependent variable debt maturity (*DMT*) for each year for the full sample. *DMT* is defined as the proportion of debt maturing in more than one year.

Years	Mean	Median	Standard Deviation	Minimum	Maximum	Obs.
2009	0,265	0,043	0,330	0	1	1998
2010	0,283	0,103	0,333	0	1	1998
2011	0,319	0,180	0,345	0	1	1998

When comparing the variation of debt maturity between SMEs and non financial firms of the PSI20[5] for the same time period (please see Figure 2) we see, as expected, that large traded firms have higher debt maturities but with a decreasing trend while average debt maturity of SMEs have a positive slope with both groups converging to close values in 2011.

Figure 2 – Average debt maturity for SMEs and non financial firms of the PSI20. Debt maturity is the proportion of debt maturing in more than one year.



[5] PSI20 is a benchmark stock market index of companies that trade on Euronext Lisbon, the main stock exchange of Portugal

In Table 4 we analyze average and median debt maturity for the several firm´s sizes (micro, small and medium) and we show evidence of an increasing trend, either in average or in median debt maturities for the sample period. Focusing now on the average, an interesting fact is that micro firms have higher average debt maturity each year, although showing the lowest increasing trend of average debt maturity, with an increase of approximately 20% from 2009 to 2011 compared with an approximately 40% increase for small sized firms and a 30% increase for medium sized ones, over the same sample period.

Table 4 - Reports median and average debt maturities for micro, small and medium sized enterprises separately for the sample period 2009-2011. Debt maturity is the dependent variable and it is defined as being the proportion of debt maturing in more than one year. The three categories (micro, small and medium) are defined following the European Comission´s definition of SME. N is the number of observations.

	2009			2010			2011		
	Median	Mean	N	Median	Mean	N	Median	Mean	N
Micro	0,039	0,268	1920	0,091	0,285	1910	0,180	0,322	1915
Small	0,142	0,182	64	0,161	0,226	74	0,178	0,256	72
Medium	0,053	0,181	14	0,120	0,227	14	0,210	0,236	11
N			1998			1998			1998

The descriptive statistics for all the variables used in this study can be found in Table 12 in the Appendix. We present for each variable the mean, the overall, between and within standard deviation, the minimum, maximum and number of observations:

- Overall variation, is the variation over the time and the individuals;
- The Between variation refers to the variation of the variable between individuals, in our case, the companies;
- The Within variation refers to the variation within the individuals over time, for example how debt maturity changes over time (not comparing one individual with another).

We can see that firm size does not vary so much through time but more between firms which is expected due to the small period of time we are analyzing. The same does not happen for *ROE*, *TAX*, *FF*, *Z* and *LIQ* that vary considerably more from year to year than from one firm to the other.

We separated highly leveraged firms from low leveraged firms in order to find out if there were any significant differences in the average debt maturity.

Table 5 - Shows the average debt maturity for high and low leveraged firms where low and high leveraged firms are defined by being below or above the median leverage ratio. Debt maturity is the dependent variable and it is defined as the proportion of debt maturing in more than one year; leverage is calculated through the ratio between total debt and total assets. N is the number of observations.

	2009	2010	2011
High Leverage	0,3049	0,3225	0,3601
Low Leverage	0,2249	0,2433	0,2786
N	1998	1998	1998

As we can see from Table 5, firms who are more financially independent, or in other words, have less debt in their balance sheets, use shorter debt maturities than those who are more leveraged. The results show that highly leveraged firms have approximately 8 percentage points higher average debt maturities than those with lower leverage every year. This is supported with the significant difference found when we run the two sample mean comparison t-test comparing the average debt maturities between low and high leveraged firms (please see Table 14 in the Appendix).

One reason for this could be that a company with higher financial autonomy has the ability to renegotiate debt contracts with better credit conditions taking advantage of roll over strategies thus having more short term debt.

We then divided firms with positive and negative Net Income for each period to see if there were significant differences in the average debt maturity. Table 6 shows the results:

Table 6 - Shows the average debt maturity for firms with positive and negative Net Income for each year. Debt maturity is the dependent variable and it is defined as the proportion of debt maturing in more than one year. N is the number of observations.

	2009	2010	2011
Positive	0,2562	0,2726	0,2993
Negative	0,2847	0,3051	0,3531
N	1998	1998	1998

From Table 6 it can be concluded that average debt maturity is higher for firms with negative Net Income. Also when we run the two sample mean comparison t-test comparing average debt maturities between firms with positive and negative Net Income (please see Table 15 in the Appendix), a statistically significant difference at the 5% significance level is found where those with negative Net Income have higher average debt maturity than those with positive Net Income.

Table 7 – Shows average debt maturity for each *Z*-score group and for each year from 2009 to 2011. Debt maturity is the dependent variable and it is defined as the proportion of debt maturing in more than one year; *Z* is the ratio of current assets minus current debt to total assets multiplied by 0.717, plus the ratio of retained earnings to total assets multiplied by 0.847, plus the ratio of earnings before interests and taxes to total assets multiplied by 3.10, plus the ratio of the book value of equity to total debt multiplied by 0.420, plus the ratio of sales to total assets multiplied by 0.998. N is the number of observations.

	Z<1,23	1,23<=Z<=2,9	Z>2,9	
Average DMT	0,3248	0,3408	0,1888	
N	2214	1974	1806	5994

The results obtained are in accordance with Diamond´s (1991) theory, i.e., the tradeoff between signaling and liquidity risk led both low and high quality firms to issue more short term debt while intermediate quality firms chose to issue more long term debt.

Table 7 shows the results and the following can be observed:

a) Debt maturity for firms with *Z* scores below 1.3 (low quality firms) is 32.48%;

b) For firms with *Z* scores above 2.9 (high quality firms) is 18.88%;

c) For firms with *Z* scores between 1.23 and 2.9 (medium quality firms), average debt maturity is 34.08%.

In order to confirm if the differences between average debt maturity between the three different groups in which *Z* score is divided (Z<1.23; 1.23<=Z<=2.9 and Z>2.9), we run the Anova test for a single factor. Table 17, in the Appendix, shows the results which confirm a statistically significant difference below the 1% significance level (p-value<0.001) between the means of the three groups, allowing us to confirm the validity of Diamond's theory (1991).

Results obtained during our study are also consistent with those found by Scherr and Hulburt (2001) when they studied the maturity structure of small firm´s debt from the National Survey of Small Business Finances (NSSBF) from 1987 to 1993 and also with those found by González (2012) when analyzing the debt maturity structure for different sizes of Spanish firms.

Table 8 – Average debt maturity for each size group according to the European Commission definition of SME for the time period between 2099 and 2011. Debt maturity is the dependent variable and it is defined as the proportion of debt that matures in more than one year. N is the number of observations.

