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Determinants of bankruptcies in leveraged buyouts

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Otto-Ville Virkkala

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Otto-Ville Virkkala
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School of Business

Aalto University, P.O. BOX 11000, 00076
AALTO
www.aalto.fi

Abstract of master's thesis

Author Otto-Ville Virkkala

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OBJECTIVES OF THE STUDY

In this thesis, I study the determinants of bankruptcies in leveraged buyouts. By constructing a large cross-sectional sample, my objective is to recognise factors that are associated with the probability that a leveraged buyout would go bankrupt. Factors of interest are deal source, financial strength, leverage, industry cyclicality, prevailing economic condition and credit market favourability and initial financial distress risk. Overall, the focus of this study is to explain determinants of failed LBOs rather than successful ones. Hence, the events of bankruptcy form the most prolific data points. All non-bankrupt buyouts, regardless of their eventual return-on-investment, are considered non-failed.

DATA AND METHODOLOGY

My sample consists of 22,796 leveraged buyouts conducted in the U.S., Canada and Europe from 1982 to 2013. The data is derived from Capital IQ database which quite well represents the actual population of leveraged buyouts for the period. I determine bankruptcies by using multiple sources and methods, and conclude that the sample's bankruptcy rate (6.1%) is in line with previous literature. I assess the determinants of the binary event of bankruptcy with probit regressions and apply Heckman sample-selection model to correct misspecification errors for the estimates considering scarcely available financial statement information. The analysis of initial financial distress risk, measured as Altman Z, is performed with ordinary least squares regression.

FINDINGS OF THE STUDY

The initial deal source significantly affects the outcome of the buyout. Buyouts of previously bankrupted, publicly listed and younger companies are associated with higher bankruptcy rates. Meanwhile secondary buyouts, privatizations and cross-border transactions are significantly less likely to go bankrupt. Also, management equity participation appears to reduce the risk of insolvency. Club deals on the other hand appear to have no significant effect on bankruptcies.

The results also indicate that financial strength is an important factor in explaining buyout bankruptcies. Portfolio firms' greater ability to convert EBITDA to free cash flow after capital expenditures, lower indebtedness, higher interest coverage and higher profitability are associated with lower bankruptcy rates.

Furthermore industry cyclicality, favourable economic conditions and flex credit market appear to be associated with higher probability of bankruptcy. Also, strength of creditor rights appears to have a very significant effect on the bankruptcy probability.

Keywords leveraged buyout, bankruptcy, bankruptcy likelihood, cyclicality, financial distress, private equity, leverage

Aalto-yliopisto
Kauppakorkeakoulu

Aalto-yliopisto, PL 11000, 00076
AALTO
www.aalto.fi

Pro Gradu tutkielman tiivistelmä

Tekijä Otto-Ville Virkkala		
Otsikko Määräävät tekijät velkarahoitteisten yrityskauppojen konkursseissa		
Tutkinto Kauppatieteiden maisteri		
Koulutusohjelma Rahoitus		
Ohjaaja(t) Professori Sami Torstila		
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TUTKIELMAN TAVOITTEET

Tutkin pro gradu-tutkielmassani määrääviä tekijöitä konkursseille velkarahoitteisissa yrityskaupoissa (”LBO”). Keräämällä laajan poikkileikkausaineiston, tavoitteenani on selvittää mitkä tekijät vaikuttavat konkurssin tapahtumiseen. Tutkielman kannalta kiinnostavia tekijöitä ovat kaupan alkuperä, taloudellinen vahvuus, toimialan syklisyys, kansantalouden tilanne, rahoitusmarkkinan myönteisyys ja transaktion lähtökohtainen riskitaso. Tutkielma keskittyy epäonnistuneisiin yrityskauppoihin ja kaikkia ei-konkurssiin tai yrityssaneeraukseen päätyneitä yhtiötä käsitellään kategorisesti ei-epäonnistuneina.

DATA JA METODOLOGIA

Otokseni koostuu 22,796 velkarahoitteisesta yrityskaupasta Yhdysvalloissa, Kanadassa sekä Euroopassa toteutetusta aikavälillä 1982-2013. Aineisto perustuu Capital IQ tietokantaan, joka edustaa suhteellisen hyvin koko LBO-populaatiota tältä ajalta. Määrittelen yrityskauppojen konkurssit useaa lähdettä ja metodia hyödyntäen. Otoksen konkurssiaste (6.1%) on linjassa aikaisemman tutkimuksen kanssa. Konkurssi on binäärinen selitettävä muuttuja, jota estimoin probit-regressiolla. Lisäksi sovellan Heckmanin otosvalinta-metodia niukasti saatavilla olevaa tilinpäätösinformaatiota analysoidessani. Yhtiön tuottavuudesta ja pääomarakenteesta johtavaa taloudellista riskiä mittaan Altman Z-luvulla, jota estimoin OLS-regressiolla.

TULOKSET

Yrityskaupan alkuperällä on merkittävä vaikutus LBO:n lopputulokseen. Alun perin konkurssista ostettujen, pörssilistattujen ja nuorten yhtiöiden LBO:t johtavat todennäköisimmin konkurssiin. Toisaalta pääomasijoittajilta ostetut yhtiöt, yksityistämiset ja kansainväliset LBO:t päätyvät konkurssiin merkittävästi epätodennäköisemmin. Konkurssiriski on myös pienempi, kun johto sijoittaa yhtiöön transaktion yhteydessä.

