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The Pricing of Loans to LBOs in the U.S. versus Europe

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Abstract

This thesis investigates the determinant factors concerning pricing of loans in LBOs, using a sample of 13,315 syndicated loans closed from 2000 to 2013. The results seem to indicate that spreads and pricing processes differ significantly in market-based *versus* bank-based financial systems as well as in the U.S. *versus* W.E. In the pre-crisis period, LBO loans extended to market-based borrowers face higher spreads compared to bank-based countries. During the crisis-period, borrowers from common law legal systems face higher spreads for loans in LBOs. The regression results presented for LBO loans extended to U.S. *versus* W.E. borrowers demonstrate that those in the U.S. face higher spreads. These results are in line with Carey and Nini (2007). A robust convex relationship between spread and maturity is found for loans in LBOs. Lastly, acquired firms with higher cash flow potential (market-to-book ratio) and asset tangibility (fixed asset to total assets) experience a lower spread. Furthermore, firms' characteristics, namely book leverage, do not affect the pricing of loans in LBOs, opposed to marketability and default factors.

Keywords: Loans, Pricing, Credit spreads, Debt.

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1. Introduction

A leveraged buyout (LBO) is an acquisition of a company by a specialized investment firm using a significant amount of borrowed funds (debt financing) and a small portion of equity[1]. The large investment in debt has advantages and disadvantages that can affect the pricing of LBO loans.

This thesis investigates the determinant factors concerning pricing of loans in LBOs, using a sample of 2,671 deals which correspond to 13,315 syndicated loans closed during the 2000-2013 period. The study aims to discover the differences in loan pricing, namely between financial systems (market-based *versus* bank-based), the location of the borrower (U.S. *versus* W.E.), the legal systems implemented on the borrower country (common law *versus* civil law), the effect of the pre-crisis and crisis period and the term structure of loan spreads.

Several studies have investigated loan pricing, specifically for corporate loans and bonds. However, only two empirical papers have tried to investigate the determinants of syndicated loan spreads in LBOs. Ivashina and Kovner (2011) use a sample of 1,590 loans closed between 1993 and 2005 in the U.S. to study the impact of private equity firms' bank relationships on the terms of their syndicated loans. Colla *et al.* (2012) study the determinants of both capital structure and debt pricing, using a sample of 1,006 tranches closed between 1997 and 2008. Since the empirical literature of the determinants that affect the pricing processes of an LBO loans is scant, this thesis aims to extend current knowledge by investigating if pricing models use similar determinants for project finance loans and syndicated loans. To extend the literature on debt pricing, this thesis

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[1] Definition of LBO is based on the paper by Kaplan *et al.* (2009).

aims to answer the following question: *Are loans in LBOs influenced by common pricing determinants and to what extent are they similar to other syndicated loans?*

The main goal of a financial system is to raise funds from investors and exchange them between investors and borrowers through regulated markets and intermediaries.[2] The types of financial system, bank-based *versus* market-based, play an important role because of the benefits and disadvantages of the financing decision and consequently, influence LBO loan spreads. Beck and Levine (2002) show that banks are more effective than the market in financing new projects. However, Chakraborty and Ray (2006) argue that the ability of a firm to raise external funds and grow is affected by the organization of financial activities. Allen and Gale (1999) show that the legal system plays an important role, controlling the restrictions used on securities and the type of contracts. La Porta *et al.* (1998) find that legal protections of investors differ across countries (common law *versus* civil-law). According to Gatti *et al.* (2013), loans for projects in countries with stronger creditor rights, lower political and economic risks have lower spreads. Ergungor (2008) shows that legal system is also correlated with economic growth. The evidence on the type of financial systems raises a second question: *Are LBO loan spreads and pricing processes significantly different between market-based and bank-based financial systems?*

The LBO loan market is not globally integrated and the spreads on syndicated loans to LBOs are different across the United States (U.S.) and Western Europe (W.E.). Although the crisis had an impact on credit spreads across the U.S. and W.E., the biggest difference is due to the type of financial systems used to finance LBO transactions and the law legal system. Carey and Nini (2007) show evidence that syndicated loan credit spreads are significantly smaller in Europe than in the U.S. Additionally, according to Colla *et al.* (2012) between 1997 and 2009, a major part of buyout deals have occurred in the U.S. and the rest of them have been

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[2] Definition of financial system is based on the papers by Boot and Thakor (1997) and Chakraborty *et al.* (2006).

placed in the U.K. This difference on spreads related to borrowers' location raises another question: *Are LBO loan spreads arranged to U.S. borrowers significantly higher than those of LBO loan spreads arranged to W.E. borrowers?*

The 2007/2008 financial crisis and the subsequent European sovereign debt crisis deteriorated the credit market conditions and investors lost confidence in structured finance credit ratings. Therefore, collaterized loan obligations (CLO) and leveraged buyout loans have dissipated, and interest rates on debt related to buyouts increased significantly[3]. According to Marques *et al.* (2015), credit spreads for other types of syndicated loans - project finance loans - have significantly increased as a consequence of the financial crisis. This increase on spreads raises an additional question: *After controlling for macroeconomic conditions and loan characteristics, did the 2007/2008 financial crisis have a significant impact on LBO loan spreads?*

Finally, the term structure of spreads for syndicated loans is yet to be fully understood since the results presented in previous studies do not reach the same conclusions. From syndicated loans to LBOs, Ivashina and Kovner (2011) and Colla et al. (2012) identify a positive relationship between spread and maturity. Concerning corporate loans, Kleimeier and Megginson (2000) and Caselli and Gatti (2005) conclude that project finance loan pricing is not a positive function of maturity. However, they discover a significantly negative relationship between spread and maturity. This negative relationship is explained by the fact that structured financing loans are characterized by longer maturities and make use of a special purpose vehicle (SPV). Nevertheless, Sorge and Gadanecz (2008) and Marques et al. (2015) show a robust-convex relationship on the term structure of spreads. These divergent results lead us to the final question: *After controlling for microeconomic and macroeconomic pricing factors, is the term structure of spreads in LBO loans different from that of corporate financing loans?*

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[3] Based on the papers by Kaplan *et al.* (2009) and Benmelech *et al.* (2009).

The results presented by this thesis show that loans in LBOs closed in market-based and bank-based financial systems are influenced differently by common pricing factors. Moreover, even loans extended to U.S. and W.E. borrowers have different pricing processes. During the pre-crisis period, loans in LBOs extended to borrowers in market-based financial systems face higher spreads (13.27 bps) than those in bank-based financial systems. During the crisis period, only loans extended to borrowers in common law legal systems face higher spreads (41.12 bps). Loans extended to U.S. borrowers are associated with 45.79 bps higher spreads than loans arranged to W.E. borrowers.

This thesis contributes to the literature on pricing processes of LBO loans. The investigation focuses on pricing processes of loans to LBO and if they differ on the borrower location, market-based financial system *versus* bank-based financial system. The study also contributes to corporate finance and financial intermediation literature, since spreads on LBOs are different across the U.S. and W.E. Furthermore, the study contributes to the analysis of the impact by the 2007/2008 crisis and the subsequent European sovereign debt crisis on the spread and pricing processes. Since the term structure of spreads remains a puzzle, we contribute with a model of the term structure of spreads for LBOs loans, controlling for different financial systems and time periods. Lastly, the influence by target firm characteristics on LBO loan spreads is also analyzed.

The thesis is organized as follows. Section 2 includes a review on the literature of LBO loans. Section 3 presents the research questions. Section 4 describes the data and sample selection, along with the descriptive and preliminary analysis to the financial characteristics on syndicated loans in LBOs. Section 5 describes the methodology and the model used to answer the research questions. In section 6 the results are presented and analyzed. Section 7 provides an analysis to the impact of acquired firms' characteristics on spreads and pricing processes. Section 8 presents the principal conclusions of this study.

2. Literature Review

2.1 What is a LBO?

Structured finance plays an important role in the financial business, offering complex financing needs for companies [Fabozzi *et al.* (2006)]. These complex financing structures allow the financing of assets and business when conventional financing products are unavailable. According to Caselli and Gatti (2005), asset securitization, project finance, structured lease and acquisition finance activities, supported by a strong debt component, are the formats of structured finance. Concerning the leveraged acquisition, the most important financial instrument used is the leveraged buyout (LBO).

According to previous studies [Kaplan *et al.* (2009)], a LBO is an acquisition of a company by a specialized investment firm using a significant amount of borrowed funds (outside debt financing) and a small portion of equity.

In a traditional LBO, contrary to what happens in a traditional firm, debt comprises 60% to 70% of the financing structure; i.e., they use highly levered capital structures [Rosenbaum *et al.* (2009)]. During the debt structuring of a LBO transaction, there are two main financing characteristics. First, the high level of debt of the special purpose vehicle firm which is settled only for the transaction. Second, debt financing is obtained in multiple debt tranches that differ in terms of lender type: banks, institutional investors and arm's length financing [Colla *et al.* (2012)]. These financing sources are called the financial intermediaries and can create value for the LBO firm. For example, repeated relationships between the leveraged firm and the bank leads to the achievement of a large amount of leverage with better terms.

In a typical leveraged buyout structure, the acquirer firm (LBO firm) remains with a higher debt ratio compared with the level of equity/debt before the acquisition. The choice of the target firm is related with the increase of the potential value for the acquirer firm, in restructuring or breaking up the target. Figure 1 demonstrates a LBO financial restructuring and the respective stages:

Figure 1 – LBO Scheme
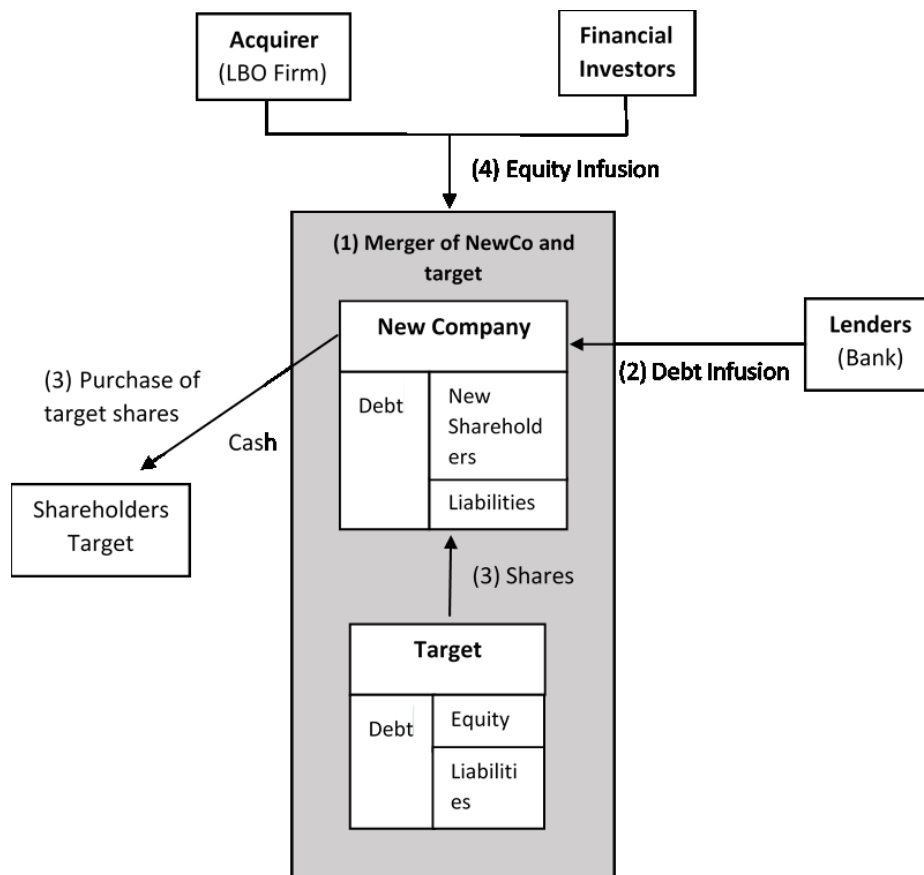
Source: Caselli, S., and S. Gatti, 2005. *Structured Finance: Techniques, Products and Market*, **Springer Berlin**

(1) The new company or special purpose vehicle is used for the transfer of ownership since it is the new company which will make the acquisition of the target firm. (2) The new company receives a large amount of capital (debt infusion) raised through lenders (pool of banks and financial intermediaries).

This debt infusion is relocated to the acquirer firm and is transformed into a cash flow source to repay the assumed liabilities. (3) The new company acquires the target's shares and the shareholders of the target firm are payed. (4) The acquirer firm makes an equity investment in the new company jointly with the financial investors [Caselli and Gatti (2005)]. According to Nikoskelainen *et al.* (2007), LBO corporate governance mechanisms, such as debt, ownership of equity and the active presence of investor, increase the firm value, reduce the agency costs and improve the efficiency of the operating performance of the firm.

With the substitution of equity by debt in the LBOs, studies show large gains in operating performance, such as the creation of value with the improvement in cash flows and interest tax shield benefits. Additionally, reduced agency costs and operational improvements of firms are identified due to the discipline effect of debt and better aligned management incentives [Liu (2014) and Guo *et al.* (2011)]. The improvement in cash flows is the result of the reduction of available cash flow and consequently lesser agency costs of free cash flow. Tax benefits are the outcome of the interest payments since interest is tax deductible to the corporation, therefore leverage can provide a valuable tax shield [Jensen (1986) and Axelson *et al.* (2007)]. The mitigation of the agency conflicts is related to the lender's monitoring of manager's behavior [Liu (2014)] and with the reduced costs of processing and acquiring information about firms and their managers through financial intermediaries [Chakraborty *et al.* (2006)]. Regarding the incentives of the management, as Jensen (1986) reveals, issuing large amounts of debt is an effective motivating force for managers to reach a more efficient corporation since the risk caused by failure of debt service payments is higher.

