The Impact of the Determinants of Capital Structure Change after a Leveraged Buyout

Daniela Turuta
Up201500264@fep.up.pt

Master Dissertation in Finance

Supervisor:

Professor Miguel Augusto Gomes Sousa, Phd

September, 2017

BIOGRAPHICAL NOTE

Daniela Turuta was born in Bălţi, Moldova, on the 4th of July, 1993.

Her university journey began in 2012 with the Bachelor degree in Management in the University of Minho which she concluded in 2015 and then entering the Master degree of Finance with no gap year in between.

Outside of academics, she enjoys outdoor activities such as running and hiking as well as discovering new books, making herself a frequent presence at book stores and public libraries.

ACKNOWLEDGEMENTS

The completion of this dissertation could not be achieved without the participation and support of certain people to whom I would like to acknowledge their role in my academic journey. Firstly, I express a genuine and deep sense of gratitude to my supervisor, Professor Miguel Sousa, for the unwearyingly help, encouragement and assistance not only in this dissertation but in my overall Master journey. His dedication of time, effort and continuous support was essential for the completion of this dissertation to which I am genuinely grateful. Secondly, I would like to present my deepest gratitude to my family, namely to my parents Liudmila Turuta, Nicolae Turuta and brother Andrei Turuta as well as to Pedro Gonçalves for the unconditional love, support and faith they all fueled me with throughout my academic life. Lastly but not least, I would like to express my deepest thanks to Camila Lucena and Mário Cardoso for their trust, amazing friendship and support. Thank you.

ABSTRACT

The determinants of capital structure choice of a firm have been highly discussed over the last 60 years. However, when the determinants of capital structure choice are related to a specific type of companies, the ones that undertake leveraged buyout operations, the field lacks more empirical evidence. Therefore, this dissertation aims to study the impact of the determinants of capital structure change, previously studied, after a leveraged buyout operation. Focusing on private European firms, this dissertation proves that the same determinants do not impact in the same way the capital structure for high-leveraged and non-high-leveraged firms; that determinants such as liquidity, business risk, profitability, taxation, tangibility and size do impact the capital structure change after a LBO and higher liquidity, larger company size, higher asset tangibility and profitability do explain why some LBO's are more leveraged than others.

Key-words: capital structure, determinants, private equity, leveraged buyouts, trade-off, pecking order.

JEL-Codes: G02, G31, G340

SUMÁRIO

A estrutura de capitais de uma empresa foi inicialmente apresentada como irrelevante para a rentabilidade da empresa pelo teorema de Miller e Modigliani. Com este teorema, resultou uma extensiva discussão acerca deste assunto. Devido ao vasto numero de estudos ficou empiricamente comprovado que a estrutura de capitais é importante para o valor da empresa e por tanto é necessário escolher a combinação de financiamento ótimo. Desta forma, os fatores que influenciam a escolha desta combinação, nomeadamente os determinantes de estrutura de capitais, passaram as ser vastamente estudados pela literatura. Embora, o extenso número de artigos neste tema, poucos foram os que se aventuraram a estudar as empresas privadas da União Europeia.

Outra componente desta dissertação, é a compra alavancada de empresas, que consiste na compra das ações de uma empresa usando maioritariamente divida como financiamento. Este tipo de negocio existe há muito tempo, porém são poucos os estudos que tentam estudar a estrutura de capitais deste tipo de aquisições.

Este estudo visa contribuir ao reduzido número de estudos acerca dos determinantes de estrutura de capitais nas compras de alavancagem.

Os resultados desta dissertação demonstram que certos determinantes, como o investimento em ativos fixos, a tangibilidade, a dimensão da empresa e o imposto, entre outros, impactam a estrutura de capitais das empresas endividadas porem não na mesma forma que o seu impacto tem efeito numa empresa não-endividada. Também podemos concluir que os mesmos determinam impactam mais as empresas endividadas do que as não endividadas e que determinantes como a liquide e a tangibilidade (entres outros) conseguem explicar o porque de certas empresas que são adquiridas por alavancagem serem mais endividadas que outras.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

Modigliani and Miller (1958) in their famous paper, brought a revolutionary view upon the conventional understanding of the capital structure. This pioneer view was followed by innumerous articles and studies that criticized and tried to state their thoughts on the topic. However, as much as it was criticized, this theorem opened a debated on a topic that until then no academic was interested in and so it lead to a journey of discovery and better understanding of this field.

The progress that followed this initial paper lead to an extent amount of studies on optimal capital structure. Furthermore, it leads to other types of studies, not about the optimal capital structure but about the decision making behind that capital structure. Titman and Wessels (1988) started to question the behavior behind the capital structure choice. They as well as other authors presented alternative capital structure theories, such as the pecking order and the static trade-off theory, that tried to explain the way that companies chose their capital structure. With these theories, the academic authors started to research the determinants responsible for the capital structure choice.

Even though, there are plenty articles on the determinants of capital structure, the same does not happen when the topic refers to a specific type of companies: firm's that undertake a leveraged buyout operation. In this field, there are very little empirical evidence that proves which determinant impacts the capital structure of LBO firms.
The object of this dissertation is to study the change of capital structure before and after a LBO operation in the target company and which factor impacts that process.

The study will be structured in two main parts. The first part will aim to observe if the determinants of capital structure previously studied by other authors impact in the same way the capital structure of high leveraged (defined as those companies that have been target of a private equity firm in the last 10 years) and non-high-leveraged companies. Past studies have already determined some factors that impact the capital structure of the companies. However, the studies treated the impact of each factor as an average for the all sample of companies. As it is widely known, the average is a statistical measure with some major disadvantages namely being sensitive to extreme values and it does not take into account the variability inside the sample. Therefore, the results presented by previous studies do not reflect the impact of a certain factor on individual types of companies.

The second part, will focus only on the subsample of leveraged companies that have been target of a private equity in the last 10 years. Because some targets of LBO seem to be more leveraged than others, it will be interesting to analyze whether the determinants identified in the first part are those that impact the change on capital structure occurred after a LBO operation. It will provide answer to the following research questions: What are the determinants of the capital structure change after the LBO operation? What are the determinants of capital structure for high-leveraged and non-high-leveraged companies in Europe Union and how they impact the capital structure of such companies? Finally, why are some LBO target companies more leveraged than others?

Beside this section, this report is structured as follows: in Section 2, a literature review on the topic of capital structure theories, determinants of capitals structure and leverage buyout operations is developed in a set of subsections. Then in Section 3 and 4 all the data and methodological aspects necessary for this dissertation are presented, respectively. In section 5, is presented the relevant descriptive statistics while in section 6 the results of the empirical analysis are discussed. Finally, chapter 7 and 8 and 9 refer to the conclusion, references and appendixes, respectively, used in this report.

2. LITERATURE REVIEW

In order to successfully build an explanatory model for this dissertation and answer the research questions, it is important to reflect on the previous literature produced in this field. As mentioned in the introduction, corporate capital structure and its determinants has been a highly discussed and studied topic by authors for more than fifty years. Considering the extensive amount of studies performed on this research topic it is not in the capacity of this dissertation to analyze the entire contribution made to this field. Therefore, this chapter will outline some of the main previous studies which possess relevant information for this dissertation and present the main theories developed on this topic since 1958. This chapter will be divided into three sections. In the first section, we will present the main corporate capital structure theories as well as its empirical evidence while in the second section we will describe the main theoretical and empirical studies produced on the determinants of capital structure. Finally, in the third part we will analyze the studies that are more similar and explanatory of the Leverage Buyout field.

2.1 Capital Structure

2.1.1 Defining Capital Structure

Given the fact that corporate capital structure represents an important element of this dissertation it is necessary to understand its definition prior to proceeding to describe its theories and determinants.

A company's financial management team always face two types of financial decisions. The first one corresponds to the investment decisions and the second is the financing decisions. Thus, the capital structure of a company refers to how a company finances its investments, which could consist of a combination of equity debt or hybrids.

Regarding the literature, according to Ross (2010) the *"capital structure (or financial structure) is the specific mixture of long-term debt and equity the firm uses to finance its operations.".* Similarly, Brealey (2001) state in their third edition of *"Fundamentals of Corporate Finance"* that capital structure corresponds to "the firm's mix of long-term financing".

2.1.2 Modigliani-Miller Theorem

As previously mentioned, Modigliani and Miller were the pioneers in building the capital structure theory. They started this discussion about the relevance of corporate capital structure by publishing the famous article in 1958 (Modigliani & Miller, 1958).

In this article, the authors state that in a world with strict assumptions like no taxes and competitive and frictionless markets the capital structure presents no impact on the firm value thus becoming irrelevant. In Tarbet (2011), this Modigliani and Miller theorem presents strong assumptions such as that there are no taxes, there is perfect information, no costs of financial distress and liquidation and there are perfect and frictionless capital markets. Therefore, under these strong assumptions it becomes indifferent for a company to finance its investments with either debt or equity and the value of the company is completely independent of the its capital structure. This corresponds to the Preposition I of the theorem. In addition, the authors presented Preposition II, a derivation of Preposition I, which states that a firm's cost of equity is directly related to its debt-to-equity ratio, meaning that the higher the debt-to-equity ratio the higher will be the cost of equity of the company. In this second preposition, the value of the firm depends of its debt-to-equity ratio, of its cost of debt and of the return of its assets (Ross, 2010).

The publishing of this theorem resulted in a major discussion right afterwards. Many authors criticized and published articles against the Modigliani and Miller Theorem. One of the first criticism came from Durand (1959) where the author mainly criticized the strong assumptions present in the Modigliani and Miller Theorem. According to him, even though Modigliani and Miller (1958) tried to achieve a *"(...) operational definition of the cost of capital and a workable theory of investment",* they used very strong assumptions that were not suitable for the real world. In the real-world markets are not perfect nor frictionless and there are taxes and risks such as bankruptcy costs and agency costs. This view was shared among several other authors as well.

Eventually, later Modigliani and Miller (1963) published another article where they relaxed the "no taxes assumption" and stated that the companies could profit from tax benefits when using debt as a way of financing. Additionally, Miller (1977) published an article where he argues that *"(...)even in a world in which interest payments are fully deductible in computing corporate income taxes, the value of the firm, in equilibrium will still be independent of its capital structure"*. Thus, for Miller (1977) the initial Modigliani

and Miller (1958) Theorem still applies in a world with taxes because individual and corporate taxes cancel each other.

Even though it was a controversial theorem, it still provided with a path for discovery of the effects that influences the capital structure of a firm.

2.1.3 Capital Structure Policy Models

Considering that the assumptions of the Modigliani and Miller (1958) Theorem were to be relaxed, the capital structure would become very relevant for the company's performance. Thus, it is important to understand what impacts the decisions of capital structure choice. The debate and progress on this topic of capital structure continued, after the Modigliani and Miller (1958) paper, and there were many studies published about the optimal capital structure of a company. However, as Myers (1984) argues, there were too many articles on optimal capital structure but none on the actual financial behavior. At the time, there were no articles which explained the actual decisions regarding the capital structure of a company. As an example, Myers (1984)[1] tried to explain this financial behavior through an article "designed as a one-on-one competition of the static tradeoff and pecking-order stories". In addition, Myers (2001) states that *"There is no universal theory of debt-to-equity choice, and no reason to expect one. There are several useful conditional theories, however."* Therefore, these conditional theories like the trade-off theory and pecking order theory began to be tested and studied in order to explain the factors behind the choice of capital structure.

Therefore, ins this section we present a summary of the definition, prediction and empirical evidence of both theories. These theories will either defend the existence of an optimal debt-to-equity ratio which firms can always adjust to (trade-off theory) or present arguments against the existence of a well-defined target capital structure (pecking order theory).

[1] Meyers (1984): The author excluded the managerial theories and dropped the Miller's neutral mutation hypothesis that states that "firms fall into some financing patterns(...)which have no material effect on firm value".

2.1.3.1 Pecking Order Theory

The pecking order theory presents the idea that financing sources of a company are chosen in a certain hierarchical order. According to Donaldson (1961) the theory defends that: "*Management strongly favored internal generation as a source of new funds even to the exclusion of external funds except for occasional unavoidable 'bulges' in the need for funds"*, meaning that firms will choose internal sources of financing over the external sources of financing.

Why this preference? According to Myers and Majluf (1984) this preference for internal financing rather than the external financing happens due to information asymmetry. As stated by the author, when a company seeks external financing it faces two main costs: information costs and transaction costs. Given that there will be a separation between the ownership and the management team, the uncertainty will increase. Investors have the knowledge that managers possess more information and at any effort of seeking for external funding, the investors will eventually interpret that as a sign that the management team believes that the company is overvalued. Thus, they will lower their value for the new stocks.

According to Myers and Majluf (1984) this is a sign that managers behave in the best interest of investors thus they will not issue undervalued stocks (because investors by believing that the company is overvalued will tend to lower the stock price and it will result in an undervalued stock). This corresponds to information asymmetry. Therefore, there is a hierarchical preference regarding financial sources starting with internal financing, followed by debt and then they will seek equity financing but only as a last resort. In addition, transaction costs also impact the financing choice, being equity financing more expensive than a bank loan.

Myers (1984), defends that the pecking order theory, motivated by the asymmetric information model, predicts that: *"(...) the announcement of a stock issue will cause stock price to fall. It also predicts that stock price should not fall, other things equal, if default-risk debt is issued."* Similarly, Myers (2001) state that firms avoid equity issues because it might signal that stocks are overvalued. Thus, these authors defend equally that firms use the pecking order theory when deciding on its capital structure.

The empirical evidence is inconclusive. There are some studies, such as, Shyam-Sunder and C. Myers (1999) and Frank and Goyal (2003) that support the pecking order theory regarding capital structure, however, some articles do not such as Helwege and

Liang (1996) where the authors state that *"Firms that access the capital markets do not follow the pecking order when choosing the type of security to offer."*.

2.1.3.2 Trade-off Theory

The trade-off theory could be understood intuitively just by its name. Trade-off means, in a general way, to balance the positive and negative aspects of two opposite situations and then choose one over the other. Regarding the capital structure, this theory states that a company will decide on the mix of equity and debt based on its benefit and costs.

According to Kraus and Litzenberger (1973) and Myers (1984), the debt to equity ratio of a company will be established based on a trade-off between *"the costs and benefits of borrowing, holding the firm's assets and investment plans constant"*. Thus, a company may be tempted to increase its debt levels to profit from tax savings, however as more debt increases the risk of the firm, the debt level should result from a trade-off decision between debt tax savings and bankruptcy costs. Therefore, a firm's debt-to-equity ratio will always be its optimal ratio. This aspect of the trade-off theory was also criticized by Myers (1984) because for a firm to always be at its debt-to-equity ratio it needs to adjust its capital structure whenever the market changes. The trade-off theory assumes that there are no costs of adjustments and therefore it was named as the static trade-off theory. However, adjusting the level of debt and equity carry transactions costs, and companies cannot adjust as much as the trade-off theory predicts.

As in the pecking order theory, the empirical evidence for the trade-off theory is also inconclusive. While Trezevant (1992) and López-Gracia and Sogorb-Mira (2008) found empirical support for the trade-off theory, Bradley et al. (1984) provides no clear evidence for this support.

