

**THE IMPACT OF FINANCIAL CRISIS ON PORTUGUESE FIRMS’
CAPITAL STRUCTURE**

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Abstract

This study aims to verify the impacts of financial crises in the capital structure for Portuguese companies. The purpose is to study different firm-specific determinants of a sample of general PSI¹ Portuguese listed firms at the Euronext Lisbon stock exchange, during the recent crises that endured from 2011 until 2013 and test the impacts on short and long-term debt.

In order to test the changes/impacts on Portuguese firms' capital structure, the most important theories around capital structure decisions, Modigliani & Miller, Trade-off, Pecking Order and the Agency theory, will be presented.

Among the many determinants that are considered to influence capital structure decisions, size, profitability, tangibility, growth, liquidity and non-debt tax shield, were chosen to test their impacts on Portuguese company. The sample used considers the period from 2005 to 2015 for 33 Portuguese listed firms. A regression analysis will be used to infer about the effects on long-term and short-term debt when the determinants change.

Results obtained support both trade-off and pecking order theories. Short-term debt ratios reported a tendency of increase during the financial crisis while long-term debt registered a decrease.

Keywords: Capital structure, Trade-off theory, International Monetary Fund, Financial Crisis

JEL: G01, G32

¹ PSI is a benchmark stock market index of companies that are listed on the Euronext Lisbon

Resumo

Este estudo visa verificar quais os impactos das crises financeiras na estrutura de capital das empresas portuguesas. Tem como objetivo estudar determinantes específicas da estrutura de capital das empresas portuguesas do PSI² geral cotadas em bolsa, durante o período da recente crise financeira, que durou desde 2011 até 2013.

Por forma a testar as mudanças/impactos na estrutura de capital das empresas portuguesas, algumas das principais teorias à volta do tema da decisão da estrutura de capital, tais como, Modigliani & Miller, Trade-off, Pecking Order e Agency Theory, vão ser apresentadas.

De entre as muitas variáveis que são consideradas como afetadoras da estrutura de capital de uma empresa, tamanho, lucrabilidade, tangibilidade dos ativos, crescimento, liquidez e o escudo fiscal da não dívida, foram seleccionados para testar os seus impactos nas empresas portuguesas.

A amostra de tempo considerada reuniu informação do período de 2005 até 2015 para 33 das empresas portuguesas cotadas em bolsa. Foi utilizada a regressão linear para testar os impactos que as alterações nas determinantes consideradas como variáveis dependentes têm nas dívidas de curto e longo prazos.

Os resultados obtidos suportam tanto a teoria de Trade-off e Pecking Order. Os rácios para a dívida de curto prazo aumentaram durante o período da crise financeira enquanto o rácio da dívida de longo prazo diminuiu.

Palavras-chave: Estrutura de capital, Teoria de Trade-off, Fundo Monetário Internacional, Crise Financeira

JEL: G01, G32

² PSI geral é um índice de ações de mercado para empresas cotadas na bolsa da Lisboa

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1. Introduction

The main goal for most corporations is to achieve profit. One variable considered when companies are defining their strategies in order to achieve profit is their own capital structure. However, the process involving the decisions regarding capital structure options, take in consideration variables and factors, internal and external, which have a major impact on financial decisions. The most suitable capital structure for a firm is a question that offers a lot of debate around it.

From time to time, companies have to figure out what to do in terms of their capital structure: raise their equity, debt, a combination of both or also search for other outstanding securities, to increase funding. The decision between equity and debt is influenced by a lot of intern variables, specific aspects of the firm, and external factors, socio-economic factors. Equity is every money invested from the shareholders of a firm and usually is considered to be a long-term investment since it does not generate an obligation of repayment in the future; debt, in this case could be short-term or long-term, is the money that is invested in a firm by external parties, outside investors, has a payment obligation and has an interest rate and time of maturity. Each decision comes with its own set of consequences but the decision itself has a lot to take in consideration to. Regarding the different structure of each firm around the world, the choice is more often to separate management from ownership. Therefore, managers should work to make shareholders confident about their controlling of the firm, resulting in maximizing the shareholders' wealth and firms' profit. However, this principle is not always followed by managers, as some prefer to follow their own interests instead of shareholders'. Regarding this, there have been numerous studies and theories around capital structure decisions.

Firstly, Modigliani & Miller (1958) explained their theory about capital structure and investment. This study was the basis for the beginning of the discussion around the determinants that mostly affect the capital structure of firms. There is no agreement on the best capital structure as Myers (2001: 81) says: "*There is no universal theory of the debt-equity choice, and no reason to expect one*". There are a range of theories that try to answer to this dilemma, the main two being the Trade-Off Theory and the Pecking Order Theory, but none of them is more certain than the other.

Finance experts have recognized through the years the determinants that affect capital structure and the current problem is to evaluate what impact they cause in the firm's value. During times of crises, for instance, there are voices that defend that more regulation to the financial sectors will bring more confidence to the markets and, consequently, for investors. Nevertheless, a strict regulation will impact the financial sector in terms of liquidity and therefore the markets and their investors.

Additionally, the discussion around capital structure evolved from the firm to the environment, the economy they belong to.

Following the mentioned before, a firm's capital structure can be influenced by internal and external factors. Among external factors we have the macroeconomic environment (Lane & Milesi, 2000).

According to Alves & Francisco (2015), since the beginning of the century, three major crises occurred: the dot.com bubble, subprime crisis and European sovereign crisis. Per Alves & Francisco (2015), the dot.com bubble occurred simply inside the USA and resulted from the irrational behavior verified in investors; the subprime crisis, the major crisis among the three mentioned before, achieving global scale, resulted from the deregulation of financial markets, financial innovation, defaults in the supervisory systems, speculation stimulated by monetary policies and the poorly designed management compensation schemes; the European sovereign crisis was the result of expansionary fiscal policies implemented in countries with low economic growth levels.

The financial crisis that hit Europe in 2008 and lead to a request for an IMF assistance program for Portugal back in 2011, could show how the macroeconomic environment, that during this financial crisis was severely affected, can impact the capital structure for Portuguese firms, particularly the listed ones, as the crisis had major impact on the macroeconomic environment. Per Atici & Gursoy (2011; 72): *"The latest global financial crisis began in July 2007 with the collapse of the two hedge funds of Bear Stearns. This collapse has revealed the so-called subprime mortgage crisis in a fragile financial environment of increasing mortgage delinquencies and foreclosures in the U.S., deepened, and widened in September 2008, by the bankruptcy of Lehman Brothers."* The IMF's April 2014 ³WEO⁴ report states that two distinct crises occurred in the recent period. A global crisis affecting countries and companies around the world and a European. The nature of the recent global financial crisis acted as a starting point for researching and studies towards credit supply conditions and economic growth. During 2011 and 2012, the world economy suffered a serious slowdown, and only in 2013 indicators showed signs of recovery in advanced economies with the stabilization of activity because of the politics imposed, and a picked up in emergent markets and developing countries, according to the IMF (2013).

The recent financial crisis provides an opportunity to study the impacts of the macroeconomic environment in the capital structure of companies. Studies around the US market have found that an obstruction caused by financial crisis on capital markets led companies to postpone their expansion plans during crisis due to the demand for short term debt instead of long term debt (Custódio *et al.*,

³ The website link is <http://www.imf.org/external/pubs/ft/weo/2014/01/pdf/text.pdf>

⁴ *World Economic Outlook*

2013). Also, the same effects can occur to banks, the supply, which proves that decisions taken by firms during crises could also be related with the fact that banks are more willing to offer short-term debt solutions despite long term. In fact, lending in 2008 was 38% lower than in the year before for long-term options. The drop was equal to financial services firms and non-financial firms (Ivashina & Scharfsteion, 2010).

This study tests the determinants of capital structure and the relationship they have with Portuguese firms in two separate periods of time: one before the crisis (2005 to 2007), one during the crisis (2008 to 2012). The study also focuses a period, after crisis, in which Portugal asked for IMF's assistance for economic matters (2013 to 2015). The sample consists of 33 non-financial PSI general Portuguese listed firms on the Euronext stock exchange, with the objective to verify the effects of financial crisis on Portuguese firm's capital structure from 2005 to 2015 and to give an overview of the impacts of the IMF's politics implemented during 2011 and 2013. The period chosen contains the year of 2008, when the global crisis was affecting Europe. To evaluate the effects of 2008s' global crisis on the capital structure of non-financial Portuguese firms, six independent variables were chosen (size, profitability, tangibility, growth, liquidity and non-debt tax shield) to explain the two dependent variables of this study: short-term and long-term debt.

Some work has already been done such as the impact of the financial crisis on the determinants of capital structure (Alves & Francisco, 2014), but not linked to the specific case of the impacts in Portuguese companies related to the IMF's politics. This study because of the mentioned before has two main questions to be answered:

Has the global financial crisis of 2008 affected Portuguese firms' capital structure?

Has the assistance program held by the IMF throughout the years (2011 until 2015) impacted the decisions regarding firm's capital structure?

To answer the questions formulated, this study will be divided as follows.

After the introduction, the second chapter of this study is a literature review of the main theories regarding capital structure decisions and reviews some of the empirical studies regarding capital structure determinants. Moreover, this chapter provides justification on the choice made in terms of the determinants selected among the many that several studies consider to affect a firm's capital structure, to study and to get results around the two questions formulated before for Portuguese firms analyzed.

The third chapter presents the methodology, data used and the variables in study and gives a descriptive analysis from 2005 until 2015 of the sample selected to test. Hypotheses and regression models are also presented in this section.

The fourth chapter includes the interpretation of the results obtained by carrying out an empirical analysis based on estimation and the discussion of its findings.

In the final part of this study, chapter five, the results obtained before are considered and an understanding and analysis on them regarding the theories mentioned in the previous sections, the Trade-off and Pecking Order theory, is carried out in order to provide conclusions, limitations and recommendations for future research and also to contribute to the existing researches on the impacts of external factors to the capital structure of firms.

2. Review of literature

Every firm must deal with the decision regarding the choice of the optimal capital structure to achieve profit. This decision and the variety of determinants affecting these decisions led to a series of studies trying to answer which determinants to choose when deciding between debt and equity, but none of them determining an optimal level of debt. Sheikh & Wang (2011) mentioned that the absence of the answer regarding the more suitable determinants to choose is explained by the different views and realities that these theories express in their focus on explaining capital structure decisions.

The literature review analysis will present a summary of the most important theories in which the determinants of the choice of capital structure are based: Modigliani & Miller, Trade-off theory, Pecking Order theory, Agency theory and other theories. This section views also some of the important aspects of the Portuguese case for the study being carried out such as work that has already been done and some important features regarding the period analyzed. Additionally, this section reviews some of the results suggested by some empirical studies in the matter of capital structure decisions and literature regarding the independent variables selected to study the impacts of the recent financial crisis of 2008 on the capital structure of Portuguese firms.

2.1. Modigliani & Miller Theory

In 1958, Modigliani & Miller started the discussion involving the capital structure of companies by publishing the M&M Theorem. They proposed that under the assertion of a perfect capital market, financing decisions are irrelevant to firms due to the fact that in a perfect capital market, there are no agency costs, taxes, financial distress and bankruptcy costs. “M&M Proposition I: *In a Perfect capital market, the total value of a firm is equal to the market value of the total cash flows generated by its assets and it's not affected by its choice of capital structure*” (Berk & Demarzo, 2013: 162).

Without taking in consideration the market imperfections, M&M concluded from their analyses that it would not be relevant for a firm in the process of deciding between raising its equity or its outstanding debt, in response to their needs. “M&M Proposition II: *The cost of capital of levered equity is equal to the cost of capital of unlevered equity plus a premium that is proportional to the market value debt-equity ratio.*” (Berk & Demarzo, 2013: 162). On the other hand, the value of a firm that has debt (levered firm) comparing to a firm that has not (unlevered firm) is not the same. The

difference is, as said in the second proposition of M&M theorem, the market value of the debt-equity ratio.

Afterwards, the authors included the influence of taxes as a relevant variable to the decisions regarding the capital structure of a firm (Modigliani & Miller, 1963). After the findings by M&M, the research on capital structure focused on whether financial decisions became relevant if the assumptions regarding those decisions are more relaxed.

2.2. Trade-Off Theory

Due to the assumption that capital markets are perfect, M&M ignored the agency and bankruptcy costs of debt. The existence of these costs lead to a trade-off between equity and debt.

The Trade-Off Theory states that there is a certain amount of debt that maximizes the value of a company. “(...) *the total value of a levered firm equals the value of the firm without leverage plus the present value of the tax savings from debt, less the present value of financial distress costs (...)*” (Berk & Demarzo, 2013: 495). Mathematically, according to Gonçalves & Neves (2015), this theory is represented as follows:

$$VL = VU + \text{Present Value}^5 - \text{Present Value}^6 \pm PV (\text{Agency costs/Benefits of Debt}) \quad (i)$$

VL = value of a company

VU = value of the unlevered company

Modigliani & Miller (1963) concluded that if firms take into consideration corporate taxes, debt would influence the value of the firm, that is, an increase in the value of a firms' debt would increase the value of the firm since debt is tax-deductible.