Although LBOs provide greater advantages for the target firm there are also some disadvantages. Cumming and Zambelli (2010) allege that LBO is associated with a negative impact on the target firm and the possibility of conflicts of interest within managers. Additionally, LBOs turn the acquired company weaker and

eradicate jobs. Ivashina and Kovner (2011) argue that the benefit of private equity investors also affect the employees with the deterioration of jobs and wage cuts. Kaplan and Strömberg (2009) show evidence that private equity investors profit from circumstances in market timings, tax benefits and superior information. Additionally, Damodaran (2008) demonstrates that the use of debt has three disadvantages: (*i*) a possibility of bankruptcy costs; (*ii*) agency costs; and (*iii*) loss of future financing possibilities. Concerning the bankruptcy costs, with the increase of debt level the probability of failure in debt payments increases in the same proportion. Furthermore, these bankruptcy costs have legal fees and court costs which can affect the value of the assets of a bankrupt firm and may cause financial stress. The agency costs result from the creation of covenants and monitoring costs from the different and competing interests of equity investors and lenders in the firm. Regarding the loss of future financing flexibilities, with the increase of debt level the firm can be incapable to make future investments because of the debt payments of loans.

According to Ivashina and Kovner (2011), a stronger bank relationship with a lead bank and LBO firms is related with lower loan spreads. In a loan contract, there is an essential element named loan covenant. Colla *et al.* (2012) show that the inclusion of covenants significantly decreases spreads at the loan tranche level. Loan covenants have an implication on the reduced asymmetric information since bank loan covenants can prevent bankruptcy due to financial flexibility. These covenants can be reduced with repeated bank lending relationships once that better-informed banks can worry less about the potential conflicts of interest in a LBO [Ivashina *et al.* (2011)]. Demiroglu et *al.* (2010) show that tighter covenants serve to limit moral hazard problems but also makes it possible for banks to impose contingent control rights to reduce risk shifting.

The financing debt used in a LBO is gathered through the issue of different types of loans, securities and other instruments [Rosenbaum *et al.* (2009)]. LBOs

are usually included in the high leveraged transactions due to the high leverage borrowed and the debt components of the capital structure. These components are usually deemed non-investment grade or rated as "Ba1[4]" and "BB+[5]" [Angbazo *et al.* (1998) and Rosenbaum *et al.* (2009)]. The rating evaluates the capacity of the borrower to repay interest on time, as promised. In the U.S., a major percentage of the LBO transactions were financed with syndicated loans [Ivashina *et al.* (2011)].

According to Maskara (2010), syndicated loans have a relationship-based bank financing, as well as characteristics such as bond financing. The syndicated loan is "tranched" into heterogeneous components, distributed across lenders with different risk aversion (e.g., liquidity characteristics or different seniority) and sometimes sold at different prices in the capital market. The multiple tranches have a lower credit spread and the same credit risk as a stand-alone loan tranche with similar loan characteristics.

Colla *et al.* (2012) find that tranche spreads can be explained by the same factors as corporate bond yields, which means spreads increase with equity volatility and with the cost of debt.

2.2   The Financial System and Investor's Protection

According to several authors[6], the main goal of a financial system is to approach and assemble funds from investors and exchange these funds between investors and borrowers through regulated markets and intermediaries. The types of financial system, bank-based versus market-based, play an important role due to the benefits and disadvantages of each financing decision, and thus

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[4] Moody's Investor Service
[5] Standard and Poor's
[6] Boot and Thakor (1997) and Chakraborty *et al.* (2006).

may impact significantly the leverage level of a LBO and, consequently, the cost of debt.

Chakraborty and Ray (2006) show that in corporate finance the ability of a firm to raise external funds and to grow through corporate governance is affected by the organization of financial activities. Boot and Thakor (1997) describe the roles of banks and financial markets and assume that "agents within a bank can cooperate and coordinate their actions, whereas agents in a market compete". In a market-based financial system, the transaction or a deal is made without a relationship between the lender and the borrower and each part is not monitored nor pressured. On the other hand, banks are more involved in the project selection, identifying promising entrepreneurs and monitoring firms [Chakraborty *et al.* (2006)].

Beck and Levine (2002) show that banks are more effective than the market in financing new projects that require high leverage since banks can bind to additional funding, if necessary, during the development of the project. Additionally, market-based reveal more information in public markets about the firm which can affect public stock prices during the acquisition of the LBO.

In financial systems, there is an extremely important component, the legal system. Allen and Gale (1999) show that the law plays an important role given that it controls the restrictions used on securities, the type of contracts and which governance mechanism is more suitable for the firm. Legal rules protect investors against expropriation and also protect shareholders. La Porta *et al.* (1997) argue that countries with better legal protections can enable higher external finance with better terms, valued at higher amounts, and broader capital markets. Furthermore, smaller debt and equity markets are related with countries which have lower investor protections.

La Porta *et al.* (1998) further on research legal protections of investors across 49 countries. Laws globally differ across the countries, which means countries

with common law tradition (English law) protect investors more than the countries with civil law (derives from Roman law). Common law countries give stronger protections for shareholders and creditors. On the other hand, investors in civil law countries have the weakest legal rights.

Colla *et al.* (2012) suggest that bond markets play an important role in the capital structure of LBOs and consequently the type of the financial system. These suggestions are related with the discovery that the deals in common law countries are concentrated in higher junior leverage and lower senior leverage.

Foley and Greenwood (2010) experiment at a country level the relationship between ownership concentration and investor protection. Their results indicate that countries with weaker investor protection have a higher ownership concentration. As a consequence, firms use more external finance (debt) and grow less because of the concentrated ownership: blockholders do not issue equity.

According to Gatti *et al.* (2013), loans for projects in countries with stronger creditor rights, lower political and economic risks have lower spreads. Esty and Megginson (2003) claim that lenders create smaller and concentrated syndicates to enable monitoring and low cost contracting, when the country has strong creditor rights and legal enforcement.

The legal system is also correlated with economic growth. Ergungor (2008) shows that flexible judicial environments are correlated with well-developed countries and economic growth since market-based has an established and developed stock market. Consequently, entrepreneurs will invest more instead of paying rents to investors.

2.3 Differences in spreads between the U.S. and W.E

Several authors[7] have showed that the LBO loan market is still a recent market which has suffered a few changes since the recent economic crisis. Therefore, the market is not globally integrated and the spreads on syndicated loans to LBOs are different across the United States (U.S.) and Western Europe (W.E.). Considering W.E., the U.K. is the most developed buyout market.

Although the crisis had an impact on credit spreads across the U.S. and W.E., the biggest difference is due to the type of financial systems used to finance LBO transactions.

Carey and Nini (2007) show evidence that syndicated loan credit spreads are significantly smaller in Europe than in the U.S. The location of the borrower's and lender's activity has some impact in debt pricing. Transactions in syndicated loans are normally centered in London, New York and Hong Kong, which lead to several home bias. Carey and Nini (2007) find a relationship between borrower and lender domicile and the market location concerning the pricing differences.

According to Ergungor *et al.* (2004), countries with common law are market-based and countries with civil law are bank-based financial systems. Common law countries are more effective than civil law countries since they have more flexibility in interpreting and creating new rules. Consequently, banks emerge in countries with civil law as a solution to enforce contracts. In addition, common law countries have more creditor and shareholder protection laws which enables the development of financial markets.

Considering the type of the financial system, the United Kingdom (U.K.) is a common law country like the U.S., both having a market-based financial system.

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[7] Rosenbaum *et al.* (2009) and Shivdasani and Wang (2011).

On the other hand, most of the countries is Western Europe are civil law countries and have bank-based financial system.

Wright *et al.* (2006) show that the U.K. had an exponential growth due to the investment of U.S. private equity firms in European buyout markets. A major part of the firms in the U.K. and Europe are family-owned with aging firms which can toughen the entry of hedge funds for buyout deals. Furthermore, U.K. managers are inclined to be more risk lovers than in W.E. for buyout deals and the infrastructure for doing buyouts differs across countries in Europe. For example, the U.K. has more developed private equity and debt markets and more favorable legal and tax backgrounds. Relatively to the size of the LBOs, higher buyouts have a greater performance and increased investor returns due to the bankruptcy risk [Nikoskelainen *et al.* (2007)]. Smaller LBOs have a higher risk of bankruptcy which is also related with the difficulty of hedge funds in Europe.

According to Colla *et al.* (2012), between 1997 and 2009, a major part of buyout deals occurred in the U.S. and the rest of them have been placed in the U.K. Moreover, deals in common law countries rely on higher junior and lower senior leverage with a significant difference in spreads. Spreads in common law countries are 32 to 58 bps higher than in civil law countries.

2.4   The Latest Financial Crisis

According to Shivdasani and Wang (2011), a leveraged buyout boom occured between 2004 and 2007, which also coincided with an exponential growth in collateralized debt obligations (CDOs) and other forms of securitization. This growth is related with important developments in capital market conditions, investor landscape and structured credit markets [Rosenbaum *et al.* (2009)]. During this LBO boom, banks used to finance LBO loans with collateralized loan

obligations (CLO) which are CDOs backed by loans. CLOs have financed globally private equity firms in leveraged buyouts [Benmelech and Dlugosz (2009)].

During this period, some of the LBO transactions were driven by the accessibility of debt financing, which implied low returns since managers were not motivated by the potential of operating and governance developments [Kaplan and Strömberg (2009)].

Banks used to finance LBO loans with CDOs due to easier credit terms and lower costs for its borrowers with cheaper credit and looser covenant protections [Shivdasani *et al.* (2011)]. However, the 2007-2008 financial crisis has deteriorated the credit market conditions and investors lost confidence in structured finance credit ratings. Consequently, CLOs and LBOs dissipated, and interest rates on debt related to buyouts increased significantly [Kaplan *et al.* (2009) and Benmelech *et al.* (2009)]. According to Marques *et al.* (2015), credit spreads for other type of syndicated loans - project finance loans - significantly increase as consequence of the financial crisis.

2.5   Different terms for divergent loans

During the past years, project finance (PF) has been associated with successful financial and operating transactions loans but with differences compared with other loans. PF is a structured finance defined by the creation of a legally independent vehicle company, a special purpose vehicle (SPV), to achieve its financing objectives [Gatti *et al.* (2013)]. According to Caselli and Gatti (2005), SPVs are a project company made for a particular purpose which is financially and legally independent from the sponsors. Since PF loans create a SPVs,

similarly to LBO loans, and are related with high leverage, the determinants that affect PF loans can be used to explain the pricing processes for LBO loans.

According to Kleimeier and Megginson (2000), PF loans differ from other loans (non-project finance) in that they have longer maturities, more participating banks, and lesser loan covenants. Ivashina and Kovner (2011) defend that a stronger bank relationship between the LBO firms and the lead bank is related with lower loan spreads. Kleimeier and Megginson (2000) determine that PF loans have lower credit spreads compared to non-PF loans due to reduced agency costs. Colla *et al.* (2012) examine spreads at the tranche level for LBOs and find that extended maturities tranches are associated with higher spreads. On the other hand, Kleimeier and Megginson (2000) and Gatti *et al.* (2013) conclude that the connection between spread and maturity have a significantly negative relationship for project finance loans. Several authors do not agree with this negative relationship between maturity and spreads. As reported by Sorge and Gadanecz (2008), the term structure of credit spreads for project finance is humped-shaped, which is due to essential characteristics of PF structures, such as high leverage and short-term liquidity as a consequence of the risk of longer maturity. Since loan repayment relies mostly on the cash-flow of the acquired firm, the short-term liquidity represents a risk. Consequently, the spreads are higher in shorter-term maturities. However, in longer maturities the cash-flow of the acquired firm is higher and the liquidity risk is smaller. Thus, the loan spreads are lower. Marques *et al.* (2015) also conclude that PF loans have a robust hump-shaped relationship between credit spread and maturity.

2.6 Pricing Determinants

In this section, the literature on the pricing of loans is reviewed.

Barclay and Smith (1995) provide evidence that regulated firms issue more long-term debt since regulation controls the underinvestment problem. A strong connotation between firm size and debt maturity is also identified since big firms issue more long-term debt than small firms. Additionally, a reliable positive relationship between a firm financial (S&P) bond rating and debt maturity is found.

Sorge and Gadanecz (2008) find an important determinant of the pricing of loans, the interest rates. Loan spreads are measured over base rates of different maturities and inflations expectations, which can have a significant impact on the pricing rate of debt. Campbell and Taksler (2003) consider the equity volatility as an important determinant of corporate bond yield spreads and also find that yield spreads and credit rating can be explained by volatility, especially for firms with a high ratio of long-term debt.

Colla *et al.* (2012) investigation focuses on a sample of 238 LBOs closed between 1997 and 2008, of which 1,006 individual debt tranches are included. Spreads are tested at tranche level and proved that they increase with maturity. In addition, macroeconomic factors can be used to explain tranche spreads since spreads increase with equity volatility and credit spreads. Furthermore, the investigation proves that market conditions positively affect the cost of LBO debt; longer maturity tranches have higher spreads; loan covenants decrease significantly spreads and the size of the loan is not significant.

Ivashina and Kovner (2011) use a sample of 1,590 LBO loans with detailed loan information for each sponsor/borrower between 1993 and 2005. The fact that bank relationships are a competitive advantage is found. Stronger bank relationships are associated with a lower cost of lending (covenants) and better

loan terms since the asymmetric information problem is reduced. LBO firms improve value since banks lower the spreads when there are potential cross-selling prospects.

Demiroglu and James (2010) investigate the role of private equity group reputation in LBO financing using a sample of 180 public-to-private LBOs in the US between 1997 and 2007. Private equity group invest more in LBO markets when lending requirements in the credit markets are sloppy and credit risk spreads are minor. Additionally, reputable private equity group (1) pay limited institutional and bank loan spreads; (2) have longer maturities; and (3) depend more on institutional loans.