2.2 Determinants of Capital Structure

Another core element of this dissertation are the determinants of capital structure. As mentioned before, the debate about the relevance of capital structure started with the Modigliani-Miller Theorem which defined that the capital structure is irrelevant for the firm value. However, if those assumptions, which some of them are strongly unrealistic,

were relaxed then the capital structure becomes very relevant for the company. Therefore, academics started to focus their studies on which theories affected the decisions of capital structured, which were already mentioned, as well as which were the determinants that affected the decisions about the mix of equity and debt financing in a company.

Thus, this section will highlight the main contributions made in literature about the determinants of capital structure that are of importance for this dissertation.

Titman and Wessels (1988) were ones of the many authors that tried to explain the relation between leverage and some firm-specific variables such as "*asset structure, non-debt tax shields, growth, uniqueness, industry classification, size, business risk, and profitability.*". Using a sample of 469 United States (U.S.) firms and a factor-analytic model the result consisted of a negative relationship between leverage and size, profitability and uniqueness while rest of the variables did not present a significant impact on leverage.

Additionally, Rajan and Zingales (1995) used international data of G-7[2] countries to evaluate four variables namely: tangibility, market-to-book ratio (growth opportunities), size and profitability, and concluded that leverage of a company is positively correlated with tangibility and size, but it is negatively correlated with market-to-book ratio and profitability.

Unfortunately, most of the literature, regarding the determinants of capital structure, use either U.S. firms or listed firms. Even though, their results are important and are still taken into account[3], the literature that used European firms or private firms as data are more important to guide this dissertation into applying a successful econometric model and achieve the desired answers. Therefore, we will now present a summary of some articles that were crucial for the development of this dissertation.

Miguel and Pindado (2001) studied a sample of 133 listed Spanish firms, from 1990 to 1997 using a two-step Generalized Method of Moments (GMM) model and concluded that non-debt tax shield and investment among other variables presented a significant impact on firm's leverage ratio.

In addition, Hall et al. (2004) using a large sample of 4000 unlisted firms from eight

[2] G-7 countries corresponded to the United States, Japan, Germany, France, Italy, the United Kingdom, and Canada.

[3] See a summary of the methodology, variables measure and the relation of the determinants with leverage proven in the main literature in appendix 1, 4 and 6, respectively.

European countries[4] from 1995 studied if the difference in capital structure of European SME's[5] are due to firm-specific or country specific factors. Thus, they concluded from the firm specific factors tangibility, growth opportunities, company size and profitability were the determinants that affect significantly the leverage ratio of a company.

Similarly, Jong et al. (2008), using an extensive sample of 11845 firms from 42 countries worldwide englobing public and private firms, analyzed the impact of firm-Lspecific and country-specific determinants on leverage. The results, form the firm-specific analysis, comprised a significant and positive impact of tangibility, size and taxation as well as a negative impact of business risk, taxation[6], growth opportunities, profitability and liquidity on leverage.

Finally, Antoniou et al. (2008) also used a mixed sample of public and private firms from some European countries[7], Japan and U.S. to study *"(...)how the firms from capital market-oriented economies (the U.K. and U.S.) and bank-oriented economies (France, Germany and Japan) determine their capital structure."*. The authors concluded that tangibility and company size appeared as significant and with a positive impact on leverage while growth opportunities and profitability presented a negative impact. The non-debt tax shield showed both signs while growth opportunities, business risk and effective tax rate were not significant.

Therefore, basing on the existent literature and on the alternative capital structure theories[8] the main variables mostly studied are the following: asset structure or tangibility, non-debt tax shields, growth opportunities, product uniqueness, company size, business risk, profitability, liquidity, taxes, effective tax rate and investment.

2.2.1 Firm-specific Determinants of Capital Structure and Hypothesis Development

In order to successfully include the determinants of capital structure in our empirical model it is necessary to understand its characteristics as well as its theoretical and

[4] Belgium, Germany, Spain, Ireland, Italy, Netherlands, Portugal and United Kingdom (U.K.).
[5] Small and medium size enterprises.
[6] The authors found both signs (negative and positive) for taxation.
[7] France, Germany, Japan and United Kingdom (U.K.).
[8] Pecking Order and Static Trade-off Theory.

empirically proved relation with leverage. The determinants chosen for this dissertation were based on the existing literature. Even though, some of the determinants were already tested on the European firms, others (for example liquidity) were not. At first, this could present a problem for the analysis, however Rajan and Zingales (1995) and Booth et al. (2001) defend that the determinants of capital structure (CS) used in U.S. prevail in other countries. In addition, Booth et al. (2001) state that it is important to be attentive to the bankruptcy law, fiscal treatment and ownership concentration and accounting standards when using the same determinants for other countries.

In a general, the aspects mentioned by Booth et al. (2001) do not present major problems for the analysis of this dissertation given that the sample is composed by companies form the European Union which are, law and political wise, very similar. While the ownership concentration becomes somewhat irrelevant because the sample comprises only unlisted firms and so the ownership concentration is almost the same for the firms of the same size, the fiscal treatment and accounting standards are the same, privilege of the Amadeus database. As a result, it allows the use of all the major determinants presented in the literature.

Thus, this section summarizes the relation of each variable with leverage along with the appropriate hypothesis for this relation based on the existing theories and empirical studies.

Liquidity

Regarding this variable, the trade-off theory predicts a positive relation between this variable and the debt ratio. While the pecking order theory predicts a negative relation between a firm's liquidity and its debt ratio, because of the preference for internal financing over external.

The empirical studies such as Deesomsak et al. (2004), Mazur (2007) and Jong et al. (2008) find a negative relation between the liquidity and leverage of a company.

Therefore, two hypotheses arise for this variable:

- H1a: Liquidity will be positively related to leverage.
- H1b: Liquidity will be negatively related to leverage.

Investment

Regarding the investment in fixed assets, according to the trade-off theory investment could present both signs. Higher investment in fixed assets means more assets to serve as collaterals and so it should be directly related with leverage (positive sign). On the other hand, a negative relation should arise between investment in fixed assets and leverage, due to more fixed assets equals to less asymmetric information hence issuing equity becomes less expensive.

The empirical findings defend the positive sign in articles such as Booth et al. (2001), Miguel and Pindado (2001) and Acedo-Ramírez and Ruiz-Cabestre (2014).

Thus, two hypotheses arise for this variable:

- H2a: Investment will be positively related to leverage.
- H2b: Investment will be negatively related to leverage.

Business Risk

Both theories, the trade-off theory and the pecking order theory, predict that this variable should present a negative relation with debt ratio. Higher business risk will increase the probability of company's default and thus it will act as a obstacle in the credit seeking. Lenders are averse to high financial distress probability and will not provide borrowings to this kind of firms. Therefore, a negative relation is to be expected.

The empirical evidence such as Miguel and Pindado (2001), Huang and Song (2006), Mazur (2007), Jong et al. (2008) and Psillaki and Daskalakis (2009) support this negative relation. However, there are several studies where this variable appears as not significant such as Bauer (2004), Chen (2004), Deesomsak et al. (2004) and Antoniou et al. (2008).

Therefore, just one hypothesis arises for this variable:

- H3: Business Risk will be negatively related to leverage.

Non-debt tax shields

According to the static trade-off theory this variable should present a negative relation with leverage. DeAngelo and Masulis (1980) state that non-debt tax shields should be perceived as suitable substitutes for tax benefits of credit financing and therefore, firms that exhibit large levels of non-debt tax shield are prone to issue less debt. However, Acedo-Ramírez and Ruiz-Cabestre (2014) argues that NDTS can also present a positive

relation with leverage because firms with high levels of this variable possess high proportion of tangible assets which act as a collateral providing security for the lenders.

The empirical evidence is indeed inconclusive. Some research support the trade-off theory and find a negative relation between NDTS and debt ratio such as Miguel and Pindado (2001), Bauer (2004), Gaud et al. (2005), Huang and Song (2006) and Acedo-Ramírez and Ruiz-Cabestre (2014). Others studies find a positive relation such as Bradley et al. (1984) and Delcoure (2007). Antoniou et al. (2008) finds both sings in its study depending on the country.

Therefore, two hypotheses arise for this variable:

- H4a: Non-debt tax shields will be positively related to leverage.
- H4b: Non-debt tax shields will be negatively related to leverage.

Profitability

According to the trade-off theory, a firm's profitability should have a positive relation with the debt ratio. This theory defends that higher profitability results in higher income to be shield form taxes and thus it should have more leverage. On the contrary, the pecking order theory argues that this variable should present a negative relation with the debt ratio because the internal financing is preferable over the external financing.

Most empirical studies such as Titman and Wessels (1988), Booth et al. (2001), Hall et al. (2004), Jong et al. (2008), Antoniou et al. (2008), Frank and Goyal (2009) and Psillaki and Daskalakis (2009) support the negative relation between profitability and leverage.

However, we will consider two hypotheses for this variable:

- H5a: Profitability will be positively related to leverage.
- H5b: Profitability will be negatively related to leverage.

Growth opportunities

According to the static trade-off theory, this variable should present a negative relation with the debt ratio. Myers (1977), states that firms that presents high growth opportunities are prone to adopt lower leverage because these opportunities can have a moral hazard effect resulting in more risk taking by the firm. On the contrary, the pecking order theory predicts that this variable should present a positive relation with the debt ration because high growth opportunities may require more funds that those that exists internally

therefore it may push the firm to look for external financing and thus borrow more leverage.

The studies that support the negative relation between this variable and debt ratio are Titman and Wessels (1988), Rajan and Zingales (1995), Bauer (2004), Gaud et al. (2005), Jong et al. (2008) and Antoniou et al. (2008). By contrast, Booth et al. (2001), Chen (2004), Hall et al. (2004) and Mazur (2007) find a positive relation between leverage and the growth opportunities of a company.

Thus, two hypotheses arise for this variable:

- H6a: Growth opportunities will be positively related to leverage.
- H6b: Growth opportunities will be negatively related to leverage.

Taxes

This variable will be divided in two: taxation (or average tax rate) and effective tax rate. Regarding taxation, according to the trade-off theory more taxation equals more tax benefits hence an increase in leverage. Similarly, the effective tax rate should also present a positive relation with leverage.

The empirical results are inconclusive. Regarding the average tax rate, Delcoure (2007) and Acedo-Ramírez and Ruiz-Cabestre (2014) support the positive sign, Jong et al. (2008) presents both relation and Booth et al (2001) shows a negative relation with leverage. As for the effective tax rate, Bauer (2004) presents both sings while Anoniou et al. (2008) find no significant results.

Therefore, two hypotheses arise for this variable:

- H7a: Taxation will be positively related to leverage
- H7b: Effective tax rate will be positively related to leverage.

Asset Structure/Tangibility

The asset tangibility of a company, according to the trade-off theory, its predicted to have a positive relation with the debt ratio, given the fact that those assets can be used as collaterals when seeking a loan. On the other hand, according to the pecking order theory, this variable should present a negative relation with the debt ratio, because *"more tangible assets will be less prone to asymmetric information problems and thus less likely to issue debt"* (Mazur, 2007).

Several empirical studies support the hypothesis of a positive relation between asset tangibility and leverage, such as Titman and Wessels (1988), Rajan and Zingales (1995), Hall et al. (2004), Jong et al. (2008), Antoniou et al. (2008) and Frank and Goyal (2009). While others like Booth et al. (2001), Bauer (2004), Mazur (2007) and Psillaki and Daskalakis (2009) find a negative relation between this variable and debt.

Thus, two hypotheses arise for this variable:

- H8a: Asset tangibility will be positively related to leverage.
- H8b: Asset tangibility will be negatively related to leverage.

Company Size

According to the trade-off theory, this variable should present a positive relation with the debt ratio. Large firms are usually more diversified with much more collateral guarantees which could provide better access to debt financing. However, the pecking order theory suggests a negative relation between leverage and this variable because large firms present less information asymmetry and so have easier accessibility to equity markets and so will present lower debt levels.

The empirical evidence such as Rajan and Zingales (1995), Colombo (2001), Hall et al. (2004), Jong et al. (2008), Antoniou et al. (2008), Frank and Goyal (2009), Psillaki and Daskalakis (2009) and Acedo-Ramírez and Ruiz-Cabestre (2014) support the positive relation while Titman and Wessels (1988), Chen (2004) and Mazur (2007) show negative relation between company size and leverage.

Thus, two hypotheses arise for this variable:

- H9a: Company Size will be positively related to leverage.
- H9b: Company Size will be negatively related to leverage.

Product Uniqueness

The static trade-off theory predicts that product uniqueness should present a negative relation with the debt ratio due to higher bankruptcy costs. Titman and Wessels (1988) and Bhaduri (2002) argue that if a firm has a high level of unique products it will be less prone in taking risks of borrowing because of the high bankruptcy costs. When facing liquidation these firms may enforce higher costs to their suppliers and customers due to the uniqueness of its product. On the contrary, the pecking order theory defend a positive

relation between this variable and leverage which could be due to the increase level of R&D expenses that could push the firms into borrowing.

The empirical evidence such as Titman and Wessels (1988), Bhaduri (2002) and Mazur (2007) support the negative relation between the product uniqueness and debt ratio.

Therefore, two hypotheses arise for this variable:

- H10a: Product uniqueness will be positively related to leverage.
- H10b: Product uniqueness will be negatively related to leverage.

Although the hypothesis previously developed are important for this dissertation, they do not provide with the answers for the main research questions. Thus, there are two more hypothesis which are relevant for this dissertation but not related with the determinants of capital structure. These two hypotheses are related with the first and second part of the analysis of this dissertation. The first part aims to find if the determinants of capital structure that impacts the non-high-leveraged firms are the same as the ones that impact the high-leveraged firms and if that is done in the same proportion. Hence the following hypothesis arise:

- H11: The determinants of capital structure that impact the capital structure of a high-leveraged and non-high-leveraged firms are the same?

The second part of the analysis focuses on the high-leveraged subsample and aims to present which determinants impact the change in the leverage ratio in a leverage buyout operation (LBO). Hence, the following hypothesis arises:

- H12: Which determinants of capital structure impact the choice of capital structure after a LBO operation?

With these extra hypothesis, we can answer to the research questions presented in the Introduction.

2.3 Leveraged Buyout

This dissertation does not focus only on the determinants of capital structure. Another crucial component of this dissertation is the leveraged buyout, mostly known as the LBO, operation itself. The objective of this thesis, as it was highlighted in the introduction is to measure the impact of the determinants of capital structure change after a leveraged buyout operation. Therefore, it is necessary to look at the existent literature on this topic to better understand how this operation occurs and its characteristics.

2.3.1 Private Equity Market

This chapter will focus on explaining briefly the background of the private equity firms and the private equity market which will lead to a better understanding of the leveraged buyout operations. The private equity market refers to the collection of funds raised by the private equity firms with the intention to be invested in the target companies.

2.3.1.1 Private Equity: Definition and main characteristics

Generally, a private equity can be a firm, group of investors or a vehicle that raises funds (through own capital or other investor's capital) in order to acquire potential targets for which they have the expertise in succeeding. The name, private equity, comes from the fact that these firms or vehicles are private entities strictly opposed to being publicly traded. Thus, when a private equity acquires 100% of the shares of a company it is denominated as a "going private" transaction.