Companies each year pay taxes after the deduction of the amount of interest expenses they had during the year to their profits. These interest costs reduce the amount of corporate tax paid by the firm and because of that, debt can be seen as a benefit to the firm but this benefit only applies to companies with profit. Firms that have a large non-debt tax shield could be less interested in benefit from debt tax advantages than others (DeAngelo & Masulis, 1980). Therefore, firms should find a

⁵ Interest tax shield

⁶ Financial distressed costs

balance in order to achieve an optimal point of leverage to prevent the firm to go bankrupt if its levels of debt became unsustainable. (Gonçalves & Neves, 2015).

Bankruptcy (which is the second factor in the formula above) costs refers to the direct costs, such as legal fees and managerial time spent in administrating these matters and indirect costs like inability for the firm to obtain credit or to issue securities (Warner, 1977). There is a relation between the amount of debt a company owns and the risk for the investor. When a firm goes bankrupt, the hypothesis for a debtholder to lose part or all the investment is very high. To account for that, they ask for a higher rate of return. The increase in the cost of capital can lead to a financial distress. Excess of debt could lead companies to a situation where they are not capable to honor their agreements with debtholders (Brealey *et al.*, 2010; Muijs. 2015).

Finally, research by Jensen and Meckling (1976) identified two different types of agency conflicts/costs: conflicts between managers and shareholders and between bondholders and shareholders. Harris & Raviv (1991) gave us an explanation about the reasons for these conflicts. In Harris & Raviv (1991), as in Stulz (1990), managers always want the operating even if liquidation was preferred by investors. They disagree over operating decisions. In Stulz (1990), managers are characterized and assumed to always want invest, even though, paying out cash is better for investors. Related to manager-shareholder conflicts, they occur because of the separation of ownership, managers do not obtain the total gain of their improvements in terms of firm's profit which means that they have an incentive to devote less effort to manage the firm's resources and to manage them to their own benefit (Jensen & Meckling, 1976).

Table 1. Comparison of Agency Models Based on Manager vs Shareholders

Model	Conflict	Benefit of Debt	Cost of Debt
Jensen and Meckling (1976)	Managerial perquisites	Increase managerial ownership	Asset substitution
Jensen (1986)	Overinvestment	Reduce free cash	Unspecified
Harris and Raviv (1990)	Failure to liquidate	Allows investors option to liquidate	Investigation costs
Stulz (1991)	Overinvestment	Reduce free cash flow	Underinvestment

Source: Harris & Raviv (1990)

Shareholder and bondholder conflicts arise because of the type of contracts and privileges they can get and the others cannot. For example, the rate of return for debtholders is agreed upon the interest rate, while for shareholders it is associated with the firm's profits and thereby is much more volatile.

From the standpoint of this theory, firms should find a balance having in one side the benefits of tax shield and on the other the costs of financial distress and measure the impacts on corporate financing.

2.3. Pecking Order Theory

The Pecking Order Theory is one of the most influential theories of corporate capital structure. It is based on the acknowledgement of the problem related to asymmetric information. Per Myers and Majluf (1984), there is a tendency for firms to prefer internal sources of funds rather than external due to adverse selection and information asymmetries. Myers and Majluf (1984) stated that there are three fund sources: debt, equity and retained earnings. When the internal cash flows generated by the firm are not enough to cover the costs, debt is preferred to equity. There is no optimal debt ratio. The theory provided a comparison between three fund sources and the timing in which a firm uses one instead of other and the fact that because of the information asymmetries, for an outside investor, equity becomes riskier than debt. Insiders will use the information they know for their personal interests: they will issue equity when they perceive stocks are being higher evaluated and will go for debt when stocks are perceived as undervalued.

Pinegar & Wilbricht (1989) decided to do a survey in which they asked U.S. industrial firms managers what kind of financing they prefer to use. The answer would be given by ranking six different sources of financing from the most preferred to the least preferred:

Table 2. Preferred sources of financing to Managers

Ranking	Source
1	Internal equity (retained earnings)
2	Straight debt
3	Convertible debt
4	External common stock
5	Straight preferred stock
6	Convertible preferred

Source: Pinegar & Wilbricht (1989)

The results obtained are a mirror of the value that managers give to control and flexibility, and due to asymmetric information between inside and outside information. Managers will choose the financing forms that give them more confidence and also that issue less costs to their firms.

1.4. The Agency Theory

Per Reis (2011), conflicts of interest may arise from firms with higher level of debt – agency costs. These conflicts happen between shareholders and bondholders (Jensen & Meckling, 1976). In one side, shareholders have their equity in the company to value and tend to favor actions that will lead to payout of dividends. On the other side, bondholders tend to take less risky decisions to receive their interest payment without any difficulties.

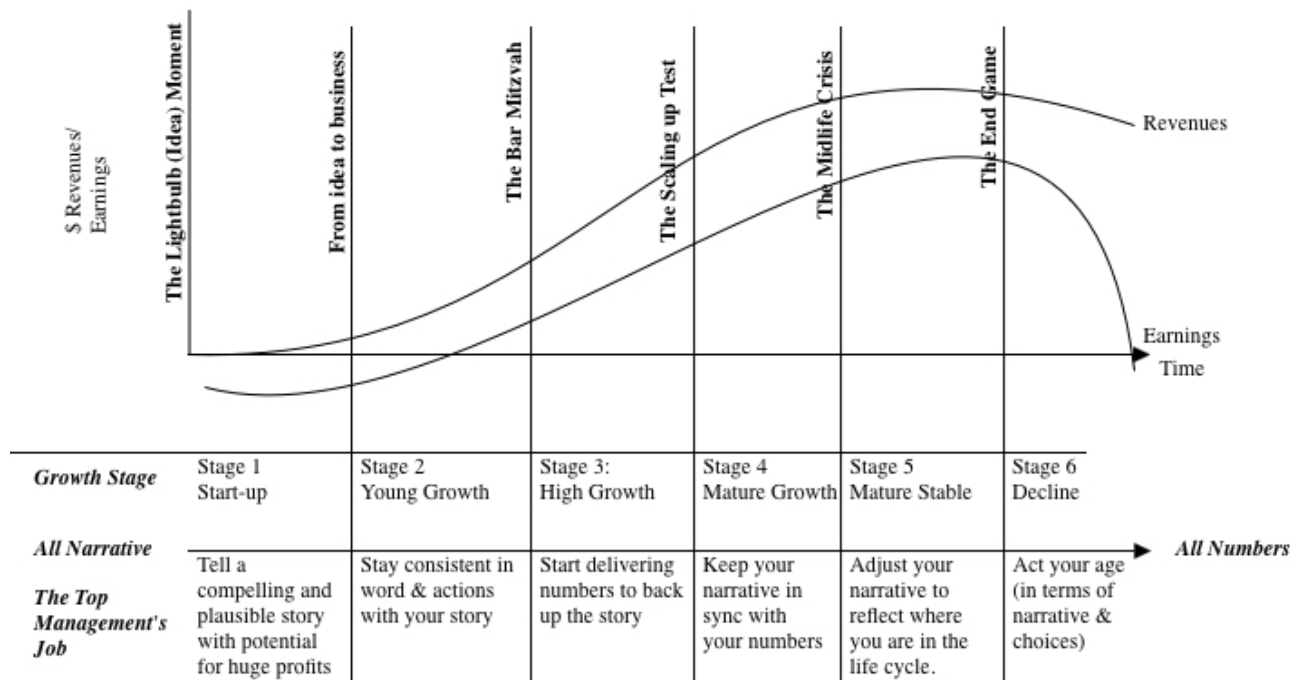
Agency costs can appear as higher interest rates on debt if bondholders believe that shareholders might take actions that could be harmful to them in terms of their payments. Bondholders may add covenants to the operations to protect their earnings. These covenants affect a firms' flexibility in terms of decisions. Following this idea, firms with a larger dimension will value less flexibility rather than smaller firms. In times of crisis, the perception of these costs could be higher since debt becomes more expensive.

Jensen (1986) says that firms can generate free cash flows very often. Over that cash flows managers can decide how to spend/invest them. He argues that as higher as cash is in managers power decision, they tend to pursue their own interests. Therefore, firms can limit the amount of cash in the hands of managers by increasing leverage.

1.5. Firms' life cycle and financing needs

Many developing theories, studies and research have been carried out in order to understand the behavior of firms regarding capital structure decisions. According to the literature (e.g. Damodoran, 2001), firms have five life stages and in each stage the tendency for seeking for more debt or more equity vary. The figure below summarizes the five stages of the firm's life cycle:

Figure 1. Firms' life cycle and financing transactions



Source: Damodoran (2001)

Stage 1 is where startup companies stand. The early stage of life means that firms are constituted by owner's equity and almost no bank debt. At this stage of life, firms are attracting customers and conquering market share. At stage 2, firms have already established their market share and their funding needs increase as the internal cash flows generated in stage 1 (owner's equity and almost no bank debt) may not be sufficient to run the firm. At this stage, firms will start to get the attention of business angels and their potential investment in the firms' capital structure. Stage 3 is the stage of high growth, expansion, and firms tend to seek for more debt to compensate the cash flows generated that, at this stage, are not enough to respond to current operations. Stage 4 is a stage of mature growth. The cash flows that firms have generated are from past investments and there is no more need to seek for future investments. Stage 5 describes firms that are not growing anymore, and are working with their own resources, without the need for further investment, since they are working with stable growth rates. Stage 6, the last stage, firms are showing a decrease in their investment returns, a decrease of their market presence and the competitors with innovating ideas/products take their market value and share.

Not all firms have these 6 stages during their existence. Many start-up firms fail, and do not survive or spend their entire existence as a small privately held business for their entire life. Another case could be of a small firm whose capital will rise externally and will go very fast but with no access

to capital markets by choice and/or need. At least some firms will succeed all the way through, to start another cycle when reaching stage 6 by launching new products and/or services, expanding to other markets, etc.

In this study the sampled firms have passed at least the first 3 stages, and have the dimension and position in the market to access all types of capital and investment being only constrained by problems in capital market itself.

1.6. Empirical studies analysis

In the introductory part of this study, some work has already been done among the study of capital structure in Portugal such as the study of the determinants of capital structure and the 2008 financial crisis, applied to Portuguese SMEs (Proença *et al.*, 2014), and capital structure of Portuguese firms during crisis using descriptive analysis (Reis, 2011). Similar studies have been carried out for other countries such as the case of non-financial firms in the Netherlands by Khademi (2013). This section has the purpose to analyze some studies that focused on the problem of capital structure decisions and shared their findings in terms of what influenced, in each situation, the capital structure of companies.

Booth *et al.*, (2001) applied the study of capital structure decisions to developing countries to analyze which capital structure theory is portable across countries with different institutional structures, using a sample of firms from 10 developing countries. The results obtained showed that the variables relevant to explain capital structure decisions in Europe or in the US⁷ are the same, even though there are several institutional differences between developed and developing countries. Results consistent with Pecking Order Theory were found since the more profitable the firm the lower is the debt ratio, supporting the existence of asymmetric information and that external financing is costly and therefore not chased by firms. Another variable that obtained a higher role in capital structure decisions according to the study was asset tangibility, affecting short-term and long-term debt differently. As Booth *et al.*, (2001: 118) stated: “(...) *Generally, the more tangible the asset mix, the higher the long-term debt ratio, but smaller the total-debt ratio.*”, meaning that as a firms' tangibility increases, although the long-term debt increases as well the total debt ratio falls, that is, the substitution of long-term debt for short-term debt does not occur in the same percentage.

Deesomsak *et al.*, (2004), investigated the determinants of capital structure for firms located in the Asia Pacific region, in four different countries: Thailand, Malaysia, Singapore and Australia. To

⁷ United States

assess the determinants of capital structure an OLS⁸ estimation was carried out, considering the period of time from 1993 until 2001. Since the period analyzed contained the year of 1997, the year of the Asian crisis, the study also investigated the impact of this crisis on capital structure decisions. The independent variables used were: tangibility, profitability, growth opportunity, firm size, non-debt tax shield, liquidity, earnings and volatility/risk and share price performance. The results showed a positive effect from the variable size and a negative from growth opportunities, non-debt tax shield, liquidity and share price performance on leverage. The outputs obtained also showed that the determinants of capital structure vary across the different countries of each region considered in the study. In the year of 1997, the relation between firm specific determinants varied between the period before and after crisis. Deesomak *et al.*, (2004) concluded that the capital structure of a firm is not only the result of the characteristics of the firm, but also a reflection of corporate governance, legal institutions and economic environment in which they operate.

Muijs (2005), studied the impact of 2008 financial crisis on the relationship between firm-specific determinants of capital structure using regression analysis, considering the period from 2008 until 2012 and using a sample of 39 Dutch listed firms on the Euronext Amsterdam stock exchange. The firm-specific determinants used were: firm size, profitability, tangibility, growth and income volatility. The results indicated a preference for the Pecking Order Theory instead of the Trade-off Theory and that the relations found are affected by the crisis. For the sampled period, Muijs concluded that short-term debt is mostly influenced by a firms' asset tangibility, while long-term debt is mostly influenced by firms' size. In terms of the level of short-term and long-term debt, a rise was observed in the starting year of the crisis.