	Average debt maturity 2009-2011	N
Micro	0,292	5751
Small	0,220	210
Medium	0,217	39

Table 8 shows that micro sized firms are the ones with higher average debt maturity (29.2%) while small and medium sized firms have almost the same average debt maturity (22% and 21.7% respectively). In order to see if the differences between the average debt maturities for each size group are significant, we run the Anova single factor test comparing the three averages (please see Table 18 in the Appendix) and found a statistically significant difference below the 1% significance level.

Similar results are found when we divided firms by size according to the number of employees (please see Table 9 bellow).

According to IAPMEI:

a) Micro sized firms have less than 10 employees;

b) Small sized firms have 10 or more but less than 50 employees and;

c) Medium sized firms have 50 or more but less than 250 employees.

Table 9 - Shows the average debt maturity for micro, small and medium sized companies according to the number of employees as defined by IAPMEI and the European Commission for the time period between 2009 and 2011. Debt maturity is the dependent variable and it is defined as the proportion of debt that matures in more than one year.

	Average debt maturity 2009-2011	N
Micro	0,303	4850
Small	0,252	809
Medium	0,178	77

Because of this unexpected result (micro firms having longer debt maturities than small and medium sized enterprises), we divided the sample in half, one half below the median for *SIZ* and the other half above that same median. After that we run a two sample mean comparison t-test comparing debt maturity ratio of both halves (please see Table 16 in the

Appendix) and found a significant difference between the two means being the average debt maturity for larger firms (30.13%) higher than the average debt maturity for smaller firms (27.69%) which is the result we expected for the relation between size and debt maturity.

Table 10 - Shows median and average debt maturity for high and low Asset Maturity firms for each year and also for the time period between 2009 and 2011. Low and high asset maturities are defined as by being below or above the median asset maturity for each year. *DMT* is the dependent variable and it is defined as the proportion of debt maturing in more than one year.

	2009		2010		2011		Average DMT
	Median	Average	Median	Average	Median	Average	2009-2011
Low	0,009	0,250	0,041	0,247	0,126	0,285	0,261
High	0,195	0,308	0,267	0,333	0,330	0,373	0,338

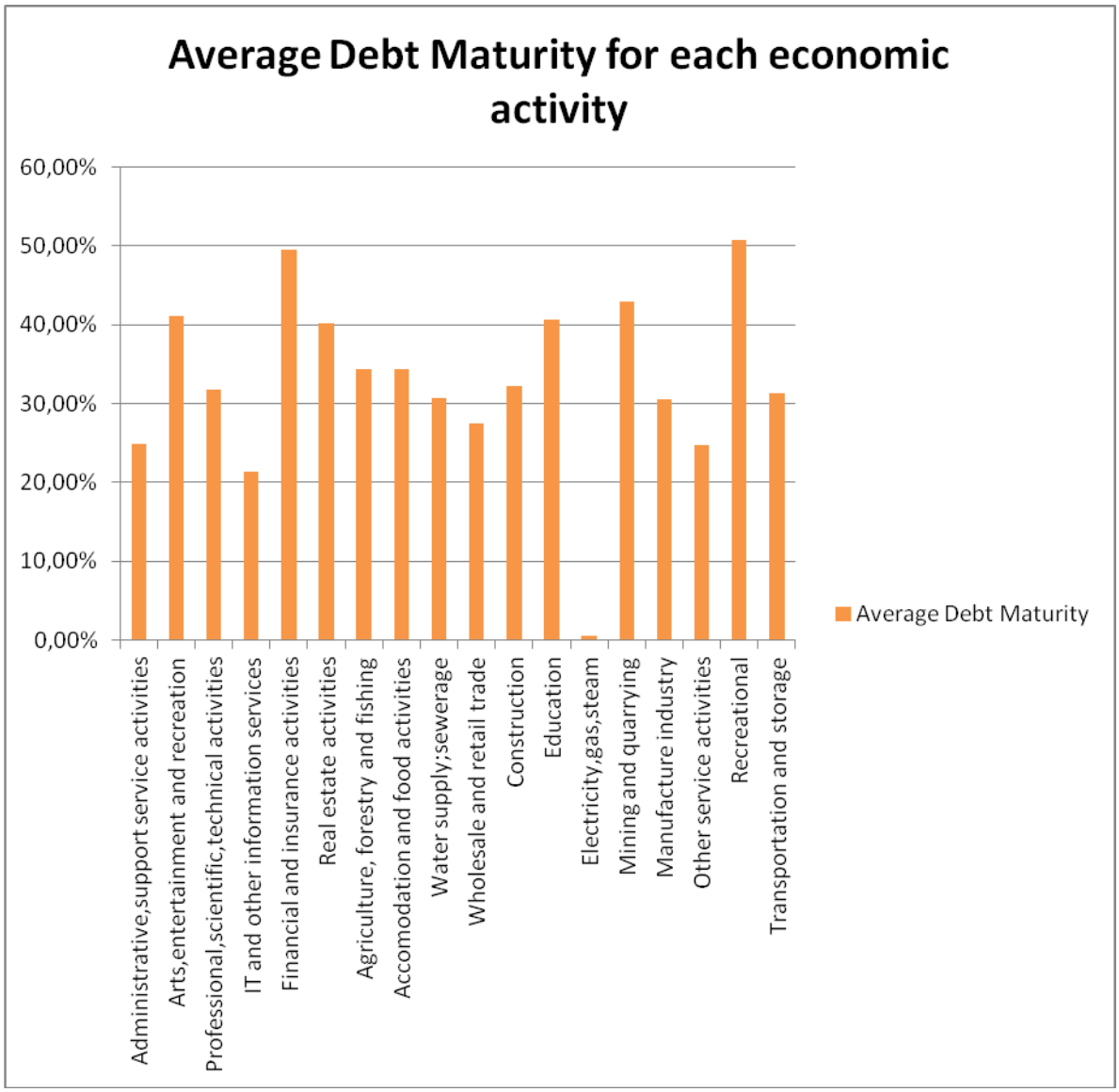
Table 10 shows the average and median debt maturity for firms with both high and low asset maturities and from which we conclude for the existence of a positive relation with debt maturity. In fact:

a) Average debt maturity for low asset maturity firms hits its minimum of 24.7% in 2010 and its maximum of 28.5% in 2011;

b) Average debt maturity for high asset maturities hits the minimum in 2009 with 30.8% and the maximum in 2011 with 37.3%.

In order to see if the differences in average debt maturity between high and low asset maturity firms we run the two sample mean comparison t test (please see Table 19 in the Appendix) and found a statistically significant difference where firms with higher asset maturity are the ones using debt with longer maturity.