In some cases, when start-up companies seek external sources of financing, banks are not willing to lend due to the risks involved with investing in new businesses and so these companies turn to private equities. These types of investments are called venture capitals. In other cases, companies seek the private equities investment due to the expertise in business management that these companies provide to the acquired firms. Therefore, in the case where the acquisition of the target company is financed mainly by borrowed funds then this is the so called leveraged buyout operations. Thus, a private equity investments may include several types of investment, such as LBO, MBO, venture capitals or mezzanine capital. However, the most prominent in this industry are the LBO and the Venture Capital investments. A private equity firm's activities can be categorized

into four phases: fund-raising, investment, value creation and exit phase (Heberlen, (2017)).

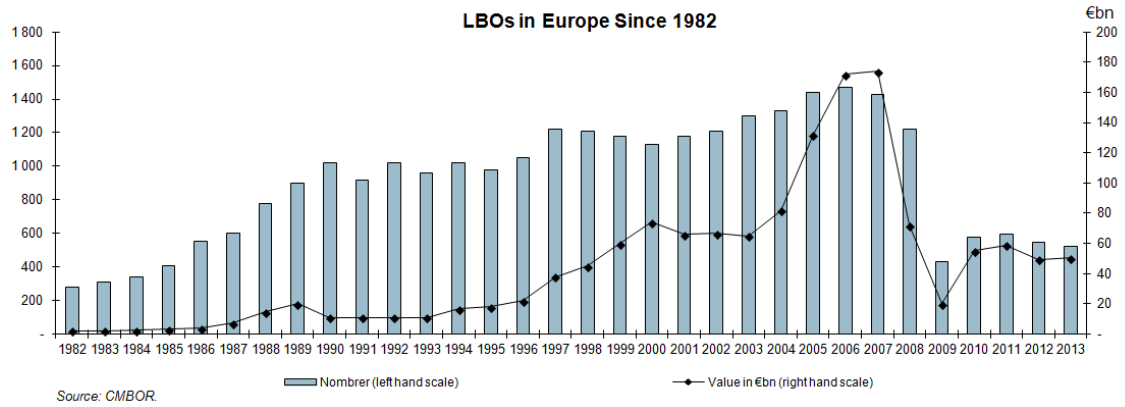
2.3.1.2 Evolution of the Private Equity and LBO Market

Due to the ambiguous definition of this type of firms/funds, the existence of private equity firms can be tracked back to the industrial revolution. At that time, there were already some companies that invested in private firms or acquired other businesses. However, the raise of professionally managed private equity firms was marked only in 1946 through the establishment of the American Research and Development Corporation (ARDC).

The evolution of this market was marked by the so called "the booms to bust periods": from the 1980's to the early 1990's, from 1992 to 2002 and from 2003 to 2007. The first two booms to bust periods happened only in the American market while the last one also happened in the European market (HVCA). Even though, the first boom of LBO's happened in the 80's (because of the boom of private equities), this type of operation existed way before that. According to Gaughan (2015), in 1919 the Ford Motor Company went through an LBO operation, when Henry Ford and his son Edsel purchased the company's shares for $106 million of which $75 million was borrowed. In addition, although this type of operation had its peak in 1980, in Europe the progress was slower and it only began to be noticeable in 1990, due to the creation of the Euro as well as the new laws appealed more for private equities to do these operations.

Overall, the private equity and LBO market have been growing vastly in the last decades. The growth is not only characterized in the number of transactions but also in the value of the transactions. Although, the American market has been faster in this growth, the European private equity and LBO market has been increasing in volume as well. In 1980's the European market of LBO was almost nonexistent when compared with the American. However, according to graph 1, from 1990 until 2008 there was a increase in the number of LBO's in Europe. Now the levels are not so different to those of the American market. Thus, the enormous evolution of these markets emphasizes the need for new empirical research on this field of LBO (Acharya, 2007).

Figure 1. *Evolution of Leverage Buyout transactions in Europe*



Source : Vernimmen.com

2.3.2 Leveraged Buyout Transaction

2.3.2.1 LBO: Definition and main characteristics

Brealey (2001) defines leveraged buyout (LBO) as an *"acquisition of the firm by a private group using substantial borrowed funds"*. Therefore, this operation consists in private equity together with members of the management team or individual investors acquire target companies using majority debt to finance the acquisition. Equity, usually provided by the private equity fund, is also used as a source of financing but in a smaller amount. Furthermore, to repay those debts the private equity firm uses the target's assets as collaterals for the loans used in the acquisition. Thus, the targets for a LBO operation are usually mature companies with stable cash flows but with either bad management or unfavorable opportunities for the long-term development.

Their success come from their ability to improve the target company's operational performance, debt repayment, profit from tax shields and perform right time exit (which could be by selling the company). According to Malenko and Malenko (2015) *"Value creation in LBO transactions is generally attributed to two sources: operational improvements and the benefits of higher leverage involving tax shields and improved management incentives."*

Usually, the private equity firm plans to execute a return on the LBO within three to five years after the acquisition. After this, the firm engage in the exit phase. There are three main exit strategies used by the private equity firms. The first most common is to sell the target to another company, the second most common is to sell it to another private equity (secondary buyout) and the last exit strategy is engaging in an Initial Public Offering (IPO).

2.3.3 Relevant literature about LBOs

Even though, the number of studies and articles on capital structure relevance and its determinants is very extensive, there are just a few papers similar to the exact topic of this dissertation. More precisely, there are three articles that are very similar to this dissertation and the interesting part is that all papers when combined correspond to the first and second part of my dissertation analysis.

Firstly, Opler and Titman (1993) investigate two hypotheses: "*1) that LBOs are motivated by the gains from realigning incentive problems (particularly those associated with free cash flow), and (2) that LBOs are deterred by potential financial distress costs. We have operationalized these hypotheses by suggesting proxy variables for financial distress costs and incentive realignment potential."* The authors used a sample of 180 firms that undertook a LBO operation from 1980 until 1990, and used a multivariate logit regression for the analysis. They concluded that free cash flow problems as well as the financial distress costs and a low Tobin's q are the main determinants for companies to go through a LBO operation. They also find evidence that LBO firms are the ones with low R&D expenses and are more diversified than the rest of the firms.

Secondly, Roden and Lewellen (1995) analyze the financing packages used in the LBO operations to test the determinants of capital structure previously studied in the literature. They focus on the role of agency and bankruptcy costs as well as taxes. The financing packages were composed by 1) senior bank debt, 2) subordinated debt securities, 3) preferred and common stock, 4) cash from the target firm, and 5) proceeds from asset sales. The authors used a sample of 107 firms that undertook a LBO operation during the period from 1981 until 1990 in the United States, and they used a multinomial logit model to analyze a set of eight hypotheses and nine determinants of capital structure. The authors concluded that the agency and bankruptcy costs as well as the tax

considerations impact the level of leveraged used in the LBO operations as well as the aspects of the attributes of the borrowing undertaken. The impacts are manifest in systematic relationships between the proportion and type of debt in the buyout financing package and the target firm's earnings rate, earnings variability, growth prospects, and its tax and liquidity position.

Finally, Axelson et al. (2013) collected a large sample of international leverage buyouts from 1980 to 2008 in order to test the capital structure theories. The authors study the determinants of capital structure (CS) on the LBO's and then compare it with matched sample of listed companies. They find that the CS of leverage buyouts is determined by time-series variation of debt market conditions while the CS of listed firms is determined by the firm-specific factors. They conclude that what determines the CS of LBO's is the price and availability of debt, "(…) *hence when credit is abundant and cheap buyouts become more leveraged."*. Thus, this article gave answer to the same research question as this dissertation: Why are some LBO's more leveraged than others?

Thus, these studies will serve as the main guide for the analysis of this dissertation.

3. METHODOLOGY

3.1 Methodological aspects of similar studies

As mentioned previously, the field of the determinants of capital structure lacks more empirical evidence in the European private firms. Most of the literature (that can be found in appendix 1) refer to either American companies or European but for **listed** companies (not private). In addition, most studies use either cross sectional or panel data, which will also be the case of this dissertation.

Therefore, the literature review allowed to establish a proper empirical design in order to enable this dissertation to test the mentioned capital structure and the hypothesis previously developed in chapter 2.

Regarding the methods of estimation, previous studies use several types of methods but the most frequent and prominent are the Ordinary Least Squares (OLS) ((Bauer, 2004), (Chen, 2004), (Deesomsak et al., 2004), (Hovakimian, Hovakimian, & Tehranian, 2004), (Huang & Song, 2006), (Delcoure, 2007), (de Jong et al., 2008)). In this dissertation, other than OLS methodology, a Binary Probit Model will also be applied.

3.2 Methodological aspects of this Dissertation

3.2.1 Empirical Framework

Panel OLS

As previously mentioned this dissertation is divided in two main parts. The first part attempts to measure if the determinants of capital structure, impact in the same way the high-leveraged and non-high-leveraged companies and for that a Binary Probit model will be used.

However, prior to applying the Binary Probit model, the determinants of capital structure will be tested in both high-leveraged and non-high-leveraged firms separately

using panel OLS regressions for each subsample in order to capture which determinant of CS impacts these types of firm.

$$Yit = \beta 0 + \beta 1 LIQ + \beta 2 INV + \beta 3 RISK + \beta 4\, NDTS + \beta 5\, PROFT \quad (1)$$
$$+ \beta 6\, GWT + \beta 7 TAX1 + \beta 8 TAX2 + \beta 9 TNG + \beta 10 SZ1 + \beta 11 SZ2 +$$
$$\beta 12 UNIQ + \varepsilon it$$

Where the dependent variable, $\boldsymbol{Y_{it,}}$ is the leverage ratio (LEV) modeled as a function of the determinants of capital structure as independent variables and $\boldsymbol{\varepsilon_{it}}$ refers to random disturbance or white noises**.**

As this study focuses on private European companies, the proxy measures for the variables cannot include any typical variable only possible for a listed company (such as: market values of assets, equity or debt). Due to this, the dependent variable leverage ratio, contrary to the majority of previous studies ((Booth et al., 2001), (Deesomsak et al., 2004), (Gaud et al., 2005), (González & González, 2008), (Frank & Goyal, 2009)) that use market values, is measured as the book value of total debt to book value of total assets.

The exogenous variables are defined as:

- **Liquidity (*LIQ*):** Liquidity will be measured as the ratio of current assets to current liabilities.
- **Investment (*INV*):** This variable will be measured as fixed $assets_t$ minus fixed $assets_{t-1}$ plus $depreciations_t$.
- **Business Risk (*RISK*):** Will be measured as the change in earnings before interest and taxes divided by the change in total assets.
- **Non-debt tax shields (*NDTS*):** This variable will be measured as depreciations and amortizations over total assets.
- **Profitability (*PROFT*):** Profitability will be measured with the return on assets, namely earnings before interest and taxes over total assets.
- **Growth Opportunities (GWT):** This variable will be measured as the percentage change of total assets.

- **Tax (TAX):** This variable presents two measures. **TAX_1** is for the taxation which will be measured by the average tax rate[9] and **TAX_2** is for the effective tax rate measured by the ratio between earnings before taxes minus earnings after taxes) and earnings before taxes.
- **Asset Tangibility (TNG):** Asset tangibility will be measured as the fixed assets over total assets.
- **Company Size (SZ):** This variable will also present two measures which are the most used in the literature: logarithm of sales **(SZ_1)** and logarithm of assets **(SZ_2).**
- **Product Uniqueness (UNIQ):** This variable will be measured as the research and development expenses over sales.

When applying the OLS method the analysis will also execute some tests like the t-test over each parameter and F-test over R-square (or global significance) in order to obtain robust results.

Binary Probit Model

For the **first part** of the analysis of this dissertation we attempt to identify if the determinants of capital structure can predict if a firm is more prone to become high-leveraged or non-high-leveraged, through a Binary Probit Model, where the dependent variable will take two values:

- 1, if the company is a non-high-leveraged company
- 0, if otherwise (high leveraged company)

Therefore, the econometric model will take the following form:

$$Y = \begin{cases} 1, & Y'' > 0 \\ 0, & otherwise \end{cases} \quad (2)$$

[9] For each year of the 10 years period of this sample was used the average tax rate of that specific year. This data was extracted from the KPMG's Corporate tax rates table.

$$P(Yi = 1|X) = \varphi(\beta 0 + \beta 1 LIQ + \beta 2 INV + \beta 3 RISK + \beta 4\, NDTS + \beta 5\, PROFT + \beta 6 GWT + \beta 7 TAX1 + \beta 8 TAX2 + \beta 9 TANG + + \beta 10 SZ1 + \beta 11 SZ2 + \beta 12 UNIQ + id + me + \varepsilon it) \quad (3)$$

where P=1 if the company is non-high-leveraged and P=0 if otherwise (company is high leveraged), $\boldsymbol{id_{it}}$ is the control variable for industry effect and $\boldsymbol{me_{it}}$ is the control variable for temporal effect. They consist of:

- **Industry effect dummies (*id*)**

The models control for the industry effect using dummy variables for each industry in our sample. Each dummy variable assumes the value of **1** if the company belongs to that specific industry and **0** if it does not. According to (Harris & Raviv, 1991)), these control variables are important because *"firms within an industry are more similar than those in different industries and that industries tend to retain their leverage rankings over time."*. Other authors, such as Bancel and Mittoo (2004), Bauer (2004), Antoniou et al. (2008) and Acedo-Ramírez and Ruiz-Cabestre (2014) control for this effect.

The Amadeus database provided for each company the NACE[10] that we used to classify each company to the according industry by introducing each code into the Eurostat RAMON website. This gave us a total of 21 industry classification. We then group these 21 industries in just 5 global groups[11].

- **Temporal effect dummies (*me*)**

Additionally, time fixed-effects were also controlled in both econometric models. This allows us to control the incidence of macroeconomic effects on the capital structure. Once again, these control variables are dummies variables that assume the value of **1** for a certain year and **0** for the rest. This will help analyze the data on the same year for all the

[10] NACE is the abbreviation for the Statistical Classification of economic activities in the European Community.

[11] More information about these five global groups is available in Appendix 2

companies and see if there are some macroeconomic effects on the capital structure Acedo-Ramírez and Ruiz-Cabestre (2014).

Ordinary Least Squares Model

In the **second part** of the study, we focused only on the high-leveraged subsample[12] and attempt to analyze the effect of the determinants of capital structure on the leverage buyout transaction. In order to do that we use the Ordinary Least Squares[13] as the estimation method of the following model.

$$Yi = \beta 0 + \beta 1 * D + \beta 2LIQ + \beta 3LIQ * D + \beta 4INV + \beta 5INV * D + \beta 6RISK + \beta 7RISK * D + \beta 8NDTS + \beta 9NDTS * D + \beta 10PROFT + \beta 11PROFT * D + \beta 12GWT + \beta 13GWT * D + \beta 14TAX1 + \beta 15TAX1 * D + \beta 16TAX2 + \beta 17TAX2 * D + \beta 18TNG + \beta 19TNG * D + \beta 20SZ1 + \beta 21SZ1 * D + \beta 22SZ2 + \beta 23SZ2 * D + \beta 24UNIQ + \beta 25UNIQ * D + id + me + \varepsilon it \quad (4)$$

Other than the variables in the previous model, this model also includes a dummy variable, $\mathbf{D_{it}}$, which indicates if the observations are from a period before or after the LBO transaction in order to show how the determinants of capital structure impact the change of CS in a LBO operation. The variable takes the value of **1** if observation is from a period after the LBO, and **0** before.

[12] In this part only the high-leveraged subsample is used, from which all firms that do not present data for the year before, during and after the LBO are excluded.