Reis (2011), studied the capital structure of Portuguese firms within a crisis. In order to do that, he selected the 16 largest non-financial Portuguese firms listed on the PSI-16 and gathered data from 2006 until 2010 from the financial statements, financial annual reports and market data and carried out a descriptive analysis, focusing on their levels of equity and debt within their capital structure. During 2006 until 2010, Reis (2011) observed that most firms retained most of their earnings which conducted to a preference towards the Pecking Order Theory: under the uncertainty and asymmetrical information, firms will prefer to use internal financing instead of taking external financing, paying higher interest rates and, in some circumstances, see their external financing lose value. Additionally, some evidence was found towards the Trade-off Theory in terms of the tax advantages of debt. The results show that the average tax shield for the sample of firms reached in 2008 the highest amount. 2008 was the peak of the financial crisis in Europe and in Portugal. Some

⁸ Ordinary Least Squares

evidence was also found in terms of the amount of debt generated through the years in the sample of firms studied by Reis, which was very conservative. This could be explained by the risk of bankruptcy and financial distress that is associated with times of crises and that leads to agency costs.

Khademi (2013) runs an empirical analysis on the capital structure of a sample of 12 firms, from 4 different industrial sectors including: food producers & processors, support & services, construction and industry. They are included in the Euronext NV, in Netherlands. The analysis was carried out from 2004 to 2011, including the period of 2008s' global financial crisis. The methodology used was panel data. The dependent variables selected were: total debt, short-term debt and long-term debt. The independent variables used were: profitability, liquidity, NTDS⁹, size and tangibility. Long-term debt results showed a high dependence on growth, size and tangibility before the crisis. During the crisis, long-term debt shows a high dependence on liquidity and profitability but not on growth. On the other hand, short-term debt was correlated to liquidity and profitability before the crisis and after, with liquidity, NTDS, size and tangibility. The results showed that Netherland firms used more long-term debt rather than short-term debt during the years in study. The independent variable liquidity after the period of crisis became important to explain leverage decisions.

Proença *et al.*, (2014), investigated the determinants of capital structure for Portuguese SMEs¹⁰ in order to study the effects of the 2008 financial crisis on their capital structure. The sample considered 12.587 Portuguese SMEs and a period from 2007 until 2010. The study used three dependent variables: total debt to assets, and its ratios decomposed according to the maturity of debt, short-term debt and long-term debt. The capital structure determinants (independent variables) used by the authors were: asset structure, non-debt tax shield, size, return on assets, growth opportunities, liquidity, cash flow, legal form, size according to the categories of SMEs and a crisis period dummy. The results obtained indicated that the variables that impacted the dependent variable were mostly: liquidity, asset structure and profitability. A negative relation between debt ratios and profitability accords to the Pecking Order Theory, Portuguese SMEs prefer internal financing rather than external due to the higher risks they face and agency costs. The determinant asset structure presented different signs for the relation with debt: negative for short-term debt and positive to long-term debt. This result is consistent with the Trade-off Theory that suggests companies with more tangible assets are expected to issue more debt using the same tangible assets as collateral in case of failure. Companies with poor tangible asset structure tend to issue less debt due to this collateral factor. The results showed also a tendency for the debt ratio to decrease after the financial crisis. According to the results

⁹ Non-debt tax shield

¹⁰ Small and medium-size enterprises

obtained, Portuguese SMEs' capital structure could be explained by both the Pecking Order and Trade-off theories.

Alves & Francisco (2015) studied the impacts on the debt-equity choice in terms of firms' capital structure, throughout the recent financial crisis: dot.com bubble, subprime crisis and European sovereign debt crisis. At the firm-level the variables used were: tangibility, profitability, size and market-to-book. The variables selected are consistent with several studies in terms of eligibility to study debt-equity choices, such as, Titman & Wessels (1988), Rajan & Zingles (1995), among others. Data used in this study included firms from different countries, from Europe to US, therefore being in terms of selected sample very diversified. The period analyzed was from 2000 until 2011. The dependent variables analyzed were: market and book leverage and short-term and long-term debt. Alves & Francisco (2015) estimated a panel regression of debt and maturity choices. The empirical results they found showed the behavior of leverage and debt maturity choices in reaction to changes in institutional variables, considering the financial crisis presented. Results showed that, dot.com bubble was between the crisis analyzed the one impacted more significantly leverage and debt maturity choices. The dot.com bubble results associated showed a positive sign meaning that an increase in the level of debt happened during that period. The most important conclusion resulting from this study was observing the amount of leverage of firms increasing during periods of financial crisis, with long-term debt being replaced by short-term debt. In terms of economic inconsistency and uncertainty, short-term debt followed a default while long-term debt kept the antagonistic trend. Alves & Francisco (2015) also noted significant findings in the years of the European sovereign crisis within the Euro Zone, specifically an asymmetric shock with the financial distress resulting from the crisis being felt differently in the periphery and in the center of the European Union. The study showed that firms followed the government in terms of financing options. In times of crisis, firms substitute long-term debt with short-term debt creating the possibility of a liquidity crisis. Financial regulators should be due to this aware of a firm's debt to prevent situations like liquidity crisis from happening in times of crisis.

1.7. Portuguese Case

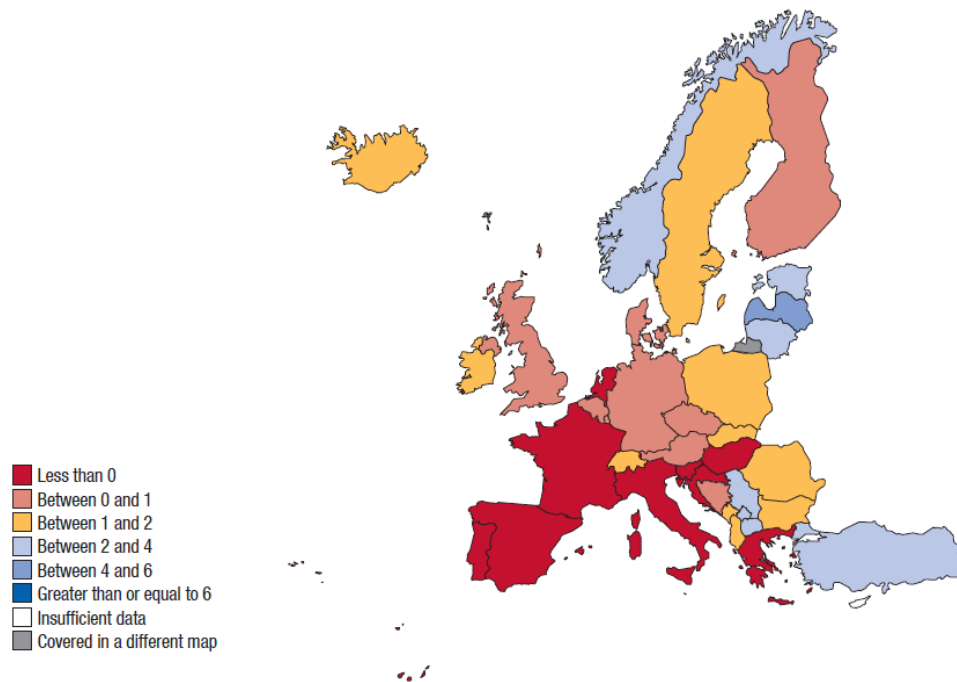
Some of the most important developments that try to answer fundamental questions regarding capital structure have already been discussed in the previous sections: M&M, Trade-Off Theory and Pecking Order Theory. The assumptions formulated by these theories were the basis for the questions that this study aims to answer. The asymmetrical information has consequences that are discriminated

in the Trade-Off Theory and due to that asymmetrical information firms prefer internal financing over external financing, according to the Pecking Order Theory. In accordance with the mentioned before, profitable companies which have retained profits, are much more likely to use internal financing instead of external because profitable firms are less likely to borrow.

The discussion around the theme of capital structure decisions contributed so far with a variety of studies, each of them focusing on a specific sub theme such as: capital structure decisions on G7 countries (Rajan & Zingles, 1995); capital structure decisions on developing countries (Booth *et al.*, 2001), capital structure decisions on developed countries (e.g. Long & Malitz, 1985; Harris & Raviv, 1991), capital structure decisions in the Portuguese corporate sector (Antão & Bonfim, 2008), among others. Comparing the capital structure of firms from different countries is sometimes hard due to, for example, due to lack of consistent accounting and market information (Rajan & Zingles, 1995). According to that, recent studies have been focusing on firms from the same country and in the factors that could affect their capital structure. This study addresses the case of Portugal, during a period of time marked by a major financial crisis and with the influence of an international organism of monetary help, the IMF.

The situation verified in 2013, resulted from a series of measures that Portugal implement since 2011, with the help of the objectives established by the IMF, to balance the economy and public accounts. The growth forecast calculated for Portugal in the WEO of April 2013, showed a less than 0 percent result. European countries obtaining more optimistic results, had a forecast of about between 4 and 6 percent. See the figure bellow.

Figure 2. Europe: 2013 GDP Growth Forecasts



Source: IMF WEO April 2013

According to Portugal's Letter of Intent, Memorandum of Economic and Financial Policies, and Technical Memorandum of Understanding (2013), credit conditions, particularly the credit sector conditions, remained difficult. This situation had a major contribution from the deleveraging occurring in the financial sector itself and in the private sector, the main demanders for credit. Additionally, the lack of capacity for smaller firms to pursue other types of credit through capital markets for instance, contributed for the decline in bank credit despite the improvements registered in both market sentiment and liquidity conditions.

Despite the direct measures for the macroeconomic environment, the Portuguese government monitored, with the help of BdP¹¹, the financial sector, particularly the banks, their balance sheets and the credit offers they had for investors and applied specific measures to banks sector, for instance, new capital requirements that had to be presented to the BdP later that same year. In that same year, BdP required banks to raise their core Tier 1¹² capital level to 9 percent by the end of 2011 and 10 percent for the years following in order to enhance confidence in the solvency of the Portuguese banking system.

To investigate the impacts of the 2008s' financial crisis on the Portuguese firm's capital structure, only a sample selection of the determinants examined in the literature review will be included. For the

¹¹ Banco de Portugal

¹² A ratio used to measure bank's financial strength

selection of such determinants, previous studies that also focused on the impact of financial crisis on the firm determinants capital structure were considered. The determinants selected and the choice regarding their selection is presented in the next section.

1.8. Firm's Capital Structure Determinants

Since the discussion around capital structure decisions became more and more debated, several empirical studies have been carried out to study which factors affect the capital structure of firms. These factors could be: growth, liquidity, ratio of size, tangibility, asset structure, profitability and non-debt tax shield (e.g. DeAngelo & Masulis, 1980; Harris & Raviv, 1991; Jensen, 1986; Stulz, 1990; Myers, 2003; Titman & Wessels, 1988; Rajan & Zingles, 1995). Not all empirical studies consider the same factors. The factors considered in each study usually rely on researchers' sensibility to the environment, companies' size, economy, and others, of the scope of study.

1.8.1. Growth

This determinant measures the growth of an investment or project made by a firm, leading to profit, and could be measured as: sales growth, asset growth, EBIT growth). It is commonly used by shareholders and investors to evaluate the company's health. Studies considering growth as a specific determinant to measure and test capital structure of companies, do not agree on the sign this determinant has with debt. Trade-off theory states that firms with more intangible assets and better growth opportunities, tend to borrow less than firms with more tangible assets. There is a negative relation between growth level and debt. Green *et al.*, (2001) argues that one reason for this negative relation has to do with the fact that firms do not distinguish between short-term and long-term debt and, according to Myers (1977), firms prefer internal financing rather than external because it can ignore future possibilities. Smaller firms, will not be willing take risks involving external financing options because they don't have the dimensions (in terms of investors) a bigger firm has and by that the possibility to share the risks by more investors, as it happens in bigger firms. Hovakimian *et al.*, (2001) states that the negative relationship must do with the fact that companies prefer to invest using their retained profits over debt, being the problem of underinvestment pointed as a reason. On the other hand, Ross (1977), states that the expected relationship is positive, as growth work as a sign for financial institutions that the company is not going to default and by than giving more favorable terms of credit.

Despite the different points of view in terms of the sign regarding growth and leverage of firms, we will test the following hypothesis:

H1a: Growth has a negative impact on firms' short-term debt

H1b: Growth has a negative impact on firms' long-term debt

1.8.2. Liquidity

This determinant is a financial ratio that measures the capacity of a firm to guarantee their short-term responsibilities. Liquidity and firms' debt ratio are expected to have a negative relationship. Antoniou (2008) and Mazur (2007) describe this negative relationship because of firms having more liquidity may issue less debt because they tend to use their internal financing. On the other hand, firms with higher liquidity should borrow more to fulfill their obligations. At the same time, firms with liquidity are more likely to issue debt to face with their short-term responsibilities. Due to that, we will test the following hypothesis regarding liquidity:

H2a: Liquidity has a negative impact on firms' short-term debt

H2b: Liquidity has a negative impact on firms' long-term debt

1.8.3. Profitability

Myers & Majluf (1984) stated that more profitable firms have less interest in using external funds for financing. They will prefer since they have the possibility to finance their investments using internal earnings. Firms acquire more debt to prevent managers from spending the money generated by profits in risky investments. Schoubben & Hulle (2004) also argued that another motivation for profitable firms for not using external leverage is to maintain their profits, since external debt is costlier and to show more quality. Profitability has a direct connection to the Pecking Order Theory. The arguments present before contradict the Modigliani and Miller's (1958) prediction because by choosing internal financing, firms are not taking advantage of the debt tax shields benefits. The most of researches/studies defend a negative relationship between profitability and debt.