Previous researchers[8] focus their investigation on term structure spreads for project finance (PF) loans.

Sorge and Gadanecz (2008) analyze the pricing of the cross section of loans and bonds, focusing on the relationship of spread-maturity. This relationship in PF is "humped-shaped" due to the short-term liquidity. Marques et al. (2015) also prove that PF term structure of spreads is "humped-shaped" as opposed to investment-grade and speculative-grade bonds, which are linearly positive.

Kleimeier and Megginson (2000) compare a sample of 4,956 PF loans with samples of non-PF loans closed in international capital markets between 1980 and 1999. Their evidence proves that PF loans have longer maturity, more detailed loan covenants, transparent cash-flows in riskier countries (more than average), and lower loan size than non-PF loans. In addition, Corielli *et al.* (2010) evidence that in PF, lenders rely on the network of nonfinancial contracts to control agency costs and improve risk management.

Gatti *et al.* (2013) use a sample of 4,122 PF loans between 1991 and 2005 and prove that prestigious arranging banks allow larger leveraged loans and create economic value by reducing loan spreads. Esty and Megginson (2003) use a

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[8] Based on Sorge and Gadanecz (2008), Kleimeier and Megginson (2000) and Marques *et al.* (2015).

sample of 495 loan tranches in 61 different countries completed between 1986 and 2000. A high concentration between syndicate structure and legal risk is identified.

Marques *et al.* (2015) investigate which factors determine the pricing of PF loans and corporate bonds using a sample of a cross-section of 24,435 Western European loans and bond issues. This sample incorporates the issues closed during the 2000-2011 period. PF loans have a robust hump-shaped relationship between credit spread and maturity.

3. Hypothesis development

In this section, the hypothesis related to the research question are presented and explained.

The literature review shows that various studies demonstrate that numerous determinants affect LBO loan spreads. The main motivation of the investigation on the determinants is related to the fact that the available literature is scant and to investigate if the determinants that affect other loan spreads are the same for loans to LBO. This thesis aims to cover the literature on debt financing and price on syndicated loans.

Hypothesis 1: Loans in LBOs are influenced by common pricing determinants similarly as other syndicated loans.

The second hypothesis intends to examine the impact of the financial system on LBO loan spreads. The market-based financial system is associated with common law countries and the bank-based financial system with civil law countries. A country with a market-based financial system to finance a LBO transaction is a country with better law enforcement and with better protections to investors. The second hypothesis aims to investigate the impact of the financial system on spreads and pricing processes of loans to LBOs.

Hypothesis 2: LBO loan spreads and pricing processes differ significantly between market-based and bank-based financial systems.

Carey and Nini (2007) show that spreads on syndicated loans in LBOs are higher in the U.S. than in Europe. The third hypothesis has the purpose of testing if there is a significant difference in terms of spreads and pricing processes between the U.S. and W.E.

Hypothesis 3: LBO loans spreads arranged to U.S. borrowers are significantly higher than those of LBO loan spreads arranged to W.E. borrowers.

The fourth hypothesis has the purpose of testing if the 2007/2008 financial crisis and the subsequent European sovereign debt crisis had a significant impact on credit spreads and pricing processes of loans to LBOs.

Hypothesis 4: After controlling for macroeconomic conditions and loan characteristics, the 2007/2008 financial crisis did have a significant impact on LBO loan spreads.

The fifth hypothesis aims to test the term structure of spreads in LBO loans, since Sorge and Gadanecz (2008) and Marques *et al.* (2015) find non-linear relationships between spread and maturity for syndicated loans extended to PF, a type of structured finance transaction like LBOs.

Hypothesis 5: After controlling for microeconomic and macroeconomic pricing factors, the term structure of spreads in LBO loans differs from that of corporate financing loans.

4. Data and Sample Selection

In this chapter, we explain how our database was assembled; the definition of the variables used and their respective expected signal; and to present a descriptive statistics and preliminary analysis of the sample used.

4.1   Data Description

The sample used to determine whether loans in LBOs are more or less expensive for borrowers located in market-based versus bank-based financial systems, in U.S. versus W.E., examine to what extent loans in LBOs are priced by common characteristics with other syndicated loans. Loans data were extracted from Dealscan and the sample consists of individual loans between 2000 until 2013. Macroeconomic variables and firm characteristics were obtained from Datastream.

Dealscan includes information on the microeconomics characteristics of the loan, bond offers and borrower. Relatively to the bond offers data available includes transaction and tranche size, maturity, currency, pricing rating, and type of interest rate. Concerning the borrowers, Dealscan has data on name, nationality and industry sector information. Finally, Dealscan contains detailed historical information on all syndicated loans settled in international capital markets but only loans with a deal specific purpose code of "leveraged buy-out" were extracted.

Deals with no tranche amount or deal amount available and deal status not closed or completed were excluded from our sample. Our final sample consists in a single loan tranche, multiple issues from the same transaction or deal appear as separate observations.

From Datastream we collected macroeconomics variables such as level of interest rates, market volatility and slope of the yield curve were extracted.

Data from Datastream and Dealscan were matched, in order to use a unique dataset and investigate the impact of firm's characteristics on credit spreads. However, Dealscan does not provide firms identification codes, it was necessary to hand-match firms in both databases by using the target name. The principal identifier in Dealscan is the firm's name, ISIN and Ticker are only available for a small subset firms, which were used when available. The matching is complex and we were conservative and only matches with lower risk were kept, ignoring matches that are not unique.

Our final sample includes 13,315 LBO loans closed between 2000 and 2013 worth $1,856,630 million. This sample, is the "full sample" being the unit of observation a single loan tranche, multiple issues from the same transaction and deal appear as separate observations in the database only for deal amount and number of facilities, therefore we conduct separate analysis for these variables and control our regressions for this.

Table 1 presents the distribution of loans in LBOs across time, borrower's nationality and industry. Panel A presents an increase of LBO loans between 2000 and 2007 worth in total $1,320,581 million. In 2007, LBO loans had the highest total value of $504,914 million. Since in 2007/2008 the financial crisis has affected conditions in capital market, LBO loans had a huge descent having a total value of $17,059 million in 2009.

Panel B reveals that LBO lending is concentrated in the U.S. and W.E. In the U.S the total number of loans were 5,821 worth in total $883,235 million and in W.E. including U.K. they have 6 362 loans with a total value of $799,183 million. The other regions only had 1,132 LBO loans worth in total $174,212 million. This values are in line with the idea that countries with developed capital markets and with low country risk has higher structured finance transactions such as LBOs.

Lastly, Panel C presents the distribution of loans in LBO by industrial category of borrower. The highest number of loans is concentrated in the commercial and industrial category, more specified in the manufacturing (5,401 loans), services (3,140 loans) and retail trade (1,067 loans).

Table 1: Distribution of the full sample of loans in LBOs by year, borrower's nationality and industry

Panel A: Distribution of loans in LBOs by year		
Year	Nr of Loans	Total Value
2,000	673	55,596
2,001	517	44,824
2,002	585	51,235
2,003	797	87,983
2,004	1,151	114,983
2,005	1,450	186,411
2,006	1,980	274,635
2,007	2,182	504,914
2,008	1,119	152,425
2,009	228	17,059
2,010	472	50,674
2,011	548	82,017
2,012	475	46,257
2,013	496	91,623
2,014	642	95,994
Total	**13,315**	**1,856,630**

Panel B: Geographic distribution of loans in LBOs		
Geographic Location of Borrower	Nr of Loans	Total Value
Europe	35	8,841
Western Europe	4,674	561,849
U.K.	1,688	237,334
U.S.	5,821	883,235
North America	222	39,261
Asia	397	59,996
Africa	26	4,570
Australia	385	42,772
Caribbean	5	10,720
Latin America	13	498
Others	49	7,554
Total	**13,315**	**1,856,630**

Panel C: Distribution of loans in LBOs by industrial category of borrower		
Industrial Category of Borrower	Nr of Loans	Total Value
Commercial and Industrial		
Agriculture, Forestry and Fishing	645	64,326
Mining	197	30,759
Construction	294	30,841
Manufacturing	5,401	683,954
Wholesale Trade	783	88,794
Retail Trade	1,067	171,531
Real Estate	205	50,860
Services	3,140	418,771
Utilities	765	192,162
Financial Services	345	71,508
Transportation	442	49,695
Public Administration/Government	31	3,429
Total	**13,315**	**1,856,630**

Note: Table 1 presents the distribution of the full sample of loans in LBOs across time (Panel A), borrower's nationality (Panel B), and industry (Panel C). The first column details the number of loans, while the second column describes the total value in $US Million.

4.2 Variables of the Model

In this section, an analysis of the variables used in the model will be present. Initially, the explained variable will be explained and then the explanatory variables divided into macroeconomics independent variables and microeconomic independent variables.

4.2.1 Dependent Variable

Spread (*Spread)* represents the spread paid by the borrower over Libor plus the facility fee (all-in-spread-drawn). Maskara (2010) has also used the AISD for the dependent variable, because the all-in-spread-drawn (AISD)[9] holds the

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[9] "All-in-spread-drawn (AISD) is calculated as the coupon spread plus the annual fee, expressed in basis-points. When a loan deal has several tranches, at the deal level, LPC calculates the AISD

interest rate of the loan paid by the borrower to the lender. Concerning syndicated loans, the all-in-spread-drawn (AISD) does not represent the full economic cost of credit (fees), such as commitment fees and up-front fees. As an alternative to the AISD, Berg *et al.* (2015) proposes the 'total-cost-of-borrowing' (TCB), which accounts for fees and spreads.

4.2.2 Independent Variables

The explanatory variables are divided into microeconomic independent variables and macroeconomic independent variables.

4.2.3 Microeconomic Independent Variables

Maturity represents the maturity of the loan in years. The term structure of syndicated loans appears as unknown, so the relationship between spread and maturity will help to understand how the maturity influences the spread and the slope of the curve between this relationship [Kleimeier and Megginson (2000); Colla et al. (2012); Gatti *et al.* (2013); Ivashina and Kovner (2011); Marques *et al.* (2015)].

Log transaction size is the natural log of the loan transaction size. Transaction size is converted into $US when necessary. Researchers such as Kleimeier e Megginson (2000), Sorge and Gadanecz (2008), Maskara (2010), Gatti *et al.* (2013) identify that the transaction size affect loans spread for syndicated loans.

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for the deal as the weighted average of the spreads for each tranche, where the weight is the amount of the loan in that tranche relative to the total amount of that loan." [Maskara (2010)].

Marques *et al.* (2015) used Log transaction size in the research and this one was significantly positively related to credit spread.

Loan size to deal size is the ratio of the tranche size to the transaction size of a given loan. Esty and Megginson (2003) have shown a positive relationship between syndicated size and loan pricing.

However, Kleimeier and Megginson (2000) and Sorge and Gadanecz (2008) conclude that loan size does not reduce loan spreads.

Number of tranches is the number of loans per deal. According to Maskara (2010) results, riskier borrowers benefit most from tranching syndicated loans having lower credit spreads than other identical non-tranched loans.

Currency risk is a dummy equal to 1 for loans that are denominated in a currency different from the currency in the borrower's home country. According to Kleimeier and Megginson (2000), syndicated loan spreads are related to currency risk such as other variables. Nevertheless, the currency risk has a significantly negative impact on spreads.

Number of lenders is the number of lenders participating in the deal. According to Ivashina and Kovner (2011) LBO lenders (sponsors) have better loan terms to sellers in the form of higher transactions prices. Meaning financial sponsors preserve competition in loan pricing with repeated relationships with numerous banks.

Fixed rate is a dummy equal to 1 if a loan has a credit rating and 0 otherwise. In line with the Sorge and Gadanecz (2008) study, most bonds are fixed rate while loans are priced over a floating base rate. Using the fixed rate instead of floating

rate appears to have a significant discount in the pricing because of the insurance of the future interest rates of the floating rate.

Rated is a dummy equal to 1 if the loan has a credit rating and 0 otherwise. The Sorge and Gadanecz (2008) research concludes that bonds with ratings correspond to higher credit quality and associated with lower spreads. Gatti *et al.* (2013) has included the credit rating in the variable country risk and has found that spreads are lower in low-risk countries.

Rated*Rated is the interaction between rated dummy variable and rating. The rating evaluates the capacity of the borrower to repay interest and principal on time as promised. The rating classification used is based on 22 rating scales for S&P's and Moody's. Loan ratings are based on the S&P and Moody's rating at the time of closing the loan, and converted as follows: AAA=Aaa=1; AA+=Aa1=2 and so on until D=22 [Sorge and Gadanecz (2008) and Gatti *et al.* (2013)].

Term loan is a dummy equal to 1 if the loan is a term loan and 0 if the loan is a credit line. According to Colla *et al.* (2012), term loans have higher spreads for all loans than credit lines. Furthermore, Berg *et al.* (2015) has discover that it is only possible to compute a total-cost-of-borrowing (TCB) measure for term loans.

4.2.4 Macroeconomic Independent Variables

Risk free rate is the yield on a 3-month U.S. Treasury bill as the time of signing the loan - a proxy for the general level of interest rates. In his research, Marques *et al.* (2015) has used the risk-free rate and has found that it is negatively related with project finance loan credit spreads, i.e., the higher the general level of interest rates the lower the spread.

Country Risk is the country credit rating at close of S&P's. This variable measures from 1 for the countries with lowest risk (AAA=1) to 22 for the countries of highest risk (D=22). The rating is converted as follows: AAA=1; AA+=2 and so on until D=22. Other measures of country risk are available and were used in other studies but in this thesis, the S&P's rating were used because as Corrielli *et al.* (2010) has pointed out, there is a strong correlation between the S&P's measures and the alternative measures (monthly data compiled by the International Country Risk Guide (ICRG) or the country risk rank provided by Euromoney magazine).