[13] This methodology is still not defined. There is a possibility of using the GMM model instead of the OLS.

4. DATA COLLECTION

4.1 Collection of Data, Databases and sample

This dissertation focuses on European Union (28 countries) private companies for the period from 2006 to 2016. Firstly, the subsample of high-leveraged companies, i.e., companies that were acquired by a private equity in the period of 2007-2016, was extracted from the Zephyr database through a set of requirements and filters which can be consulted in the Appendix 3.

This process resulted in 303 leverage buyout deals from which were eliminated the deals whose targets were either financial firms[14] and firms that no longer existed or had no data available in the Amadeus database. The final high-leveraged subsample consisted of 127 European private firms.

Then, in order to create a control group, a second subsample of all Europe Union non-financial companies that were not acquired by a private company in the period of 2006-2016 was collected. This subsample was extracted from the Amadeus data base using similar requirements and filters as the first subsample (Appendix 3).

This process, created a subsample of 4390 firms. These firms were used to select 127 non-high-leveraged firms as similar as possible to the high-leveraged subsample, through the matching process. The matching process consisted in using the return on assets[15] and the total asset[16] as the matching characteristics for choosing a company from the 4,390 sample similar to the one from the high-leveraged subsample. Thus, for each company from the first subsample (high-leveraged) another was chosen from the 4390 sample (non-high-leveraged) that had a very similar ROA and total assets. Therefore, this second subsample resulted in 127 European non-high-leveraged private firms. Axelson et al. (2013) used the same matching technique to achieve a sample of non-high-leveraged listed firms similar to the leverage buyout sample. Although they used different matching characteristics[17], the authors were able to use the similar samples for comparison analysis.

[14] Since financial firms present different structure for the balance sheets when comparing with the non-financial firms, thus it was necessary to exclude them in order to achieve robust results.

[15] ROA was computed as ROA=EBIT/TA.

[16] Total assets +/- 5%.

[17] According to Axelson et al. (2013) "…we take as a matching characteristic the median industry value among the public companies in the Global Compustat database in the same year, region (North America, Western Europe, Eastern Europe, Asia, or Australia), and Fama-French industry (using their 49-industry

The type of data used is cross-sectional and panel data and according to Delcoure (2007), the use of panel data provides additional degrees of freedom.

4.2 DESCRIPTIVE STATISTICS

This section will present some relevant descriptive statistics of the high-leveraged and non-high-leveraged companies, separately.

Table 1 exhibits the descriptive statistics for the high-leveraged subsample. The mean *leverage ratio,* is 36.2% and there is not much difference from the mean to median (32.5%).

Table 1. *Descriptive statistics for the High-Leveraged subsample*

Variables	Unit	Mean	Median	Std. Deviation	Observations
Total Assets	**(€)**	749,725.3	504,810.9	735514	1035
Sales	**(€)**	362,277.6	247,031.4	414,694.3	870
Leverage (BVTD/BVTA)	**(%)**	36.2	32.5	31.1	990
Liquidity (CA/CL)	**(%)**	3,089.3	118.2	57,939.1	1,031
Investment ($(FA_t-FA_{t-1}+D\&A)/TA$)	**(%)**	0.8	2.3	33.8	804
Risk (ΔEBIT/TA)	**(%)**	-3,540.3	105.7	73,375.6	71
Non-debt Tax Shields (D&A/TA)	**(%)**	4.2	2.9	7.0	925
Profitability (ROA)	**(%)**	3.2	2.9	16.8	1,032
$Taxes_1$ (average tax rate)	**(%)**	28.2	29.6	4.8	1,270
$Taxes_2$ ((EBT-EAT)/EBT)	**(%)**	74.5	9.8	1,946.2	979
Tangibility (FA/TA)	**(%)**	58.5	62.9	29.3	1,035
$Size_1$ (ln(S))	**(€)**	5.2	5.4	0.7	838
$Size_2$ (ln(TA))	**(€)**	5.7	5.7	0.4	1,035
Product Uniqueness (R&D/S)	**(%)**	14.5	0.0	393.9	714

Source: own creation

Table 2, presents the descriptive statistics for the non-high-leveraged subsample. As expected the *leverage ratio* is lower than for the high-leveraged subsample, with a mean (median) equal to 23.8% (11.5%). As it can be seen the leverage ratio of the non-high-

classification) as the LBO".

leveraged firms is lower by a mean (median) of 12.4% (21%) which is expected given that the high-leveraged firms are more leveraged.

Table 2. *Descriptive statistics for the Non-High-Leveraged subsample*

Variables	Unit	Mean	Median	Std. Deviation	Observations
Total Assets	**(€)**	821,421.4	499,417.7	958,156.6	1280
Sales	**(€)**	767,275.4	384,862.6	656,151.8	1248
Leverage (BVTD/BVTA)	**(%)**	23.8	11.5	29.1	1,219
Liquidity (CA/CL)	**(%)**	223.4	113.9	835.8	1,270
Investment ((FA_t – FA_{t-1}+D&A)/TA)	**(%)**	-994.1	1.1	33,200.8	1,183
Risk (ΔEBIT/TA)	**(%)**	2,155.4	83.9	262,800.7	1,220
Non-debt Tax Shields (D&A/TA)	**(%)**	3.2	2.6	3.8	1,192
Profitability (ROA)	**(%)**	4.4	3.7	11.4	1,268
$Taxes_1$ (average tax rate)	**(%)**	27.6	28.0	5.4	1,270
$Taxes_2$ ((EBT-EAT) / EBT)	**(%)**	28.2	19.7	337.2	1,239
Tangibility (FA/TA)	**(%)**	51.0	49.6	31.6	1,270
$Size_1$ (ln(S))	**(€)**	5.5	5.6	0.8	1,234
$Size_2$ (ln(TA))	**(€)**	5.7	5.7	0.4	1,270
Product Uniqueness (R&D/S)	**(%)**	-115.8	0	3,979.0	1,229

Source: own creation

In general, there is no significant difference between the *total assets* of the high-leveraged and the non-high-leveraged. Which was expected given that this was the criteria used in the matching process to choose the control group. However, this could also suggest that firms, which are a target of a LBO transaction, tend to present higher assets values due to the use of these same assets as collaterals to repay for the financing packets used in the acquisition. The *sales* section presents a bigger difference between the two subsamples. This could happen due to the difference in missing values for this account (high-leveraged firm present more missing data). Additionally, firms that go through a LBO transaction can present lower sale power hence lower sale volume than those that were not in this type of operation. There are also some apparent differences in the means and medians of the dependent and independent variables between the two subsamples. Therefore, a difference in the results of the econometric analysis between the two subsamples is expected.

5. RESULTS

5.1 Panel OLS

Prior to execute the panel OLS and given the fact that there is a large number of variables the possibility for **multicollinearity** arises. The presence of multicollinearity is not favorable because as Bauer (2004) states multicollinearity could result in *"large standard errors of the estimated regression coefficients and leads to instability of regression estimates"*.

To avoid the multicollinearity and given the existence of some obstacles with the multicollinearity test models[18] two classic approaches were implemented. Firstly, all variables that comprised absolute values (from the balance sheet) as their measure should be tested separately. Since absolute values from the balance sheet, like total assets and sales, would be highly correlated with the size of the company (higher companies would present higher sales and assets) joining them all in the same model would could bring multicollinearity problems, thus the necessity to test them separately. Thus, the two measures of company size will be tested separately due to the presence of absolute values of assets and sales. The second approach consists in building the correlation matrix and highlight which variables present high correlation between and then built restricted models with and without those variables. Following Bauer (2004), correlation equal and higher than 0.5 are considered to entail multicollinearity problems.

Therefore, the correlation matrix was computed to verify which measures had high correlation between them. Appendix 6 and 7 presents the correlations between the various measure for the subsamples and samples used in all models of the econometric analysis. In the subsample of high-leveraged firms only one value is equal to 0.5 which corresponds to correlation between *investment* and *growth opportunities*. While, in the subsample of non-high-leveraged firms three values appear equal of higher than 0.5, namely the correlation between *investment* and *non-debt tax shields* and *profitability* and the correlation between the first measure of *company size* (SZ_1) and *tangibility*. For the other samples used in the Binary Probit model and second OLS there were no high correlation.

Taking this into account, the panel OLS is applied to the high-leveraged subsample

[18] The Eviews 9 software does not provide with the tools to test for multicollinearity when using panel data.

and Table 3 shows the results. In order to know which model to use[19] the Hausman test was applied. As it can be seen in the table all five models present a statistically significant Hausman test, meaning that the fixed effect is preferable for this data, hence the panel OLS fixed effects was applied. The table presents five models, where (1) represents the overall (unrestricted) model which comprises all dependent variables and could present the multicollinearity problem[20], (2), (3), (4) and (5) represent the models with and without the variables with the high correlation mentioned previously[21] (restricted models) as well as the presence of absolute values between the two measures for company size.

As for the results, the independent variable *non-debt tax shields* is statistically significant and shows a positive relation with debt ratio which is consistent with the hypothesis $H4_a$ that defends that leverage increase as the non-debt tax shields increase. This finding is supported by the literature such as Delcoure (2007) and Antoniou et al. (2008). *Taxation* appears statistically significant and positive which supports the hypothesis $H7_a$ which states that the higher the average tax rate of a firm the higher will be its leverage ratio. Delcoure (2007) and Acedo-Ramírez and Ruiz-Cabestre (2014) also present the same conclusions regarding this determinant of capital structure. The determinant *asset tangibility* is also significant and presents a positive relation with leverage consistent with the hypothesis $H8_a$ that defends that firms with higher assets volumes will present a higher leverage ratio. The findings of Hall et al. (2004), Deesomsak et al. (2004)[22] and Jong et al. (2008) also support this relation. *Company size* also appears positive and statistically significant which is supported by the hypothesis $H9_a$ meaning that larger firms will exhibit larger leverage ratio. Rajan and Zingales (1995), Bauer (2004), Gaud et al. (2005), Jong et al. (2008), Frank and Goyal (2009), Psillaki and Daskalakis (2009) and Acedo-Ramírez and Rui-Cabestre (2014) found the same relation in their studies. The interesting fact is that the natural log of assets (SZ_2) appears significant in all models (where this variable is included), while the natural log of sales (SZ_1) is significant only in the absence of SZ_2.

[19] Pooled OLS, fixed effect or random effect.

[20] Even though the multicollinearity problem could be present in this model (1), it was computed specially to compare with the restricted models and see if the multicollinearity problem indeed was present in this data.

[21] Investments and growth opportunities. See appendix 7.

[22] The author finds positive relation between tangibility and leverage but not significant in all countries of the sample.

Table 3. *Panel Ordinary Least Squares regression for the High-leveraged subsample*

This table presents the results from the panel data OLS regression regarding the determinants that impact the capital structure of the high-leveraged firms. Model (1) comprises all determinants of capital structure, while (2) and (3), each one, relaxes one of those independent variables that presented a high correlation in table 3, in order to avoid multicollinearity. Model (4) and (5) test the difference between the measures for company size (SZ). This table gives the coefficients and the standard error (in parentheses) for each variable. In addition, it presents the Hausman and F-statistic test as well as the number of observations that each model uses. The *, **, and *** indicates if the results given by the model are statistically significant for the level of significance of 10%, 5% and 1%, respectively.

Variables	Unit	(1)	(2)	(3)	(4)	(5)
Liquidity (CA/CL)	(%)	0.001 (0.070)	0.001 (0.071)	0.000 (0.071)	0.004 (0.070)	-0.003 (0.070)
Investment (($FA_t - FA_{t-1}$+D&A)/TA)	(%)	- 2.755 (3.643)		0.642 (3.210)		- 1.705 (3.242)
Risk (ΔEBIT/TA)	(%)	-0.001 (0.001)	-0.002 (0.001)	-0.002 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Non-debt Tax Shields (D&A/TA)	(%)	68.871*** (11.700)	63.397*** (11.148)	62.441*** (11.590)	66.307*** (11.051)	68.049*** (11.529)
Profitability (ROA)	(%)	0.287 (4.762)	0.823 (4.782)	0.973 (4.800)	0.623 (4.738)	0.458 (4.749)
Growth opp. (% Δ of TA)	(%)	0.014 (0.021)	0.025 (0.018)		0.007 (0.019)	
$Taxes_1$ (Average tax rate)	(%)	0.017 *** (0.003)	0.014 *** (0.003)	0.014*** (0.003)	0.017*** (0.003)	0.017*** (0.003)
$Taxes_2$ ((EBT-EAT) / EBT)	(%)	- 0.069 (0.327)	- 0.089 (0.329)	- 0.084 (0.330)	- 0.075 (0.326)	- 0.066 (0.327)
Tangibility (FA/TA)	(%)	15.665** (6.180)	16.54** (6.073)	16.526** (6.200)	14.643** (6.040)	15.217** (6.140)
$Size_1$ (ln(S))	(€)	0.007 (0.027)	0.048* (0.025)	0.053** (0.024)		
$Size_2$ (ln(TA))	(€)	0.147** (0.046)			0.151*** (0.041)	0.160*** (0.039)
Product Uniqueness (R&D/S)	(%)	- 0.879 (1.186)	- 0.861 (1.183)	- 0.660 (1.194)	- 1.011 (1.173)	- 0.844 (1.182)
Intercept		- 1.146*** (0.274)	- 0.442** (0.166)	- 0.469** (0.167)	- 1.117*** (0.271)	- 1.183*** (0.264)
F-statistic		21.44***	21.40***	21.31***	21.88***	21.89***
Hausman		19.62*	18.63**	18.97**	19.43**	19.80**
N		655	655	655	655	655

Source: own computation

Overall, all five models present the same statistically significant variables suggesting that the results are robust. Additionally, the global significance presented by the F-statistic test is statistically significant to all three levels of confidence which adds to the robustness of the results. Now, regarding the multicollinearity problem, even when using restricted models the results maintain the same except for one of the company size measures (SZ_1) which only appears significant in the restricted models, meaning that there was multicollinearity problem only between this two company size measures.

Table 4 presents the result of the panel OLS regression applied to the non-high-leveraged subsample. The Hausman test was applied again which provided with the same significant result in all models except in (2) and (3) for which even though the Hausman test suggested the random effect model, the fixed effect was applied in order to be consistent with the previous results. Thus, the panel OLS fixed effects was applied.

This table presents five models, where (1) represents the overall model which comprises all independent variables and also could present the multicollinearity problem[23] while, as in the high-leveraged subsample, models (2), (3), (4) and (5) represent the models with and without the variables with the high correlation mentioned previously[24] (restricted models) as well as the presence of absolute values between the two measures for company size.

Regarding the results, in this subsample the independent variable ***liquidity*** is statistically significant and shows a negative relation with debt ratio in all models which is consistent with the hypothesis $H1_b$ which defends that firms with higher liquidity will show lower leverage ratio. The literature such as Deesomsak et al. (2004) and Mazur (2007) supports our findings. ***Investment*** appears statistically significant and positive which supports the hypothesis $H2_a$ meaning that firms with higher levels of investment in fixed assets will show higher leverage ratios. This is also supported by the findings of Acedo-Ramírez and Ruiz-Cabestre (2014) and Miguel and Pindado (2001). In addition, the independent variable ***non-debt tax shields*** appear statistically significant and with a negative sign which is consistent with hypothesis $H4_b$ which states that if firms present high non-debt tax shields it will present lower leveraged ratio. The findings of Bauer

[23] For the same reason, as in the high-leveraged subsample: even though the multicollinearity problem could be present in this model (1), it was computed specially to compare with the restricted models and see if the multicollinearity problem indeed was present in this data.