Due to the points enumerated before, the following hypothesis will be tested:

H3a: Profitability has a negative impact over firms' short-term debt

H3b: Profitability has a negative impact over firms' long-term debt

1.8.4. Size

Size is considered an important determinant of capital structure. Therefore, it is a common variable to see in many studies carried out on capital structure decisions. According to the Trade-off Theory, bigger firms tend to issue more debt because they face less costs of financial distress in its structure. Additionally, larger firms tend to have access to better credit solutions than smaller ones. Due to their dimension, credit markets see them as less risky than smaller firms. Smaller firms tend to have less debt structures compared to larger firms.

Wald (1999) calculated a positive correlation between these two variables. Titman & Wessels (1988) states also that size of companies is positively correlated with debt. Despite this positive correlation, the pecking order theory states that a negative relation could occur due to asymmetric information. Although some researchers found a negative relation between size and debt, we will test the following hypothesis distinguishing between short and long-term debt:

H4a: Size has a positive impact on firms' long-term debt

H4b: Size has a negative impact on firm's short-term debt

1.8.5. Tangibility

Assets can be used as collateral when firms are issuing debt. Myers & Majluf (1984) stated that leverage and asset tangibility have a positive relationship. This is related to the fact that firms with tangible assets that can be used as collateral in case of failure for creditors, are expected to issue more debt or other external financing options. At the same time, using assets as collateral for an investment reduces the creditor's risk in lending the money. In contrast, Titman & Wessle (1988) argue that this relationship is negative since some managers may use more than the optimal level they are allowed. The point of view stated lead us to the conflicts between managers and shareholders and between shareholders and bondholders. Those same conflicts would decrease if less assets firms' value were secured. The recent financial crisis showed that fixed assets play an important role in the approval of bank financing with debt becoming more expensive.

To study tangibility's impact on firms' capital structure we will test the following hypothesis:

H5a: Tangible assets impact positively firms' short-term debt

H5a: Tangible assets impact positively firm's long-term debt

1.8.6. Non-debt tax shield

The Trade-off Theory stated that firms prefer debt because of the incentive they get due to the non-debt tax shield. The interests generated by debt are deductible expenses, raising the amount of after-tax income. According to DeAngelo & Masulis (1980), the deductibility mentioned before could be the main benefit of debt. However, there are other deductible expenses. For example, depreciation expense can work as a substitute for debt tax shield. Most part of studies suggest a negative relationship between NDTS and debt, particularly long-term debt, without the literature being conclusive about the relation between NDTS and short-term debt. On the other hand, Vieira & Novo (2010) suggest a positive relation between NDTS and long-term debt and a negative relationship between NDTS and short-term debt for SMEs Portuguese companies.

Therefore, to study the impact on firms' debt of changes on the NDTS we will follow the hypothesis under:

H6a: Non-debt tax shield is negatively correlated with short-term debt

H6b: Non-debt tax shield is negatively correlated with long-term debt

Investors and individuals in general, tend to become more risk averse during times of instability such as during the time of a financial crisis. Due to all the changes that result from financial crises in the economy of a country from a macroeconomic and microeconomic point of view, a result of these changes could be to some firm-specific determinants and the capital structure of companies. Moreover, some financial crisis in Europe became so severe to countries that sometimes a request for an IMF's assistance program and its restricted politics is the last resource for countries, in order to balance and reestablish their public accounts.

This study tries to focus on the determinants that play an important part in the capital structure of Portuguese firms.

3. Methodology and Data

This section provides a presentation of the research, methodology and data used on the study as well as a descriptive statistical analysis regarding some important features of the sample of firms selected.

As already had been done in some other studies (Deesomsak *et al.*, 2004; Rajan & Zingales, 1995; Muijs, 2015) that attempted to study the determinants of capital structure, a cross sectional ordinary least squares regression (OLS) is often used. Using this method, one can investigate the relation and influence that independent variables have on dependent ones.

3.1. Research Methods

This empirical study will be carried out by using panel data regression as had already been done (e.g. Rajan & Zingales, 1995). It refers to sets of multiple observations for each sampling unit (Baltagi & Giles, 1998). Panel data regression can be divided in static and dynamic. The present study will use static panel model.

Using this approach allow us to control individual heterogeneity among our sample as well as the time series for a single firm. Additionally, if combined with cross-sectional and longitudinal data, global effects can be seen, otherwise, using a simply one type of data, it would not be possible. One limitation underlined to panel data is when a sample has incomplete accounts or the non-response rate is high it can lead to non-balanced results.

3.2. Variables

Ratios are commonly used to determine the capital structure of firms. This study focused on seven different ratios, calculated for each firm and period. Regarding conclusions, the study, as mentioned before, will analyze the ratios chosen in three different time frames:

Before crisis: from 2005 to 2007;

During crisis: from 2008 to 2012;

FMI assistance program: from 2013 to 2015.

The variables used are similar to studies that focused on other countries and/or other sectors of economy. For example, Khademi (2013) focused on the capital structure of non-financial firms in the Netherlands and Sheikh & Wang (2011) focused on the determinants of capital structure in Pakistan, among others.

Dependent Variables

The dependent variables considered in this study will be long-term and short-term debt ratios. The variables are analyzed separately because they are not affected in the same way.

$$1) \text{ Short-term debt ratio} = \frac{\text{Total short-term debt } t}{\text{Total assets } t} \quad (\text{ii})$$

$$2) \text{ Long-term debt ratio} = \frac{\text{Total long-term debt } t}{\text{Total assets } t} \quad (\text{iii})$$

Independent Variables

As already have been used by Muijs (2015), the firm-specific determinants will be considered as the independent variables of this study. The independent variables used in this study are based in the ones used by Khademi (2013) in the study of the impact of global financial crisis on firms in Netherlands and in Muijs (2015) for Dutch listed firms. Table 4 shows the independent variables and expected sign.

1. **Growth (GRWT)**: firms' growth will be measured as total assets (t) – total assets ($t-1$) / total assets ($t-1$). The values to calculate this ratio have been retrieved from the balance sheet of each firm. The relation between this ratio and debt is supposed to be negative. When a firm is growing, its needs for borrowing and loans decrease.
2. **SIZE (SIZE)**: firm size is determined to be the natural logarithm of total assets \ln (total assets t). The values to calculate this determinant have been retrieved from the balance sheet of each firm. The relation between this determinant and debt is supposed to be positive. A bigger firm has more opportunities to borrow money at better conditions and therefore, have major debt.

3. **Profitability (PROF):** in this study, a firm's profitability is measured by calculating EBIT t / total assets t . The values to calculate this ratio have been retrieved from balance and income sheets of each firm. The relation between this ratio and debt is supposed to be negative. The more profitable a firm gets, the less need for loans and borrowing it has.

4. **Tangibility (TAN):** tangibility is calculated by dividing firms' total tangible assets by its total assets. The values to calculate this ratio have been retrieved from the balance sheet of each firm in analysis. The relation between tangibility and debt are supposed to be positive. As debt increases the tangibility of assets are more likely to be used as collateral to secure that debt.

5. **Liquidity (LIQ):** liquidity is calculated by dividing: current assets t / current liabilities t . The values to calculate this ratio have been retrieved from balance sheets of each firm in analysis. The relation between liquidity and debt is supposed to be negative. If a firm's liquidity increases its needs for external financing decreases.

6. **Non-debt tax shield (NTDS):** non-debt tax shield is calculated by dividing firms' total depreciation expense by its total assets. The values to calculate this ratio have been retrieved from the balance sheet of each firm in analysis. The relation between non-debt tax shield and debt are supposed to be negative.

Table 3. Dependent Variables

Dependent Variables	Calculation
Long-term debt ratio (LTD)	Long-term debt / Total assets
Short-term debt ratio (STD)	Short-term debt / Total assets

Table 4. Independent Variables

Independent Variables	Calculation	Expected Relationship
Growth (GRWT)	$\text{Total assets } (t) - \text{Total assets } (t-1) / \text{Total assets } (t-1)$	- ; -
Size (SIZE)	$\text{Ln} (\text{Total assets})$	+ ; -
Profitability (PROF)	$\text{EBIT} / \text{Total assets}$	- ; -
Asset tangibility (TAN)	$\text{Tangible fixed assets} / \text{Total assets}$	+ ; +
Liquidity (LIQ)	$\text{Current assets} / \text{current liabilities}$	- ; -
Non-debt tax shield (NTDS)	$\text{Total Depreciation Expense} / \text{Total Assets}$	- ; -

3.3. Data and Sample

The data for this study was gathered using Bloomberg¹³ and the annual financial statements of each firm of the sample (balance sheets, income statements and key stats), from 2005 until 2015. Bloomberg is an online database that provides historical and current financial statements, business newswires, and descriptive, research and statistic information on over 52,000 companies worldwide. The reason for the choice of this period is related with the purpose of this study: to analyze the impact of financial crises.

In this study, the data from 33 PSI general Portuguese listed firms will be used. Not all Portuguese firms will be included, like Muijs (2015), were excluded:

Firms operating in the financial, governmental and utilities sector. Those firms have a different nature in terms of capital structure compared to firms related to the industry sector and are subjected to specific regulation and legislation that affect their choices in terms of capital structure;

Firms with vital information missing for a certain year in analysis, in order to have a balanced sample to study.

Table 5 represents the industry classification codes, according with Fama & French (2007), and the percentage of firms of the sample that fit in each category sector. The industry sector with the highest percentage of firms is others (mining, construction, transportation, hotels, business services and entertainment). Healthcare, medical equipment and drugs do not have any firm representing their sector in this sample.

¹³ <http://www.bloomberg.com/europe>

Table 5. Industry Sector Classification

Industry Classification	% of Firms
Consumer Durables	9%
Manufacturing	3%
Oil, Gas and Coal Extraction and Products	3%
Chemicals and Allied Products	6%
Business Equipment	3%
Telephone and Television Transmission	12%
Utilities	6%
Wholesale, Retail and some Services	21%
Healthcare, Medical Equipment and Drugs	0%
Others	36%

Note: Table 5 categorizes the sample of firms in study according to the Fama & French (1997) industry classification sectors. Others include sectors such as Mining, Construction, Transportation, Hotels, Business Services and Entertainment.

Balance sheets and income statements of the sample of firms have been used to calculate the ratios used. Although the study does not use the information from all the firms listed in the Lisbon Euronext stock exchange, the sample used tries to represent the variety of sectors included in the Portuguese market.

3.4. Descriptive Statistics

The descriptive statistic analyzed in this section aim to verify if there are significant differences in the results obtained from the different periods in analysis. This study used Stata to calculate the descriptive analysis as follows. The source of the data used in this descriptive statistics analysis was Bloomberg and the financial statements of each firm. The analysis will focus on mean, median, standard deviation, maximum and minimum value and the number of observations for dependent and independent variables through the time period: 2005 to 2015.

Annex 1 shows the results for the four scenarios: one for the period before the crisis (2005 to 2007), one for the period during the crisis (2008 to 2012), one for the period with IMF intervention (2013 to 2015) and one for the entire period (2005 to 2015).

As shown in Table 1-, before the crisis, the mean for short-term debt is 0.399 which implies that about 40% of the assets of the sample firms are financed by short-term debt, the rest are financed by other financing options such as equity and long-term debt; long-term debt has a mean of 0.327

implying that about 33% of the assets of the selected firms are financed by long-term debt. The variable with the most significant mean is size with a mean of 6.44, as expected, since this study uses large companies. Liquidity shows also a high mean value, with a mean of 1.07. The results obtained imply that current assets of the selected firms are more than current liabilities. By analyzing the standard deviation of the independent variables used in the regression, only profitability, growth and non-debt tax shield present high dispersion because the value of their standard deviation is higher than the mean value.

For the period during crisis, from 2008 to 2012, as shown in Table 2, the mean for short-term debt is 0.432, about 43%. The mean for long-term debt ratio is 0.336. From one period to another, the ratio for short and long-term debt increased, although short-term debt ratio increased more. The results show that those firms increased their short-term debt instead of increasing long-term. The variable with higher mean continues to be size, with a mean of 6.656. Analyzing the output obtained, one can see comparing the period from 2005 to 2007 and 2008 to 2012, the mean for all variables decreased, with the exception of size. The variable size is the one with the most significant value in terms of mean in both periods since the industry sector for the companies selected is highly dependent on their sales and size.