Figure 3 - Presents average debt maturity for each economic activity present in our dataset for the year 2011. Debt maturity is the dependent variable and it is defined as the proportion of debt maturing in more than one year.



We underline the following:

a) Firms with longer debt maturity are those in “Recreational” (50.71%), “Financial and insurance activities” (49.49%), “mining and quarrying” (42.98%), “Arts,

entertainment and recreation" (41.09%), "Education" (40.68%) and "Real estate activities" (40.16%);

b) The 0.61% value for "Electricity, gas, steam and air conditioning supply" sector is misleading and badly represents the reality; Table 11 shows for this sector a value of 44.72% in 2010 and 39.63% in 2009. We think that the reason for such a low value in 2011 is based on the fact that there is in our sample one only firm representing this economic activity and 2011 may have been the year the firm repaid its long term debt obligations or, it was the time when its long term liabilities became short term ones. Therefore, if 2011 is taken out of the equation and if one looks for the two previous years, a clear conclusion emerges: "Electricity, gas, steam and air conditioning supply" sector is actually one of the economic activities with higher values of debt maturity;

c) With less than 30% use of long term debt we have "Other service activities" (24.74%), "Administrative and support service activities" (24.95%) and "Wholesale and retail trade, repair of motor vehicles and motorcycles" (27.45%);

d) With the lowest value for average debt maturity we find "IT and other information services" (21.36%). Interesting of note is that this last category is one of the only two economic activities that, during the three sampled years, had a decreasing value of average debt maturity every year, being the other the "Recreational" sector which is the one with highest values for average debt maturity.

4. Empirical Study: Results

4.1 Correlation Analysis

Table 20 presents the Pearson correlation matrix with the Pearson correlation coefficients as well as their level of significance (10%, 5% or 1% significance levels) for all the firm specific variables for the whole sample.

The first thing we notice is a very high and significant correlation coefficient between *TAN* and *CAPX* (0.9814) which indicates some multicollinearity in the model. To overcome that problem we eliminate the *TAN* variable.

Besides that, correlations between variables are low being the highest ones between *Z* score and *LIQ* (0.3482), *CAX* and *TAN* (0.3017), *CAX* and *CAPX* (0.2947) and *CAX* and *SIZ* (0.2539) while the lowest are between *ROE* and *AMT*, *FCF* and *ROE* and *FCF* and *TAX* all with a p-value < 0.001.

Furthermore, we find some interesting and significant results like the positive, although small (0.0383), correlation between *LEV* and *DMT* at the 1% significance level consistent with the findings of several empirical work like Stohs and Mauer (1996), Scherr and Hulburt (2001), Leland and Toft (1996), Barclay and Smith (1995), and Custódio *et al*, (2012). *SIZ* is also positively correlated to the dependent variable as predicted. *CAPX* has a positive and high (0.190) correlation with debt maturity at the 1% significance level, as a proxy for growth options we were expecting to find this result as firms who invest more in their physical assets, usually use them as collateral to obtain better credit conditions thus being able to borrow long term. *CAX* is negatively correlated (0.1436) with *DMT* at the 1% significance level which is in accordance with Custódio *et al*. (2012) where the authors found out that firms with more cash holdings usually used more short term debt. Finally, *Z* score is found to be negatively correlated with the dependent variable also at the 1% significance level, although with a small coefficient (0.0357) this relation is in accordance with Diamond´s (1991) theory where firms with lower risk of insolvency (high *Z* score) issue debt of shorter maturity in order to signal high quality to the market.

4.2 Regression Analysis

We will now pursue support for the most important theories on the determinants of debt maturity from the financial literature by running a fixed effects regression model with our panel data (please see Table 13 in the Appendix).

$$DMT_{it} = 0.021386LEV_{it} + 0.278584RD_{it} + 0.0434735SIZ_{it} + 0.2281854CAPX_{it} - 0.00000000214AMT_{it} + 0.0059354CAX_{it} + 0.0004677ROE_{it} + 0.0000115TAX_{it} - 0.00000000695FF_{it} - 0.00000972Z_{it} + 0.0000937FCF_{it} + 0.00000174LIQ_{it} \quad (15)$$

The regression estimated coefficients shown in the above equation show that research and development (*RD*) and capital expenditures (*CAPX*) followed by size (*SIZ*) are the explanatory variables who better help explaining debt maturity of Portuguese SMEs while both measures for asset maturity (*AMT* and *FF*) are the ones that less explain debt maturity.

4.2.1 *Z* score

Altman´s *Z* score (1968) measures firm´s default risk which in our regression is statistically significant with a p-value below the 1% significance level (<0.001) and with a small negative coefficient, meaning that it is negatively related to the dependent variable, debt maturity. The interpretation of *Z* score is as follows:

a) A company is safe or with very low default risk if *Z* is higher than 2.9;

b) If its values are between 1.23 and 2.9, there is a cause for concern and caution before investing in that firm is recommended;

c) If the value is below 1.23, there is a high probability of default and the company is heading to bankruptcy.

If *Z* score is higher for firms with lower default probability, then the negative relation found with debt maturity means that firms with lower default probability tend to use shorter debt maturity which is consistent with Diamond´s (1991) tradeoff theory. In addition to that, we run the regression for each subgroup (low, medium and high quality firms) based on the *Z* score, and for medium quality firms the signal of the coefficient changed from negative to positive while still significant. This means that for firms with medium default risk, there is a positive relation with debt maturity. Consistent with Diamond´s (1991) theory where

intermediate quality firms chose to issue more long term debt while low and high quality firms tend to issue more short term debt.

4.2.2 Size Analysis:

Size is statistically significant below the 5% significance level and positively correlated with debt maturity.

As an inverse proxy of information asymmetry (smaller firms are usually the ones who are more affected by asymmetric information) the results obtained are consistent with those found by Stohs and Mauer (1996) and López-Gracia *et al.* (2010) for Spanish SMEs.

Their findings showed that smaller firms used debt of shorter maturities than larger firms do. The same happens for Portuguese SMEs.

Barclay and Smith (1995) also found a positive relation between size and debt maturity for firms with less than $1 billion of market value.

4.2.3 Asset Maturity Analysis:

The matching hypothesis predicts that firms will match the maturities of their assets with the maturities of their liabilities.

Contrarily to that assertion *AMT* is significant and negatively related to debt maturity, although with a very small coefficient. This study shows evidence that firms do not match their debt and asset maturities: in fact, our data reveals that firms choose shorter debt maturities when they have longer asset maturities. This finding is not very surprising giving the fact that most of the companies in our dataset are micro sized firms who are forced by financial institutions to borrow in the short term because of their size, lack of transparency and default probability. So, even if those firms wanted to match their debt and asset maturities, it is hard when their loans have such small maturities.