[24] Investments, non-debt tax shields and profitability. See appendix 7.

(2004), Deesomsak et al. (2004) and Huang and Song (2006) support this idea. The independent variable *profitability* appears statistically significant and negative only in unrestricted model (1) which shows the problem of multicollinearity. This result is consistent with hypothesis $H5_b$ which suggests that firms with higher profitability will exhibit lower debt ratio. Gaud et al. (2005) and Psillaki and Daskalakis (2009) support our findings. *Company size*, similarly with the previous subsample results, the natural log of assets appears negative and statistically significant in all models while natural log of sales is statistically significant in one of the restricted models. This is consistent with the hypothesis H9b meaning that larger firms present lower leverage ratio. Our findings are consistent with those of Titman and Wessels (1988) and Chen (2004). Finally, *product uniqueness* appears statistically significant and positive which supports the hypothesis $H10_a$ which defends that firms with more unique products will show higher leverage ratios. This is consistent with the results presented by Mazur (2007). The global significance presented by the F-statistic test is statistically significant to all three levels of confidence which adds to the robustness of the results. Overall, all five models present the same statistically significant variables with the exception of the non-debt tax shields and the company size (SZ_1) which only become statistically significant in the restricted models, meaning that the multicollinearity problem is evident in this sample.

When comparing the results of the two subsamples the differences are evident. There is difference in the number of observations, the observations are superior in the non-high-leveraged subsample. Additionally, there is difference in the significance of the determinants of capital structure. The non-high-leveraged firms exhibits more statistically significant determinants than the high-leveraged firms. Additionally, there are only two determinants in common between the high-leveraged and the control group meanly non -debt tax shields and company size, but with different signs. Which means even though there are some determinants in common they present different signs thus there is no determinant that impacts in the same way the high-leverage and non-high-leveraged firms. Therefore, our results do not support the hypothesis H11, *namely the determinants of capital structure that impact the capital structure of a high-leveraged and non-high-leveraged firms are the same?* .

Table 4. *Panel Ordinary Least Squares regression for the Non-High-leveraged subsample*

This table presents the results from the panel data OLS regression regarding the determinants that impact the capital structure of the non-high-leveraged firms. Model (1) comprises all determinants of capital structure, while model (2) and (3) test the difference between the measures for company size (SZ). This table gives the coefficients and the standard error (in parentheses) for each variable. In addition, it presents the Hausman and F-statistic test as well as the number of observations that each model uses. The *, **, and *** indicates if the results given by the model are statistically significant for the level of significance of 10%, 5% and 1%, respectively.

Variables	Unit	(1)	(2)	(3)	(4)	(5)
Liquidity (CA/CL)	(%)	- 0.148 ** (0.062)	- 0.169** (0.060)	- 0.165** (0.058)	- 0.150** (0.06)	- 0.141** (0.061)
Investment ((FA_t – FA_{t-1}+D&A)/TA)	(%)	0.012*** (0.003)		0.007*** (0.001)		0.008*** (0.001)
Risk (ΔEBIT/TA)	(%)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)	0.000 (0.000)
Non-debt Tax Shields (D&A/TA)	(%)	- 9.644 (34.400)	- 100.113*** (20.631)		-123.250*** (22.071)	
Profitability (ROA)	(%)	- 11.443** (5.434)	- 5.947 (5.361)		- 5.466 (5.311)	
Growth opp. (% Δ of TA)	(%)	0.001 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)	0.000 (0.001)
$Taxes_1$ (Average tax rate)	(%)	-0.001 (0.002)	0.000 (0.002)	- 0.000 (0.002)	- 0.001 (0.002)	- 0.001 (0.002)
$Taxes_2$ ((EBT-EAT) / EBT)	(%)	- 0.101 (0.106)	- 0.082 (0.108)	- 0.085 (0.106)	- 0.089 (0.107)	- 0.088 (0.106)
Tangibility (FA/TA)	(%)	- 7.675 (5.037)			- 2.444 (4.927)	1.934 (4.336)
$Size_1$ (ln(S))	(%)	0.000 (0.022)	- 0.037** (0.016)	- 0.031 (0.019)		
$Size_2$ (ln(TA))	(%)	- 0.103** (0.035)			- 0.081*** (0.024)	- 0.059** (0.027)
Product Uniqueness (R&D/S)	(%)	0.061*** (0.009)	0.061*** (0.009)	0.060*** (0.009)	0.062*** (0.009)	0.061*** (0.009)
Intercept		0.898*** (0.197)	0.469*** (0.103)	0.402*** (0.118)	0.773*** (0.155)	0.574*** (0.171)
F-statistic		37.76***	38.69***	38.95***	38.73***	38.46***
Hausman		24.93**	11.43	11.35	20.26**	20.20**
N		1082	1101	1095	1102	1097

Source: own computation

5.2 Binary Probit Model

The Probit model measures probabilities, and in the case of this dissertation it will give the probability of a company being either high-leveraged or non-high-leveraged according to some determinants of capital structure. In other words, it permits to see if the determinants of capital structure can predict if a firm is more prone to become high-leveraged or non-high-leveraged. The dependent variable is binary so it assumes the value of **1** if the company if non-high-leveraged and **0** if it is high-leveraged.

Table 5 presents the result of the estimation of the Probit model. Model (1) and (4)[25] are the restricted models only for the two company size measures given that there are no other high correlations. Then model (2), (3) refers to the model (1) with the addition of the control variables of the industry effects and temporal effects. This is equal to models (5) and (6) which refer to model (4) with the control variables added.

Regarding the results, the probabilities estimated in table 5 show that these determinants that appear statistically significant can predict more if a company will become a target of a LBO transaction than if it will not[26]. Thus, the determinants *investment*, *non-debt tax shields*, *taxation* and *tangibility* appear statistically significant with a positive sign which means that the higher the value of this determinants the higher will be the leverage ratio of the firm. Now, regarding the direct impact presented by the *investment* (in fixed assets) as well as *tangibility* and *non-debt tax shields*, it was expected given that usually the LBO targets are mature firms which present higher assets that are then used as collaterals for the debt used in the transaction (*tangibility* and investment). Additionally, these firms present higher non-debt tax shields due to their larger and mature activity allowing to obtain other tax shields other than those that come from debt. As for the taxation, this result is unexpected given that usually firms with high average tax rate would not be so suitable as targets for LBO transactions due to the costs in debt seeking, thus it should be presenting a negative sing and not otherwise.

Profitability and *growth opportunities* appear with a negative sing. These results suggest that firms with high profitability and growth opportunities will have a low

[25] Note that the when combined the two subsamples into one, the sample does not present any correlation above 0.5, therefore there is not a possibility for multicollinearity regarding the correlation but only regarding the absolute values of the company size measure. See appendix 5.

[26] Table 5 presents a low probability for a company being non-high-leveraged firms thus it presents a high probability for a company being a high-leveraged firm. Therefore, the determinants that appear statistically significant impact more the high-leveraged firms than the control group.

probability of becoming a non-high-leveraged and a high probability of becoming a high-leveraged firm. A firm with high profitability levels are less prone to be part of a LBO transaction. This is explained by the pecking order theory where high profitability means lower levels of debt ratio and thus lower probability of being in a LBO transaction due to the preference for internal financing over the external. Therefore, companies with higher profitability leads to a decrease in leverage due to the preference of internal financing over external and thus are less prone to be target of a LBO transaction. Regarding *growth opportunities* they suggest that firms that possess high growth opportunities are less prone of being part of a LBO transaction. One of the characteristics of a typical LBO target is the maturity of the company. Thus, a steady firm with steady cash flows also means not so many growth opportunities (Fundamentalfinance.com). Therefore, this result presence a real logic regarding the LBO target characteristics.

Except for non-debt tax shields and the first measure of company size (SZ_1)[27], none of these variables are statistically significant in all models. When applying the control variable industry effects, in model (2) and (5) there is no significant change in the significance of the variables. However, when controlling for temporal effects, in model (3) and (6), there are some changes. Investment and growth opportunities become not statistically significant and the same happens to profitability when the company size is measured by the natural log of sales.

Thus, the determinants that actually[28] could determine which company is more or less prone to be in a leveraged buyout operation are the non-debt tax shields, taxation, tangibility and profitability[29].

[27] Note that the natural log of sales is statistically significant in all models that included this variable, which does not include all six models but only three.

[28] Even when adding the control variable industry effects and macroeconomic or temporal effects.

[29] Only in the model with the natural log of assets as the company size measure.

Table 5. *Binary Probit Model*

This table presents the results from the Binary Probit model which aims to prove if the same determinants impact the capital structure of the high-leveraged and non-high-leveraged firms in the same way. Model (1) and (4) test the different measures of company size (SZ_1 and SZ_2) to avoid multicollinearity. Model (2) and (3), as well as (5) and (6) are the same (1) and (4) models with the addition of the control variables. This table gives the coefficients and the standard error (in parentheses) for each variable. In addition, it presents the LR-statistic test as well as the number of observations that each model uses. The models test for industry effect (**id_{it}**) and for the temporal effect (**me_{it}**) The *, **, and *** indicates if the results given by the model are statistically significant for the level of significance of 10%, 5% and 1%, respectively.

Variables	Unit	(1)	(2)	(3)	(4)	(5)	(6)
Liquidity (CA/CL)	(%)	- 0.158 (0.425)	- 0.151 (0.436)	- 0.391 (0.496)	0.137 (0.388)	0.168 (0.392)	- 0.010 (0.433)
Investment ($(FA_t - FA_{t-1}+D\&A)/TA$)	(%)	28.163* (14.601)	27.904* (14.945)	23.027 (18.017)	25.703* (14.122)	24.811* (14.221)	18.968 (17.582)
Risk (ΔEBIT/TA)	(%)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)	0.002 (0.003)
Non-debt Tax Shields (D&A/TA)	(%)	155.643** (65.654)	166.068** (67.057)	174.738** (68.749)	117.636* (64.466)	119.709* (66.165)	126.459* (68.033)
Profitability (ROA)	(%)	- 58.809* (30.604)	- 57.374* (31.521)	- 29.046 (31.245)	- 78.494** (30.953)	- 80.211** (32.165)	- 52.653* (31.626)
Growth opp. (% Δ of TA)	(%)	- 0.158* (0.081)	- 0.160* (0.084)	- 0.009 (0.033)	- 0.176** (0.081)	- 0.170** (0.083)	- 0.010 (0.038)
$Taxes_1$ (Average tax rate)	(%)	0,016** (0,007)	0,009 (0,007)	0,018** (0,008)	0,019** (0,007)	0,013* (0,007)	0,021* (0,008)
$Taxes_2$ ((EBT-EAT) / EBT)	(%)	- 4.703* (2.471)	- 4.533* (2.494)	- 5.024* (2.747)	- 4.491* (2.478)	- 4.254* (2.482)	- 4.741* (2.730)
Tangibility (FA/TA)	(%)	5.364 (13.203)	16.255 (13.622)	19.974 (14.195)	25.134** (11.564)	39.124** (12.268)	44.509*** (12.787)
$Size_1$ (ln(S))	(€)	- 0.191*** (0.057)	- 0,244*** (0,059)	- 0,256*** (0,062)			
$Size_2$ (ln(TA))	(€)				0,148 (0,100)	0,098 (0,103)	0,078 (0,108)
Product Uniqueness (R&D/S)	(%)	0.158 (1.123)	0.201 (1.080)	0.855 (1.178)	0.047 (1.205)	0.050 (1.176)	0.698 (1.333)
Industry Fixed Effects			Included	Included		Included	Included
Temporal effect				Included			Included
Intercept		- 0.235 (0.418)	- 0,643 (0,460)	- 1,848*** (0,529)	-2,272*** (0,628)	- 2,697*** (0,655)	- 3,877*** (0,722)
LR statistic		57.09***	107.36***	247.81***	47.63***	90.48***	231.53***
P(Y=1|X)		0.00	0.00	0.006	0.00	0.00	0.009
N		1767	1767	1767	1768	1768	1768

Source: own computation

5.3 Ordinary Least Squares Model

This corresponds to the second part of the analysis previously mentioned. In this analysis, the OLS regression will be applied only to the high-leveraged subsample. However, it is not the same subsample used in the previous regression (table 3), this subsample excludes all firms that present no data for the year before, during and after a leverage buyout operation. Those firms are excluded given that in this part it is important to understand the determinants that contribute more to the change in leverage during a leverage buyout operation. Therefore, to measure that change, a dummy variable, D, is added to the equation 1 resulting in equation 4 (the control variables are also added). This dummy assumes the value of **0** the years before the LBO and the value of **1** in the years during and after the LBO operation. By adding this dummy variable, those determinants that appear statistically significant, with the dummy it will reflect the additional impact on the change of capital structure.

Table 6 presents the results of the OLS application. Note that, all the six models used in this regression are equal to the ones used in the Binary Probit model. *Liquidity* is the first one to appear statistically significant in all models. Thus, the coefficient of Liquidity*D represents the additional impact on the change of CS. In summary, not only this determinants impact positively leverage ratio, which means higher the liquidity higher the leverage levels, but also it impacts directly the change of Capital Structure during a LBO operation. The independent variable *investment* appears statistically significant and the signs of both variables are different (positive for investment and negative for investment*D). Thus, higher the liquidity higher the leverage ratio and lower the increase of leverage after the leverage buyout operation. *Profitability* appears statistically significant and once again both variables show different signs (negative for profitability and positive for profitability*D) leading to this conclusion: higher the profitability of a company, lower the leverage level and higher will be leverage ratio after the LBO transaction (although it presents a negative relation with debt ratio it shows a positive impact on the leverage level during the LBO operation). The determinant *taxation* presents the same results as the investment where it has both signs in the result (positive for taxation and negative for taxation*D) leading to the conclusion of higher the average tax rate, higher will be the leverage ratio and lower will be its impact after the LBO operation. This suggests that when the average tax rate is high firms will tend to

seek more external debt to obtain tax shields, and after the LBO the need for more leverage is mitigated. Regarding *tangibility*, this variable suggests that higher the assets tangibility of a target of LBO higher will be the leverage ratio of that company due to the collateral value of the assets and lower will be the impact of this variable on leverage after the LBO operation. This suggests that after a LBO transaction, all assets are used as collaterals for the financing repayment leading to a low amount of existing assets in that target and thus it will lower the level of leverage after that operation. *Company size* (only the natural log of sales measure) exhibits different signs for both variable (negative for size and positive for size*D). Thus, larger the firm, lower will be the leverage ratio and higher will be the impact of the company dimension on leverage after the LBO operation. The large dimension of a company can allow accessibility to external funding.

Finally, as for *product uniqueness* it suggests that if a company has more unique product it will decrease its leverage ratio because it is not willing to incur in a lot of risk, however after being in the LBO transaction a firm these unique product increase leverage which could be due to the need for research and development. These results give answer to the hypothesis 12 on which are the determinants that impact the capitals structure choice after a LBO operation. When introducing the dummy variables that control for industry effect it impacts the statistically significance of the non-debt tax shields (which now become not statistically significant) and when controlling for the temporal effect the variable affected is investment (actually investment*D).