From 2005 until 2015, as shown in Table 4., the mean for short-term debt was 0.413 and the mean for long-term debt was 0.333. The most significant mean value was the variable was size, with a mean of 6.56 followed by liquidity with a mean of 1.03. The values show that during that period of time, current assets for selected firms were more than their current liabilities. The results obtained are in accordance with other studies done for other European countries such as Netherlands, UK and Belgium (Hall et al., 2004). The short-term debt ratio is higher than the long-term, according to the mean values observed for those variables. On the other hand Khademi (2013) in his study on the capital structure for firms in Netherlands observed running descriptive analysis that the ratio of long-term debt is bigger than the short-term one. Firms in Netherlands, during the period of financial crisis identified in the study, 2008 to 2011, increased their long-term debt and decreased short-term debt.

Regarding the specific period of IMF's intervention studied, 2013 to 2015, results show a mean of 0.392 for short-term debt and 0.332 for long-term debt. Compared to the period before and during crisis, the percentage of total assets financed by debt decreased. Firms preferred to lower their levels of debt. The effect on long-term debt was not significant compared to other periods. The mean for size in this period decreased when compared to other periods. Also, from 2013 until 2015 the variable growth registered a negative mean.

Additionally, this study analyzes some features on the capital structure of the selected firms in the period analyzed to see the behavior of some important variables to capital structure, across time. The analysis of some variables' behavior during the observed time is important to better understand the changes they suffered across different time periods and it is the same exercise that managers should do in the process of taking decisions regarding the capital structure of firms in both present and future. Additionally, it is also important for investors to know the situation of a firm they might be interested in investing in and the evolution of the firm throughout time.

Table 6. Firms' Capital Structure – Average Liabilities in % (2005-2015)

Variable	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2005-2015
Current Liabilities	39%	38%	38%	39%	38%	36%	38%	37%	36%	37%	36%	38%
Non-Current Liabilities	61%	62%	62%	61%	62%	64%	62%	63%	64%	63%	64%	62%

Table 6 provides the evolution of the average weight of debt in total debt for the sample of firm selected from 2005 to 2015. The results show that during the period of analysis, non-current liabilities represented a higher portion of total debt (average value of 62%) than the current liabilities (average value of 38%). The results show that the period between 2010 and 2011 was the period where non-current and current liabilities varied the most in terms of their relevance in firms' total debt. The percentage for current liabilities increased in 2% and the non-current liabilities percentage decreased in 2%. The contrast with other years and the fact that 2010 and 2011 were years with global crisis affecting the Portuguese economy, could show a tendency for firms needing cash and, therefore, choosing short-term debt options instead of long-term. Although there are some differences between years, there are not significant changes in the average values of the variables analyzed.

Figure 3. Evolution of average Current and Non-Current Liabilities (2005-2015)

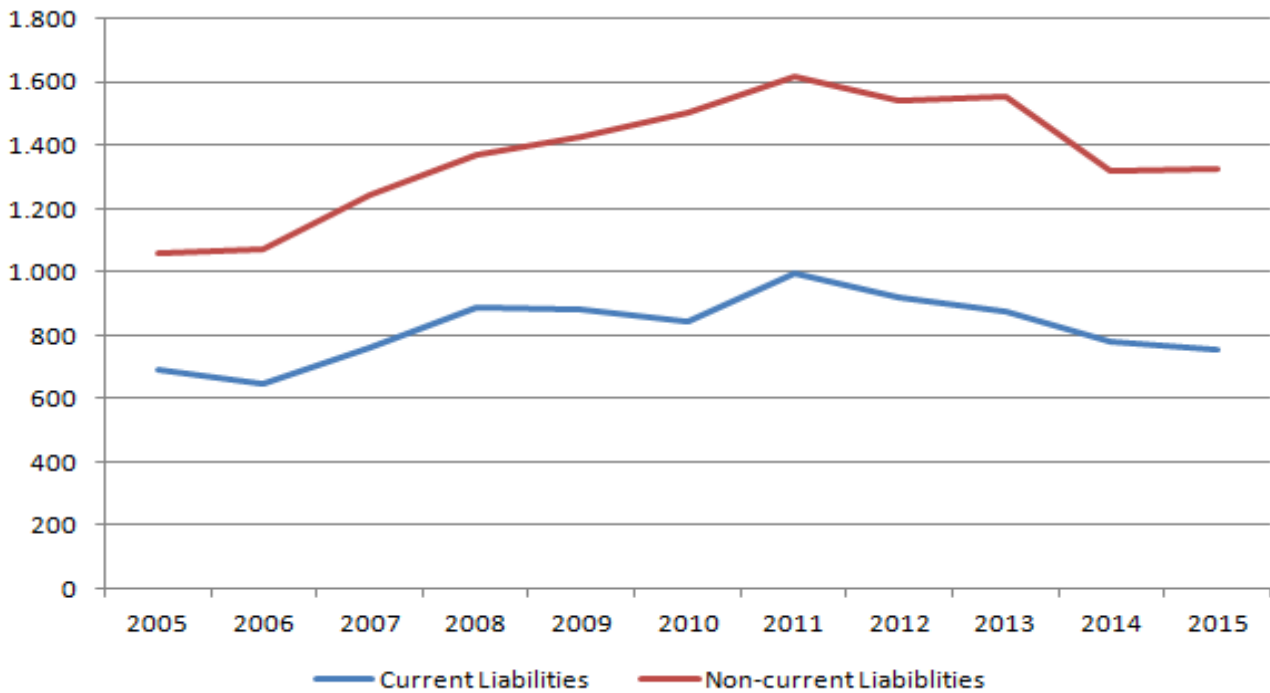


Table 7. Firms' Capital Structure – Average Liabilities and Equity (2005-2015)

Un.: M€

Variable	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Current Liabilities	690	649	763	890	881	842	999	918	872	778	756
Non-Current Liabilities	1.057	1.071	1.243	1.372	1.427	1.505	1.617	1.544	1.557	1.320	1.325
Equity	661	688	714	699	807	931	935	983	984	972	921

Table 7 shows the evolution of the average amount of current and non-current liabilities, as well as equity. Observing the values of equity in table 7, from 2008 to 2009 the average amount of equity increased by 15,45%. It was the biggest variation verified in the period analyzed and in all the variables. From 2009 to 2010, the amount increased by almost the same (an increase of 15,37%). These results show that during the initial times of the economic crisis that hit Europe back in 2008 drove firms, due to the environment of economic instability inside Europe and outside, to reinforce their levels of equity, in order to use internal financing for investments instead of external financing. Current liabilities suffered a decrease of 1% on the average amount from 2008 to 2009 and a decrease

of 4,43% from 2009 to 2010. On the other hand, from 2010 to 2011, average current liabilities registered their biggest value, with an increase of 19%, from the previous amount registered (842M€ against 999M€). The results show that during the year of 2011, firms needed short-term liabilities more than long-term liabilities (the value on this period only increased by 7%). During the years in which the IMF imposed measures and worked with the Portuguese government to balance public accounts and restore the economy, one see that both current, non-current liabilities and equity values decreased across time. The table also indicates that a connection with the trade-off theory may exist since the level of debt, specifically, long-term debt, plays an important role in the capital structure of the sampled firms, since the values obtained are higher than the values obtained for equity, indicating that probably firms tend to pursue debt in order to benefit from tax benefits.

Although all the average values register a decrease from 2013 to 2014, non-current liabilities is the variable that registers a larger decrease when compared to the decreases in the average values of the other variables.

Figure 4. Evolution of average Equity, Current and Non-Current Liabilities as % of Total Assets (2005-2015)

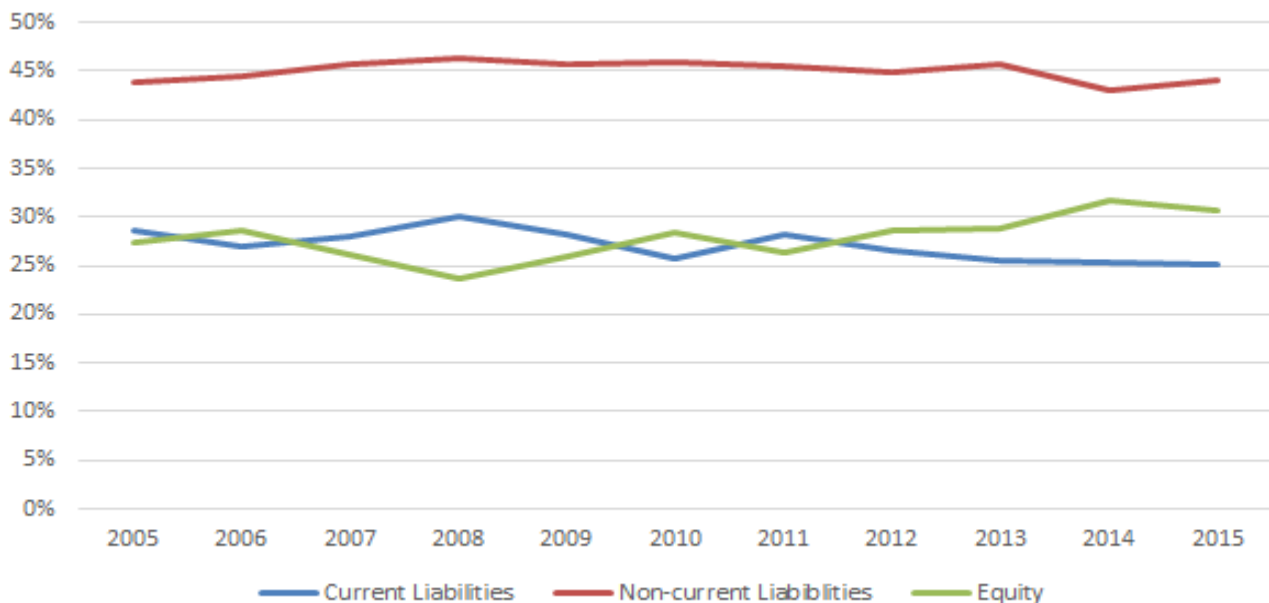


Figure 4 shows the evolution of current, non-current liabilities and equity as a percentage of total assets. As one can see by looking at the tendency verified in each curve representing current liabilities, non-current liabilities and equity, respectively, is that non-current liabilities had a constant behavior across 2005 to 2015, registering only between 2013 and 2014 a slight decrease. The behavior

of current liabilities and equity has the opposite for each year observed. When the average percentage of current liabilities on total assets increased, the average percentage of equity on total assets decreased. The most significant decrease verified on current liabilities was from 2008 to 2010 and for equity the period before, 2006 to 2008. The figure shows that the variable that mostly financed total assets of the firms was non-current liabilities and that from 2005 to 2015 there is a tendency for a direct substitution in choosing between current liabilities and equity depending on the period of time.

In contrast with other studies that focused on the determinants of capital structure for firms in the Portuguese economy, particularly SMEs, Proença *et al.*, (2014), found different average debt ratios from 2007 to 2010. SME's firms present a large percentage of their debt ratios mainly related to short-term debt (about 49%). As for long-term debt, the percentage is only 17%. SME's firms show a preference for short-term debt or their access to long-term options is not easy when compared to the access to short-term credit due to their size. In this study, our sample consists in large firms that have access to a bigger range of options concerning debt choices, short-term and long-term ones.

Figure 5. Evolution of average Current Liabilities and Current Assets (2005-2015)



Figure 5 describes how average current assets and current liabilities evolved during the period analyzed, 2005 to 2015. The period before crisis (2005 to 2007) is essentially represented by higher values of current liabilities other than current assets. This may indicate that during that period, firms' short-term debt responsibilities were higher than current assets. This relation changes from 2009 until

2011. The average current assets were higher than the average current liabilities during that time. This time frame is marked with the presence of the global financial crisis in Europe and, therefore in Portugal. In 2012, the average levels of current assets and current liabilities returned to the same tendency verified in the beginning of the period in analysis, 2005 to 2007. As for the time from 2013 to 2015, the time defined as having the presence and the effects of IMF's politics in the Portuguese economy, again a higher level of average current assets is observed, in comparison with current liabilities. If in some circumstance a firm had to cover all its short-term responsibilities, during these years, current assets would not be enough to cover them. Non-current assets by its nature are not adequate to fit short-term needs. The economic benefits generated by them take more than a year to convert in money, for example, and some are not maintained in order to use as future payments. The behavior identified before inverted between 2009 and 2010 and from 2013 to 2014. Although these different behaviors during the period analyzed, the average values of current assets and liabilities remained constant and did not suffer larger variations across time. The period from 2007 to 2009 was the period where the discrepancy between average current assets and liabilities was higher. During this period, in 2008, financial crisis affected Europe, particularly Portugal, and one can see a decrease of current liabilities and an increase of current assets.