Tulokset indikoivat lisäksi taloudellisen vahvuuden vaikuttavan merkittävästi konkurssin todennäköisyyteen. Portfolioyhtiöiden kyky konvertoida käyttökate vapaaksi kassavirraksi investointien jälkeen, matalampi velkaisuus, korkeampi velanhoitokyky ja korkeampi tuottoisuus pienentävät kaikki konkurssin todennäköisyyttä.

Lisäksi yhtiön toimialan syklisyys, kansantalouden kasvu ja suotuisat rahoitusmarkkinat lisäävät konkurssiriskin todennäköisyyttä. Myös velkojien oikeuksien vahvuudella vaikuttaisi olevan merkittävä vaikutus konkurssin todennäköisyyteen.

Avainsanat: Yrityskauppa, LBO, konkurssi, velkarahoitus, velkavipu, syklisyys, pääomasijoittaminen

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1. Introduction

> "The biggest leveraged buyout ever has become one of the largest bankruptcies, as a Texas power company succumbed to a lousy bet on natural gas prices and more than $40 billion in debt. Energy Future Holdings Corp., the former TXU Corp., filed for Chapter 11 bankruptcy protection Tuesday to rework debt that became unsustainable amid hefty losses." – (Wall Street Journal, April 29th, 2014)

> "Critics predicted the largest private-equity deals would end up like the giant python in Florida, which exploded in 2005 after it hungrily devoured an alligator. During the 2006-07 bubble, buy-out firms hunted iconic companies at sky-high prices with oodles of borrowed money. Then the economy turned. Boston Consulting Group forecast in 2008 that the majority of companies owned by private equity would default on their debts." – (The Economist August 4th, 2012)

During the past three decades, private equity industry has cleared its way to become one of the most influential forms of investment management in the world. With the use of operational, governance and financial engineering, private equity firms have shaped their portfolio companies and consequently resourced them to reach their ambitious growth plans (Strömberg, 2008). In order to execute these actions, private equity firms use a method called a leveraged buyout (LBO) where a private equity firm (general partner) acquires a majority share of an established company typically for a five-year period using significant leverage and relatively little equity. However, LBOs also entail significant risks if projected cash flows fail to materialise. In these situations leverage and limited time horizon leave little room for turnaround actions, which may be vital to save the company from heading into bankruptcy.

The underlying motive of the private equity model is to create returns for investors (limited partners) who have invested capital in specially structured private equity funds. Leverage enables utilisation of tax-shields and may magnify returns of the investment. As LBOs are generally characterised by high leverage and bold value creation plans, the risk of a portfolio company falling into creditors' hands also increases significantly after the transaction (Tykvová & Borell, 2012). However, leverage alone cannot explain why some buyouts thrive while others fail. For example, portfolio firms' profitability, management capability, cyclicality of the business and macro-economic sentiment are also likely to play significant roles in the eventual outcome of the buyout. In this thesis I aim to provide further light into the issue by analysing differences between bankrupted and non-bankrupted LBOs. By bankruptcy, I refer to events where a company has filed for Chapter 11 or Chapter 13 (U.S.), entered into debt reorganisation or otherwise gone out of business. Hence, this study does not aim to answer eventual returns of LBOs but rather why they have ended up in bankruptcy.

The private equity industry is characterised by compensation structures based on high return expectations. Meanwhile, fierce competition among private equity firms put pressure to also provide these superior returns for their investors. Chung et al. (2012) report that the performance of a preceding private equity fund significantly affects general partners' ability to raise a follow-on fund. In a hunt for high returns, private equity firms are particularly effective in reaping the benefits from for example, leverage, tax shields, intra-firm inefficiencies, credit market conditions, economic cycles and distressed valuations (Axelson et al., 2012; Strömberg, 2008). However, as debt payback is based on uncertain future cash flows, LBOs are particularly vulnerable if projections fail to materialise. Hence, it would not be trivial to expect that also a significant part of LBOs also become distressed and end up in bankruptcy.

In my thesis, I construct a large cross-sectional dataset of North American and European LBOs conducted during 1982-2013, and aim to explain which factors are associated with the event that a LBO goes bankrupt. Factors of particular interest are deal source and type, financial strength, leverage, business cyclicality, prevailing economic climate and initial financial distress risk.

The issue is topical. While writing this thesis, Energy Future Holdings (a.k.a TXU), the largest buyout ever, applied for Chapter 11 bankruptcy in late April 2014. With the bankruptcy, $6.8 billion of investors' (among others KKR and Goldman Sachs) equity capital is most likely wiped away and $45.6 billion of debt restructured (Bravo & Jinks, 2014). The LBO, conducted in February 2007 was based on the expectation that prices for natural gas set by regulators would hike and provide competitive advantage for the company which heavily relied on coal to generate power. Instead, after the market turned, prices for natural gas unexpectedly collapsed and electricity usage tumbled. These events resulted in Chapter 11 being the only option for the company (Carey & Morris, 2012).