Table 6. *Ordinary Least Squares*

This table presents the results from the Ordinary Least Squares regression model which aims to prove if the which determinants impact the capital structure change and why some LBO's are more leveraged than others. Model (1) comprises all determinants of capital structure, while (4) tests the difference between the measures for company size (SZ). Model (2) and (3), as well as (5) and (6) are the same (1) and (4) models with the addition of the control variables. This table gives the coefficients and the standard error (in parentheses) for each variable. In addition, it presents the F-statistic test as well as the number of observations that each model uses. The models test for industry effect (**id_{it}**) and for the temporal effect (**me_{it}**) In addition, the model includes a dummy variable, **D_{it}**, to capture the change in the capital structure done by the determinants of capital structure. The results were computed with the Huber-White covariance method which give robust results against heteroskedasticity and autocorrelation. The *, **, and *** indicates if the results given by the model are statistically significant for the level of significance of 10%, 5% and 1%, respectively.

Variables	Unit	(1)	(2)	(3)	(4)	(5)	(6)
Liquidity (CA/CL)	(%)	0.271***	0.267***	0.280***	0.264***	0.254***	0.268***
		(0.033)	(0.036)	(0.044)	(0.039)	(0.041)	(0.049)
Liquidity *D ((CA/CL)*D)	(%)	0.017	0.011	0.017	0.220	0.148	0.150
		(0.566)	(0.565)	(0.562)	(0.599)	(0.588)	(0.585)
Investment ($(FA_t - FA_{t-1}+D\&A)/TA$)	(%)	20.106*	17.345*	17.631*	15.939	13.442	13.568
		(11.042)	(10.160)	(10.508)	(11.594)	(10.668)	(10.951)
Investment * D ($((FA_t - FA_{t-1}+D\&A)/TA)*D$)	(%)	- 29.355**	- 24.816**	-22.124	- 24.831*	- 20.684*	-17.056
		(13.001)	(12.164)	(13.477)	(13.421)	(12.505)	(13.848)
Risk (ΔEBIT/TA)	(%)	0.003	0.002	0.002	0.003	0.002	0.002
		(0.002)	(0.003)	(0.002)	(0.002)	(0.002)	(0.003)
Risk*D ((ΔEBIT/TA)*D)	(%)	-0.004	-0.003	-0.003	-0.005	-0.004	-0.004
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Non-debt Tax Shields (D&A/TA)	(%)	- 7.155	10.320	9.664	-12.293	6.573*	5.796
		(29.823)	(29.368)	(30.082)	(30.437)	(30.253)	(30.740)
Non-debt Tax Shields*D ((D&A/TA)*D)	(%)	122.521**	96.079	92.723	120.195**	102.536	100.008*
		(59.110)	(59.805)	(60.732)	(55.505)	(56.774)	(57.388)
Profitability (ROA)	(%)	- 57.308**	- 43.717**	-42.838*	- 64.503**	- 49.707**	- 49.393**
		(20.751)	(21.266)	(21.974)	(21.831)	(22.161)	(22.601)
Profitability*D (ROA*D)	(%)	54.936**	43.501**	41.763*	60.615**	49.076**	47.743**
		(21.386)	(21.772)	(22.410)	(22.936)	(22.835)	(23.254)
Growth opp. (% Δ of TA)	(%)	0.001	0.002	-0.004	-0.008	-0.007	-0.010
		(0.041)	(0.043)	(0.044)	(0.043)	(0.046)	(0.046)
Growth opp.*D (% Δ of TA*D)	(%)	0.124	0.127	0.112	0.134	0.135	0.117
		(0.086)	(0.088)	(0.091)	(0.089)	(0.091)	(0.093)
$Taxes_1$ (Average tax rate)	(%)	0.007**	0.007**	0.008**	0.005	0.004	0.005
		(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)

Taxes$_1$*D (Average tax rate*D)	**(%)**	- 0.011** (0.004)	- 0.010** (0.004)	- 0.010** (0.005)	-0.006 (0.004)	-0.005 (0.004)	-0.004 (0.005)
Taxes$_2$ ((EBT-EAT) / EBT)	**(%)**	-0.138 (1.437)	0.003 (1.358)	0.044 (1.353)	-0.379 (1.365)	-0.178 (1.320)	-0.213 (1.322)
Taxes$_2$*D (((EBT-EAT) / EBT)*D)	**(%)**	-0.081 (1.463)	-0.260 (1.385)	-0.225 (1.381)	0.205 (1.395)	-0.072 (1.351)	-0.060 (1.356)
Tangibility (FA/TA)	**(%)**	35.738*** (7.048)	36.391*** (8.068)	36.761*** (8.335)	38.894*** (7.516)	38.903*** (7.918)	39.003*** (8.278)
Tangibility*D (FA/TA)	**(%)**	-8.097 (9.088)	-10.444 (9.161)	-10.732 (9.534)	-7.192 (10.386)	-9.872 (10.442)	-9.854 (10.823)
Size$_1$ (ln(S))	**(€)**	- 0.073** (0.029)	- 0.063** (0.031)	- 0,063** (0,031)			
Size$_1$ *D (ln(S)*D)	**(€)**	0.041* (0.025)	0.044* (0.024)	0,044* (0,025)			
Size$_2$ (ln(TA))	**(€)**				0.007 (0.048)	0,003 (0,049)	0.006 (0.050)
Size$_2$ *D (ln(TA)*D)	**(€)**				0.012 (0.027)	0,012 (0,026)	0.008 (0.027)
Product Uniqueness (R&D/S)	**(%)**	- 4.787* (2.700)	- 5.448** (2.557)	- 5.211** (2.588)	- 4.666* (2.813)	- 5.386** (2.648)	- 5.133* (2.673)
Product Uniqueness*D ((R&D/S)*D)	**(%)**	1.198 (2.754)	2.417 (2.628)	1.982 (2.724)	1.044 (2.870)	2.373 (2.720)	1.903 (2.806)
Industry fixed effects			Included	Included		Included	Included
Temporal effect				Included			Included
Intercept		0.358** (0.159)	0.237 (0.200)	0.348 (0.217)	-0.003 (0.272)	-0.034 (0.2)	0.105 (0.304)
F-statistic		5.69***	5.26***	3.90***	5.34***	5.02***	3.73***
N		448	448	448	448	448	448

Source: own computation

5.4 Discussion

In this section, we will present a discussion about the main results of the econometric models and other authors findings.

Firstly, we will discuss about the first panel ordinary least squares computed for both subsample separately. The difference between the results of the high-leveraged and the non-high-leveraged subsamples entail answers to two of the research questions. The determinants that impact positively the leverage ratio are the *non-debt tax shields*, the *taxation*, *asset tangibility* and *company size*. This means the higher these determinants the higher will be the leverage ratio. According to Acedo-Ramírez and Ruiz-Cabestre (2004), a positive impact of the *non-debt tax shields* on leverage suggests that firms with high levels of this determinant has a high proportion of tangible assets that can be used as collaterals thus increasing the leverage accessibility and levels. Bradley et al. (1984) also states that this determinant acts as "securability" of assets. The positive impact of the *taxation* in the leverage ratio is directly related to the tax benefits that can come from borrowing more. Delcoure (2007) and Acedo-Ramírez and Ruiz-Cabestre (2004) defend this idea that higher average tax rate will increase the leverage level due to the necessity for tax benefits that come from borrowing. The *asset tangibility* also presents a positive impact on the leverage ratio, meaning that a firm with high asset tangibility will tend to present higher leverage levels due to the fact that assets count as collaterals for borrowing (Hall et al. (2004), Jong et al. (2008), Antoniou et al. (2008) and Frank and Goyal (2009)). Finally, as for the *company size*, it suggests that larger the company higher will be leverage ratio. The trade-off theory and authors like Hall et al. (2004), Antoniou et al (2008) and Psillaki and Daskalakis (2009) suggest that larger firms are more diversified and possess more collaterals giving more accessibility to leverage.

Which gives the answer to the research question *"Why are some LBO's more leveraged than others?"*. These determinants are the ones that explain why some leverage buyout target companies become more leveraged than the others. It must do with the non-debt tax shields of the target company, as well as the taxation impact, the amount of asset tangibility that the target company possesses and its size, meaning that larger targets tend to be more leveraged than the other LBO's targets. In addition, the positive impact of these determinants on leverage is proved by many authors such as Rajan and Zingales

(1995), Hall et al. (2004), Bauer (2004), Gaud et al. (2005), Delcoure (2007), Antoniou et al. (2008), Jong et al. (2008) and Acedo-Ramírez and Ruiz-Cabestre (2014).

Regarding the results of the non-high-leveraged subsample it presents different statistically significant variables. The major difference between the two models is that this one showed new statistically significant variables as well as the same variables as the other subsample but with a different sign. The determinants *investment* and *product uniqueness* presented a positive relation with debt ration while the *liquidity, non-debt tax shields, profitability* and *company size* presented a negative relation with the debt ratio. The positive sign of *investment* in fixed assets on the leverage level is due to the fact that more fixed assets means more collaterals to be used when borrowing (Booth et al. (2001), Miguel and Pindado (2001), Acedo-Ramírez and Ruiz-Cabestre (2014)). Regarding the *product uniqueness*, this determinant of capital structure presented a positive relation with leverage meaning that higher the number of unique products higher will be the leverage ratio. This could be explained by the fact that unique products may require more innovation hence the necessity for capital and the increase in leverage level. *Liquidity*, shows an indirect impact on leverage ratio, meaning higher the liquidity lower the leverage. This result could be supported by pecking order theory. Thus, the result of higher liquidity equals to higher leverage ratio. *Non-debt tax shields* also exhibit a negative relation with debt ratio. According to DeAngelo and Masulis (1980), the authors state that non-debt tax shields should be perceived as suitable substitutes for tax benefits of credit financing and therefore, firms that exhibit large levels of non-debt tax shield are prone to issue less debt. As for profitability, it shows a negative sign consistent with the pecking order theory that defends that the internal financing is preferable over the external one thus firms choose to use firm's profitability rather than borrowing (Titman and Wessels (1988), Booth et al. (2001), Hall et al. (2004), Jong et al. (2008), Antoniou et al. (2008)).

These results were consistent with the literature, namely with article like Titman and Wessels (1998), Miguel and Pindado (2001), Bauer (2004), Deesomsak et al. (2004), Huang and Song (2006) and Psillaki and Daskalakis (2009).

These difference between the high-leveraged and non-high-leveraged firms could be explained either by the nature of their capital structure or by the amount in observations. Either way, both subsample's models were globally statistically significant and controlled for multicollinearity which delivered robust results. In addition, the difference in the

determinants of capital structure answered the second question *"What are the determinants of capital structure for high-leveraged and non-high-leveraged companies in Europe Union and how they impact the capital structure of such companies?"*

Secondly, regarding the Binary Probit model in general the determinants that impact positively the probability of a company being non-high-leveraged are the *investment, non-debt tax shields, taxation* and *asset tangibility*. A negative impact presents the determinants such as profitability and the growth opportunities of a company. The result shows a very low probability of the company continuing to be a non-high-leveraged firm and a very high probability of a company becoming target of a LBO operation when those determinants with same sign and impact (coefficient) are present. The sign difference could be explained by the determinant's characteristics, and it is also related with the findings from the previous panel OLS results. For example, the larger the asset tangibility of a company the higher the probability of a company becoming a target of a LBO because the assets can be used as collaterals.

Finally, the second Ordinary Least Squares model applied presented with some results regarding the question *"What are the determinants of the capital structure change after the LBO operation?"* This model comprised a dummy variable multiplied to the independent variables that gave the impact of a LBO on the leverage level of the company. The determinants of capital structure that showed a statistically significant impact on the leverage ratio are liquidity, investment, non-debt-tax shields, profitability, taxation, asset tangibility, company size and product uniqueness. However, in some cases the determinant and the LBO impact (determinant*Dummy) showed different signs. For example, profitability showed a negative impact on leverage ratio while profitability*D showed a positive impact on leverage suggesting more profitable companies tend to increase more leverage the LBO transaction, than less profitable companies. The contrary happens with investment, it shows a positive impact on leverage ratio, meaning higher investment in fixed assets will be taken as a collateral insurance hence the higher leverage. However, after the LBO transaction, this determinant impacts negatively the leverage level which means that higher the investment in fixed assets, lower the leverage increase.

6. CONCLUSION

The theme of this dissertation consisted of two major topics: the determinants of capital structure and the leverage buyout, a not as discussed topic but with some valid empirical evidence. Combining these two topics gave result to something unique. Firstly, because even in the so highly discussed field of determinants of capital structure there is lack of empirical evidence regarding the private European firms. Secondly, when joining the two topics together there are even fewer authors publishing in this field. Finally, there is no paper with these two topics together, that studies private European LBO's targets from 2006 to 2016 and with a matching subsample of private companies.

This dissertation aimed to provide answers to some research questions. The first one was "*What are the determinants of capital structure for high-leveraged and non-high-leveraged companies in Europe Union and how they impact the capital structure of such companies?"*. Our results show that determinants of capital structure like non-debt tax shields, average tax rate, asset tangibility and company size impact the capital structure of the high-leveraged firms. The non-high-leveraged firm are affected by investment, product uniqueness, liquidity, non-debt tax shields, profitability and size. Our results also provide with some insights about *"What are the determinants of the capital structure change after the LBO operation?"* The estimations state that determinants like liquidity, investment, average tax rate, and tangibility have a positive impact on the leverage ratio, in general, but after the LBO they decrease the leverage ratio. On the contrary, determinants like profitability, size and product uniqueness create a negative impact in leverage in the general form but after the LBO they help increase the leverage level. The final research question was "Why are some LBO target companies more leveraged than others?". When comparing the panel OLS of the high-leveraged subsample and the Binary Probit model que can conclude that the determinants that really impact the level of leverage are non-debt tax shields, average tax rate, tangibility, profitability and company size. Regarding future research, there are some directions that could be developed form this dissertation's framework. The first one is to use a dynamic model, such as system GMM, for this analysis. The second, is to test for differences between country specific and firm specific determinants for the LBO's. Finally, the third consists in testing the difference between bank-oriented and market oriented economies when dealing with LBO's.

7. REFERENCES

Acedo-Ramirez, M. A., & Ruiz-Cabestre, F. J. (2014). Determinants of Capital Structure: United Kingdom Versus Continental European Countries. *Journal of International Financial Management & Accounting, 25*(3), 237-270. doi:10.1111/jifm.12020

Acharya, V. V. F., Julian and Servaes, Henri. (2007). Private Equity: Boom and Bust? *Journal of Applied Corporate Finance, 19*(4).

Antoniou, A., Guney, Y., & Paudyal, K. (2008). The Determinants of Capital Structure: Capital Market-Oriented versus Bank-Oriented Institutions. *Journal of Financial and Quantitative Analysis, 43*(1), 59-92. doi:10.1017/S0022109000002751

Arellano, M., & Bover, O. (1995). Another look at the instrumental variable estimation of error-components models. *Journal of Econometrics, 68*(1), 29-51. doi:http://dx.doi.org/10.1016/0304-4076(94)01642-D

Axelson, U. L. F., Jenkinson, T. I. M., Str, xd, Mberg, P. E. R., & Weisbach, M. S. (2013). Borrow Cheap, Buy High? The Determinants of Leverage and Pricing in Buyouts. *The Journal of Finance, 68*(6), 2223-2267.