Volatility represents The Chicago Board Options Exchange Volatility Index (VIX). VIX reflects a market estimate of future volatility. According to Colla *et al.* (2012), there is a positive and significant relationship between market volatility and spreads. Although according to Marques *et al.* (2015), for project finance credit spread and volatility have an insignificant relationship.

5yTB – 3mTB represents the yield curve slope. It was obtained as the difference between the U.S. five-year Treasury Bond rate and the U.S. 3-month Treasury Bill rate. According to the results presented by Marques *et al.* (2015), spread and the yield curve slope 5Ytb-3mTB are significantly negatively related for loans, meaning a steeper yield curve is associated with lower spreads.

Common law is a Dummy equal to 1 if the loan is extended to a borrower located in a country with a common law legal regime and 0 otherwise. According to Colla et *al.* (2012) results, loans settled in countries with a common law legal system are associated with higher spreads than civil law countries.

Market-Based is a Dummy equal to 1 if the loan is extended to a borrower located in a country with a market-based financial system and 0 otherwise.

Crisis is a Dummy equal to 1 if the closing date belongs to the crisis period and 0 otherwise. In line with the results of Marques *et al.* (2015), the 2007-2008 financial crisis and the subsequent European sovereign debt crisis has induced an increase in spreads for loans in project finance.

4.3   Descriptive Statistics

The descriptive statistics present in Table 2 allow an analysis regarding the performance of the variables of interest, considering the contractual characteristics of loans in LBOs. Table 2 present values of the summary statistics for the full and high-information of loans in LBOs.

From the univariate analysis of the full sample (Panel A), only issues that have complete data on credit spread were selected likewise values for the deal size and loan size variables (deal size and number of tranches). In addition, financial and non-financial firms vary across fundamental characteristics. Therefore, deals classified with the industrial category of "Financial Institutions" were excluded, having eliminated 345 deals.

In Panel B, the high-information sample consists of 10,753 loans. The high-information sample is used in the regression analysis. The mean (median) of spreads is 345.75 bps (300 bps) and the mean for maturity is 6.33 years. Each tranche (loan size) worth on average $138.69 million and each deal has on average 6.11 tranches (number of tranches). The mean of deal size is $643.22 million and each loan as on average 5.75 number of lenders. The loan size to deal size mean (median) is 31.80% (21.74%) and the average rating for LBO loans in

the high information sample is 14.67. The country risk mean (median) is 1.24 (1) which indicates that the spread of each loan has on average a credit rating of AAA=Aaa=1. LBO loans are very secure with a guarantee of 97.07%. The probability of an occurrence on currency risk in a LBO loan is low (9.09%) and the probability on having a fixed rate loan is also extremely low (2.44%). This low occurrence of having a fixed rate loan is explained by the fact that LBO loans are characterized by having floating interest rates. Finally, the probability of the loan is a term loan instead of a credit line is 65.21%.

Table 2: Contractual characteristics of syndicated loans in LBOs

Panel A: Univariate analysis of the full sample						
Variable of interest	Number	Mean	Median	Std. Dev.	Min.	Max.
Continuous variables:						
Spreads (bps)	11 044	346,16	300,00	151,60	35	962,5
Maturity (years)	12 317	6,29	6,08	1,76	0,08	15,92
Loan size (US$ million)	13 315	139,44	49,08	363,65	0,43	12500
Deal size (US$ million)	2 671	586,00	254,22	1152,90	8,66	12500
Loan size to deal size	13 315	32,52%	22,00%	27,22%	0,00	1
Number of tranches	2 671	3,66	4	1,92	1	16
Rating [1-22 weak]	2 464	14,66	15,00	2,34	1	22
Number of lenders	13 281	5,47	4,00	5,58	1	114
Country risk [1-22 weak]	13 252	1,33	1,00	1,23	1	15
Dummy Variables:						
	Nº of issues with data available		Nº of issues with dummy=1		% of total available data	
Secured	6 903		6 664		96,54%	
Term loan	13 315		8 920		66,99%	
Currency Risk	13 315		1 222		9,18%	
Financial firms	13 315		345		2,59%	
Fixed rate loan	11 286		451		4,00%	

Panel B: Univariate analysis of the high-information sample						
Variable of interest	Number	Mean	Median	Std. Dev.	Min.	Max.
Continuous variables:						
Spreads (bps)	10,753	345.75	300	151.34	35	962.5
Maturity (years)	10,292	6.33	6.5	1.65	0.08	15.00
Loan size (US$ million)	10,753	138.69	50.00	324.87	0.63	8,537.8
Deal size (US$ million)	1,958	643.22	207.24	1 177.08	9.06	12,178.9
Loan size to deal size	10,753	31.80%	21.74%	26.26%	0.00	1
Number of tranches	1,958	6.11	3	1.89	1	16
Rating [1-22 weak]	2,182	14.67	15	2.32	1	22
Number of lenders	10,749	5.75	4	5.84	1	114
Country risk [1-22 weak]	10,709	1.24	1	0.99	1	15
Dummy Variables:						
	Nº of issues with data available		Nº of issues with dummy=1		% of total available data	
Secured	5 558		5 395		97,07%	
Term loan	10 753		7 012		65,21%	
Currency Risk	10 753		977		9,09%	
Financial firms	10 753		0		0,00%	
Fixed rate loan	10 753		262		2,44%	

Note: Spread is the spread paid by the borrower over Libor plus the facility fee (all-in-spread-drawn). The loan ratings are based on S&P and Moody's ratings at closing; the rating is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=22. Country risk is the S&P's country credit rating at closing date. The rating is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=22.

Table 3 provides an analysis and comparison of means and medians for continuous variables and levels for discrete variables of the contract characteristics between sub-samples. The descriptive statistics for sub-sample are grouped (1) whether the borrower is located in a country with a bank-based versus a market-based; (2) whether the borrower is located in U.S. versus W.E. and (3) whether the crisis has affected an increase in spreads.

Concerning the sub-sample (1) the mean of spreads diverges across borrowers located in market-based relatively to the bank-based financial systems. The spread mean (median) is higher for loans concentrated in market-based (371.71 bps) than the bank-based (286.05 bps). These results are in accordance with Foley and Greenwood (2010) since countries with weaker investor protection have a higher ownership concentration and therefore use more external finance (debt). For the sub-sample (2) the mean spread is also higher for the U.S. (400.32 bps) compared to W.E. (293.78 bps).

The maturity mean does not divergence significantly from market-based to bank-based having a mean of 6 years and 7 years respectively, and for the U.S. the maturity is 5.5 years and for W.E. it is 7 years.

Each loan (loan size) worth more on average in countries with market-based financial systems ($147.02 million) than in bank-based financial systems ($119.39 million). The same is true for W.E. having a higher mean of $55.88 million compared to the U.S. of $42 million.

The deal size mean is higher for countries with market-based ($711.34 million) compared to countries which are bank-based ($537.53 million). Similarly, the U.S. also has a higher mean of $761.60 million compared to W.E. of $581.64 million.

The loan size to deal size ratio mean is higher in countries with market-based (24.75%) compared with countries with bank-based (17.14%) financial systems. The same happens with the U.S. compared with W.E. The loan size to deal size is higher for the U.S. (30.25%) compared to W.E. (17.94%).

The number of the tranches mean is higher for countries with bank-based financial systems (4.58 tranches) and for W.E. (4.52 tranches) in comparison with countries with market-based financial systems (3.63 tranches) and for the U.S. (2.98 tranches). Therefore, LBO loans are more advantageous when they are tranching in W.E. countries with bank-based financial systems.

The average rating for loans extended for countries with market-based financial systems is 14.83 and for the U.S. is 14.96 which are higher compared to countries with bank-based financial systems which are 13.33 and 13.64. for W.E.

Concerning the country risk rating, it does not follow the same results as the average rating. For countries with market-based financial systems and for the U.S., the average rating is 1.05 and 1 respectively, being lower than the countries with market-based financial systems and for W.E., which are 1.65 and 1.46 respectively.

The number of lenders mean is inferior for countries with market-based financial systems (4.99) and for the U.S. (4.33) compared to countries with bank-based financial systems (7.5) and for W.E. (7.1). This difference is explained by the fact that the countries with bank-based systems and W.E. have a higher number of tranches and the principal financial sector is the bank.

Relatively to the discrete variables, all the loans are significantly secured but the U.S. (96.46%) is the country with lowest percentage of the loans compared with W.E. (97.56%), market-based financial systems (97.06%) and bank-based financial systems (97.08%).

The percentage of loans settled as term loans in the bank-based financial systems (70.50%) and W.E. (70.28%) are higher compared to the market-based financial systems (62.92%) and the U.S. (59.89%), which are more likely to be a credit line than a term loan.

The currency risk is much smaller in market-based financial systems (8.23%) and the U.S. (1.64%) than in bank-based financial systems (10.90%) and W.E. (16.18%).

The fixed rate loan percentage is lower for all the loans of the sub-sample (1) and (2) since the floating interest rate is used the most, being a distinguishing factor of loans in LBOs.

Regarding the sub-sample (3) whether the crisis has affected an increase in spreads, the average spreads for loans after the crisis (475.21 bps) is significantly higher than the pre-crisis (312.22 bps), concluding that the crisis has indeed affected an increase in spreads. For the rest of the variables this is also verified, except for the maturity, deal size, number of tranches, average rating and the term loan which suffered a decrease after the crisis. Maturity and deal size can be explained by the fact that banks have lost their capacity of lending after the crisis. The number of tranches diminishes after the crisis since loans became more controlled and expensive. The average rating can be explained by the fact, that after the crisis, the rating became more reliable and more controlled.

Table 3: Tests for similar distributions in contract characteristics across sub-samples

Variable of Interest		Market-Based	Bank-Based	U.S.	W.E.	Pre-Crisis	Crisis
Continuous Variables:							
Spread (bps)	Mean	371.71	286.05	400.32	293.78	312.22	475.21
	Median	350	250	375	250	275	450
	Number	7,499	3,247	5,245	5,508	8,541	2,212
Maturity (years)	Mean	6	7.08	5.60	7.01	6.56	5.49
	Median	6	7	5.5	7	7	5
	Number	7,110	3,175	4,903	5,389	8,121	2,171
Loan size ($US million)	Mean	147.02	119.39	147.19	130.6	137.48	143.39
	Median	50	51.35	42	55.88	50	47
	Number	7,499	3,247	5,245	5,508	8,541	2,212
Deal size ($US million)	Mean	711.34	537.53	761.6	581.64	670.26	543.29
	Median	254.26	254.28	200.25	269.24	264.13	193
	Number	1,196	758	670	1,288	1,541	417
Loan size to deal size	Mean	35.59%	23.02%	40.37%	23.65%	29.68%	40.00%
	Median	24.75%	17.14%	30.52%	17.94%	21.27%	26.32%
	Number	7,499	3,247	5,245	5,508	8,541	2,212
Number of tranches	Mean	3.63	4.58	2.98	4.52	4.23	3.09
	Median	3	5	3	5	4	3
	Number	1,196	758	670	1,288	1,541	417
Rating [1-22 weeks]	Mean	14.83	1333	14.96	13.64	14.69	14.53
	Median	15	14	15	14	15	14
	Number	1,947	235	1,690	492	1,809	373
Number of lenders	Mean	4.99	7.5	4.33	7.1	6.11	4.33
	Median	4	5	3	5	4	4
	Number	7,497	3,245	5,244	5,505	8,539	2,210
Country Risk [1-22 weeks]	Mean	1.05	1.65	1	1.46	1.2	1.37
	Median	1	1	1	1	1	1
	Number	7,471	3,238	5,245	5,464	8,509	2,200
Discrete Variables:							
Secured	% of total available data	97.06%	97.08%	96.46%	97.56%	97.14%	96.71%
	Issues with data available	3,635	1,920	2,484	3,074	4,584	974
	Issues with dummy=1	3,528	1,864	2,396	2,999	4,453	942
Term Loan	% of total available data	62.92%	70.50%	59.89%	70.28%	66.63%	59.72%
	Issues with data available	7,499	3,247	5,245	5,508	8,541	2,212
	Issues with dummy=1	4,718	2,289	3,141	3,871	5,691	1,321
Currency Risk	% of total available data	8.23%	10.90%	1.64%	16.18%	8.72%	10.49%
	Issues with data available	7,499	3,247	5,245	5,508	8,541	2,212
	Issues with dummy=1	617	354	86	891	745	232
Fixed Rate Loan	% of total available data	2.79%	1.57%	0.50%	4.28%	2.13%	3.62%
	Issues with data available	7,499	3,247	5,245	5,508	8,541	2,212
	Issues with dummy=1	209	51	26	236	182	80

Note: Spread is the spread paid by the borrower over Libor plus the facility fee (all-in-spread-drawn). The loan ratings are based on S&P and Moody's ratings at closing; the rating is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=22. Country risk is the S&P's country credit rating at closing date. The rating is converted as follows: AAA=Aaa=1, AA+=Aa1=2, and so on until D=22

4.4 Preliminary Analysis

Table 4 presents an overview of the expected sign of each variable of the high-information sample divided into sub-samples (Market-based versus Bank-Based financial systems and U.S. versus W.E.).

Concerning the microeconomic independent variables, only the *Fixed rate* had an insignificant impact on the spread. For the macroeconomic independent variables, the variables *Volatility* and *Common Law* also has little impact on the spread. Relatively to the Acquired firms' characteristics only the variable *Fixed assets to total assets* had a significant impact on the spread.

The variable *Maturity* has a convex relationship for all the sub-samples having a significant impact on the spreads.

For the sub-sample market-based the variable *Maturity* has a convex relationship impact on the spread. The variables *Currency risk*, *Fixed rate*, *Country Risk*, *Common Law, Log total assets* and *Debt to total assets* have an insignificant influence on the spread. On the other hand, in the bank-based financial systems these variables were all significant to the spread except for the variables of the acquired firms' characteristics.