Today, buyout funds globally are sitting on a record amount of $1.19 trillion of dry powder, i.e. money committed to private equity funds but yet as uninvested (Johnson, 2014). This vast amount of unused capital suggests that competition for upcoming investment opportunities will intensify among private equity firms and this is likely to reflect in the form of higher transaction prices, lower returns and more investments on less attractive opportunities. Hence, identifying macro-economic, deal and firm-specific factors that are associated with higher failure likelihoods make a prolific and topical issue for both private equity practitioners and the academia.

1.1.Key findings from existing literature

The academic research covering the field of leveraged buyouts has been active. Popular topics range from value creation (e.g. Jensen, 1989; Acharya et al., 2008; Valkama et al., 2013), capital structures (e.g. Kaplan & Stein, 1993; Axelson et al., 2012) to critical assessment of compensation structures and employment effects (e.g. Rappaport, 1989; Rasmussen, 2008; Phalippou, 2009).

However, studies focusing on why LBOs fail are less represented. Among the earliest ones, Kaplan & Stein (1993) examine a sample of 124 LBOs of which 23 defaulted on their debt. The authors attribute the causes of defaults to leverage, poorly designed capital structures and buyout pricing rather than unexpected deteriorations in operational performance. Andrade & Kaplan (1998) analyse the cost of financial distress for 28 highly leveraged LBOs that filed for bankruptcy. They estimate that the cost of distress to 10 to 20 percent of firm value and that it comprises of a fixed component rather than e.g. leverage, capital structure complexity or industry performance. Of more recent studies, Strömberg (2008) examines general activity, exit behaviour and longevity of LBOs globally. On a sample of 21,397 LBOs during 1970-2007, he finds that 6% of transactions had exited through bankruptcy/restructuring procedures. Considering the amount of leverage in LBOs, the rate is relatively low. Axelson et al. (2012) find significant correlation between buyout debt and economy-wide credit conditions, which may indirectly influence the bankruptcy likelihood of LBOs. Tykvová & Borell (2012) consider a European sample of 1,842 buyouts during 2000-2008 and examine the distress risk of private equity backed buyout companies as a function of capital structure, profitability, economic climate and private equity investors' experience. They find that in years when cheap debt financing was available, the bankruptcy likelihoods were no different for LBO companies than for other companies. Also the authors find that buyouts conducted by experienced private equity investors showed lower bankruptcy likelihoods three years after the buyout compared to inexperienced investors.

Finally, Wilson & Wright (2013) study insolvency risk in U.K. buyouts and construct an extensive sample of over 9 million U.K. firm-year observations and 25,484 buyouts. The authors conduct an in-detail analysis of the impacts of operational ratios, capital structure and distress risk on the event of bankruptcy. The authors find that among the three main types of buyouts, Management buy-ins (MBIs) have the highest propensity to insolvency. The other two types, Management buyouts (MBOs) and private equity backed LBOs, carry higher insolvency

risk than the non-buyout population before the legislative change in 2002 in the U.K[1]. They authors find that the likelihood of failure for all firms is associated with higher leverage but is more specifically related to interest coverage (capacity to service debt). Also, controlling for financial performance and operational risk, private equity backed firms are more able to avoid insolvency when they exhibit signs of distress compared to other companies. Furthermore, private equity investors appear to choose firms that are initially more likely to generate healthy interest coverage ratios.

1.2.Contribution to existing literature

My thesis aims to contribute to the previous literature by extending the scope of previous studies and validating their key findings with more extensive and global data. This includes: i) analysis of the effect of deal source and type, ii) analysis the effect of industry cyclicality, iii) use of actual bankruptcy events instead of financial distress likelihood scores (e.g. Altman Z), iiii) validation of previous findings regarding the effect of financial ratios and macro-economic data by using new and modified variables. In order to observe variation of the effects during different time-periods, I split my analyses to multiple sub-periods. In Table 1, I summarise my thesis' positioning compared to closely-related previous studies. Next I will discuss these points in more detail.

Firstly, from a conceptual perspective, previous closely related papers focus on the riskiness of LBO companies compared to "normal" non-buyout companies. The findings also provide valuable insight for the economic discussion (e.g. Tykvová & Borell, 2012; Wilson & Wright, 2013). However, I approach the issue from a rather more practical point of view. My aim is to identify specific deal types that are more or less likely to fail while simultaneously analysing which sort of deals are generally performed with riskier capital structures.

With my findings, private equity practitioners and lenders may be more able to review their investment decisions, recognise potential pitfalls and align appropriate risk metrics as a basis of specific deal types, target companies and economic climate. Furthermore, my data consists of actual bankruptcy events compared to e.g. Tykvová & Borell (2012) who focus on

[1] Enterprise Act 2002 in the U.K. promotes a corporate rescue culture and increases the likelihood of continuation of a business as a going concern The act provides creditors more negotiation power and rights, which significantly reduced bankruptcy rates in the U.K.. (Wilson & Wright, 2013)

bankruptcy *likelihood* (i.e. Altman Z & Ohlson O). These authors note that the biggest caveat in their study is that they do not check whether the company has gone bankrupt or not.