Bancel, F., & Mittoo, U. R. (2004). Cross-Country Determinants of Capital Structure Choice: A Survey of European Firms. *Financial Management, 33*(4), 103-132.

Bauer, P. (2004). Determinants of capital structure - Empirical evidence from the Czech Republic. *Finance a Uver, 54*(1-2), 2-21.

Bhaduri, S. N. (2002). Determinants of capital structure choice: a study of the Indian corporate sector. *Applied Financial Economics, 12*(9), 655-665. doi:10.1080/09603100010017705

Booth, L., Aivazian, V., Demirguc-Kunt, A., & Maksimovic, V. (2001). Capital Structures in Developing Countries. *The Journal of Finance, 56*(1), 87-130.

Bradley, M., Jarrell, G. A., & Kim, E. H. (1984). On the Existence of an Optimal Capital Structure: Theory and Evidence. *Journal of Finance, 39*(3), 857-878.

Brealey, M., Marcus. (2001). *Fundamentals of Corporate Finance* (T. Edition Ed.): McGraw-Hill Companies, Inc.

Chang, C., Lee, A. C., & Lee, C. F. (2009). Determinants of capital structure choice: A structural equation modeling approach. *The Quarterly Review of Economics and Finance, 49*(2), 197-213. doi:http://dx.doi.org/10.1016/j.qref.2008.03.004

Chen, J. J. (2004). Determinants of capital structure of Chinese-listed companies. *Journal of Business Research, 57*(12), 1341-1351. doi:http://dx.doi.org/10.1016/S0148-2963(03)00070-5

Colombo, E. (2001). Determinants of corporate capital structure: evidence from Hungarian firms. *Applied Economics, 33*(13), 1689-1701. doi:10.1080/00036840010015057

Črnigoj, M., & Mramor, D. (2009). Determinants of Capital Structure in Emerging European Economies: Evidence from Slovenian Firms. *Emerging Markets Finance and Trade, 45*(1), 72-89. doi:10.2753/REE1540-496X450105

de Jong, A., Kabir, R., & Nguyen, T. T. (2008). Capital structure around the world: The roles of firm- and country-specific determinants. *Journal of Banking & Finance, 32*(9), 1954-1969. doi:http://dx.doi.org/10.1016/j.jbankfin.2007.12.034

de Miguel, A., & Pindado, J. (2001). Determinants of capital structure: new evidence from Spanish panel data. *Journal of Corporate Finance, 7*(1), 77-99. doi:10.1016/s0929-1199(00)00020-1

DeAngelo, H., & Masulis, R. W. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics, 8*(1), 3-29. doi:http://dx.doi.org/10.1016/0304-405X(80)90019-7

Deesomsak, R., Paudyal, K., & Pescetto, G. (2004). The determinants of capital structure: evidence from the Asia Pacific region. *Journal of Multinational Financial Management, 14*(4–5), 387-405. doi:http://dx.doi.org/10.1016/j.mulfin.2004.03.001

Delcoure, N. (2007). The determinants of capital structure in transitional economies. *International Review of Economics & Finance, 16*(3), 400-415. doi:http://dx.doi.org/10.1016/j.iref.2005.03.005

Donaldson. (1961). *Corporate Debt Capacity*: Beard Books.

Durand, D. (1959). The Cost of Capital, Corporation Finance, and the Theory of Investment: Comment. *The American Economic Review, 49*(4), 639-655.

Flannery, M. J., & Rangan, K. P. (2006). Partial adjustment toward target capital structures. *Journal of Financial Economics, 79*(3), 469-506. doi:http://dx.doi.org/10.1016/j.jfineco.2005.03.004

Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics, 67*(2), 217-248. doi:http://dx.doi.org/10.1016/S0304-405X(02)00252-0

Frank, M. Z., & Goyal, V. K. (2009). Capital Structure Decisions: Which Factors Are Reliably Important? *Financial Management, 38*(1), 1-37.

Gaud, P., Jani, E., Hoesli, M., & Bender, A. (2005). The Capital Structure of Swiss Companies: an Empirical Analysis Using Dynamic Panel Data. *European Financial Management, 11*(1), 51-69.

Gaughan. (2015). *Mergers, acquisitions, and corporate restructurings*: Hoboken.

González, V. M., & González, F. (2008). Influence of bank concentration and institutions on capital structure: New international evidence. *Journal of Corporate Finance, 14*(4), 363-375. doi:http://dx.doi.org/10.1016/j.jcorpfin.2008.03.010

Hall, G. C., Hutchinson, P. J., & Michaelas, N. (2004). Determinants of the Capital Structures of European SMEs. *Journal of Business Finance & Accounting, 31*(5-6), 711-728. doi:10.1111/j.0306-686X.2004.00554.x

Hall, G. C., PJ, H., & N, M. (2004). Determinants of the Capital Structures of European SMEs (Vol. 31, pp. 728). Oxford, UK: Blackwell Publishing Ltd.

Harris, M., & Raviv, A. (1991). The Theory of Capital Structure. *The Journal of Finance, 46*(1), 297-355. doi:10.2307/2328697

Heberlen, A. (Private Equity Outlook 2017: Signs of Fatigue). Retrieved from https://www.toptal.com/finance/private-equity-consultants/private-equity-industry

Helwege, J., & Liang, N. (1996). Is there a pecking order? Evidence from a panel of IPO firms. *Journal of Financial Economics, 40*(3), 429-458. doi:http://dx.doi.org/10.1016/0304-405X(95)00851-5

Hovakimian, A., Hovakimian, G., & Tehranian, H. (2004). Determinants of target capital structure: The case of dual debt and equity issues. *Journal of Financial Economics, 71*(3), 517-540. doi:http://dx.doi.org/10.1016/S0304-405X(03)00181-8

Huang, G., & Song, F. M. (2006). The determinants of capital structure: Evidence from China. *China Economic Review, 17*(1), 14-36. doi:http://dx.doi.org/10.1016/j.chieco.2005.02.007

HVCA. The Development of Private Equity and Venture Capital. Retrieved from http://www.hvca.hu/pevc-explained/private-equity/the-development-of-private-equity-and-venture-capital/

Kraus, A., & Litzenberger, R. H. (1973). A State-Preference Model of Optimal Financial Leverage. *The Journal of Finance, 28*(4), 911-922. doi:10.2307/2978343

López-Gracia, J., & Sogorb-Mira, F. (2008). Testing trade-off and pecking order theories financing SMEs. *Small Business Economics, 31*(2), 117-136. doi:10.1007/s11187-007-9088-4

Malenko, A., & Malenko, N. (2015). A theory of LBO activity based on repeated debt-equity conflicts. *Journal of Financial Economics, 117*(3), 607-627. doi:http://dx.doi.org/10.1016/j.jfineco.2015.06.007

Mazur, K. (2007). The Determinants of Capital Structure Choice: Evidence from Polish Companies. *International Advances in Economic Research, 13*(4), 495-514. doi:10.1007/s11294-007-9114-y

Miller, M. H. (1977). Debt and Taxes. *The Journal of Finance, 32*(2), 261-275. doi:10.2307/2326758

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review, 48*(3), 261-297.

Modigliani, F., & Miller, M. H. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *The American Economic Review, 53*(3), 433-443.

Myers, S. C. (1984). THE CAPITAL STRUCTURE PUZZLE. *Journal of Finance, 39*(3), 575-592. doi:10.2307/2327916

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

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics, 13*(2), 187-221. doi:http://dx.doi.org/10.1016/0304-405X(84)90023-0

Opler, T., & Titman, S. (1993). The Determinants of Leveraged Buyout Activity: Free Cash Flow vs. Financial Distress Costs. *The Journal of Finance, 48*(5), 1985-1999. doi:10.2307/2329077

Ozkan, A. (2001). Determinants of Capital Structure and Adjustment to Long Run Target: Evidence From UK Company Panel Data. *Journal of Business Finance & Accounting, 28*(1-2), 175-198. doi:10.1111/1468-5957.00370

Psillaki, M., & Daskalakis, N. (2009). Are the determinants of capital structure country or firm specific? *Small Business Economics, 33*(3), 319-333. doi:10.1007/s11187-008-9103-4

Rajan, R. G., & Zingales, L. (1995). What Do We Know about Capital Structure? Some Evidence from International Data. *The Journal of Finance, 50*(5), 1421-1460. doi:10.2307/2329322

Roden, D. M., & Lewellen, W. G. (1995). Corporate Capital Structure Decisions: Evidence from Leveraged Buyouts. *Financial Management, 24*(2), 76-87. doi:10.2307/3665536

Ross, W. J. (2010). *Fundamentals of Corporate Finance* (Vol. 9th): McGraw-Hil.

Shyam-Sunder, L., & C. Myers, S. (1999). Testing static tradeoff against pecking order models of capital structure1. *Journal of Financial Economics, 51*(2), 219-244. doi:http://dx.doi.org/10.1016/S0304-405X(98)00051-8

Tarbet, M. (2011). *Corporate Finance for Business*: Oxford.

Titman, S., & Wessels, R. (1988). The Determinants of Capital Structure Choice. *The Journal of Finance, 43*(1), 1-19. doi:10.2307/2328319

Trezevant, R. (1992). Debt Financing and Tax Status: Tests of the Substitution Effect and the Tax Exhaustion Hypothesis Using Firms' Responses to the Economic Recovery Tax Act of 1981. *The Journal of Finance, 47*(4), 1557-1568. doi:10.2307/2328952

8. APPENDIXES

Appendix 1. *Summary of the methodology of the main studies*

Studies	Methodology	Type of data	Sample size	Location/ type of companies	Data Source/Base	Time
(Acedo-Ramirez & Ruiz-Cabestre, 2014)	Two stage GMM	Panel Data	888 companies	France, Germany, Itali, Spain and UK / PUBLIC companies	Worldscope	1998-2008
(Antoniou et al., 2008)	System GMM	Panel Data	4,854 (total of 4 countries)	France, Germany, Japan and UK / all non financial firms	Datastream, SDC platinum, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997), (1998).	1987-2000
(Bancel & Mittoo, 2004)	Survey + univariate and multivariate regression and Probit	Cross-sectional data	720 firms	16 European countries	the French financial journal La Tribun and Bloomerang database	2000-2002
(Bauer, 2004)	OLS	Cross-sectional data	74 firms	Czech Republic listed firms	Prague Stock Exchange website + Centre of the Czech Republic data base	2000-2001
(Bhaduri, 2002)	Two stage model: 1st) Partial adjustment model 2nd) Factor Analytic technique	Cross-sectional data	363 firms	India	Centre for Monitoring Indian Economy (CMIE) database	1990-1995
(Chang, Lee, & Lee, 2009)	MIMIC model	Cross-sectional data	13 887 firm-year observations in 16 years		Annual *Compustat* Industrial Files	1988-2003
(Chen, 2004)	pooled OLS, fixed effects, and random effects	Firm-level Panel Data	88 companies	China – listed companies	Dow–China 88 Index + U.S. GAAP	1995-2000
(Colombo, 2001)	Tobit model	Cross-sectional and Panel data	1100	Hungary	Hungarian Ministry of Finance + Hungarian Central Statistical Office	1992-1996
(Črnigoj & Mramor, 2009)	Multiple regression	Cross-sectional data	3 214 in 1999 to 4,280 in 2006	Slovenian public and private firms	Agency of the Republic of Slovenia for Public Legal Records and Related Services (AJPES).	1999-2006
(de Jong et al., 2008)	Firm level OLS	Cross-sectional	11 845 firms	42 countries worldwide (developed	COMPUSTAT Global database + World	1997-2001

		and Panel data		and developing) Private + public firms	Development Indicators and Financial Structure Database of the World Bank	
(de Miguel & Pindado, 2001)	GMM	Panel Data	133 firms	Spain Listed companies	CNMV (Spanish Security Exchange Commission)	1990-1997
(Deesomsak et al., 2004)	OLS	Cross-sectional and Panel data	294 Thai, 669 Malaysian, 345 Singaporean, and 219 Australian firms	Thailand, Malaysia, Singapore and Australia All non financial listed firms	Datastream	1993-2001
(Delcoure, 2007)	pooled OLS, fixed effect, and random effects	Panel Data	22 Czech, 61 Polish, 33 Russian, and 13 Slovak	-Czech Republic, Poland, Russia and Slovak Republic -Publicly traded companies	Thomson Financial's Worldscope database	1996-2002
(Frank & Goyal, 2009)	FACTOR ANALYSIS	Cross-sectional data	270 000 firm-year observations	US – publicly traded	Center for Research in Security Prices (CRSP) database	1950-2003
(Gaud et al., 2005)	Arellano and Bond (1991) two-step GMM	Panel data	104 firms	*Switzerland Listed firms*	Worldscope Swiss Stock Guide	1991-2000
(González & González, 2008)	GMM	Panel data	12 049 firms	39 countires	Worldscope	1995-2004
(Graham C. Hall, Hutchinson, & Michaelas, 2004)	Regression analysis	Cross-sectional data	4000 (500 from each country)	Belgium, Germany, Spain, Ireland, Italy, Netherlands, Portugal and the UK	Dun and Bradstreet	1995
(Hovakimian et al., 2004)	OLS		1689 firms		Compustat Industrial, Full Coverage, and Research files	1982-2000
(Huang & Song, 2006)	OLS		1200	Chinese listed firms		1994-2003
(Mazur, 2007)	Multiple regression model		238 (13 industires)	Polish listed firms	Notoria Serwis	2000-2004
(Psillaki & Daskalakis, 2009)	Period SUR (Seemingly Unrelated Regression) and Pooled EGLS (Estimated Generalized Least Squares).	Panel data	320 Italian, 52 Portuguese, 1,252 Greek and 2006 French SMES	Greek, French, Italian, and Portuguese SME's	Amadeus database	1997-2002
(Booth et al., 2001)	Fixed effects regression	Cross-sectional and Panel data	5281	10 developed countires with listed firms	the International Finance Corpo-ration (IFC	1980-1990

(Titman & Wessels, 1988)	LISREL system: factor- analytic model consisting of two parts: a measurement model and a structural model that are estimated simultaneously	Cross-sectional Data	469	US	Annual Compustat Industrial Files and Department of Labor, Bureau of Labor Statistics, "Employment and Earnings"	1974-1982
(Rajan & Zingales, 1995)	Regression: Maximum Likelihood and censored Tobin Model	Panel data	30% - 70% of the companies listed in every country	- G-7 countries (US, Japan, Germany, France, Italy, Uk and Canada) -Listed non-financial companies	Global Vantage	
(Opler & Titman, 1993)	Multivariate Logit Regression	Cross-sectional Data	180	-US -Firms that undertook a LBO operation	NBER Manufacturing Firm Panel And ADP M &A Database	
(Roden & Lewellen, 1995)	Multinomial Logit Model	Panel data	107	US -Firms that undertook a LBO operation	Annual lists published in Mergers and Acquisitions and COMPUSTAT	