4.2.4 Tax Analysis:

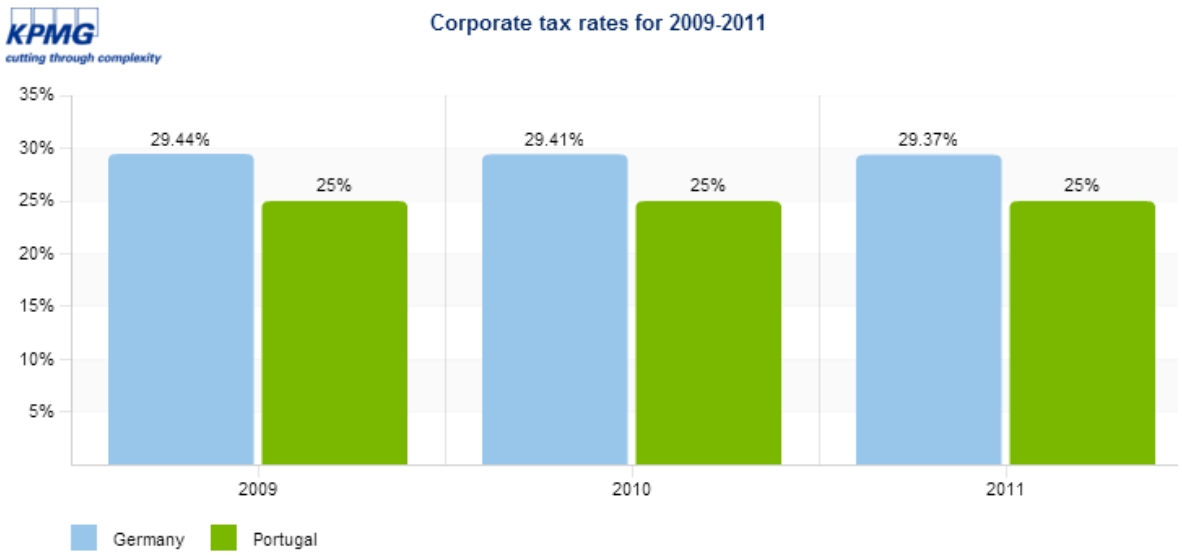
TAX is statistically significant in the 1% significance level and establishes a very small but positive relation with *DMT*.

When we run the regression for only those firms with low liquidity, we find a significant and negative relation between *TAX* and *DMT*.

We find similarities with the results obtained by Antoniou *et al.* (2006) evidencing the clientele argument proposed by Scholes and Wolfson (1992): on their study, German companies showed a positive and significant relation between the effective tax rate and debt maturity, while French and UK firms showed insignificant results. They attributed the findings to a "relatively higher rate of tax in Germany" (Antoniou *et al.*, 2006:187). But there is an exception for this theory in our dataset, when we run the regression for only those firms with low liquidity, we find a significant and negative relation between *TAX* and *DMT* which is contradicts the clientele argument.

Comparing the corporate tax rates of Germany and Portugal for the time period in analysis we see some similarities with tax rates around 29% and 25% for Germany and Portugal respectively (Figure 4).

Figure 4 – Corporate tax rates for Portugal and Germany from 2009 to 2011.



Source: KPMG[6]

4.2.5 Liquidity Analysis

Our result for *LIQ* is statistically significant below the 10% significance level and positively correlated with debt maturity, although with a small coefficient.

We can say that our results are partially in accordance with Diamond´s (1991) theory in the sense that the positive relation found with debt maturity means that low liquid firms tend to use more short term debt.

We subdivided firms into high and low liquid relatively to the median liquidity and run the regression for each subgroup founding an interesting result. It appears to be the case that for low liquid firms, *TAX* continues to be significant below the 10% significance level but the signal of the coefficient changed from positive to negative meaning that low liquid firms tend to issue more short term debt when their tax expense is higher.

[6] http://www.kpmg.com/Global/en/services/Tax/tax-tools-and-resources/Pages/tax-rates-online.aspx

4.2.6 Capital Expenditures

We find *CAPX* to be statistically significant at the 1% significance level and positively correlated with debt maturity with the strongest coefficient of our significant variables. In average a 1 pp increase of *CAPX* leads to an increase of 0.23 pp in *DMT*. This evidence indicates that firms with more physical assets to use as collateral when discussing credit conditions are getting longer debt maturities. Because *CAPX* is working as an inverse proxy for growth options, meaning that those firms with more physical assets usually have less growth opportunities, we can affirm that the positive relation found with debt maturity is in accordance to Myers (1977) where the author defended the idea that firms with more growth opportunities should use more short term debt.

5. Discussion and Conclusions

We now present the main conclusions from this empirical study on debt maturity for a sample of 2,000 Portuguese SMEs for the sample period of 2009-2011. Our purpose was to understand the reasoning behind debt maturity choices from Portuguese SMEs and to see if those choices were made based on the existent debt maturity theories proposed by the finance literature.

Strong evidence was found that partially confirms Diamond´s (1991) theory, Portuguese SMEs with lower default probability (higher *Z* score) issue more short term debt while those with medium default probability tend to issue debt with longer maturities which is partially consistent with our third hypothesis. This behavior is due to the interaction between signaling and liquidity risk caused by short term debt, which while reducing borrowing costs also increases the risk of the company lacking liquidity to meet its short term obligations. Furthermore, when analyzing the liquidity of Portuguese SMEs we discovered that low liquid firms tend to use more short term debt also partially in accordance with Diamond´s (1991) theory. Low quality firms, which have poor liquidity, are imposed by financial institutions to borrow short term in order to allow for often supervisory and thus, decreasing the risk for those financial institutions.

The size of each enterprise is relevant when talking about information asymmetries as smaller firms reveal less information about themselves, they have usually more information asymmetry and issue more short term debt as a consequence because financial institutions are reluctant to concede longer debt maturities when information about the company in question is lacking. Our results show that smaller firms (those more affected by information asymmetries) use debt of shorter maturities consistent to the second hypothesis and confirming the findings of Stohs and Mauer (1996) and López-Gracia *et al*. (2010).

Contrarily to the match hypothesis, this study did not find evidence of firms matching their debt and asset maturities, rejecting our first hypothesis: in fact, our data reveals that firms have shorter debt maturities when they have longer asset maturities. This finding is not very surprising giving the fact that most of the companies in our dataset are micro sized firms who are forced by financial institutions to borrow in the short term because of their size, lack of transparency and default probability. Thus, even if those firms wanted to match their debt and asset maturities, it would be hard when their loans have such small maturities.