Secondly, in the analysis of financial strength I test the validity of previous studies' findings and add new cash-flow based variables that are more often used in practice. In more detail, I include leverage, profitability and interest coverage ratios to examine their effects on bankruptcy. I test the validity of these factors in my data and find supporting evidence for previous literature that higher leverage (debt to total assets), lower profitability (return on assets) and lower interest coverage (EBIT to interest expenses) are associated with higher bankruptcy probabilities. In addition, I include cash-flow based measures for leverage (net debt to EBITDA), profitability (EBITDA margin) and a Cash conversion measure which are less used in previous studies. Moreover I extend the findings of Acharya et al. (2011) in the context of buyout bankruptcies. The authors report that less leverage is used in countries where the potential liquidation value is lower (i.e. higher creditor rights). I find that indeed, buyouts in countries with higher creditor rights are also significantly less likely to go bankrupt. Finally, as free cash flow is a key factor in terms of servicing debt, I add a novel factor "cash conversion" ([EBITDA-Capital expenditures]/EBITDA) to measure portfolio company's ability to convert its profits to free cash flow. My results indicate that higher cash conversion is associated with lower probability of bankruptcy. One unit increase in cash conversion % decreases the probability of bankruptcy by 3.6%. For the mean company in the sample, this means an increase from 62.2% to 79.6%.

Thirdly, in the analysis concerning the effects of different deal types, I include factors such as secondary LBO, corporate divestiture and bankruptcy sale. Alperovych et al. (2013) study the effects of these vendor source on LBO performance and find that efficiency improves in corporate divestitures while secondary buyouts (SBO) provide the lowest potential for improvement. I test how these factors behave in the context of buyout bankruptcies and find that despite large differences in efficiency improvement, both of these deal types are significantly less likely to go bankrupt. Also, I confirm the findings of Strömberg (2008) that buyouts conducted on bankrupted companies are more likely to go bankrupt again. Moreover, I test how the findings of Tykvová & Borell (2012) in this context. While the authors report that buyouts conducted by experienced investors have lower financial distress risks three years after the buyout compared to similar non-buyout companies, I report that, in effect, buyouts conducted by more experienced investors are more likely to go bankrupt. Also, in terms of management participation I find somewhat opposing evidence compared to study by Wilson & Wright (2013) who report that management buyouts (MBO) and management buy-ins have significantly higher failure rates in the U.K compared to

other buyouts. My results indicate that when management has participated in the buyout in the form of equity, the buyout is less likely to go bankrupt. However, the effect is small and not consistently significant across time periods. Moreover, I add novel deal types such as Going private and Cross-border transactions and find that both buyouts of previously public firms and foreign firms are less likely to go bankrupt.

Fourthly, in terms of macro-economic factors I study the effects of current economic state and credit markets. These factors are well covered in the studies of e.g. Tykvová & Borell (2012), Wilson & Wright (2013) and Axelson et al. (2012). However, the cyclicality of the target firm's underlying business is not covered in any of these studies. As LBO debt structures are often aggressively geared and rely on the projected cash flows to also materialize, unexpected swings in the economy should have a greater impact on performance of more cyclical companies. Hence, I add a novel cyclicality variable, which measures the correlation of the portfolio company's industry demand with local GDP. I find that, depending on the state of the economy, cyclicality has a significant effect on buyout bankruptcy.

Table 1 – Thesis' positioning compared to closely-related previous studies

Contribution	Kaplan & Stein (1993)	Andrade & Kaplan (1998)	Strömberg (2008)	Tykvová & Borell (2012)	Axelson et al. (2012)	Wilson & Wright (2013)	My thesis (2014)
Focus	Defaults in LBOs	Cost of distress in LBOs	Exit route and longevity of LBOs	Financial distress: LBOs vs non-buyouts	LBO leverage and credit availability	Insolvency and financial distress: LBOs vs non-buyouts	LBO bankruptcies: bankrupted vs non-bankrupted
Sample size	124 LBOs	24 LBOs	21,397 LBOs	1,842 LBOs	1,157 LBOs	25,484 LBOs	22,796 LBOs
Time period	1980-1989	1989-1992	1970-2007	2000-2008	1980-2008	1995-2010	1982-2013
Geographic reach	U.S.	U.S.	U.S, Can & Eur	Europe	U.S, Can & Eur	U.K.	U.S, Can & Eur
Main data source	Securities data corporation	SEC documents, Compustat	Capital IQ	Orbis	Capital IQ, LPC, Dealscan	U.K. company filing statutory	Capital IQ
Dependent variables	Buyout price, debt repayment, debt type, recaps	Leverage, interest coverage, profitability	Descriptive study	Financial distress (Altman Z, Ohlson O)	Leverage	Insolvency, financial distress	Bankruptcy, financial distress (Altman Z)
Explanatory variables							
Deal source/type	n.a.	n.a.	Public-to-private, bankruptcy sale, syndicated deal, carve-out	Syndicated deal, investor experience	Carveout, public-to-private, secondary buyout, privatisation, bankruptcy sale, fund size,	MBO/MBI/LBO, family company	Same as Strömberg + cross-border, man. participation, SBO, investor experience, privatisation
Cyclicality	Yes	n.a.	n.a.	n.a.	n.a.	n.a.	Yes
Financial ratios	Balance sheet and cash-flow based	Balance sheet and cash-flow based	n.a.	Balance sheet based	Balance sheet based	Balance sheet based	Cash-flow based, balance sheet based
Market factors	Market pricing	Credit market	Credit market	Credit market, GDP, credit tightening	Credit and stock market	Herfindahl-Hirschman	Creditor rights, credit market, economy

1.3.Key research questions

Overall, the focus of this study is to explain determinants of failed LBOs rather than successful ones. Hence, the events of bankruptcy form the most prolific data points. All non-bankrupt buyouts, regardless of their eventual return-on-investment (even if highly negative), are considered non-failed.