Source: own creation

Appendix 2*. Industry classification*

NACE VER. 2 (the sample only comprises 16 from 21 industries)	**Joining the industry classification**	**Five global groups**
A – Agriculture, forestry and fishing B – Mining and quarrying C – Manufacturing	L + M + N + Q + R = 72 firms	ID1
D – Electricity, Gas, Steam and Air conditioning supply E – Water supply, Sewerage, Waste management and Remediation activities F – Construction	D + E = 17 firms	ID2
G – Wholesale and retail trade; Repair of motor vehicles and motorcycles H – Transportation and Storage	G + H = 51 firms	ID3
I – Accommodation and Food service activities J – Information and Communication	C + F = 72 firms	ID4

K – Financial and Insurance activities		
L – Real Estate activities M – Professional, Scientific and Technical activities N – Administrative and Support Service activities Q – Human Health and Social Work activities R – Arts, Entertainment and Recreation	Others = A + B + I + J + K	ID5

Source: own creation + Eurostat

Appendix 3. *Data sample filters*

Filters for the Zephyr and Amadeus database	High-leveraged	Non-high-leveraged
1º	Unlisted targets	Unlisted companies
2º	Deal type: Institutional Buyout	Latest years of accounts: 2016
3º	Current Deal status: Completed and confirmed	Category: very large companies
4º	Time period: 1/01/2006 – 1/12/2016	Nº of years with accountings: 10 years
5º	World region: European Union enlarged (28)	World region: European Union enlarged (28)
6º	Target's financials: Total Assets = 250,000 EUR	Firm's financials: Total Assets = 250,000 EUR
7º		Status: Active

Source: own creation + Amadeus and Zephyr database

***Appendix 4**. Measures of the determinants of capital structure in the literature*

Studies	LEV	TNG	NDTS	GWO	UNIQ	SZ	RISK	PROFT	LIQ	TAX	INV
(Acedo-Ramirez & Ruiz-Cabestre, 2014)	Dit = Total debtit/Total assetit	n.a	NDTSit = Depreciationit	n.a.	n.a.	Sit = Ln Sit Log of sales	n.a.	n.a.	n.a.	EFECTIVE TR : ETRit = Taxes paidit/Earnings before taxesit	Iit = NFAit _ NFAit_1 + Depreciationit
(Booth et al., 2001)	Total liabilities/(Total liabilities+net worth) Or LT D/(TA- BV Eq+MV Eq)	(TA – Current A)/TA		R&D Market to book ratio		Natural log of Sales	SD of ROA	ROA=(NOI/TA)		EFECTIVE TR : ETRit = Taxes paidit/Earnings before taxesit	
(Frank & Goyal, 2009)	1) TD/MV TA 2) TD/BV TA 3) LT D/MV TA 4) LTD/ BV TA	Tangibility or R&D/Sales or Uniqueness dummy	NDTSit = Depreciationit	Market-to-book ratio or Change in log of assets Or Capex/TA		Log of Assets	n.a.	Profitability	n.a.	Variance of stock returns	n.a.
(Huang & Song, 2006)		FA/TA	D&A/TA	Market-to-book ratio of eq		Sit = Ln Sit Log of sales Or Log of TA	SD(EBIT/TA)	EBIT/TA		Average tax rate	
(Antoniou et al., 2008)	BV Total Debt/ BV total Assets	Net Tangible assets/ BV TA	D&A/TA	n.a. (uses market values)	n.a	Natural Logos Total Annual Sales/Assets	First difference of annual earnings (% change) minus average of the first differences	Operating profit/ BV Total Assets	n.a	EFFECTIVE TR: Total tax/total taxable income	n.a.
(Bauer, 2004)	*TL= Book Total Liabilities Ratio = Toatl Liabilities/ (Total Liabilities +*	Tang A/TA	D&A/TA	P/B ratio	n.a	Natural Log of S/TA	Standard deviation of ROA	ROA(EBIT/TA)	n.a	(Earnings before taxes-earnings after taxes)/earnings before taxes	n.a

	Book Value of Equity) *TD = Book Total Debt Ratio = Total Debt/ (Total Debt + Book Value Equity)* -										
(Chang et al., 2009)		(Inventory+gross plant and equipment)/TA	NDT/TA or DEP/TA oe Investment tax credit/TA	n.a.	R&D/SALES	n.a.	SD of % Change of Operating Income or coefficient of variation of ROA or ROE Or coefficient of variation of OI/TA	Operating Income/ TA or OI/Sales	n.a.	n.a.	n.a.
(Chen, 2004)	BV TD/BV TA and BV Long Term Debt /TA	Tangible Assets/TA	D&A/TA	Sales growth/TA growth	n.a.	Log of TA	First difference of % change of OI	EBITDA/TA	n.a.	n.a.	n.a.
(Colombo, 2001)	net trade credit position (payables± receivables) to total assets.	Fixed Assets/TA and Inventories/TA	n.a.	Investments/TA	n.a.	Log of Net sales and Level of employment	n.a.	After tax profits/TA	n.a.	n.a.	n.a.
(de Jong et al., 2008)	BV Long term debt/(BV TA-BV Eq + MV Eq)	Net FA/BV TA	n.a.	MV TA/BV TA	n.a.	Natural log of Total Sales	SD of OI/BV TA	OI/BV TA	Total Current Assets/ T. Curren Liabilities	Taxation: Average tax Rate of the Year from Compustat EFECTIVE TR : ETRit = Taxes paidit/Earnings before taxesit	n.a.
(Deesomsak et al., 2004)	TD/(TD+MV Eq+BV Preference shares)	T FA/TA	D&A/TA	(BV TA – BV Eq + MV Eq)/ BV TA	n.a.	Natural Log Assets	Annual % change in EBIT and the average of EBIT over the sample period	EBIT/TA	Current A/ Current Liabilities	n.a.	n.a.

(Delcoure, 2007)	TD/TA Long Term Debt/TA Short term Debt/TA	Net PPI/TA	Dep/TA	ratio of the geometric average of 5years' sales growth to total assets growth	n.a.	(ln(TA))	SD of first difference of (EBIT/TA)	ROA = (NOI/TA)	n.a.	Average tax rate	n.a.
(Rajan & Zingales, 1995)	Total Liabilities/total Assets (NOT GOOD) (Short term+long term Debt)/TA	Tangible Assets/TA		R&D/Sales		Natural log of sales	EBIT/Interest expenses or EBITDA/interes t expenses	ROA = (NOI/TA)			
(Titman & Wessels, 1988)	TD/TA Long Term Debt/TA Short term Debt/TA	Intangible asstest/TA and (Inventory + gross plant and equipment)/TA	Investment Tax Credit/TA And D/TA NDT/TA	Capex/TA % change of TA R&D/S	R&D/SALE S CS/S Qui rate	Natural log of sales And qui rate	SD of % change in OI	OI/S OI/TA			
(Ozkan, 2001)						Natural log of sales		EBITDA/Ta			
(de Miguel & Pindado, 2001)			Ebit -interest payable - (Taxes paid/t)								Iit = NFAit _ NFAit_1 + Depreciationi t
(Gaud et al., 2005)	BV TD/BV TA´ Market cap of Eq	(Tangible assets + inventories)/TA		Market to book value of Assets		Natural log of sales		EBITDA/Ta			
(González & González, 2008)	Lt debt/(TA – BV Eq + MV Eq)	% of Property, lant and equipment (PPE)		Market-to-book ratio		Natural log of sales		EBITDA/Ta			
(Graham C. Hall et al., 2004)	Short term D/TA Long T D/TA	FA/TA		% change in sales turnover in the previous 3 years		TA		EBIT/SALES Turnover			
(Mazur, 2007)	BV TOTAL LIABILITIES/B V TA	FA/TA	D/TA	% change of TA % change of Net Revenue Sales Long term investment/TA	Cost of Sales/Net revenues from sales	Net revenue from Sales or TA	SD of % change of OI	OI/NET REVENUES FROM SALES	Current assets/Shor t term liabilities	EFFECTIVE TR: Income tax/ gross profit	

(Psillaki & Daskalakis, 2009)	Total Liabilities/total Assets	Tangible Assets/TA		Annual change of earnings		Log of Sales	the squared deviation of each year's earnings before taxes from the period average	EBIT/TA			
(Bancel & Mittoo, 2004)				P/B ratio		Natural Log of Mkt Cap					

Source: own creation

Appendix 5. *The relation between the variables and leverage reported in the literature*

Studies	TNG	NDTS	GWO	UNIQ	SZ (often weak resulst)	RISK	PROFT	LIQ	TAX	INV	AGC
(Acedo-Ramirez & Ruiz-Cabestre, 2014)		Negative and significant			positive and significant				Taxation: positive and significant	significant and positive	
(Booth et al., 2001)	negative		positive		Negative/positive		negative		Negative	significant and positive	
(de Miguel & Pindado, 2001)		negative								significant and positive	
(Rajan & Zingales, 1995)	positive		negative		Positive		NEGATIVE				
(Frank & Goyal, 2009)	positive	n.a.	n.a.	n.a.	positive	n.a.	negative	n.a.	n.a.	n.a.	n.a.
(Antoniou et al., 2008)	positive	Negative and positive (depends on country)	negative		positive	Not significant	negative		Effective tax rate: Not significant		
(Flannery & Rangan, 2006)	positive		negative		positive						
(Huang & Song, 2006)	Positive and not significant in other models	negative	negative		positive	negative	negative				
(Titman & Wessels, 1988)	Not significant	Not significant	Not significant	negative	negative	Not significant	negative				
Bradley et al (1984)		positive				negative					
(Bauer, 2004)	negative	negative	negative		positive	Not significant	negative		Positive and negative		
(Chen, 2004)	positive	Not significant	positive		Negative (for long term debt)	Not significant	negative				
(Colombo, 2001)	positive				Positive						

(Deesomsak et al., 2004)	Positive but not significant in all countries	negative	negative		positive	Not significant	Negative but not significant in all countries	negative			
(Delcoure, 2007)	positive	positive			positive	Negative inconclusive	negative		positive		
(Gaud et al., 2005)	positive		negative		positive		negative				
(González & González, 2008)	Positive but not significant		Negative but not significant(González & González, 2008)		positive		negative				
(Graham C. Hall et al., 2004)	positive		positive		positive		negative				
(Mazur, 2007)	negative	Negative (insignificant??)	positive	positive	negative	negative	negative	negative	positive		
(Psillaki & Daskalakis, 2009)	negative		Not significant		positive	negative	negative				
(de Jong et al., 2008)	positive		negative		positive	Negative and not significant	negative	Negative and not significant	Taxation: negative and positive (average tax rate)		

Source: own creation

Appendix 6: *Correlation matrix for the sample used in Probit Model (left down) and second part Ordinary Least Squares (right up)*

	D	LEV	LIQ	INV	RISK	NDTS	PROFT	GWO	TAX_1	TAX_2	TNG	SZ_1	SZ_2	UNIQ
D	**1**	-	-	-	-	-	-	-	-	-	-	-	-	-
Leverage (BVTD/BVTA) (%)		**1**	0.0	0.1	0.0	0.2	-0.2	0.1	0.0	0.0	0.3	-0.2	0.1	-0.1
Liquidity (CA/CL) (%)	0.0	-	**1**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0	0.0	0.0
Investment ((FA_t – FA_{t-1}+D&A)/TA) (%)	0.0	-	0.0	**1**	0.0	0.4	-0.2	0.4	-0.1	0.1	0.1	0.1	0.1	0.2
Risk (ΔEBIT/TA) (%)	0.0	-	0.1	0.0	**1**	0.0	-0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0
Non-debt Tax Shields (D&A/TA) (%)	0.1	-	-0.1	-0.3	0.0	**1**	-0.3	0.0	-0.2	0.0	0.2	0.1	0.0	0.0
Profitability (ROA) (%)	-0.1	-	0.0	0.4	0.0	-0.4	**1**	-0.1	0.0	0.0	0.0	0.1	0.0	0.0
Growth opp. (% Δ of TA)	0.0	-	0.0	0.0	0.0	0.0	0.0	**1**	0.0	0.0	0.0	0.0	0.2	0.1
$Taxes_1$ (Average tax rate)	0.1	-	0.1	0.0	0.0	-0.1	0.0	0.0	**1**	0.1	-0.2	0.0	-0.2	0.0
$Taxes_2$ ((EBT-EAT)/EBT) (%)	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1**	0.0	0.0	0.0	0.0
Tangibility (FA/TA) (%)	0.1	-	-0.1	0.0	0.0	0.1	0.0	0.0	-0.2	0.0	**1**	-0.3	0.2	-0.1
$Size_1$ (ln(S))	-0.1	-	-0.1	0.2	0.0	0.0	0.2	0.0	0.0	0.0	-0.4	**1**	0.2	0.1
$Size_2$ (ln(TA))	0.0	-	0.0	0.3	0.0	-0.2	0.1	0.0	-0.1	0.0	0.1	0.4	**1**	0.0
Product Uniqueness (R&D/S) (%)	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1**

Appendix 7. *Correlation Matrix (High-leveraged firms on the left down, non-high-leveraged firms on the right up)*

This table presents the correlation matrix between the dependent and independent variables. The data on the left down corresponds to the correlation matrix of the high-leveraged firms, while the data on the right up refers to the correlation matrix for the non-high-leveraged firms. These correlation matrixes were built in order to identify any high correlation (higher than 0.5) from which the multicollinearity problem could arise. The variables growth opportunities and investment present high correlation for the high-leveraged firm

	LEV	LIQ	INV	RISK	NDTS	PROFT	GWO	TAX_S	TAX_2	TNG	SZ_1	SZ_2	UNIQ
Leverage (BVTD/BVTA) (%)	1	-0.1	0.0	0.0	-0.1	-0.1	0.1	0.0	0.0	0.2	-0.1	0.1	0.0
Liquidity (CA/CL) (%)	0.0	1	0.0	0.1	-0.1	0.0	0.0	0.1	0.0	-0.1	-0.2	0.0	0.0
Investment ((FA_t – FA_{t-1}+D&A)/TA) (%)	0.1	0.0	1	0.0	-0.6	0.6	0.0	0.1	0.0	0.0	0.2	0.4	0.0
Risk (ΔEBIT/TA) (%)	0.0	0.0	0.0	1	0.0	0.1	0.0	0.0	0.0	0.0	-0.1	0.0	0.0
Non-debt Tax Shields (D&A/TA) (%)	0.2	0.0	0.4	0.0	1	-0.4	0.0	-0.1	0.0	0.2	0.0	-0.4	0.0
Profitability (ROA) (%)	-0.2	0.0	-0.2	0.0	-0.4	1	0.0	0.0	0.0	0.0	0.2	0.2	0.0
Growth opp. (% Δ of TA)	0.1	0.0	0.5	0.0	0.0	-0.1	1	0.0	0.0	0.0	0.0	0.0	0.0
$Taxes_1$ (average tax rate)	-0.1	0.0	-0.1	0.0	-0.2	0.0	0.0	1	0.0	-0.3	0.0	0.0	0.0
$Taxes_2$ ((EBT-EAT)/EBT) (%)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	0.0	0.0	0.0	0.0
Tangibility (FA/TA) (%)	0.3	-0.1	0.1	0.0	0.1	0.0	0.0	-0.1	0.0	1	-0.5	0.0	0.0
$Size_1$ (ln(S))	-0.1	-0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	-0.3	1	0.4	0.0
$Size_2$ (ln(TA))	0.1	0.0	0.1	0.0	0.0	0.0	0.1	-0.2	0.0	0.3	0.3	1	0.0
Product Uniqueness (R&D/S) (%)	-0.1	0.0	0.2	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0	1

Source: own creation