On the sub-sample U.S. the variables *Number of tranches*, *Log total assets*, *Debt to total assets* and *Short-term debt to total debt* have an insignificant impact on spread. The sub-sample W.E. had a dissimilar impact on these variables, being significant on the spread. However, the variables *Fixed rate*, *Rated*, *Rated*Rating*, *Common Law, Market-Based, Log total assets, Debt to total assets, Market to book ratio, Return on assets* have an insignificant impact on the spread.

In conclusion, the acquired firms' characteristics only had an impact on the spread for the sub-samples market-based and U.S.

Table 4: Expected sign and findings

Independent Variables	Expected Sign	Findings			
		M.B	B.B.	U.S.	W.E.
Microeconomic Independent Variables:					
Maturity (years)	+	CX	CX	CX	CX
Log transaction size	-	-	+	-	+
Loan size to deal size	-	-	-	-	-
Number of tranches	-	-	-	I/-	-
Currency risk	+	I/+	+	-	+
Number of lenders	-	-	-	-	-
Fixed rate	I/+	I/+	-	+	I/-
Rated	-	-	I/+	-	I/+
Rated*Rating	+	+	I/-	+	I/-
Term Loan	+	+	+	+	+
Macroeconomic Independent Variable:					
Risk free rate	-	-	-	-	-
Country Risk	+	I/-	+	N/A	+
Volatility	I/+	+	-	+	-
5yTB-3mTB	-	-	-	-	-
Common Law	I/+	I/-	+	N/A	I/+
Market-Based	+	N/A	N/A	N/A	I/+
Crisis	+	+	+	+	+
Acquired firms' characteristics:					
Log total assets	I/+	I/+	I/-	I/+	I/+
Debt to total assets	I/+	I/-	I/+	I/-	I/+
Short-term debt to total debt	I/-	-	I/-	I/+	-
Fixed assets to total assets	-	-	-	-	-
Market to book ratio	I/-	-	I/+	-	I/+
Return on assets	I/-	-	I/-	-	I/+

Note: The following characters mean: – = negative impact on spread ∣ + = positive impact on spread ∣ I = insignificant impact on spread ∣ CX = convex relationship ∣ N/A = not applicable.

5. Methodology

The sample selected for the study of the pricing determinants of loans in LBOs uses a sample of 10,753 loans (1,958 deals) closed during 2000-2013 period and will be defined as a data sample of longitudinal (panel). This database contains observations of the same variables for different countries, firms, financial systems and law enforcements at different points across time. Panel data sample is a method that will allow to analyze and observe the behavior of the observations across time, different determinants, to control heteroskedasticity and less collinearity.

We use an OLS regression with the following model, to estimate the determinants of loan pricing:

$$
\begin{aligned}
(1) \quad Spread_i ={}& \alpha + \beta_1 Maturity_i + \beta_2 Log\ transaction\ size_i \\
& + \beta_3 Log\ Loan\ size\ to\ deal\ size_i + \beta_4 Number\ of\ tranches_i \\
& + \beta_5 Currency\ Risk_i + \beta_6 Number\ of\ lenders_i + \beta_7 Fixed\ rate_i \\
& + \beta_8 Rated_i + \beta_9 Rated * rated_i + \beta_{10} Term\ loan_i \\
& + \beta_{11} Risk\ free\ rate_i + \beta_{12} Country\ Risk_i + \beta_{13} Volatility_i \\
& + \beta_{14} TB5y - TB3m_i + \beta_{15} Crisis_i + \varepsilon_i
\end{aligned}
$$

The sample used is tranche-level observations, thus the analysis of each observations is per loan. It is expected that standard errors for each tranche that belongs to the same level are correlated with each other. As a solution, the standard errors are clustered by deal.

Model (1) aims at five objectives based on our hypothesis. The first objective (hypothesis 1) is to determine which variables have significant and independent effects on spreads when the effects of other variables are taken into consideration. The second objective (hypothesis 2) tests if the pricing of loans in LBOs closed in countries with market-based and bank-based financial systems affects the costs

of spreads and pricing process. The third objective (hypothesis 3) investigates if the pricing of LBO loans in the U.S. and W.E. are correlated with debt markets (bank-based financial systems). Along with the existence of differences in LBO loan spreads between W.E. and U.S., in other words, if the LBO loan spreads in W.E. are lower compared to the U.S. The fourth objective (hypothesis 4) determines if the 2007-2008 financial crisis had an impact on loan spreads and pricing processes, after controlling the other micro and macro pricing factors. The final objective (hypothesis 5) examines the term structure of syndicated loans, focusing on the relationship between spread and maturity, while controlling for other relevant microeconomic and macroeconomic risk factors.

6. Results

In this section, the results from the regression analysis are presented, analyzed and compared with empirical literature previously mentioned.

6.1 Results of the regression analysis

6.1.1 Are loans in LBOs priced in integrated debt markets?

To examine if the spreads on loans closed in the two different financial systems (market-based and bank-based) are significantly different, equation (1) was used. Additionally, a dummy variable *Market-Based* was created and set equal to 1 if the tranche is extended to a borrower in a market-based financial system and 0 if extended to a borrower in a bank-based financial systems. In order to isolate legal systems and financial system impact, an additional control variable was included in equation (1), the *common law* dummy variable. This variable was added since the financial systems is normally related with legal traditions. The dummy variable is equal to 1 if loans are extended to common law countries and 0 if loans are extended to civil law countries. Finally, the variables *region* and *industry* were included as a control on fixed effects.

Table 5 presents the regression analysis of the determinants on credit spreads for equation (model [1]). All loans and then divided into sub-groups: (model [1a]) Market-based financial systems; (model [1b]) Bank-based financial systems; (model [1c]) U.S.; (Model [1d]) W.E. It is also present an equation (model [2]) U.S. and W.E. where the U.S. dummy variable is included. All these estimations have control for fixed-effects variables region and industry.

Concerning equation (Model [1]), the sample is constituted by 10,244 loans and LBO loans extended to borrowers in market-based financial systems are associated with higher spreads, since the dummy variable is statistically significant with an increase in spread by 13.38 bps.

It is expected that credit spreads for loans extended to U.S. borrowers to be higher compared to loans extended to borrowers in W.E. Therefore, to estimate if credit spreads are higher in the U.S. than in W.E., in equation 1 (model [2]) the dummy variable *U.S.* was added being 1 if the loan is extended to a U.S. borrower, and 0 otherwise. The equation (model [2]) reports the variables estimation for a sample of 10,244 loans (4,902 loans extended to U.S borrowers and 5,342 loans extended to W.E. borrowers). The estimation results meet the expected prediction, the *U.S.* dummy variable is statistically significant, increasing the spreads by 33.26 bps. Loans in W.E. are indeed associated with lower spreads, holding other factors constant. Concerning the sub-samples equation (model [1c] and [1d]), this result does not change. In model [1d], a dummy variable *common law* was created representing U.K. It is based on whether W.E. borrower is located in Continental Europe or in the U.K. once that the U.K. is the only country in W.E. with a common law legal system. Since the estimation of the variable *common law* is statistically insignificant, the spreads are lower for W.E., knowing that LBO loans credit spreads does not differ significantly for borrowers based on Continental Europe nor the U.K. As a conclusion, hypothesis 2 and 3 are accepted.

Table 5: Regression analysis of the determinant of credit spreads

Dependent Variable	All Loans	U.S. and W.E.	Market-Based	Bank-Based	U.S.	W.E.
Spreads (bps)	[1]	[2]	[1a]	[1b]	[1c]	[1d]
Independent Variables						
Constant	292.00***	287.03***	438.16***	96.04***	506.77***	76.59***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maturity	20.72***	20.71***	14.67***	27.64***	-24.45***	27.12***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Transaction Size	-8.04***	-7.31***	-18.73***	14.41***	-24.45***	13.60***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Loan Size to Deal Size	-104.24***	-105.03***	-121.04***	-68.13***	-137.49***	-72.41***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of tranches	-3.06**	-3.56***	-3.56**	-5.27***	-3.23	-6.44***
	(0.05)	(0.01)	(0.04)	(0.00)	(0.17)	(0.00)
Currency Risk	14.26***	21.05***	8.35	30.75***	-68.06***	19.35***
	(0.05)	(0.00)	(0.24)	(0.00)	(0.00)	(0.00)
Number of lenders	-2.24***	-2.33***	-2.33***	-2.20***	-2.99***	-2.34***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fixed Rate	14.95	17.56	43.58	-57.90**	87.37*	-24.43
	(0.54)	(0.48)	(0.20)	(0.05)	(0.07)	(0.29)
Rated	-59.06***	-59.79***	-102.33***	25.97	-144.99***	22.42
	(0.01)	(0.01)	(0.00)	(0.28)	(0.00)	(0.35)
Rated*Rating	3.36**	3.41**	6.97***	-1.01	10.07***	-0.62
	(0.02)	(0.05)	(0.00)	(0.57)	(0.00)	(0.73)
Term Loan	75.38***	75.55***	89.18***	55.14***	102.86***	58.86***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Risk Free Rate	-0.19***	-0.19***	-0.21***	-0.14***	-0.25***	-0.14***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Country Risk	4.78***	3.47**	-4.43	3.45*		3.37***
	(0.01)	(0.02)	(0.60)	(0.07)		(0.01)
Volatility	0.12	0.12	1.23***	-1.91***	2.08***	-1.05***
	(0.61)	(0.62)	(0.00)	(0.00)	(0.00)	(0.00)
5yTB-3mTB	-0.19***	-0.19***	-0.20***	-0.14***	-0.19***	-0.14***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Crisis	108.20***	107.84***	95.03***	139.59***	72.71***	145.06***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Common Law	3.62		-13.66	22.04***		9.80
	(0.61)		(0.11)	(0.00)		(0.13)
Market-Based	13.38**					1.00
	(0.05)					(0.00)
U.S.		33.26**				
		(0.02)				
Fixed Effects						
Region	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Nr of Observations	10,244	10,244	7,080	3,164	4,902	5,342
Adjusted R2	0.40	0.40	0.40	0.34	0.42	0.34

Note: Table 5 presents the results of OLS regressions analyzing the determinants of loan credit spread. Model [1] reflects the high-information sample of 10,244 loans with a deal specific purpose code of "leveraged buy-out". Model [2] isolates the 10,244 loans extended to both W.E. and the U.S. Models [1a] and [1b] focus on sub-samples created according to whether the loan is arranged to a borrower in a market-based or bank-based financial system. Models [1c] and [1d] are estimated for two sub-samples created according to whether the borrower is located in W.E. or the U.S. Common law equals 1 if the loan is extended to a borrower in a common law country, and 0 otherwise. Market-based equals 1 if the loan is extended to a borrower in a country with a market-based financial system, and 0 otherwise. U.S. equals 1 if the loan is extended to a borrower located in the U.S. and 0, otherwise. For each independent variable, the first row reports the estimated coefficient and the second row reports the p-value. Coefficients were estimated based on heteroskedasticity-consistent standard errors clustered by deal. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Control for fixed-effects variables region and industry.

6.1.2 Determinants of spreads for the high-information sample.

Since it is not possible to create a single model with borrowers in both market-based and bank-based financial systems as well as loans extended to U.S. and W.E. borrowers, the analysis will focus on the characteristics that affect credit spread separately.

In Table 5, models [1a] and [1b] present loan pricing regression results for a sample of 7,080 loans extended to borrowers in market-based and 3,164 loans bank-based financial systems. Models [1c] and [1d] portray the impact of common pricing factors on credit spreads for loans extended to U.S. borrowers with a sample of 4,902 and 5,342 loans extended to W.E. borrowers.

Concerning the influence of *maturity* on spread, the results presented demonstrate a significantly positive relationship for loans arranged in market-based and bank-based financial systems. On the other hand, for loans closed in the U.S., the influence of *Maturity* on spread is negative and for W.E. is positive. The coefficient values indicate that issuing a loan, with an original maturity one year longer than the mean, decreases spread by 24.45 bps for the U.S. and increases spread by 27.12 bps for W.E.

Once more the U.S. has a significant negative influence (-24.45 bps) of *Log transaction size* in loan spread. The market-based financial systems have the same negative influence with a decrease of 18.73 bps on spreads. Furthermore, loans extended to borrowers in bank-based financial systems and loans closed in W.E. have a significant positive impact on spreads, having an increase of 14.41 bps and 13.60 bps, respectively. Since loans extended to bank-based are more concentrated in larger deals, banks could apply a higher spread to compensate the larger share in bank loan portfolios.

Loan size to deal size has a different impact on spreads compared to what was expect in the descriptive analysis. In all the sub-samples the impact is significant and negative, which means that an increase in the weight of each tranche size will decrease the spread implied for loans in LBOs. For example, an increase of 10 percentage points of the *loan size to deal size* will decrease the implied spread by 12.10 bps for the market-based financial systems and 7.24 bps for the loans closed in W.E. Higher *loan size to deal size ratio* could indicate a lower risk for lenders since banks can only retain a higher loan on its balance sheet if the risk is minimized. In addition, larger loans are associated to senior loans. Relatively to the *number of tranches*, once more the impact is significant and negative except for loans extended to U.S. borrower which is not significant. In conclusion, LBO loans can benefit from tranching.

The influence of *currency risk* on spread has no impact on the market-based financial systems. However, for the bank-based financial systems (and for the U.S. as well) the impact is significant and positive, meaning an increase on the currency risk will increase the spread by 30.75 bps (19.35 bps). For loans extended to U.S. borrowers closed in other currency than $US, the *currency risk* significantly decreases the spread by 68.06 bps.

The *number of lenders* has a significant and negative impact on all the sub-samples. For example, for loans extended to market-based financial systems for each additional lender the spread decrease by 2.33 bps. The higher the number of lenders the lower the risk of default, since the risk is distributed across different lenders.