I approach the issue from three angles. Firstly, I examine the effects of deal type (such as vendor source and buyer experience) on the bankruptcy probability and initial financial distress risk of the buyout. Secondly, I analyse how specific target firm characteristics (such as cyclicality, capital structure and profitability) are associated with the probability of bankruptcy. Thirdly, I assess the influence of exogenous factors (such as the economic climate and credit market favourability), which are independent of the private equity firm and the portfolio company. The empirical tests are further divided into separate subgroups in order to assess the significance of variables across time-periods. This framework facilitates the following research questions:

I. *Do different deal sources and types affect the probability of a buyout going bankrupt?*

II. *Do private equity investor(s)' experience, share of knowledge and management participation impact the probability of a buyout going bankrupt?*

III. *What is the impact of a portfolio company's cyclicality, leverage and financial strength on the probability of it going bankrupt?*

IV. *Do favourable credit markets and positive macro-economic development increase the probability of a buyout going bankrupt?*

1.4.Main findings

The analysed dataset consists of 14,602 transactions conducted during 1994-2009. LBOs prior to year 1994 lack the necessary information for most control variables and hence transactions performed during 1982-1994 mainly serve only descriptive purposes. Transactions after 2009 are excluded from the analysis in order to allow most recent buyouts some time to go bankrupt.

The number of findings is high due to the large number of factors that influence the success or failure of buyouts.

Among key findings, I report that different deal sources and types significantly affect the outcome of the buyout. Among the riskiest transactions, regardless of their capital structures, buyouts that are acquired from bankruptcy proceedings are some 10% more likely to go bankrupt compared to buyouts generally. Moreover, if the portfolio company has been publicly listed before the LBO, the probability of bankruptcy is some 3% higher. On the safer front, secondary buyouts are 2% less likely to go bankrupt. This indicates that despite secondary buyouts' generally lower upside potential (Alperovych et al., 2013), these deals can also be considered to be of better quality and lower risk. Results suggest that SBOs are also generally performed with even riskier capital structures and hence they can be considered as more solid credit cases for lenders. Also, interestingly the results on cross-border transactions indicate 2% lower bankruptcy probability while intuitively one might expect higher risk from information asymmetry in these transactions. One reason may be that risks are more thoroughly analysed in cross-border transactions and hence show lower bankruptcy probabilities.

On the analysis covering the effects of the economic climate and cyclicality, the results provide consistent evidence that buyouts conducted during favourable economic conditions are more likely to go bankrupt. The favourability of credit market appears to be associated with higher leverage and hence higher probability of bankruptcy. Also, I report that the cyclicality of the underlying business is associated with higher bankruptcy probability for the sample period 1994-2009 despite LBOs having lower initial financial distress risk.

Finally, for the analysis including financial ratios, my results indicate that higher leverage significantly increases the probability of bankruptcy while higher interest coverage (calculated as EBIT/Interest expenses) decreases the probability. Moreover, companies that have higher cash conversion are less likely to go bankrupt. If portfolio firms can manage with lower capital expenditures, they are generally also more able to service their debt. Another interesting finding is that the strength of portfolio company country's creditor rights appears to significantly decrease the probability of bankruptcy. This is line with Acharya et al. (2011) who report that less leverage is used in countries where creditor rights are higher.

1.5.Limitations of the study

The main caveat of the study is that only buyouts that have filed for bankruptcy are considered as failed ones. In the event of distress, private equity firms often inject additional equity in order to save the company from bankruptcy. In case a portfolio firm still has a viable equity story, additional equity injection can save the firm from bankruptcy and shelter private equity firms from reputational losses and hampered lender-relationships. A case in point in the data can be found from perhaps the most famous LBO ever conducted, the $25 billion buyout of RJR Nabisco in 1988. Private equity firm Kohlberg, Kravis and Roberts (KKR) acquired the company with $1.5 billion of equity and financed the rest with debt including $6 billion of reset notes whose interest rate depended on the market value of those notes (Carey & Morris, 2012). By the spring of 1990 the rate of those notes had jumped from 13.71% to 25% resulting in a liquidity crisis and leaving KKR with only one option to stave off from filing to Chapter 11. KKR eventually invested additional $1.7 billion of equity to bail out the company and successfully exited during 1994. However, in my data this transaction is simply considered as "non-bankrupt" despite the fact that without additional equity the buyout would have ended up in bankruptcy.