Table 8. Firms' average value for Non-Current Assets (2005-2015)

Un.: M€

Variables	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Non-Current Assets	1.711	1.772	2.038	2.301	2.386	2.338	2.593	2.556	2.493	2.303	2.335

Figure 6. Evolution of average Non-Current Assets, Equity and Non-Current Liabilities as % of Total Assets (2005-2015)

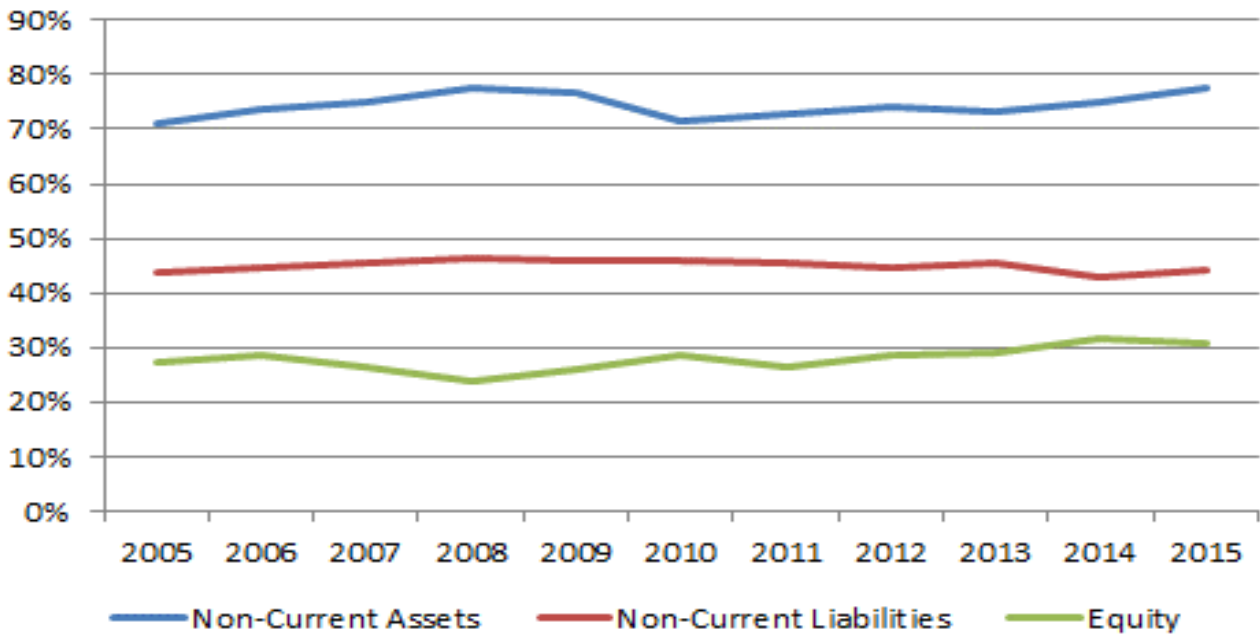


Table 8 describes the evolution of average non-current assets from 2005 to 2015. Figure 6 compares the evolution of average non-current assets, non-current liabilities and equity on percentage of total assets. Analyzing the average values for non-current assets in the table and in the figure, it is visible that until 2011, the level of non-current assets was increasing, despite the decrease of 2% from 2009 to 2010, having from 2006 to 2007 the biggest increase observed (about 15%). The years following 2011 show a slowly decrease on the average levels of non-current assets for firms. The purpose to observe the evolution and behavior of non-current assets, non-current liabilities and equity (taking in consideration tables 8 and 7) is to see if during the time analyzed tangible and other non-current assets were secured by non-current liabilities such as long-term credit and equity.

Table 9 shows the results obtained by adding the average value of non-current liabilities and equity compared with the average value of non-current assets.

Table 9. Average Non-Current Assets, Non-Current Liabilities and Equity – Results (2005-2015)

Year	Non-Current Assets	Non-Current Liabilities + Equity	Difference
2005	1.711	1.718	7
2006	1.772	1.759	-14
2007	2.038	1.957	-81
2008	2.301	2.071	-230
2009	2.386	2.234	-152
2010	2.338	2.436	98
2011	2.593	2.552	-41
2012	2.556	2.528	-28
2013	2.493	2.540	48
2014	2.303	2.292	-12
2015	2.335	2.246	-89

Analyzing the results obtained in table 9, it is possible to conclude that only in three of the years analyzed, average values of non-current liabilities plus equity were higher than the value of non-current assets. In the years where the average value of non-current assets are higher than the value of non-current liabilities plus equity, firms' non-current assets were not supported by only non-current liabilities and equity. Since the value of non-current assets is higher, some part of current liabilities was also supporting the value for non-current assets during these years. The years that registered a higher difference between the levels of non-current assets and non-current liabilities and equity combined were 2008 and 2009. The following year (2010) showed a value of non-current assets totally covered by permanent capitals, debt and equity. 2011 and 2012 showed again a negative result but in a lower value than compared with the years of 2008 and 2009.

Following this analysis, an observation of the evolution of average revenues is carried out. Revenues are the amount of money that goes to a firm and results from their business activities during a specific year. The analysis on revenues allow investors to perceive the amount of money that a firm is receiving from sales and is also an indicator of a firms' health.

Figure 7 . Evolution of average Revenues (2005-2015)

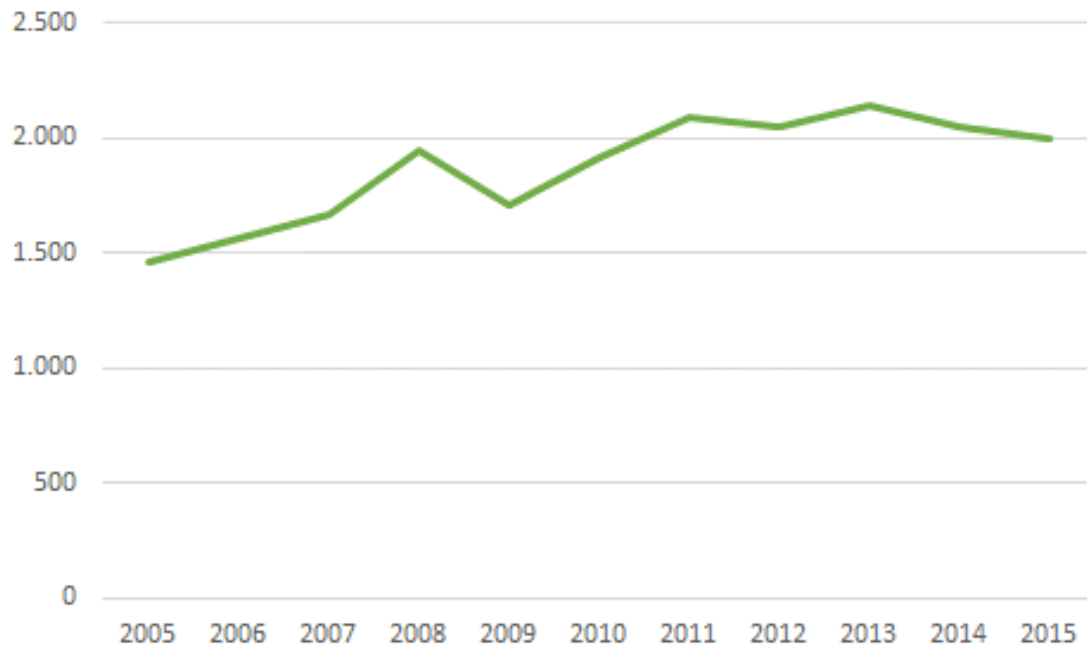


Figure 7 shows the evolution of revenues from 2005 to 2015. The behavior of revenues from 2005 to 2015 shows that between 2006 and 2008 the average value of revenues of firms analyzed were increasing. From 2008 to 2009 the value of the average revenue of firms decreased. It was the biggest decreased observed in the analyzed period. The year of 2008 was the year when economic crisis stricken Europe. Even though the decrease registered from 2008 to 2009, the average value of revenues in 2009 (about 1.704M€) was bigger than the average value of revenues in the years of 2005, 2006 and 2007: 1.462M€, 1.558M€ and 1.664M€ respectively. The years following 2009 registered an increase in the average values of revenues, occurring only from 2011 and 2012 a slight decrease and another from 2013 to 2015. The average values of revenue registered their highest values between 2011 and 2015.

3.5. Empirical Model

The methodology used is similar to the model used by Silva *et al.*, (2017) in the case of non-financial firms in Germany. Data gathered will be organized as panel data. This method presents some advantages like the development of more efficient estimators and reduces the collinearity among the independent variables. Our panel data will have two dimensions like in Silva *et al.*, (2017): panel variable (companies' names) and time variable (years in analysis).

An OLS regression will be estimated to study the relation between the determinants of capital structure selected, that in this study are size, profitability, tangibility, growth, liquidity and non-debt tax shield.

The model chosen is:

$$\text{DEBT } it = \alpha + \beta \text{INDEP } it + \mu it \quad (\text{iv})$$

Applying the model above to the dependent and independent variables selected and presented before, the model is written as:

$$\text{DEBT } it = \alpha + \beta 1 \text{ SIZE } it + \beta 2 \text{ PROF } it + \beta 3 \text{ TAN } it + \beta 4 \text{ GRWT } it + \beta 5 \text{ LIQ } it + \beta 6 \text{ NDTS } it + \mu it \quad (\text{v})$$

Where:

DEBT it = short-term debt (STD) or long-term debt (LTD) ratio of a firm i over the period t

α = constant

SIZE it = size of firm i over the period t

PROF it = profitability of firm i over the period t

TAN it = tangibility of firm i over the period t

LIQ it = liquidity of firm i over the period t

NDTS it = non-debt tax shield of firm i over the period t

The β 's are the regressions coefficients of the independent variables.

3.6. Methodology of Analysis

As already mentioned in the introduction section of this study, the questions based on the aim and objective of this work are:

Has the global financial crisis of 2008 affected Portuguese firms' capital structure?

Has the assistance program held by the IMF throughout the years (2011 until 2015) impacted the decisions regarding firm's capital structure?

In order to answer the questions above and hypotheses formulated in the review of literature of this work, a multiple linear regression was formulated and additionally a VIF test and a Pearson Correlation Matrix analysis was also carried out.

The model chosen was presented before in equation (v). This formula represents an OLS regression which has been estimated in Stata. The right side of the equation shows the dependent variable. The right side represents the coefficients and independent variables. This study uses two different dependent variables: short-term debt (STD) and long-term debt (LTD). Equations for these dependent are as follows:

$$\text{STD } it = \alpha + \beta_1 \text{SIZE}it + \beta_2 \text{PROF}it + \beta_3 \text{TAN}it + \beta_4 \text{GRWT}it + \beta_5 \text{LIQ}it + \beta_6 \text{NDT}Sit + \mu it \quad (\text{vi})$$

$$\text{LTD } it = \alpha + \beta_1 \text{SIZE}it + \beta_2 \text{PROF}it + \beta_3 \text{TAN}it + \beta_4 \text{GRWT}it + \beta_5 \text{LIQ}it + \beta_6 \text{NDT}Sit + \mu it \quad (\text{vii})$$

Where i refer to the firm and t to the year.

There is a positive or negative relationship with the dependent variable that change per various theories on capital structure. The relationships assumed in this study were mentioned before.

The ratios of the independent and dependent variables were calculated with the data obtained using Bloomberg. Since there is no missing information for any of the years in analysis, our panel data is balanced. Organizing data by panel data has some advantages, such as the possibility to develop and obtain better results from more efficient estimators and also reduces the existence of collinearity among the independent variables. The panel data used has two dimensions:

Panel variable: numeric value for each firm;

Time variable: years and period of time in analysis.

The two regressions will be analyzed separately and subsequently two panel data regressions will be run in Stata in order to obtain the results. There are two models of analysis when organizing data through panel data that are most commonly used: fixed effects and random effects. In order to choose between fixed and random effects a Hausman test (1978), will be carried out. One of the assumptions related with the model OLS is that there are no external variables that could probably be correlated with the explanatory variables already included in the model.

To run the Hausman test (1978), our null hypothesis will be that random effect model is appropriate (H_0) and, our alternative hypothesis, will be that fixed effect model is more appropriate (H_a).

H_0 = random effect model is more appropriate

H_a = fixed effect model is more appropriate

The test will be performed two times: one for STD and the other for LTD. The results for the test on STD and LTD are documented in Annex 4. After the test, we reject the null hypothesis for both regressions and conclude that the best model to use is the fixed effect model.

The aim of this study is to verify if global financial crisis of 2008 affected Portuguese sample firms' capital structure, this period is considered as the period from 2008 to 2012. Since this study addresses different time periods, there is a year effect to study two dummy variables were integrated in both regressions in order to study the impacts on dependent variables during a period of crisis (D2) and after crisis with the IMF's intervention the Portuguese economy (D3). The dummy variable D2 equals 1 when the observation is from the period during (2008 to 2012) crisis and 0 if not; the dummy variable D3 equals 1 when the observation is from the period after crisis (2013 to 2015) and 0 if not. When the observation value for both dummy variables is 0, it means that the observation refers to the period before crisis (2005 to 2007).