The variable *fixed rate* is only significant for loans extended to bank-based financial systems and for loans arranged to the U.S. The impact on the spread is different, being negative for the bank-based (57.90 bps decrease in spread) and positive for the U.S. (87.37 bps increase in spread).

The impact of *Rated* and *Rated*Rating* on spread for loans arranged in W.E. and for loans extended to the bank-based financial systems is insignificant. Credit risk information regarding this two sub-samples is scant, that could explain this insignificant relationship between spread and credit risk.

The impact of *Rated* and *Rated*Rating* on loans extended to market-based financial systems and for loans extended to the U.S. on spreads is significant. A one-unit increase in credit rating (corresponding a downgrade from AAA to AA+) is associated with a decrease on spreads of 102.33 bps and 144.99 bps and an increase of spread of 6.97 bps and 10.07 bps, respectively. For the coefficient estimation of *Term loan*, the influence on spread is significant and positive for all sub-samples, which indicates a higher spread than credit lines.

Regarding the *Risk free rate* influence on spreads, the impact is significant and negative for all sub-samples. *Country risk* estimation is significant and positive for loans arranged to W.E. borrowers and extended to bank-based financial systems. Loans to borrowers with a grading bellow AAA (AAA=1) will increase spread by 3.45 bps and 3.37 bps, respectively.

Spread and the yield curve slope (*5yTB-3mTB)* are greatly related to loans extended to all sub-samples, meaning a steeper yield curve is associated with lower spreads. The *volatility* has the same impact on spreads, being negatively significant to all sub-samples. This negative influence is explained by the fact that when there is an increase in volatility there is a change on the financing source from bond markets to loan syndicated markets. This result diverges from those by Colla *et* al. (2012) which say that credit spread and equity volatility explain the increase of tranche spreads.

The 2007-2008 financial crisis and the subsequent European sovereign debt crisis had a significant impact for loans in LBOs, namely an increase in spreads. Loans arranged for borrowers in market-based and bank-based financial systems

had an increase in spreads of 95.03 bps 139.59 bps, respectively, if the transaction has an active date during de crisis period.

Lastly, the influence of *common law* on loan credit spread is only significant and positive for bank-based financial systems. Concerning loans extended to W.E. borrowers, the difference between loan spreads is not due by the type of the financial system or by the type of legal system.

In conclusion, borrowers located in market-based financial systems and in U.S. face in general lower spreads for loans to LBO in comparison with bank-based financial system and W.E. The determinants that decrease spreads for all the sub-samples are *number of lenders, risk free rate* and *yield curve slope*. The *maturity, log transaction size, loan size to deal size, currency risk, currency risk, rated* decrease spread for U.S. borrowers. Finally, for borrowers in market-based financial systems the determinants that decrease spreads are *log transaction size, number of tranches and rated.*

6.1.3 The impact of the financial crisis on credit spreads.

Following the descriptive analysis and the results presented in section 5.1.2. it can be concluded that the 2007-2008 financial crisis and the subsequent European sovereign debt crisis had a significant impact for loans in LBOs, namely an increase in spreads. Since the objective is to investigate this impact on spreads and pricing process (hypothesis 4) the high-information sample was divided into a pre-crisis period from January 1, 2000 to September 14, 2008, and a crisis period from September 15, 2008 (Lehman Brothers' bankruptcy filing date) through December 31, 2013.

Table 6 presents estimation results for a sample with all loans, model [1] and [2], and the sub-samples for the U.S. (model [1c]) and W.E. (model [1d]) presented for both periods, namely pre-crisis and crisis. In model [1], in the pre-

crisis period, borrowers in countries with *market-based* financial system face an increase of 13.27 in spread but the law systems, namely the *common law* variable, does not have an influence on spread before the crisis. In the crisis period, *common law* is the only variable whose influence is associated with higher spreads with an increase of 41.12 bps. Thus, the financial system has no influence in spread in the crisis period, which is why only the sub-samples U.S. and W.E. where analyzed.

The type of factors that explain loan credit spreads has changed. Maturity, currency risk, country risk and yield curve slope are the characteristics with greatest influence. For model [1], in the crisis period, the influence of the yield curve slope is statistically negative and might derive from a downturn in economic growth. *Country risk* influence on spread during the crisis is positive because of the downgraded sovereign ratings from W.E. countries. For model [2], in pre-crisis, the *U.S.* dummy has a significant positive impact on spreads but, in the crisis-period this result is no longer valid. These results indicate that the U.S. has not suffered from an increase in spread.

Concerning loans extended to U.S. borrowers, in model [1c] the principal changes of the coefficient influence in spread in both periods and are related to *rated, rated*rating* and *risk free rate* which became insignificant during the crisis period. On the contrary, *log transaction size* and *fixed rate* became significant and negative.

Model [1d] presents results for loans extended to W.E. borrowers and the coefficients *Rated, Rated*rating* and *market-based* became insignificant during the crisis. On the other hand, *Currency risk* and *Volatility* have turned into significant coefficients. Lastly, the financial system has no influence in spreads during the crisis period and the dummy *Common law* also has no influence in spreads, meaning that the U.K. have not suffered an increase in spreads comparing to W.E. countries. These results are consistent with the fact that the U.K. is a country

with common law legal system and has a better law enforcement with better protections. Hypothesis 4 is valid.

Table 6: Regression analysis of the impact of the financial crisis

Dependent Variable	All Loans [1]	All Loans [1]	U.S. and W.E. [2]	U.S. and W.E. [2]	U.S. [1c]	U.S. [1c]	W.E. [1d]	W.E. [1d]
Spreads (bps)	(Pre-crisis)	Crisis	(Pre-crisis)	Crisis	(Pre-crisis)	Crisis	(Pre-crisis)	Crisis
Independent Variables								
Constant	244.36***	543.56***	231.18***	576.33***	254.86***	592.79***	223.95***	471.14***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maturity	22.30***	11.63***	22.30***	11.67***	22.27***	12.83***	21.92***	13.28***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Transaction Size	-3.50*	-20.58***	-2.67	-19.41***	-2.77	-19.77***	-4.22**	-19.26***
	(0.07)	(0.00)	(0.16)	(0.00)	(0.15)	(0.00)	(0.03)	(0.00)
Loan Size to Deal Size	-109.48***	-107.94***	-110.29***	-106.95***	-110.32***	-109.30***	-109.11***	-109.40***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of tranches	-3.09**	-10.98***	-3.60**	-10.92***	-3.65***	-11.62***	-3.09**	-11.58***
	(0.04)	(0.01)	(0.02)	(0.01)	(0.01)	(0.01)	(0.04)	(0.01)
Currency Risk	8.86	23.27*	16.16***	35.14**	12.02**	35.37***	8.76	28.15**
	(0.14)	(0.1)	(0.01)	(0.03)	(0.04)	(0.01)	(0.14)	(0.05)
Number of lenders	-2.25***	-5.53***	-2.33***	-5.88***	-2.35***	-5.35***	-2.14***	-5.31***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.01)
Fixed Rate	44.56	-53.57	48.96*	-57.69	37.55	-77.49**	45.98	-49.84
	(0.12)	(0.18)	(0.08)	(0.15)	(0.17)	(0.05)	(0.12)	(0.18)
Rated	-74.28***	3.16	-75.71***	5.69	-73.00***	1.34	-70.43***	-47.18
	(0.00)	(0.96)	(0.00)	(0.93)	(0.00)	(0.98)	(0.00)	(0.49)
Rated*Rating	3.71***	2.32	3.81***	2.10	3.63**	2.33	3.47**	5.77
	(0.01)	(0.60)	(0.01)	(0.63)	(0.02)	(0.59)	(0.02)	(0.21)
Term Loan	76.18***	78.88***	76.35***	77.68***	76.25***	78.50***	76.09***	78.31***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Risk Free Rate	-0.16***	-0.50	-0.16***	-0.36	-0.16***	-0.37	-0.15***	-0.35***
	(0.00)	(0.12)	(0.00)	(0.26)	(0.00)	(0.25)	(0.00)	(0.00)
Country Risk	3.19	8.39***	1.66	6.90***			2.89	8.64***
	(0.17)	(0.00)	(0.46)	(0.01)			(0.21)	(0.00)
Volatility	0.10	0.39	0.12	0.32	0.11	0.22	1.35***	0.81*
	(0.68)	(0.31)	(0.64)	(0.43)	(0.67)	(0.59)	(0.00)	(0.07)
5yTB-3mTB	-0.13***	-0.26***	-0.12***	-0.27***	-0.13***	-0.27***	-0.19***	0.20***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Common Law	-0.06	41.12*					-0.43	39.10
	(0.99)	(0.1)					(0.95)	(0.16)
Market-Based	13.27**	12.31					13.11**	11.64
	(0.05)	(0.61)					(0.05)	(0.66)
U.S.			45.79***	12,44				
			(0.00)	(0.71)				
Fixed Effects								
Region	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Nr of Observations	8,087	2,157	8,087	2,157	8,087	2,157	8,087	2,157
Adjusted R2	0.27	0.24	0.27	0.24	0.27	0.23	0.26	0.25

Note: Table 6 presents the results of OLS regressions analyzing the determinants of loan credit spread. Models [1], [2], [1c] and [1d] are re-estimated for two sub-samples created by considering a pre-crisis period from January 1, 2000 through September 14, 2008, and a crisis period from September 15, 2008 (Lehman

Brothers' bankruptcy filing date) through December 31, 2013. Common law equals 1 if the loan is extended to a borrower in a common law country, and 0 otherwise. Market-based equals 1 if the loan is extended to a borrower in a country with a market-based financial system, and 0 otherwise. U.S. equals 1 if the loan is extended to a borrower located in the U.S. and 0, otherwise. For each independent variable, the first row reports the estimated coefficient and the second row reports the p-value. Coefficients were estimated based on heteroskedasticity-consistent standard errors clustered by deal. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Control for fixed-effects variables region and industry.

6.1.4 The term structure of spreads

On section 5.1.2, the regression results for the influence of *maturity* on spreads is significant and linearly positive for model [1], [2], [1a], [1b], [1d], except for model [1c] which is significantly linearly negative. These results are in line with with Colla *et al.* (2012) who found a positive relationship between maturities and spreads, since lenders require a higher remuneration due to the liquidity risk. Nevertheless, recent studies suggest a hump-shaped term structure of credit spreads for project finance loans which can also be applied for LBO loans [Sorge and Gadanecz (2008) and Marques *et al.* (2015)]. To test this hump-shaped term structure it was added to the high-information sample components of non-linear maturity.

Table 7 presents the regression results with the natural logarithm of maturity (*log maturity)* for all loans (model [3]) and the sub-samples for loans extended to market-based (model [3a]) and bank-based (model [3b]) financial systems; U.S. (model [3c]) and W.E. (model [3d]). A convex relationship is found between credit spread and *log maturity* for all the models. LBO loan spreads extended to market-based-based financial systems and extended to W.E. are the models where the non-linear relationship between credit spread and maturity is more pronounced.

This convex relationship between credit spread and maturity can be explained by the intrinsic characteristics of LBO transactions and by loan market effects. In section 2.5 this hump-shaped relationship is explained by the fact that the short-term liquidity for shorter maturities increase the spreads because of the liquidity risk. However, in longer maturities the cash-flow of the acquired firm are higher and the liquidity risk is smaller, then the LBO loans spreads required are lower.

Figure 2 – Term structure loans extended to market-based borrowers
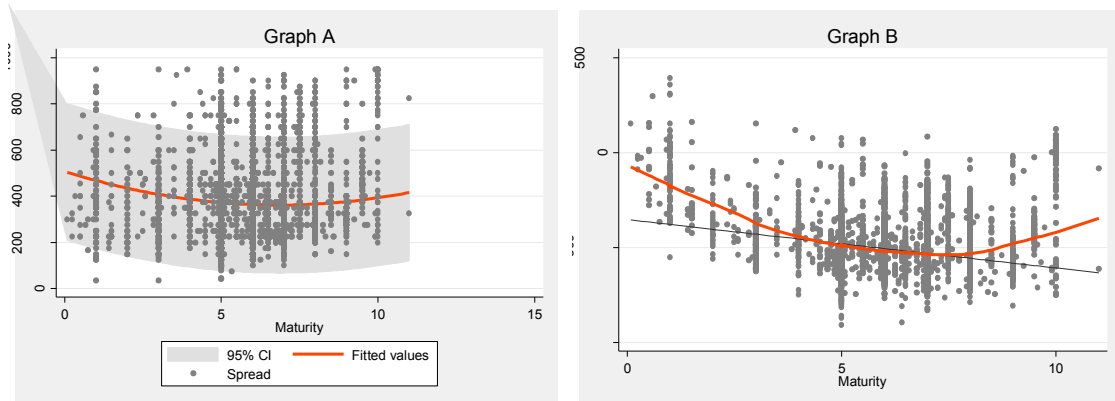
Note: Graphs A and B are based on model [3a]. Graph A plots credit spread against maturity, it plots the prediction from a quadratic regression and adds the confidence interval on the basis of the standard error of forecast. Graph B presents the augmented component-plus-residual and depicts the partial relationship between credit spread and maturity, once all other micro and macro factors have been controlled for. The straight line corresponds to the regression model. The curved line reflects the fitting process based on non-parametric regression.