Another limitation also relates to the classification of whether the buyout has ended up in bankruptcy or not. Capital IQ has a distinct bankruptcy database for U.S. transactions, which enables me to reliably assign bankruptcies for transactions that the database covers. Moreover, by matching M&A transactions labelled as "bankruptcy sale", I can safely determine bankruptcies for transactions which are acquired by another entity after the portfolio company has filed for bankruptcy. However, for the rest of the transactions I mainly rely on company status codes. Capital IQ and Orbis provide information for the company's current status; for example whether the company is operating, in bankruptcy or under restructuring proceedings. If the company is classified as bankrupt by the company status code, I can conclude bankruptcy by checking that the last owner of the company prior to bankruptcy also matches with the private equity firm that conducted the transaction. However, an issue arises if the company after bankruptcy reorganisation (Chapter 11 in the U.S.) is able to continue its operations under the same ownership and the bankruptcy is not reported in the Capital IQ bankruptcy database. In these special cases the data is likely to be flawed. Nevertheless, the bankruptcy rates of my data are in line with the paper of Strömberg (2008) who, also using Capital IQ data, conducts extensive manual web searches to determine the eventual fate of buyouts in his sample.

A third limitation is the availability of financial statement information for portfolio companies. Financials are needed for the analysis regarding the effect of capital structures and profitability. Due to the private nature of post-LBO portfolio companies, Capital IQ provides adequate financials for only 709 buyouts (5% of the population during the analysis period). In order to control this issue, I apply Heckman sample selection methodology, which adjusts the error terms in the regression to take into account the missing observations.

Finally, in some cases buyout bankruptcy can be intentional and value-adding for the private equity firm. For example, if the portfolio company's value is more valuable in parts rather than as a combined entity, distinct business units can be divested separately and the parent company ran down.

1.6.Structure of the thesis

The structure of the thesis is as follows. Chapter 2 provides a general overview of the private equity industry, how it has developed and basic concepts of the private equity model. For a reader unfamiliar with leveraged buyouts, understanding the concepts introduced in the chapter facilitates a broader understanding of the topic. Chapter 3 presents academic literature related to the economic role, value creation and financial distress in LBOs. In chapter 4, I discuss my hypotheses. Chapter 5 presents the data and descriptive statistics. Chapter 6 provides methodology and results of the analyses. Finally, in chapter 7, I conclude key findings of my analyses and suggest areas for future research.

2. Private equity and leveraged buyouts

In this section, I introduce the basic concepts of the private equity model and how it has evolved during the past three decades. The concept of private equity is rather distinct from the more "traditional" forms of financial economics, such as corporate finance or investment management. Hence, for a non-practitioner or non-academic, a thorough understanding of related literature and this thesis might require drilling into key definitions and structures of leveraged buyouts that are introduced in this chapter.

Firstly, I discuss the three very distinct boom and bust periods that the relatively young private equity industry has gone through. The impact of these periods are clearly observable in descriptive statistics presented in Chapter 5 and in the results of analyses in Chapter 6. Secondly, I describe the structure of the private equity model and key definitions.

2.1.Overview of the private equity market

2.1.1. Private equity model briefly

A leveraged buyout (LBO) can generally be described as a transaction where a target company is acquired by a specialised investment firm. The transaction is financed with a relatively small share of equity and a relatively large portion of debt financing. Typically in a LBO the private equity firm acquires a majority share of an existing firm. Another distinct form, closely related to private equity, is venture capital (VC) where the VC firm typically invests in young or emerging start-up companies with a minority share and little or no debt is used. (Kaplan & Strömberg, 2008)

A private equity firm, also referred to as General Partner (GP), raises equity capital through a private equity fund. These funds are "close-end" vehicles where investors, also referred to as Limited Partners (LP), commit capital for a fixed period to finance the fund's investments managed by the GP. The typical investment period for a private equity fund is ten years, where the GP spends first five years acquiring portfolio firms and the subsequent five years developing and eventually selling those firms for a profit. For its services the GP collects fixed and variable fees from the fund and portfolio companies. (Phalippou, 2009)

By their legal form, private equity funds are organized as limited partnerships where the GPs manage the fund and the LPs provide majority of the capital. The LPs typically include

institutional investors, such as corporate and public pension funds, endowments, banks and insurance companies and wealthy individuals. It is customary that the GP provides at least 1 percent of the total capital. (Kaplan & Strömberg, 2008)

2.1.2. Historical booms and busts of leveraged buyouts

Leveraged buyouts emerged as a significant phenomenon in the U.S. during 1980s. Since its inception, the private equity industry has experienced three distinguishable boom and bust cycles which have formed the industry to what it is today. In 1991, new leveraged buyout transactions amounted to $7.5 billion (Acharya et al., 2007) later peaking to a record $831 billion in 2007 (Pitchbook, 2014). In this thesis, I divide my analyses into separate time-period-wise subgroups in order to examine how the determinants of leveraged buyouts bankruptcies have varied over these rather different time periods.