The regressions will be:

$$\mathbf{STD}_{it} = \alpha + \beta_1\mathbf{SIZE}_{it} + \beta_2\mathbf{PROF}_{it} + \beta_3\mathbf{TAN}_{it} + \beta_4\mathbf{GRWT}_{it} + \beta_5\mathbf{LIQ}_{it} + \beta_6\mathbf{NDTS}_{it} + \beta_7\mathbf{D2}_{it} + \beta_8\mathbf{D3}_{it} + \mu_{it} \quad \mathbf{(viii)}$$

$$\mathbf{LTD}_{it} = \alpha + \beta_1\mathbf{SIZE}_{it} + \beta_2\mathbf{PROF}_{it} + \beta_3\mathbf{TAN}_{it} + \beta_4\mathbf{GRWT}_{it} + \beta_5\mathbf{LIQ}_{it} + \beta_6\mathbf{NDTS}_{it} + \beta_7\mathbf{D2}_{it} + \beta_8\mathbf{D3}_{it} + \mu_{it} \quad \mathbf{(ix)}$$

Where i refer to firm and t refers to year and D2 and D3, for the dummy variables added to the regressions.

4. Results

According to the methodology and data presented before, this section addresses the results obtained regarding the regressions estimated. First, the results obtained on the VIF test and on the Pearson Correlation Matrix will be presented and analyzed. Following that presentation the results obtained on the regressions (short-term debt and long-term debt) estimated will be presented.

4.1. VIF Test and Pearson Correlation Matrix

Before proceeding to the regression analysis, a VIF test was run in SPSS in order to verify that there was no collinearity problem between the variables in study. The tables in Annex 2 show that the results obtained are lower than 5, meaning that the variables do not carry collinearity problems.

Additionally, a Pearson's Correlation Matrix for each period analyzed was obtained. This test was performed to see if there were relationships between the variables coefficients. To perform this test, four separate analyses were done: one for the pre-crisis period (2005 until 2007); one for the crisis period (2008 until 2012); one for the period with IMF intervention (2013 until 2015); and one for the whole period (2005 until 2015). Tables in Annex 3 show the results for this test.

The results in Table 5, annex 3, show that for the period before crisis, all variables are negatively correlated with STD with exception of NDTs. The relation between LTD and the dependent variables in study is positive, except for growth. The correlation between LTD and the dependent variables is only significant with tangibility of assets and size.

The results in Table 6, annex 3, show that the relation between STD and LTD is significant and negatively correlated. Size, profitability and liquidity are significant and negatively correlated with STD. Profitability is significantly negatively correlated with LTD.

Table 7, annex 3, shows the results for the period after crisis (2013 to 2015). The Pearson correlation results for this period show that STD is significant and negatively correlated with size, profitability and liquidity. There is also a positive and significant correlation between STD and NDTs (correlation = 0.254; p-value<0.05). LTD is negatively and significantly correlated with liquidity.

The results in Table 8, annex 3, which has the correlations for the whole period analyzed, show that size is significant and positively correlated with profitability and tangibility and negatively correlated with STD (correlation = -0.490; p-value<0.01) and positively correlated with LTD (correlation = 0.284; p-value<0.01). The relation between size and both STD and LTD becomes less strong during the crisis (2008 to 2012) and in the period after (2013 to 2015), as shown in tables 6 and 7 in annex 3, when comparing with the period before crisis (2005 to 2007). Size is also negatively

correlated with NDTs. Growth is not significant with any of the other variables in study, for any of the periods in study. Liquidity is significant and negatively correlated with STD and significant and positively correlated with profitability. Liquidity is also negatively correlated with tangibility at 5% level (correlation = 0.114; $p\text{-value} < 0.05$), as shown in table 8. The relation between STD, LTD and profitability is significant and negatively correlated. Profitability is also significant and negatively correlated with size. Tangibility is negatively and has significant correlation with STD. The relation between tangibility and LTD is significant and negatively correlated. Tangibility is also positively correlated with size and profitability. NDTs has significant and positive correlation with both STD and LTD. NDTs is also negatively correlated with profitability. Size, profitability and liquidity are negatively correlated with NDTs.

Although some correlations between variables were found the values for the correlations between variables are low, meaning that problems related to multi collinearity in the regressions estimated may not arise.

4.2. Regression Results

As mentioned in the sections before, this study used six different variables: debt, size, profitability, growth, tangibility, liquidity and non-debt tax shield. The model is a multiple linear regression organized through panel data.

The results obtained for each equation estimated will be presented and analyzed in two different sections to analyze separately the results on the different independent variables: STD and LTD.

Table 10. Panel Data Regression on Short-term debt

	STD			
Variable	Coefficient	Std. Err. (Robust)	t-statistic	P > t
SIZE	-0.035	0.025	-1.37	0.179
PROF	-0.827	0.316	-2.62	0.013
TAN	-0.014	0.146	-0.09	0.926
GRWT	-0.030	0.029	-1.04	0.307
LIQ	-0.088	0.025	-3.54	0.001
NDTS	-0.030	0.348	-0.09	0.931
D2	0.010	0.022	0.46	0.647
D3	-0.010	0.025	-0.38	0.710
α (constant)	0.762	0.194	3.94	0.000
R-squared:	within	0.2629		
	between	0.5889		
	overall	0.4555		
F-statistics:		3.55		
Prob > F:		0.0048		

Note: Table summarizes the estimation of equation (viii). The independent variable is STD (short-term debt/total assets). The explanatory variables are SIZE (natural logarithm of total assets), PROF (EBIT/total assets), TAN (tangible fixed assets/total assets), GRWT (total assets t - total assets $t-1$ /total assets $t-1$), LIQ (current assets/current liabilities), NDTS (total depreciation/total assets). We use panel data during 2008 to 2015. Coefficient values, standard error and t-statistic are represented.

Table 9 show the results for the regression carried out having as dependent variable the coefficient regression of STD. Table 10 show the results for the regression carried out having as dependent variable the coefficient regression of LTD.

Table 11. Panel Data Regression on Long-term debt

	LTD			
Variable	Coefficient	Std. Err. (Robust)	t-statistic	P > t
SIZE	0.083	0.044	1.90	0.067
PROF	-0.148	0.430	-0.34	0.733
TAN	-0.027	0.144	-0.19	0.854
GRWT	0.018	0.027	0.67	0.506
LIQ	0.001	0.020	0.03	0.979
NDTS	1.057	0.263	4.02	0.000
D2	-0.005	0.028	-0.18	0.858
D3	0.009	0.039	0.24	0.811
α (constant)	-0.252	0.277	-0.91	0.369
R-squared:	within	0.1059		
	between	0.0906		
	overall	0.0783		
F-statistics:		4.17		
Prob > F:		0.0017		

Note: Table summarizes the estimation of equation (ix). The independent variable is LTD (long-term debt/total assets). The explanatory variables are SIZE (natural logarithm of total assets), PROF (EBIT/total assets), TAN (tangible fixed assets/total assets), GRWT (total assets t - total assets $t-1$ /total assets $t-1$), LIQ (current assets/current liabilities), NDTS (total depreciation/total assets). We use panel data during 2008 to 2015. Coefficient values, standard error and t-statistic are represented.

Analyzing both tables and the results obtained and particularly the Prob > F, we can see that for both equations it is significant at 1% level. This assumption tells us that the independent variables selected to study the effects on the dependent variable are suitable to explain those effects. The values of R-squared obtained for both regressions are not that high. This means that although the independent variables are suitable to explain the regression, their capacity to predict the values of the dependent variable are not very high. When the dependent variable is short-term debt, the variables profitability and liquidity are statistically significant. When the dependent variable is long-term debt, only non-debt tax shield is statistically significant.

The variable size (SIZE) has a negative relation with short-term debt. When size increases by 1% , short-term debt decreases 3,5%. As for long-term debt, size presents a positive relationship. When size increases by 1%, long-term debt increases by 8,3%. As stated by trade-off theory, bigger firms have more opportunities and options to issue debt, especially long-term debt. Due to the fact that

they are large firms, they represent a lower risk in terms of bankruptcy and therefore interest more to creditors to offer credit options to these firms. The results obtained support the hypotheses for short-term and long-term debt (H4a and H4b).

The variable profitability (PROF) is negatively associated with both short-term and long-term debt. In the case of this variable, if profitability increases by 1 unit, short-term debt decreases by 0.827 and long-term debt decreases by 0.148. The results obtained support the hypotheses formulated in section 2 of this study (H3a and H3b). Titman & Wessels (1988) say that equity is not as expensive as debt so, therefore, firms more profitable than others tend to prefer equity instead of debt. Since they are profitable firms they can finance their investments with their own capital (equity), without the need to issue debt. As per Silva *et al.*, (2017), we can also state that profitable firms will choose to issue their equity as many times as needed to decrease the difference between their market and book value. The observed results are in accordance with the pecking order theory. Larger firms will use their internal resources to finance their activities since they have internal resources to do that. Smaller firms will pursue debt due to the insufficient resources they possess. This result is not in accordance with the trade-off theory since the theory says that profitable firms are more likely than others to have a high tax burden and a low risk associated with bankruptcy (Sayilgan *et al.*, 2002).

The results obtained for the variable tangibility of assets (TAN) are a negative relation with both short-term and long-term debt. Results show that if there is an increase of 1 unit in firm's tangible assets, short-term debt decreases by 0.014 and long-term debt decreases by 0.027. In this case the hypotheses formulated in section 2 are not supported since the expectation was for a positive relationship between the dependent and independent variables, considering the study of Myers and Maljuf (1984) that stated that firms with more tangible assets tend to issue more debt since they have the opportunity to use their tangible assets as collateral in case of bankruptcy for external financing. It indicated that firms use their internal resources to finance their investments, guaranteeing this way the lenders outcome. The results are in this case related with those found by Titman & Wessels (1988). They stated that managers could use their internal resources as collateral more than they should leading to conflicts between managers and shareholders.

Considering the results obtained for growth (GRWT), table 9 and 10 show that there is a negative relationship between short-term debt and growth and a positive relationship between growth and long-term debt. When there is an increase of 1 unit in firms' growth, short-term debt decreases by 0.030 and long-term debt increases by 0.018. The results support hypotheses H1a; growth has a negative impact on firms' short-term debt options. Trade-off theory states that firms with more intangible assets and better growth opportunities tend to borrow less than firms with more tangible

assets. There is a negative relation between growth level and debt. A firm that is on a good growth path may prefer their internal financial options instead of short-term debt to finance short-term investments. The hypothesis formulated related with long-term debt and its relation with growth expected a negative relationship between the two. Results show that instead there is a positive relationship between the two variables. As stated by Ross (1977), the expected relationship is positive, as growth work as a sign for financial institutions that the company is not going to default and by than giving more favorable terms of credit. The exposure to better financing options may lead firms to pursue more forms of external financing instead of using external resources.

The variable liquidity (LIQ), has a negative relationship with short-term debt and a positive relationship with long-term debt. The results found show that when liquidity of a firm increases by 1 unit, short-term debt decreases by 0.088 and long-term debt increases by 0.001. Although the increase verified in the long-term debt with changes in a firms' liquidity is on a percentage not that significant, an increase is verified anyway. This result does not support our hypothesis H2b since the expectation was a negative relationship between all variables. Regarding Antonio (2008) and Mazur (2007), firms having more liquidity will tend to use internal financing instead of external. On the other hand, despite the good liquidity levels firms could also pursue external financing at the same time to fulfill their obligations, saving internal financing for other financing options.

The variable non-debt tax shield (NDTS) show a negative relationship with short-term debt and a positive relationship with long-term debt. In relation with short-term debt, when non-debt tax shield increases 1 unit short-term debt decreases by 0.030 and in relation to long-term debt, when non-debt tax shield increases 1 unit long-term debt increases by 1.057. As in accordance with the hypothesis formulated before related to the behavior of short-term and long-term debt when there are changes in non-debt tax shield, the prediction related with short-term debt was verified. This result is also consistent with the trade-off theory. DeAngelo & Masulis (1980), explained that if a firm has a large value of depreciation expense, they will have less incentives to borrow debt (and by than having more expenses on the interest expense variable), since total depreciation expense works as a debt shield as well. A firm with a high value of depreciation expenses has less incentive to use debt. As for long-term debt regressions, the relation is positive. This result is not in accordance with the trade-off theory. Despite the fact that this relation is not in accordance with the trade-off theory, Vieira & Novo (2010), studying the capital structure of SMEs also found a negative relation between short-term debt and NDTS and a positive relation between long-term debt and NDTS.

We have said before, we introduced dummy variables in this study in order to better understand if the global financial crisis, defined in this study as affecting the firms in the sample from

2008 to 2012, and the period after crisis but with the IMF's intervention in the economy decision making in Portugal, defined here as from 2013 to 2015. Results show that for short-term debt the period during crisis have a positive effect and the period after a negative effect. As for long-term debt, the period during crisis had a negative effect and the period after a positive effect. For the period during crisis, 2008 to 2012, Portuguese listed firms increased their short-term debt levels by 0.010 and decreased their short-term debt after, from 2013 to 2015, by the same proportion as they have increased their short-term debt in the period before, 0.010. As for long-term debt, Portuguese firms decreased their debt by 0.005, during the period of crisis, and increased their long-term debt in the following period, a period after crisis, by 0.009.

5. Conclusions

The debate around capital structure and the factors that could impact the decisions that managers take into consideration when defining the next strategic or financial decision continues to be one of the most studied subjects among Finance. Many studies have been trying to answer the question regarding the optimal capital structure, the one that maximizes the firms' value. There have been many theories that provided answers for this subject but none of them seems to fit every country, firm or managers' realities. There is no universal answer because what suits the most in terms of capital structure can vary from country to country, time to time, firm to firm and even from an individual to another. This study presented some of these theories: the trade-off theory, the pecking order theory and the agency theory.