Consistent with the clientele argument proposed by Scholes and Wolfson (1992), firms affected by higher tax rates tend do use longer debt maturities confirming the fifth hypothesis, except in the case of low liquid firms where the results contradict the clientele argument showing a negative relation with debt maturity. The explanation given by the authors for the clientele argument is that firms with higher marginal tax rates will naturally choose longer debt maturities in order to take advantage of tax shields. When comparing our results to those found by Antoniou *et al*. (2006) we discovered similarities with their findings concerning the relation between debt maturity and tax rates for German companies, also consistent with the clientele argument. We justify our findings with the same justification presented by Antoniou *et al*. (2006): a relatively higher tax rates both in Portugal and Germany for the time period in question.

Firms with more physical assets, which can be used as collateral when discussing credit conditions, are getting longer debt maturities. Confirming our fourth hypothesis concerning growth opportunities, this finding goes along with Myers (1977) where the author defended

the idea that firms with more growth opportunities should use more short term debt allowing debt renegotiations before growth options are exercised.

Our sixth hypothesis concerning agency costs of debt received mixed support. In the one hand, two of the proxies used (leverage and free cash flow) were statistically insignificant. Portuguese SMEs do not seem to be using leverage and the free cash flow to avoid the risk shifting or overinvestment problems. On the other hand we found evidence that firms with more growth opportunities use more short term debt, consistent with Myers (1977) who predicted this relation between growth opportunities and debt maturity in order to avoid the underinvestment problem.

Furthermore, the relation between cash holdings and debt maturity for U.S. industrial firms (Custódio *et al,*. 2012), indicating that firms with more cash were borrowing with shorter maturities, is not consistent with the Portuguese reality of SMEs where no relation between the two variables was found.

This empirical study presents some limitations though, more specifically, the small sample of 2,000 SMEs and a limited time period of three years 2009-2011. Furthermore, the formulas used to define some of the explanatory variables as well as assumptions made may not be consensual to all authors but that is part of the difficulty of using proxies to explain firm´s behaviors.

A recommendation for future research that we would like to make is to compare the findings of this empirical work with others concerning SME´s debt maturity in different countries for the same time period as well as studying debt maturity within SME´s for a greater time period in order to understand if there are significant differences when comparing a time before the 2008 financial crisis and after.

Besides the limitations, our opinion is that this empirical study is a contribution to the financial literature providing a better understanding on Portuguese small and medium sized enterprises and the way they make decisions about their debt maturities. We show that Portuguese SMEs follow some of the theories provided by the financial literature like Diamond´s (1991) on signaling and liquidity risk hypothesis, Scholes and Wolfson (1992)

on the clientele argument and Myers (1977) on the underinvestment problem and reveal some possible explanations to why they do not follow the remaining theories.

References

Almeida, H., Campello, M., Laranjeira, B., Weisbenner, S. 2011. **Corporate Debt Maturity and the Real Effects of the 2007 Credit Crisis**. Working paper no. 14990, National Bureau of Economic Research, Cambridge.

Altman, E. 1968. Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. ***The Journal of Finance***, 23: 589-609.

Antoniou, A., Guney, Y., Paudyal, K. 2006. The Determinants of Debt Maturity Structure: Evidence from France, Germany and the UK. ***European Financial Management***, 12: 161-194.

Barclay, M., Marx, L., Smith, C. 2003. The Joint Determination of Leverage and Maturity. ***Journal of Corporate Finance***, 9: 149-167.

Barclay, M., Smith, C. 1995. The maturity structure of corporate debt. ***Journal of Finance***, 50: 609-631.

Breusch, T.S., Pagan, A.R. 1979. Simple Test for Heteroscedasticity and Random Coefficient Variation. ***Econometrica Journal of The Econometric Society***, 47: 1287-1294.

Brick, I., Ravid, S. 1985. On the Relevance of Debt Maturity Structure. ***The Journal of Finance***, 40: 1423-1437.

Custódio, C., Ferreira, M., Laureano, L. 2012. Why are U.S firms using more short-term debt?. **Journal of Financial Economics**, 108: 182-212

De Miguel, A. and Pindado, J. 2001. Determinants of Capital Structure: New Evidence from Spanish Panel Data. ***Journal or Corporate Finance***, 7: 77-99.

Denis J., Mihov T. 2002. The choice Among Bank Debt, Non-Bank Private Debt and Public Debt: Evidence From New Corporate Borrowings. ***Journal of Financial Economics***, 70: 3-28.

Diamond, D. 1991. Debt Maturity Structure and Liquidity Risk. ***Quarterly Journal of Economics***, 106: 709-737.

Easterwood, J., Kadapakkam, P-R. 1994. Agency Conflicts, Issue Costs, and Debt Maturity. ***Quarterly Journal of Business and Economics***, 33: 69-80.

European Commission, 2011, SMEs´ Access to Finance – Survey 2011, http://ec.europa.eu/enterprise/policies/finance/files/2011_safe_analytical_report_en.pdf.

European Commission, 2013, Fact and Figures about the EU´s Small and Medium Size Enterprise (SME), http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/.

Flannery, M. 1986. Asymmetric information and risky debt maturity choice. ***Journal of Finance***, 41: 19-37

González, V. 2012. **Determinants of Debt Maturity Structure Across Firm Size**. Unpublished working paper, Universidad de Oviedo-Facultad de Economicas.

Guedes, J.,Opler, T. 1996. The Determinants of Debt Maturity of Corporate Dept Issues, ***Journal of Finance***, 51: 1833-1909.

Hausman, J.A. 1978. Specification Tests in Econometrics. ***Econometrica Journal of The Econometric Society***, 46: 1251-1271.

INE, 2010, Estudos sobre Estatísticas Estruturais das Empresas 2007-2009, Destaque, http://www.ine.pt/xportal/xmain?xpid=INE&xpgid=ine_destaques&DESTAQUESdest_boui=107557341&DESTAQUESmodo=2&xlang=pt, 2011.

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

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

Jun, S-G., & Jen, F. 2003. Trade-off Modelo f Debt Maturity Structure. ***Review of Quantitative Finance and Accounting***, 20: 5-34.

Kane, A., Marcus, A.J., McDonald, R.L. 1985. Debt policy and the rate of return premium to leverage. ***Journal of Financial and Quantitative Analysis***, 20: 479-499.

Leland, H.E., & Toft, K.B. 1996. Optimal Capital Structure, Endogenous Bankruptcy, and the Term Structure of Credit Spreads. ***Journal of Finance***, 51: 987-1019.