The concept of a leveraged buyout became a well-known phenomenon in Wall Street in 1978, when a then-little-known investment firm Kohlberg Kravis & Roberts (KKR) acquired Houdaille Industries, a struggling industrial pumps maker with $380 million using only $12 million of its own money. The extraordinary small share of equity enabled KKR to reach stratospheric returns if the buyout succeeded while much of the downside risk was carried by lenders. Following the transaction, numerous new private equity firms emerged and opted to pursue magnified returns with similar LBO methods. Private equity firms succeeded in raising vast amounts of capital from institutional investors who were attracted by the superior returns LBOs could offer. The dramatic surge of leverage buyout activity was supported by the raise of junk bond financing. This resulted in the private equity industry's first boom cycle, enduring from 1982 to an eventual bust in 1993 when the junk bond market shut down. The boom culminated in 1988 to the $25 billion buyout of RJR Nabisco. (Carey & Morris, 2012)

Jensen (1989) predicted that the LBO organisational form would eventually become the dominant corporate organizational structure. He praises private equity firms' inner ability to combine concentrated ownership companies, align high-powered incentives for their investment professionals, and structure lean and efficient organisations with minimal overhead costs. The private equity firm aligns portfolio company management's incentives with performance-based compensation, applies highly leveraged capital structures and introduces active governance. Jensen argues that these structures are superior compared to public companies with dispersed ownership, low leverage and weak corporate governance. Generally

private equity firms' primary objective is to develop the company in a friendly collaboration with the target company's management. However, less complimentary terms such as "corporate raiders" and "hostile takeovers" were commonly used to describe the buyout practitioners (Kaplan & Strömberg, 2008).

The first buyout boom period was, for the most part, U.S., Canadian and U.K., phenomenon. From 1985-89, transactions conducted in these three countries accounted for 89% of global buyouts and 93% of global transaction value. The nature of LBOs was dominated by the relatively large public-to-private transactions in mature industries, such as manufacturing and retail. These transactions comprised close to 50% of the value of all LBOs. This contributed to the general perception that LBOs equal going-private transactions of large firms in mature industries. However, in 1990 the shutdown of the junk bond market, which had multiplied debt-levels in LBOs, signalled an end for the first LBO boom. As a result, large number of leveraged buyouts defaulted on their debt payments and filed for bankruptcy. Eventually, the buyouts of public companies practically disappeared in the early 1990s. (Kaplan & Strömberg, 2008)

Kaplan & Stein (1993) analyse the collapse of the LBO market and suggest that the crash was mainly due to five distinct reasons. Firstly, the ample availability of debt caused the transaction prices to inflate substantially. Secondly, debt levels swell abruptly comprising of as much as more than 90% of total capital. Thirdly, banks began to tighten terms on principal repayments, which deteriorated firms' ability to service their immense load of debt. Fourthly, junk bonds replaced more flexible private subordinated debt and bank debt while the use of strip-financing techniques declined[2]. Finally, as much of the junk bond-type debt was sold to private investors, distressed firms' ability to negotiate debt repayments deteriorated greatly.

However, already in 1992 LBOs began to re-emerge. While the public-to-private buyouts practically disappeared, private equity firms nevertheless continued to purchase private companies and divisions of them. Buyouts of private companies spread to new industries such as ICT, financial services and healthcare, while manufacturing and retail firms no longer resembled the most dominant buyout targets. Even though the aggregate transaction value fell, the amount of deals undertaken doubled in 1990–94 compared to 1985–89. The second buyout

[2] Junk bonds have a non-investment grade status, often including payment-in-kind (PIK) provisions. Strip financing is the repackaging of different types of obligations into one security. In a situation where an acquisition is financed with strip-financing and the company begins to default on loans, investors are more willing to renegotiate lending terms, thus avoiding the hold-up problem often seen in prior to and during bankruptcy. See for example (Kaplan & Stein, 1993)

boom ultimately culminated in the Dot-com bubble in 1999 and 2000, and along with its burst, the LBO market again crashed. (Kaplan & Strömberg, 2008)

In mid-2000s, credit markets were overflowing with liquidity and hedge funds emerged as important financiers for leveraged buyouts. As a result, the third and biggest, leveraged buyout boom period was set to begin. Public-to-private transactions started to reappear; record amounts of capital were committed to private equity, both in nominal terms and as a fraction of the overall stock market (Kaplan & Strömberg, 2008). In February 2007, the credit market facilitated KKR, Goldman Sachs and other investors to acquire Energy Future Holdings for $45 billion, making it the largest buyout in history. However, the boom finally ended in the collapse of the sub-prime market in June of 2007, which had fuelled an unprecedented supply of leverage throughout the whole global financial system (Acharya et al., 2007). Despite the risks that high leverage impose, Wilson et al. (2012) find that before and during the global recession, private equity backed buyouts achieved not only superior economic and financial performance compared to similar non-portfolio firms, but also positive employment growth.

Today, private equity has become a global phenomenon having spread to all corners of Europe, Asia, Australia and other parts of the world. In 2013, the total transaction value of private equity-backed LBOs amounted to $700 billion (Pitchbook, 2014), however still lower than the peak in 2007.

According to Bain & Company (2014), in 2013 the circumstances for LBOs were more lucrative than ever. The market was characterised by a record year of fundraising since the global financial crisis, $356 billion of new fund capital earmarked for buyouts (near all-time high), near zero interest rates, yield-hungry investors and banks eager to lend. However, as the industry is sitting on record amounts of uninvested capital, the competition for attractive investment opportunities will intensify while higher transaction prices eat up a significant share of profits. This might encourage struggling private equity firms to make aggressive bets. As a result, an increasing number of buyouts could also end up in bankruptcy in the coming years.