The aim of this study was to determine, by using a sample of firms and capital structure determinant variables, such as common financial ratios, if the recent financial crisis and the IMF's assistance program to Portugal, affected and/or changed firms' capital structure. Additionally, hypotheses were formulated in order to see which of the theories presented before better explains the Portuguese firms' capital structure. A sample of 33 listed companies in the Lisbon Euronext were used and data was gathered from 2005 to 2015 to produce panel data. An ordinary least square with fixed effects and dummy variables was estimated to provide results to the hypothesis formulated. The dependent variables were short and long-term debt. As for independent variables, size, growth, profitability, tangibility, liquidity and non-debt tax shield were used variables that could affect the dependent variables.

The results obtained with the study showed that all theories explain in certain ways the capital structure of Portuguese firms. The observations made revealed results confirming trade-off theory as well as pecking order theory. Considering the results obtained on the independent variable size, it affects positively long-term debt and negatively short-term debt. This result shows that larger Portuguese companies tend to issue more long-term debt options instead of short-term debt options, because of the access they have to them. Larger firms represent a minor risk of bankruptcy, so creditors offer more options and better conditions to larger companies instead of smaller ones and larger Portuguese firms tend to accept. As for profitability, it has a negative relation with both short and long-term debt. Profitable firms tend to pursue less debt to finance their investments because they finance themselves by using internal financing. The results on assets tangibility refused the hypothesis formulated since the expectation was for a positive relation on this variable with both long and short-term debt. Having in mind the literature and studies regarding the effects of this variable on the capital structure of firms, it was expected that this variable should have a positive relation with firms' debt.

Firms with more valuable tangible assets tend to use them as collateral in order to get external financing but, for the results regarding the capital structure of firms in the sample, the relation obtained was negative meaning that increases in the value of tangible assets do not lead Portuguese companies to issue more external debt, short or long-term wise. The results on growth show a negative relation with short-term debt and positive relation with long-term debt. The negative relation with short-term debt was obtained as expected but the relation with long-term debt not. The formulation of the hypothesis had in consideration the assumption that firms with better growing values, will tend to use less debt. On the contrary, results show that firms pursue more debt in order to finance their long-term investments. The results found on liquidity did not support the hypothesis formulated for long-term debt since we were expecting a negative relation with both dependent variables. Having more liquidity proved to be a disincentive for short-term debt but not for long-term debt. As for non-debt tax shield, only the prediction related with short-term debt was verified. Results show a positive relation with long-term debt. Regarding the results obtained with the estimation of the dummy variables, although there are not statistically significant, the results observed showed that the period during crisis, from 2008 to 2012, affected positively the dependent variable short-term debt and negatively long-term debt. This observation shows that during the time of the financial crisis, Portuguese firms increased their short-term debt options instead of long-term debt. This could be related with the instability verified in economies when affected by financial crisis. As for the period before the crisis, but marked with the presence and interference of IMF's measures on the Portuguese economy, a positive relation with long-term debt and a negative relation with short-term debt were obtained. This result shows that after the period of crisis, and despite all the restricted measures that could be imposed to the Portuguese economy and affecting indirectly the capital structure of Portuguese firms, the tendency verified in the previous years remained valid for the period from 2013 to 2015, with firms increasing long-term debt and decreasing it short-term debt.

The study show, through the descriptive analysis made, the review of literature presented and the econometric model regressed that Portuguese firms prefer to use long-term debt instead of short-term debt. Although, during the recent financial crisis that came to Europe and Portugal in 2008, results show a slight preference for short-term debt during those years.

The main limitations of this study had been the small sample, since there are not many firms listed in the Lisbon Euronext that are large and have data available for all the periods in analysis, exclusions had to be made in accordance with the assumption that firms with missing data could not be considered for the study; the selection of the independent variables was based on previous studies regarding capital structure decisions and the choice of each ones better fit the Portuguese economy.

Keeping this in mind, some other important explanatory variables could have been left out of the study. Although the period after 2012 could be considered as a period without crisis the fact is that an economy takes a certain time to recover from a crisis. The IMF intervention in 2012 had the mission to balance the public accounts after the crisis and to purpose measures that could prevent future crisis to affect the economy. Since these were considered harsh measures, the recovery time from the crisis could have been longer than without the IMF intervention. Thus, future research on the period after crisis should be considered and compared with the period during crisis to see differences between the relations of the variables in those times.

As well as continuing to study the post crisis and crisis differences, an industry study could also reveal important results to the capital structure study. Additionally, considering other country specific factors instead of just firm specific factors could show some new important features or new opportunities of comparison with studies that already had addressed these issues. New studies applied to other countries could reveal new similarities or reinforcing differences and contribute to some more answers around the question on capital structure decisions.

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7. Annexes

Annex 1: Descriptive Statistics Tables Results

Table 1. Descriptive Analysis before crisis (2005-2007)

Variable	Obs	Mean	Std. Dev.	Min	Max
STD	99	0.399	0.176	0.091	0.991
LTD	99	0.328	0.161	0	0.741
SIZE	99	6.443	1.728	3.174	10.357
PROF	99	0.043	0.065	-0.195	0.178
TAN	99	0.332	0.199	0.001	0.779
GRWT	99	0.084	0.236	-0.365	1.284
LIQ	99	1.067	0.627	0.169	3.563
NDTS	99	0.053	0.056	0.001	0.425

Table 2. Descriptive Analysis during crisis (2008-2012)

Variable	Obs	Mean	Std. Dev.	Min	Max
STD	165	0.432	0.246	0.120	2.018
LTD	165	0.336	0.193	0.009	0.966
SIZE	165	6.656	1.723	3.231	10.660
PROF	165	0.025	0.079	-0.367	0.115
TAN	165	0.293	0.195	0.000	0.745
GRWT	165	0.047	0.336	-0.521	2.716
LIQ	165	0.917	0.582	0.060	3.240
NDTS	165	0.046	0.036	0.001	0.164

Table 3. Descriptive Analysis during IMF Intervention (2013-2015)

Variable	Obs	Mean	Std. Dev.	Min	Max
STD	99	0.392	0.236	0.031	1.239
LTD	99	0.332	0.226	0.000	1.045
SIZE	99	6.532	1.776	3.062	10.666
PROF	99	0.030	0.065	-0.301	0.118
TAN	99	0.256	0.200	0.000	0.645
GRWT	99	-0.011	0.199	-0.899	0.890
LIQ	99	1.176	1.229	0.019	7.539
NDTS	99	0.039	0.034	0.000	0.144

Table 4. Descriptive Analysis 2005-2015

Variable	Obs	Mean	Std. Dev.	Min	Max
STD	363	0.413	0.226	0.031	2.018
LTD	363	0.333	0.194	0	1.046
SIZE	363	6.564	1.737	3.062	10.666
PROF	363	0.031	0.072	-0.367	0.179
TAN	363	0.294	0.199	0.000	0.779
GRWT	363	0.040	0.280	-0.899	2.716
LIQ	363	1.029	0.825	0.019	7.539
NDTS	363	0.046	0.042	0.000	0.425

Annex 2: Collinearity Statistics VIF test

Coefficientes (a)

Model	Collinearity Statistics	
	Tolerance	VIF
SIZE	0.760	1.315
PROF	0.798	1.253
TAN	0.833	1.200
GRWT	0.984	1.016
LIQ	0.905	1.105
NDTS	0.841	1.189

(a). Dependent Variable: STD

Coefficientes (a)

Model	Collinearity Statistics	
	Tolerance	VIF
SIZE	0.760	1.315
PROF	0.798	1.253
TAN	0.833	1.200
GRWT	0.984	1.016
LIQ	0.905	1.105
NDTS	0.841	1.189

(a). Dependent Variable: LTD

Annex 3: Pearson Correlation Coefficient Analysis

Table 5. Pearson Correlation Matrix pre-crisis period (2005-2007)

	STD	LTD	SIZE	PROF	TAN	GRWT	LIQ	NDTS
STD	1							
LTD	-0.304**	1						
SIZE	-0.605**	0.284**	1					
PROF	-0.580**	0.036	0.523**	1				
TAN	-0.046	0.248*	0.265**	0.052	1			
GRWT	-0.151	-0.041	0.130	0.129	-0.107	1		
LIQ	-0.537**	0.126	0.177	0.276**	-0.253*	0.077	1	
NDTS	0.092	0.073	-0.193	-0.067	0.008	-0.148	-0.199*	1

*. Correlation is significant at the 0.05 level

**.. Correlation is significant at the 0.01 level

Note: Table 5 presents Pearson's correlations between dependent and independent variables as well as for the whole period analyzed. STD is Short-Term Debt divided by Total Assets. LTD is Long-Term Debt divided by Total Assets. SIZE is measured by the logarithm of Total Assets, PROF is Profitability measured by EBIT divided by Total Assets, TAN is Asset Tangibility measured by the weight of Tangible Assets on Total Assets, GRWT is Growth measured by the difference between Total Assets from one year to another, divided by the value of Total Assets registered in the period before, LIQ is Liquidity is measured by the current value of assets divided by the current value of liabilities and NDTS is Non-Debt Tax Shield calculated by dividing Total Depreciation and Amortization Expense to Total Assets.

Table 6. Pearson Correlation Matrix during crisis period (2008-2012)

	STD	LTD	SIZE	PROF	TAN	GRWT	LIQ	NDTS
STD	1							
LTD	-0.347**	1						
SIZE	-0.509**	0.255**	1					
PROF	-0.415**	-0.299**	0.388**	1				
TAN	-0.134	0.090	0.344**	0.092	1			
GRWT	-0.100	0.053	0.044	0.028	-0.092	1		
LIQ	-0.433**	0.064	0.102	0.175*	0.016	0.050	1	
NDTS	0.322**	0.207**	-0.099	-0.496**	0.158*	-0.082	-0.321**	1

*. Correlation is significant at the 0.05 level

** . Correlation is significant at the 0.01 level

Table 7. Pearson Correlation Matrix during IMF's intervention (2013-2015)

	STD	LTD	SIZE	PROF	TAN	GRWT	LIQ	NDTS
STD	1							
LTD	-0.138	1						
SIZE	-0.438**	0.131	1					
PROF	-0.348**	-0.136	0.253*	1				
TAN	-0.122	0.164	0.340**	0.187	1			
GRWT	0.108	0.136	0.036	-0.003	0.137	1		
LIQ	-0.483**	-0.215*	0.156	-0.016	-0.202*	-0.321**	1	
NDTS	0.254*	0.175	-0.068	-0.313**	0.411**	0.169	-0.287**	1

*. Correlation is significant at the 0.05 level

** . Correlation is significant at the 0.01 level

Table 8. Pearson Correlation Matrix total period (2005-2015)

	STD	LTD	SIZE	PROF	TAN	GRWT	LIQ	NDTS
STD	1							
LTD	-0.267**	1						
SIZE	-0.490**	0.220**	1					
PROF	-0.429**	-0.180**	0.377**	1				
TAN	-0.107*	0.146**	0.315**	0.114*	1			
GRWT	-0.061	0.051	0.059	0.050	-0.029	1		
LIQ	-0.450**	-0.061	0.128*	0.114*	-0.136**	-0.068	1	
NDTS	0.219*	0.144**	-0.125*	-0.284**	0.170**	-0.041	-0.241**	1

*. Correlation is significant at the 0.05 level

** . Correlation is significant at the 0.01 level

Annex 4: Hausman Test (1978)

1) Results of Hausman Test (1978) on STD regression:

	Coefficients			sqrt (diag(V_b-V_B)) S.E.
	(b) fe	(B) re	(b-B) Difference	
SIZE	-0.031	-0.042	0.010	0.016
PROF	-0.836	-0.833	-0.002	0.048
TAN	-0.008	-0.018	0.010	0.040
GRWT	-0.029	-0.027	-0.001	0.007
LIQ	-0.090	-0.093	0.004	0.004
NDTS	-0.013	-0.003	-0.010	0.094

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho = differences in coefficients not systematic

$$\begin{aligned} \text{chi2}(6) &= (b-B)' [(V_b-V_B)^{-1}] (b-B) \\ &= 1.33 \end{aligned}$$

$$\text{Prob}>\text{chi2} = 0.9699$$

2) Results of Hausman Test (1978) on LTD regression:

	Coefficients			sqrt (diag(V_b-V_B)) S.E.
	(b) fe	(B) re	(b-B) Difference	
SIZE	0.082	0.048	0.034	0.015
PROF	-0.146	-0.250	0.105	0.036
TAN	-0.034	-0.027	-0.006	0.034
GRWT	0.017	0.028	-0.011	0.005
LIQ	0.001	-0.004	0.006	0.004
NDTS	1.039	0.927	0.112	0.073

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho = differences in coefficients not systematic

$$\begin{aligned} \text{chi2}(6) &= (b-B)' [(V_b-V_B)^{-1}] (b-B) \\ &= 15.25 \end{aligned}$$

$$\text{Prob}>\text{chi2} = 0.0184$$