Lewis, C. 1990. A Multiperiod Theory of Corporate Financial Policy under Taxation. ***Journal of Financial and Quantitative Analysis***, 25: 1-25.

López-Gracia, J., & Mestre-Barberá, R. 2010. **On the Relevance of Agency Conflicts in SME Debt Maturity Structure**. Unpublished working paper, University of Valencia-Department of Accounting, Valencia.

Morris, J. 1976. On Corporate Debt Maturity Strategies. ***The Journal of Finance***, 31: 29-37.

Modigliani, F., & Miller, M. 1958. The Cost of Capital, Corporation Finance and the Theory of Investment. ***The American Economic Review***, 48: 261-297.

Modigliani, F., & Miller, M. 1963. Corporate Income Taxes and the Cost of Capital. ***The American Economic Review***, 53: 433-443.

Myers, S. 1984. The Capital Structure Puzzle. ***The Journal of Finance***, 39: 574-592.

Myers, S.C. 1977. Determinants of Corporate Borrowings. ***Journal of Financial Economics***, 5: 147-175.

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

Peixoto, M. 2013, Crédito às empresas vai melhorar mas leva tempo, ***PME Líder 2013***, Diário Económico nº5654, 14-17.

Poza, E., Hanlon, S., Kishida, R. 2004. Does the Family Business Interaction Factor Represent a Resource or a Cost?. ***Family Business Review***, 17: 99-118

Sachs, J., Tornell, A., Velasco, A. 1996. **Financial Crisis in Emerging Markets: The Lessons from 1995**. Working paper no. 5576, Brookings Papers on Economic Activity 1:1996.

Scherr, F.C., & Hulburt, H.M. 2001. The Debt Maturity Structure of Small Firms, ***Financial Management***, 30: 85-111.

Scholes, M. S., & Wolfson, M.A. 1992. ***Taxes and business strategy: A planning approach***. Englewood Cliffs, NJ: Prentice Hall.

Silva, M. 2011, Juros no financiamento às PME acima de 7%, Diário Económico, http://economico.sapo.pt/noticias/nprint/125970.html, 06-09-11.

Stiglitz, J. 1974. On the Irrelevance of Corporate Financial Policy. ***The American Economic Review***, 64: 851-866.

Stohs, M., & Mauer, D. 1996. The Determinants of Corporate Debt Maturity Structure. ***Journal of Business***, 69: 279-312.

Titman, S., and Wessels, R. 1988. The Determinants of Capital Structure Choice. ***Journal of Finance***, 43: 1-20

Urbano, H. 2011. **Debt Maturity Structure across Europe: Evidence from Greece, Ireland, Italy, Portugal and Spain**, Unpublished master dissertation, ISCTE Business School, Lisbon.

Appendix

Table 11 - Shows the average debt maturity for each economic activity present in our dataset for the whole sample period, including the number of observations in each economic activity.

	2011	2010	2009	Obs/year
Administrative and support service activities	24,95%	29,02%	25,18%	45
Arts, entertainment and recreation	41,09%	29,75%	23,54%	15
Professional, scientific and recreation	31,82%	27,25%	25,86%	332
IT and other information services	21,36%	26,20%	28,33%	29
Financial and insurance services	49,49%	41,90%	36,20%	14
Real estate activities	40,16%	32,73%	32,40%	94
Agriculture, forestry and fishing	34,41%	20,89%	18,77%	19
Accommodation and food service activities	34,42%	27,44%	24,26%	233
Water supply; sewerage, waste management and remediation	30,67%	31,03%	29,15%	6
Wholesale and retail trade; repair of motor vehicles and motorcycles	27,45%	26,63%	24,38%	467
Construction	32,16%	32,16%	31,73%	208
Education	40,68%	38,10%	34,29%	41
Electricity, gas, steam and air conditioning supply	0,61%	44,72%	39,63%	1
Mining and quarrying	42,98%	37,17%	39,16%	10
Manufacture industry	30,48%	27,78%	27,52%	182
Other service activities	24,74%	24,74%	17,78%	40
Recreational	50,71%	52,44%	58,07%	1
Transportation and storage	31,26%	27,30%	25,66%	261
Total Observations per year				1998

Table 12 - shows the descriptive statistics of all variables for the full sample from 2009 to 2011.

The dependent variable is *DMT* and it is defined as the proportion of debt maturing in more than one year. The explanatory variables are defined as follows: *LEV* is the ratio of total debt to total assets; *TAN* is the ratio of PPE to total assets; *RD* is the ratio of investment in research and development to total assets; *SIZ* is the natural logarithm of the book value of total assets; *CAPX* is the ratio of capital expenditures to total assets; *AMT* is the ratio of PPE to the annual depreciation; *CAX* is the ratio of cash holdings to total assets; *ROE* is the ratio of net income to total equity; *TAX* is the ratio of income tax expense to pretax income; *FF* is the proportion of fixed assets in total assets multiplied by the ratio of net fixed assets to the annual depreciation plus the proportion of client accounts in total assets multiplied by the ratio of receivables to sales plus the proportion of stock in total assets multiplied by the ratio of stock to sales plus the proportion of the rest of current assets in total assets; *Z* is ratio of current assets minus current debt to total assets multiplied by 0.717 plus the ratio of retained earnings to total assets multiplied by 0.847 plus the ratio of earnings before interests and taxes to total assets multiplied by 3.10 plus the ratio of the book value of equity to total debt multiplied by 0.420 plus the ratio of sales to total assets multiplied by 0.998; *FCF* is the ratio of cash flow to total assets multiplied by the ratio of 1 to growth where growth is the ratio of sales in year "t" to sales in year "t-1"; *LIQ* is the ratio of current assets to current liabilities.

Variable		Mean	Std. Dev.	Min	Max	Observations
DMT	overall	0,289	0,337	0,000	1,000	N = 5994
	between		0,297	0,000	1,000	n = 1998
	within		0,158	-0,378	0,956	T = 3
LEV	overall	0,827	1,406	0,000	40,395	N = 5994
	between		1,281	0,000	28,659	n = 1998
	within		0,581	-17,927	12,563	T = 3
TAN	overall	0,248	0,267	0,000	1,489	N = 5994
	between		0,257	0,000	1,462	n = 1998
	within		0,074	-0,349	0,915	T = 3
RD	overall	0,009	0,063	-0,080	0,965	N = 5994
	between		0,061	-0,074	0,946	n = 1998
	within		0,015	-0,485	0,435	T = 3
SIZ	overall	11,994	1,581	-4,605	17,482	N = 5994
	between		1,557	0,109	17,406	n = 1998
	within		0,276	7,281	21,422	T = 3
CAPX	overall	0,243	0,265	0,000	1,489	N = 5994
	between		0,254	0,000	1,462	n = 1998
	within		0,074	-0,354	0,910	T = 3