Figure 3 – Term structure loans extended to W.E. borrowers
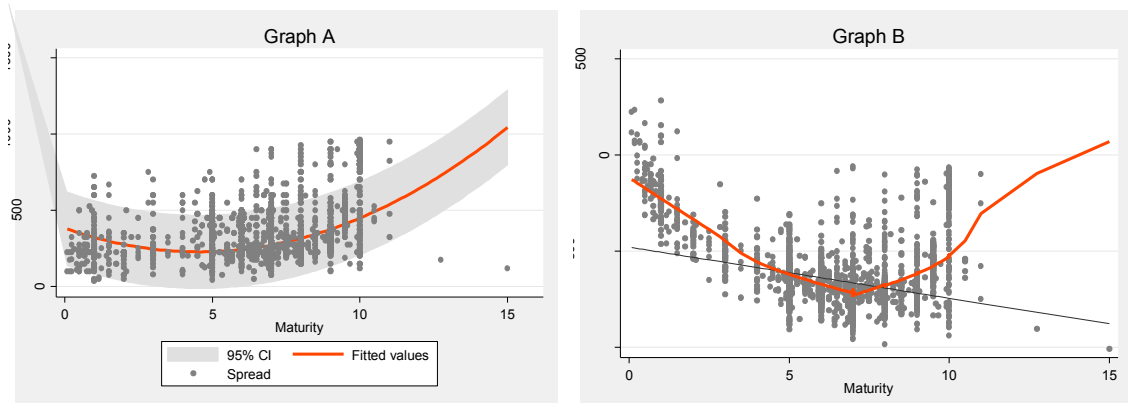
Note: Graphs A and B are based on model [3d]. Graph A plots credit spread against maturity, it plots the prediction from a quadratic regression and adds the confidence interval on the basis of the standard error of forecast. Graph B presents the augmented component-plus-residual and depicts the partial relationship between credit spread and maturity, once all other micro and macro factors have been controlled for. The straight line corresponds to the regression model. The curved line reflects the fitting process based on non-parametric regression.

Table 6: Regression Analysis of the term structure of spreads

Dependent Variable	All Loans with log maturity	Market-Based with log maturity	Bank-Based with log maturity	U.S. with log maturity	W.E. with log maturity
Spreads (bps)	[3]	[3a]	[3b]	[3c]	[3d]
Independent Variables					
Constant	360.90***	550.00***	141.25***	594.79***	137.49***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Maturity	63.83***	67.94***	71.23***	60.15***	72.23***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Maturity	-173.43***	-222.45***	-167.76***	-194.62***	-183.69***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Log Transaction Size	-11.90***	-24.82***	12.43***	-31.02***	11.31***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Loan Size to Deal Size	-95.97***	-115.79***	-45.26***	-135.66***	-52.30***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Number of tranches	-3.64***	-3.93**	-6.08***	-3.13	-7.17***
	-0,01	(0.03)	(0.00)	(0.19)	(0.00)
Currency Risk	15.85***	9.55	34.53***	-71.64***	20.96***
	(0.01)	(0.19)	(0.00)	(0.00)	(0.00)
Number of lenders	-1.93***	-1.94***	-1.87***	-2.68***	-2.02***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Fixed Rate	12,38	39.91	-66.45	78.90*	-23.04
	(0.61)	(0.23)	(0.04)	(0.10)	(0.35)
Rated	-49.17**	-85.93***	32.98	-125.06***	29.87
	(0.02)	(0.00)	(0.18)	(0.00)	(0.19)
Rated*Rating	2.66*	5.91***	-1.56	8.74***	-1.09
	(0.07)	(0.00)	(0.43)	(0.00)	(0.53)
Term Loan	58.83***	72.23***	33.06***	88.07***	37.47***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Risk Free Rate	-0.20***	-0.22***	-0.17	-0.26***	-0.13***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Country Risk	4.91***	-0.19	3.07		3.09*
	(0.01)	(0.98)	(0.13)		(0.10)
Volatility	0.07	1.18***	-2.04***	2.05***	-1.03***
	(0.79)	(0.00)	(0.00)	(0.00)	(0.00)
5yTB-3mTB	-0.20***	-0.21***	-0.24***	-0.19***	-0.17***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Crisis	113.23***	101.38***	144.44***	79.47***	150.66***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Common Law	0.62	-16.93**	16.39		6.96
	(0.93)	(0.13)	(0.47)		(0.29)
Market-Based	20.51***				7.76
	(0.00)				(0.22)
Fixed Effects					
Region	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Nr of Observations	10,244	7,080	3,164	5,342	5,342
Adjusted R2	0.43	0.44	0.40	0.44	0.38

Note: Models [3], [3a], [3b], [3c], and [3d] are similar to models [2], [1a], [1b], [1c], and [1d], respectively, adding the logarithmic of maturity. For each independent variable, the first row reports the estimated coefficient and the second row reports the p-value. Coefficients were estimated based on heteroskedasticity-consistent standard errors clustered by deal. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Control for fixed-effects variables region and industry.

7. The impact of acquired firm's characteristics on spreads and pricing processes

Previous studies have analyzed the impact of firm characteristics on spreads and pricing processes. Therefore, in this section a univariate and multivariate analysis will be presented. According to Ivashina and Kovner (2011) acquired firms' characteristics like leverage, efficiency and profitability have influence on spreads. On the other hand, Colla *et al.* (2012) research has verified that only the characteristics of the target firm, namely pre-LBO profitability affects spreads, since they found a significant negative and insignificant relationships between spreads and leverage level, respectively.

7.1   Univariate Analysis

From the hand-matching code firm of the database samples, an analysis to the impact of the firms' characteristics on credit spreads was realized. The sample includes 1,290 LBO loans closed between 2000 and 2013 to acquire 607 publicly traded firms located in W.E. and the U.S., due to the lack of information for public acquired firms outside the U.S. and W.E. The hand-matching consists in LBO firm characteristics reported around the loan closing date. The firm characteristics to use as explanatory variables are *Total assets*, *Debt to total assets*, *Short-term debt to total debt*, *Fixed assets to total assets*, *Market-to-book ratio* and *Return on assets.*

Firm size (*total assets*) and market-to-book ratio are used as alternatives variables for the asymmetric information problem. Firms with higher asymmetric information problems have a higher probability of paying more expensive spreads. The market-to-book ratio variable is used to measure the

firm's potential growth and cash flow. Smith and Watts (1992) has identified the capital expenditures/value ratio an alternative represent for the cash flow of the firm's investment opportunities.

Debt to total assets and the short-term debt to total debt are alternative variables for borrower's potential level of financial constraint. According to Ivashina and Kovner (2011) results there is a significant relation between spreads and leverage. However, Colla *et al.* (2012) results presents an insignificant negative relation between spreads and leverage. But there's is an expectation to prove the contrary since firms with financial problems and with short-term debt to total debt have higher risk to bankruptcy. *Fixed assets to total assets* are used as a proxy for asset tangibility since it reflects the value of firms' liquidation. Moreover, the greater the asset tangibility the bigger the expected recovery in default and the lower the spread required.

Table 8 presents the characteristics of public firms that were acquired as LBO transactions. The descriptive analysis is based on the deals and the sample is divided into sub-samples: firms located in market-based, bank-based financial system and firms located in the U.S. and W.E.

Concerning the *short-term debt to total debt* median, the acquired firms in market-based financial systems have lower levels compared to the firms in bank-based financial systems. For firms located in the U.S. the result is similar, having a lower *short-term debt to total debt* median compared to W.E. It is expected that firms in market-based financial systems, as well as in the U.S., have lower spreads. The *market-to-book ratio* mean is higher for firms located in market-based financial systems and for the U.S., meaning they have a higher potential growth and cash flow. During the pre-crisis firms had a higher asset tangibility compared to the firms after the crisis.

Table 8: Tests for similar distributions in contract characteristics across sub-sample

Variable of Interest		Market-Based	Bank-Based	U.S.	W.E.	Pre-Crisis	Crisis
Total assets (in $US million)	Mean	2,926.91	4,950.02	3,248.69	3,575.14	3,539.85	3,350.67
	Median	13.48	13.29	13.61	13.26	13.47	13.34
	Number	382	116	270	228	373	125
Debt to total assets	Mean	0.34	0.26	0.37	0.27	0.31	0.34
	Median	0.27	0.20	0.28	0.23	0.27	0.23
	Number	382	116	270	228	373	125
Short-term debt to total debt	Mean	0.27	0.36	0.23	0.37	0.30	0.27
	Median	0.10	0.28	0.06	0.28	0.15	0.15
	Number	337	107	233	211	314	103
Fixed assets to total assets	Mean	0.29	0.25	0.26	0.31	0.30	0.24
	Median	0.23	0.21	0.18	0.24	0.23	0.15
	Number	382	115	270	227	372	125
Market to book ratio	Mean	2.37	0.94	1.77	2.36	1.00	5.08
	Median	2.31	2.17	2.24	2.31	2.22	2.35
	Number	376	111	264	223	363	124
Return on assets	Mean	-0.03	0.06	0.05	0.04	0.02	-0.11
	Median	0.05	0.06	0.05	0.06	0.05	0.06
	Number	347	99	251	195	329	117

Note: Table 8 reports characteristics of public firms that were acquired via a LBO transaction. Our sample includes 607 LBO deals closed in W.E. and the U.S. between 2000 and 2014. We created three sub-samples according to whether firms are located in market-based (382 deals) or bank-based (116 deals) financial systems, in the U.S. (270 deals) or in W.E. (228 deals), and were closed in the pre-crisis (373 deals) or crisis (125 deals) periods. Each cell contains means and parenthetic medians.

7.2 Multivariate Analysis

For the multivariate analysis, the firm characteristics were included as control variables.

In table 9, models [4] and [5] reflect the high-information sample of 1,290 loans with a deal specific purpose code of "leveraged buy-out" — these models have the same number of observations because information on acquired firm characteristics for transactions outside W.E. and the U.S. is not available. Models [4a] and [4b] focus on sub-samples created according to whether the loan is arranged to a borrower in a market-based or bank-based financial system. Models [4c] and [4d] are estimated for two sub-samples created according to whether the borrower is located in W.E. or the U.S.

Regarding models [4] and [5] the results are different compared to section 5.1.2. The variable market-based is no longer significant but the U.S. is still significant reflecting on an increase of 73.40 bps in spreads compared to W.E. The law legal system, namely the variable *common law* is not significant for both models. For the firm control variables, namely *debt to total assets* leverage does not affect credit spreads having an insignificant relation. These results are in line with those presented by Ivashina and Kovner (2011). Regarding the sub-samples market-based *versus* bank-based financial systems, this result remains, meaning book leverage does not have an influence in spreads. However, firms located in market-based have a significant negative influence of *short-term debt to total debt* on spreads (20.60 bps) compared to the bank-based where it is insignificant. According to Barclay and Smith (1995) evidence, firms with larger potential information asymmetries (*market-to-book ratio*) issues more short-term debt. This

evidence is supported by the results presented on table 9, since targets with a significant market-to-book ratio face lower spreads.

For the sub-samples U.S. versus W.E. the short-term debt to total debt is significant and negative for firms located in W.E. facing a decrease in spreads of 29.93 bps. Leverage and total assets have an insignificant relation with spreads for both models. The market-to-book ratio and the return on assets are significant for the U.S., facing a decrease in spread. This results is like those presented by Colla et al. (2012), the pre-LBO profitability affects the pricing of debt in LBOs.

Comparing the regression results from Table 5 of microeconomic and macroeconomic factors on spreads, the coefficients have different impacts. Namely, the number of tranches, the fixed rate and the country risk are no longer significant for all the models and the currency risk is only significant for the U.S. (model [4c]). *Crisis and common law* have no influence in spreads for loans extended to bank-based financial systems and for W.E. These differences can be explained by the fact that the number of observations is much smaller compared to Table 5.

Table 9: Regression Analysis of the determinants of credit spreads: the impact of acquired firm's characteristics

Dependent Variable	All Loans	U.S. and W.E.	Market-Based	Bank-Based	U.S.	W.E.
Spreads (bps)	[4]	[5]	[4a]	[4b]	[4c]	[4d]
Independent Variables						
Constant	303.22***	290.08***	429.46***	118.15	578.75***	98.29
	(0.00)	(0.00)	(0.00)	(0.38)	(0.00)	(0.25)
Maturity	12.22***	12.39***	5.32	31.41***	-3.16	28.14***
	(0.00)	(0.00)	(0.14)	(0.00)	(0.42)	(0.00)
Log Transaction Size	-12.50*	-11.70*	-24.37***	29.13***	-29.85***	11.86
	(0.06)	(0.09)	(0.00)	(0.00)	(0.00)	(0.29)
Loan Size to Deal Size	-83.92***	-84.41***	-102.97***	13.19	-125.06***	-24.05
	(0.00)	(0.00)	(0.00)	(0.80)	(0.00)	(0.50)
Number of tranches	-1.07	-1.55	-0.60	-3.64	-1.27	-4.23
	(0.64)	(0.52)	(0.79)	(0.47)	(0.55)	(0.29)
Currency Risk	-3.32	6.34	-7.32	78.38	-58.54***	9.60
	(0.81)	(0.66)	(0.59)	(0.17)	(0.00)	(0.54)
Number of lenders	-2.77***	-2.85***	-2.27**	-6.40***	-1.42*	-5.24**
	(0.01)	(0.00)	(0.02)	(0.01)	(0.06)	(0.00)
Fixed Rate	71.93	72.74	49.02	0.00	22.99	0.00
	(0.21)	(0.20)	(0.30)	(Omitted)	(0.58)	(Omitted)
Rated	-121.87***	-119.97***	-169.22***	-21.77	-158.92***	-5.60
	(0.01)	(0.01)	(0.00)	(0.89)	(0.00)	(0.97)
Rated*Rating	9.07***	8.95***	12.36***	3.92	11.95***	1.15
	(0.01)	(0.01)	(0.00)	(0.723)	(0.00)	(0.90)
Term Loan	82.47***	82.47***	98.52***	36.88***	120.05***	47.89***
	(0.00)	(0.00)	(0.00)	(0.01)	(0.00)	(0.00)
Risk Free Rate	-0.15**	-0.15***	-0.17***	-0.20	-0.26***	-0.25**
	(0.03)	(0.01)	(0.01)	(0.21)	(0.00)	(0.05)
Country Risk	9.23	6.74	8.81	11.51		9.85
	(0.28)	(0.44)	(0.79)	(0.25)		(0.34)
Volatility	0.82*	0.81*	1.03**	1.28	1.57***	1.40
	(0.01)	(0.10)	(0.05)	(0.28)	(0.01)	(0.13)
5yTB-3mTB	-0.18*	-0.19*	-0.19**	-0.22	-0.33***	-0.11
	(0.09)	(0.08)	(0.05)	(0.38)	(0.00)	(0.60)
Crisis	103.40***	101.56***	98.57***	81.55	77.15***	72.52
	(0.00)	(0.00)	(0.00)	(0.16)	(0.00)	(0.13)
Common Law	12.03		0.05	-42.81		26.36
	(0.34)		(1.00)	(0.236)		(0.13)
Market-Based	7.96					-13.22
	(0.61)					(0.52)
U.S.		73.40**				
		(0.04)				
Log total Assets	2.44	1.52	3.83	-8.13	1.82	0.62
	(0.64)	(0.77)	(0.45)	(0.56)	(0.74)	(0.94)
Debt to total assets	15.57	15.85	-3.89	41.24	-6.42	35.98
	(0.32)	(0.31)	(0.70)	(0.23)	(0.49)	(0.20)
Short term debt to total debt	-15.63	-15.78	-20.60*	-29.58	0.92	-29.93**
	(0.13)	(0.12)	(0.09)	(0.14)	(0.94)	(0.03)
Fixed assets to total assets	-53.93***	-48.15***	-43.84***	-177.22***	-32.75*	-88.73***
	(0.00)	(0.01)	(0.01)	(0.01)	(0.08)	(0.00)
Market to book ratio	-0.16	-0.13	-0.22**	0.54	-0.19**	0.05
	(0.29)	(0.41)	(0.03)	(0.26)	(0.04)	(0.86)
Return on assets	-7.41	-6.72	-19.73**	-67.42	-17.14**	56.97
	(0.54)	(0.57)	(0.02)	(0.75)	(0.02)	(0.42)
Fixed Effects						
Region	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	1,290	1,290	1,005	285	715	575
Adjusted R2	0.32	0.32	0.37	0.35	0.44	0.29

Note: Table 9 presents the results of OLS regressions analyzing the determinants of loan credit spread. Common law equals 1 if the loan is extended to a borrower in a common law country, and 0 otherwise. Market-based equals 1 if the loan is extended to a borrower located in a market-based financial system, and 0 otherwise. U.S. equals 1 if the loan is extended to a borrower located in the U.S. and 0, otherwise. For each independent variable, the first row reports the estimated coefficient and the second row reports the p-value. Coefficients were estimated based on heteroskedasticity-consistent standard errors clustered by deal. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Control for fixed-effects variables region and industry.

7.2.1 Term structure of spreads with firm's characteristics

Since the term structure remains a puzzle for most of the previous studies, an analysis to the term structure of spreads was made. The models presented in Table 7 were re-estimated including acquired firm's characteristics as additional regressors.

In Table 10, the relation between credit spread and maturity is still a robust convex relationship. Concerning the acquired firms' characteristics, once more leverage has no effect on spread. The *short-term debt to total debt* has no influence on spreads. However, targets with a significant *market-to-book ratio* face lower spreads.

For the sub-samples U.S. *versus* W.E. the *short-term debt to total debt* is significant and negative for firms located in W.E. facing a decrease in spreads of 29.93 bps. Leverage and total assets have an insignificant relation with spreads for both models. The *market-to-book ratio* has a significant impact on firms located on market-based financial systems and the U.S. facing a decrease of 0.28 bps and 0.25 bps on spreads, respectively. However, for firms located in bank-based the results is different. The *market-to-book ratio* has a significant impact but positive, facing an increase on spreads of 0.80 bps.

Table 10: Regression Analysis of the term structure of spreads with firms' characteristics

Dependent Variable	All Loans with log maturity	Market-Based with log maturity	Bank-Based with log maturity	U.S. with log maturity	W.E. with log maturity
Spreads (bps)	**[6]**	**[6a]**	**[6b]**	**[6c]**	**[6d]**
Independent Variables					
Constant	318.23***	461.50***	148.03	585.69***	127.31
	(0.00)	(0.00)	(0.30)	(0.00)	(0.15)
Maturity	62.83***	56.16***	87.04***	36.35**	86.93***
	(0.00)	(0.00)	(0.00)	(0.03)	(0.00)
Log Maturity	-180.57***	-181.06***	-196.93***	-132.56**	-219.48***
	(0.00)	(0.00)	(0.00)	(0.02)	(0.00)
Log Transaction Size	-16.50**	-29.47***	32.43	-34.64***	11.56
	(0.03)	(0.00)	(0.17)	(0.00)	(0.34)
Loan Size to Deal Size	-88.07***	-108.12***	15.76	-132.41***	-8.54
	(0.00)	(0.00)	(0.78)	(0.00)	(0.83)
Number of tranches	-2.71	-1.61	-6.48	-1.32	-6.46
	(0.24)	(0.44)	(0.24)	(0.53)	(0.17)
Currency Risk	-0.14	-4.36	76.36	-62.51***	12.47
	(0.99)	(0.76)	(0.19)	(0.00)	(0.51)
Number of lenders	-2.54***	-2.14**	-5.37***	-1.36*	-4.43***
	(0.01)	(0.02)	(0.01)	(0.07)	(0.00)
Fixed Rate	42.29	18.45	0	3.06	0
	(0.14)	(0.34)	Omitted	(0.89)	Omitted
Rated	-118.00**	-156.60***	-155.76	-145.41***	-17.63
	(0.02)	(0.00)	(0.27)	(0.00)	(0.90)
Rated*Rating	8.66***	11.36***	13.17	10.92***	1.58
	(0.01)	(0.00)	(0.19)	(0.00)	(0.88)
Term Loan	57.60***	73.87***	11.38	102.09***	16.95*
	(0.00)	(0.00)	(0.43)	(0.00)	(0.09)
Risk Free Rate	-0.15**	-0.16***	-0.28	-0.25***	-0.28*
	(0.04)	(0.01)	(0.12)	(0.00)	(0.05)
Country Risk	11.61	1.60	12.64		11.50
	(0.19)	(0.97)	(0.22)		(0.28)
Volatility	0.64	0.73	1.19	1.35**	1.23
	(0.20)	(0.16)	(0.37)	(0.02)	(0.18)
5yTB-3mTB	-0.19*	-0.18*	-0.33	-0.31***	-0.19
	(0.10)	(0.08)	(0.24)	(0.00)	(0.45)
Crisis	115.82***	115.29***	84.88	91.09***	83.40
	(0.00)	(0.00)	(0.24)	(0.00)	(0.16)
Common Law	5.35	-6.85	-50.88		16.51
	(0.72)	(0.72)	(0.17)		(0.40)
Market-Based	19.81				2.78
	(0.26)				(0.90)
Log total assets	4.42	6.31	-8.99	3.75	1.38
	(0.42)	(0.23)	(0.52)	(0.51)	(0.86)
Debt to total assets	17.51	1.79	22.05	-1.15	27.08
	(0.23)	(0.87)	(0.55)	(0.90)	(0.36)
Short-term debt to total debt	-6.94	-10.22	-30.42	8.17	-22.40
	(0.49)	(0.41)	(0.15)	(0.51)	(0.14)
Fixed assets to total assets	-56.74***	-46.51***	-172.97***	-31.84*	-87.25***
	(0.00)	(0.01)	(0.00)	(0.10)	(0.01)
Market to book ratio	-0.21	-0.28***	0.80*	-0.25***	-0.01
	(0.18)	(0.00)	(0.08)	(0.01)	(0.97)
Return on assets	-7.68	-17.13**	-96.80	-13.97*	10.81
	(0.49)	(0.04)	(0.66)	(0.06)	(0.89)
Fixed Effects					
Region	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes
Number of Observations	1290	1005	285	715	575
Adjusted R2	0.37	0.41	0.42	0.47	0.37

Note: Models [6], [6a], [6b], [6c], and [6d] are similar to models [3], [3a], [3b], [3c], and [3d], respectively, adding the logarithmic of maturity. For each independent variable, the first row reports the estimated coefficient and the second row reports the p-value. Coefficients were estimated based on heteroskedasticity-consistent standard errors clustered by deal. ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively. Control for fixed-effects variables region and industry.

8. Summary and Conclusions

The purpose of this thesis was to analyze the pricing determinants of loans in LBOs using a sample of 13,315 loans (2,671 deals) closed during the 2000-2013 period. The literature review is focused on spreads and pricing processes and how they differ between market-based *versus* bank-based financial systems, common law *versus* civil law legal regimes, U.S. *versus* W.E. borrowers, and, finally, pre-crisis *versus* crisis periods.

The main results seem to indicate that loans closed in market-based *versus* bank-based financial systems besides U.S. *versus* W.E. are priced in segmented loan markets. Loan spreads in LBOs are explained by contractual characteristics and macroeconomic factors. Concerning the contractual characteristics, the variables that have an impact are the deal size (*log transaction size*), loan size to deal size ratio, number of tranches and number of bank lenders per deal. Regarding the macroeconomic factors, the variables influencing spreads are the general level of interest rates, market volatility, the yield curve slope and the region where the firm is located.

Furthermore, the current literature is also extended with the empirical study of creditor protection and financial market development on the influence of the relative cost of debt in LBOs. This effect is due to the 2007/2008 crisis and the subsequent European sovereign debt crisis. During the pre-crisis period, only LBO loans extended to market-based borrowers face a higher spread compared to bank-based countries. However, during the crisis-period simply borrowers extended to common law legal systems face a higher spread for loans in LBOs. In addition, comparing the regression results between LBO loans extended to

U.S. *versus* W.E. borrowers during the crisis period, it is verified that borrowers in the U.S. face higher spreads compared to borrowers located in W.E.

The regression results presented for the term structure on spreads are different compared to Kleimeier and Megginson (2000), Ivashina and Kovner (2011) and Colla *et al.* (2012). They discovered a linear positive relationship between spread and maturity. The results presented in this thesis document a robust convex relationship, which can be explained by some fundamental economics, such as liquidity or cash flow-risk and supply and demand effects.

Lastly, firm characteristics such as book leverage have no effect on LBO loan spreads but pre-LBO profitability does affect the pricing of debt in LBOs.

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10. Appendix

Figure 4 – Term structure of credit spreads
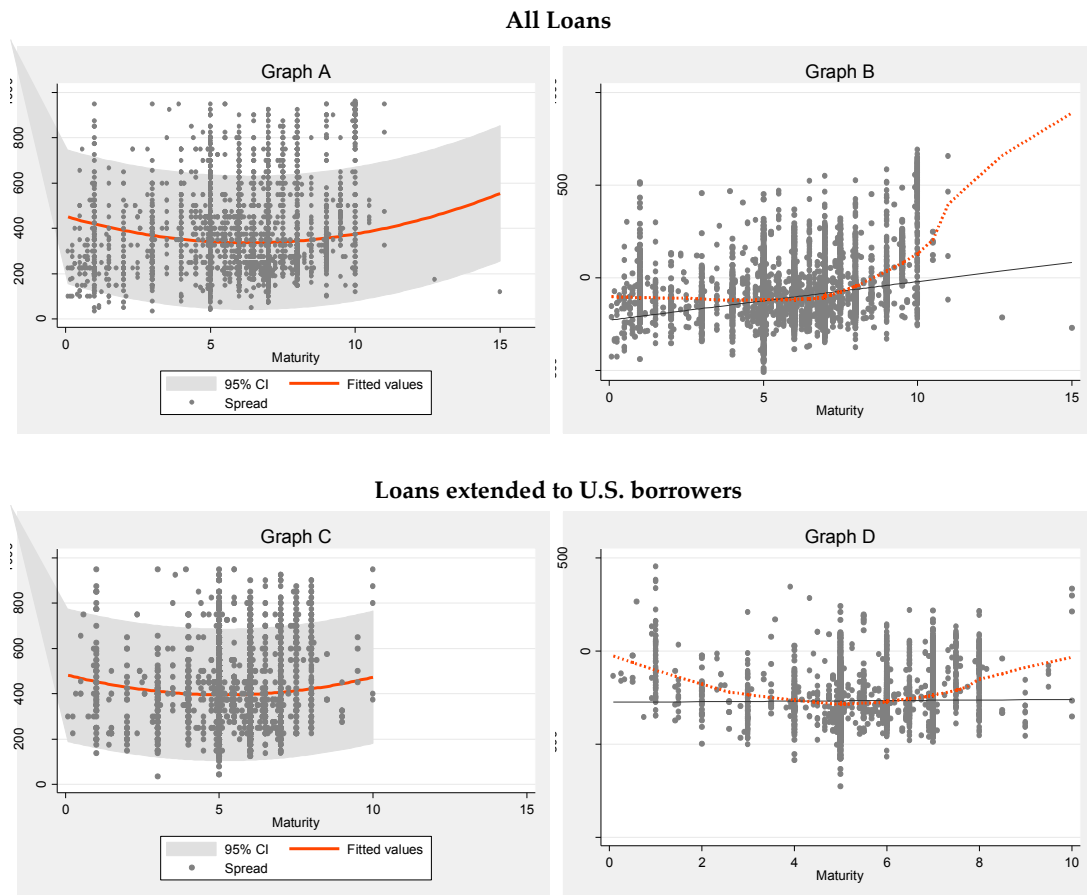
Note: Graphs A and B are based on models [3]. Graphs C and D are based on model [3c]. Graphs A and C plots credit spread against maturity, it plots the prediction from a quadratic regression and adds the confidence interval on the basis of the standard error of forecast. Graphs B and D presents the augmented component-plus-residual and depicts the partial relationship between credit spread and maturity, once all other micro and macro factors have been controlled for. The straight line corresponds to the regression model. The curved line reflects the fitting process based on non-parametric regression.