Table 12 - shows the descriptive statistics of all variables for the full sample from 2009 to 2011. (Continued)

AMT	overall	14.848,130	601362,500	-15,927	3.43e+07	N =	5994
	between		490359,900	0,000	2.19e+07	n =	1998
	within		348230,200	-2.19e+07	1.25e+07	T =	3
CAX	overall	0,200	0,248	-1,303	1,000	N =	5994
	between		0,229	-0,349	1,000	n =	1998
	within		0,095	-0,755	0,956	T =	3
ROE	overall	0,112	8,143	-345,609	459,371	N =	5994
	between		4,697	-114,884	153,667	n =	1998
	within		6,653	-230,613	305,815	T =	3
TAX	overall	-0,551	38,902	-2.687,590	52,411	N =	5994
	between		22,461	-895,945	17,470	n =	1998
	within		31,765	-1.792,196	895,671	T =	3
FF	overall	6.594,688	85467,030	-11,921	2.385.864,000	N =	5994
	between		50760,280	0,000	795.290,900	n =	1998
	within		68766,760	788.693,200	1.597.170,000	T =	3
Z	overall	58,155	1351,729	-158,820	88.453,260	N =	5994
	between		812,139	-52,243	29.484,540	n =	1998
	within		1080,658	-29.426,450	59.026,870	T =	3
FCF	overall	0,129	18,493	-940,270	452,738	N =	5994
	between		10,684	-313,020	152,250	n =	1998
	within		15,096	-627,122	313,991	T =	3
LIQ	overall	394,523	8344,984	-0,249	478.578,200	N =	5994
	between		4939,667	0,017	159.536,600	n =	1998
	within		6726,558	159.139,200	319.436,100	T =	3

Table 13 - Fixed effects regression predicting the effect of each explanatory variable in the dependent variable for the full sample from 2009 to 2011.

The dependent variable is *DMT* and it is defined as the proportion of debt maturing in more than one year. The explanatory variables are defined as follows: *LEV* is the ratio of total debt to total assets; *RD* is the ratio of investment in research and development to total assets; *SIZ* is the natural logarithm of the book value of total assets; *CAPX* is the ratio of capital expenditures to total assets; *AMT* is the ratio of PPE to the annual depreciation; *CAX* is the ratio of cash holdings to total assets; *ROE* is the ratio of net income to total equity; *TAX* is the ratio of income tax expense to pretax income; FF is the proportion of fixed assets in total assets multiplied by the ratio of net fixed assets to the annual depreciation plus the proportion of client accounts in total assets multiplied by the ratio of receivables to sales plus the proportion of stock in total assets multiplied by the ratio of stock to sales plus the proportion of the rest of current assets in total assets; *Z* is ratio of current assets minus current debt to total assets multiplied by 0.717 plus the ratio of retained earnings to total assets multiplied by 0.847 plus the ratio of earnings before interests and taxes to total assets multiplied by 3.10 plus the ratio of the book value of equity to total debt multiplied by 0.420 plus the ratio of sales to total assets multiplied by 0.998; *FCF* is the ratio of cash flow to total assets multiplied by the ratio of 1 to growth; *LIQ* is the ratio of current assets to current liabilities. N is the number of observations. The test is statistically significant according to the F-Test. T-test values are reported in parentheses.

Fixed Effects Estimates		
Variables	Expected Sign	Full Sample Estimate
Constant		-0,3093525 (-1,16)
LEV	+	0,021386 (1,29)
RD	-	0,278584 (1,13)
SIZ	+	0,0434735 (1,99)**
CAPX	+	0,2281854 (3,73)***
AMT	+	-2,14E-09 (-4,26)***
CAX	-	0,0059354 (0,12)
ROE	-	0,0004677 (0,97)
TAX	±	0,0000115 (2,62)***
FF	+	-6,95E-09 (-0,17)
Z	±	-9,72E-06 (-3,58)***

Table 13 - Fixed effects regression predicting the effect of each explanatory variable in the dependent variable for the full sample from 2009 to 2011. (Continued)

FCF	+	0,0000937 (0,57)
LIQ	-	1,74E-06 (1,87)*
N		5994
Adjusted R^2		0,6793

Table 14 – Two sample mean comparison t-tests for average debt maturity for both high and low leveraged firms. Low and high leveraged firms are defined by being below or above the median leverage ratio. Debt maturity is the dependent variable and it is defined as the proportion of debt maturing in more than one year; leverage is calculated through the ratio between total debt and total assets.

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
HighLEV	2997	0,328689	0,006247	0,342012	0,316439	0,340939
LowLEV	2997	0,249511	0,005965	0,326552	0,237815	0,261207
combined	5994	0,2891	0,004349	0,336679	0,280575	0,297625
diff		0,079178	0,008638		0,062245	0,096111
t test	9,1665					
P value	0,0000					

Table 15 - Two sample mean comparison t-tests for average debt maturity for firms with positive and negative Net Income. Debt maturity is the dependent variable and it is defined as the proportion of debt maturing in more than one year.

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
PositResult	4000	0,275244	0,005093	0,322129	0,265258	0,285229
NegResult	5981	0,289697	0,004355	0,336796	0,28116	0,298234
combined	9981	0,283905	0,003314	0,331056	0,277409	0,2904
diff		-0,01445	0,006701		-0,02759	-0,00132
t test	-2,1568					
P value	0,0310					

Table 16 - Two sample mean comparison t-tests for average debt maturity for the smallest and the largest firms in the sample. Debt maturity is the dependent variable and it is defined as the proportion of debt maturing in more than one year. Smallest and largest firms where defined as being bellow or above the median of the *SIZ* variable measured as the natural logarithm of total assets.

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Smallest	2997	0,276868	0,006449	0,353028	0,264224	0,289512
Largest	2997	0,301332	0,005829	0,319086	0,289904	0,312761
combined	5994	0,2891	0,004349	0,336679	0,280575	0,297625
diff		-0,02446	0,008692		-0,0415	-0,00742
t test	-2,8145					
P value	0,0049					

Table 17 - Anova single factor test for average *DMT* for the three different *Z* score groups (Z<1.23; 1.23<=Z<=2.9; Z>2.9) for the time period between 2009 and 2011. *DMT* is the dependent variable and it is defined as the proportion of debt maturing in more than one year. *Z* is ratio of current assets minus current debt to total assets multiplied by 0.717 plus the ratio of retained earnings to total assets multiplied by 0.847 plus the ratio of earnings before interests and taxes to total assets multiplied by 3.10 plus the ratio of the book value of equity to total debt multiplied by 0.420 plus the ratio of sales to total assets multiplied by 0.998.

Summary

Group	*Obs.*	*Sum*	*Average*	*Variance*
Z<1,23	2214	719,115	0,325	0,126
1,23<=Z<=2,9	1974	672,758	0,341	0,109
Z>2,9	1806	340,992	0,189	0,089

ANOVA

Source of Variation	*SQ*	*gl*	*MQ*	*F*	*p-value*	*F critic*
Between	26,265	2	13,133	120,475	0,000	2,997
Within	653,059	5991	0,109			
Total	679,325	5993				

Table 18 – Anova single factor test for average *DMT* for each size group for the time period between 2009 and 2011. *DMT* is the dependent variable and it is defined as the proportion of debt maturing in more than one year.

Summary

Groups	*Obs.*	*Sum*	*Average*	*Variance*
Micro	5751	1678,178	0,292	0,116
Small	210	46,212	0,220	0,051
Medium	39	8,475	0,217	0,053

ANOVA

Source of Variation	*SQ*	*gl*	*MQ*	*F*	*p-value*	*F critic*
Between	1,244	2	0,622	5,496	0,004	2,997
Within	678,582	5997	0,113			
Total	679,826	5999				

Table 19 - Two sample mean comparison t-tests for average debt maturity for both high and low *AMT* for the time period between 2009 and 2011. DMT is the dependent variable and it is defined as the proportion of debt maturing in more than one year. *AMT* is the ratio of PPE to the annual depreciation. Low and high asset maturities are defined by being below or above the median asset maturity.

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
High AMT	2598	0,338	0,007	0,339	0,325	0,351
Low AMT	2598	0,261	0,006	0,327	0,248	0,273
combined	5196	0,299	0,005	0,335	0,290	0,308
diff		0,078	0,009		0,059	0,096
t test	8,397					
P value	0,000					

Table 20 - Pearson correlation matrix for firm level variables for the whole sample for the time period between 2009 and 2011. The dependent variable is DMT and it is defined as the proportion of debt maturing in more than one year. The explanatory variables are defined as follows: LEV is the ratio of total debt to total assets; TAN is the ratio of PPE to total assets; RD is the ratio of investment in research and development to total assets; SIZ is the natural logarithm of the book value of total assets; CAPX is the ratio of capital expenditures to total assets; AMT is the ratio of PPE to the annual depreciation; CAX is the ratio of cash holdings to total assets; ROE is the ratio of net income to total equity; TAX is the ratio of income tax expense to pretax income; FF is the proportion of fixed assets in total assets multiplied by the ratio of net fixed assets to the annual depreciation plus the proportion of client accounts in total assets multiplied by the ratio of receivables to sales plus the proportion of stock in total assets multiplied by the ratio of stock to sales plus the proportion of the rest of current assets in total assets; Z is ratio of current assets minus current debt to total assets multiplied by 0.717 plus the ratio of retained earnings to total assets multiplied by 0.847 plus the ratio of EBIT to total assets multiplied by 3.10 plus the ratio of the book value of equity to total debt multiplied by 0.420 plus the ratio of sales to total assets multiplied by 0.998; FCF is the ratio of cash flow to total assets multiplied by the ratio of 1 to growth; LIQ is the ratio of current assets to current liabilities.

Table ?? Correlation matrix of firm-specific variables for the whole sample.

	DMT	LEV	TAN	RD	SIZ	CAPX	AMT	CAX	ROE	TAX	FF	Z	FCF	LIQ
DMT	1													
LEV	0,0383***	1												
TAN	0,1944***	0,0138	1											
RD	0,0848***	0,0156	0,0346***	1										
SIZ	0,0534***	0,1974***	0,1692***	0,0153	1									
CAPX	0,1900***	0,0156	0,9814***	0,0324**	0,1421***	1								
AMT	0,0200	0,0012	0,0112	0,2688***	0,0658***	0,0109	1							
CAX	0,1436***	0,1224***	0,3017***	0,0571***	0,2539***	0,2947***	0,0174	1						
ROE	0,0033	0,0061	0,0011	0,0008	0,0010	0,0010	0,0000	0,0110	1					
TAX	0,0162	0,0071	0,0007	0,0028	0,0143	0,0011	0,0001	0,0030	0,0001	1				
FF	0,0157	0,0012	0,0019	0,0105	0,0360***	0,0014	0,0150	0,0313**	0,0005	0,0010	1			
Z	0,0357***	0,0258**	0,0155	0,0063	0,0321**	0,0148	0,0006	0,0678***	0,0029	0,0002	0,0009	1		
FCF	0,0071	0,0026	0,0126	0,0016	0,0339***	0,0102	0,0001	0,0295**	0,0000	0,0000	0,0021	0,0111	1	
LIQ	0,0595***	0,0149	0,0150	0,0061	0,0058	0,0142	0,0011	0,0224*	0,0017	0,0005	0,0013	0,3482***	0,0018	1

*** 1% Significance Level; ** 5% Significance Level; * 10% Significance Level. Values in red represent negative values.

Table 21 - Variable Definitions.

Variable	Abbreviation	Definition
Debt Maturity	DMT	Proportion of debt maturing in more than one year
Leverage	LEV	Ratio of total debt to total assets
Tangibility	TAN	Ratio of PPE to total assets
Research & Development	RD	Ratio of investment in research and development to total assets
Size	SIZ	Natural logarithm of the book value of total assets
Capital Expenditures	CAPX	Ratio of capital expenditures to total assets
Asset Maturity	AMT	Ratio of PPE to the annual depreciation
Cash	CAX	Ratio of cash holdings to total assets
Return on Equity	ROE	Ratio of net income to total equity
Taxes	TAX	Ratio of income tax expense to pretax income

Table 21 - Variable Definitions. (Continued)

Financial Flexibility	FF	Proportion of fixed assets in total assets multiplied by the ratio of net fixed assets to the annual depreciation plus the proportion of client accounts in total assets multiplied by the ratio of receivables to sales plus the proportion of stock in total assets multiplied by the ratio of stock to sales plus the proportion of the rest of current assets in total assets
Altman´s Z score	Z	Ratio of current assets minus current debt to total assets multiplied by 0.717 plus the ratio of retained earnings to total assets multiplied by 0.847 plus the ratio of earnings before interests and taxes to total assets multiplied by 3.10 plus the ratio of the book value of equity to total debt multiplied by 0.420 plus the ratio of sales to total assets multiplied by 0.998
Free Cash Flow	FCF	Ratio of cash flow to total assets multiplied by the ratio of 1 to growth where growth is the ratio of sales in year "t" to sales in year "t-1"
Liquidity	LIQ	Ratio of current assets to current liabilities