2.2.Private equity model

In this section, I introduce the basic concepts and definitions of the private equity model. For a reader non-familiar with private equity and leveraged buyouts, this section provides basic knowledge in order to achieve a deeper understanding of the analyses in latter sections.

2.2.1. Private equity investment mix

Private equity firms can invest through a mix of investment strategies depending on the firm's size, state, strategy, industry and transaction expertise. Of these, this paper focuses on private equity-backed leveraged buyouts.

Leveraged buyout (LBO) refers to an acquisition of an operating company financed with a significant amount of borrowed funds. Value is created by realising opportunities and improving efficiencies with the use of debt as financial leverage. *Venture capital (VC)* considers typically smallish investments in companies that are early stage of development and cash flow negative. *Growth capital* typically considers minority share investments in equity and/or debt instruments as these companies are growing and require increasing amounts of working capital, capital expenditures or add-on acquisitions. *Mezzanine financing* relates to investments in the form of subordinated debt or preferred equity. By nature, mezzanine falls between equity and senior debt on the balance sheet. *Distressed buyout* considers investments in equity or debt securities of financially distressed companies with the aims of corporate restructuring or turnaround business. Investors in this field are often referred to as "vulture investors" (Cumming, 2009)

2.2.2. Buyout transaction types

LBOs can be further divided into separate sub-groups. These are distinct by the nature of the acquiring party.

An institutional buyout (IBO) refers to a leveraged buyout conducted by an institutional investor, such as a private equity firm or a venture capital firm. Typically the IBO investor aims to sell its stake in the company within a certain time period. In a typical LBO, the private equity firm involved in the IBO will take charge in structuring and exiting the deal as well as hiring managers. *A management buyout (MBO)* refers to a transaction where a company's existing managers acquire a majority or the complete shares outstanding of the company from the parent company or private owners. *A management buy-in (MBI)* is a transaction where an outside management raises the necessary financing, acquires the company and becomes the company's new management. Management buy-ins typically take place when outside investors believe the firm's products could generate greater profits through a change in strategy or optimised capital structure. *A secondary buyout (SBO)* is a form of LBO where the both vendor and acquiring company are financial sponsors or private equity firms. SBO investors often seek returns from

when the selling firm has already realised significant gains or is forced to sell the company due to distress, and the second private equity firm can have greater benefits to the firm being bought and sold. (Metrick & Yasuda, 2011)

2.2.3. Key stakeholders

A private equity firm, also referred to as General Partner (GP), is an investment management company that makes investments into portfolio companies on the behalf of the private equity fund where it has raised capital from outside investors. Investments are by nature private and illiquid, and are conducted through various investment strategies, including leveraged buyouts, venture capital and growth capital (Metrick & Yasuda, 2011). The key differences between private equity firms and other investment fund managers, such as mutual funds and hedge funds, is that private equity funds acquire a majority share and actively influence actions of the management of the portfolio companies. The most prominent private equity firms are Blackstone, Carlyle and Kohlberg Kravis Robers & Co (KKR). Jensen (1989) describes private equity firms as lean, decentralized organizations with relatively few investment professionals and employees.

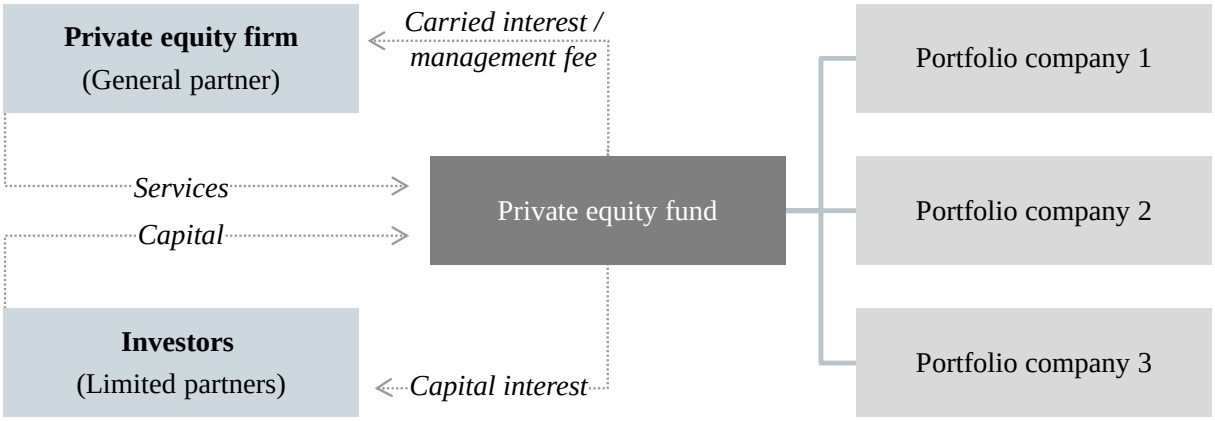
Private equity investors, also referred to as limited partners (LP), make investments into the private equity fund. Limited partners are generally large institutions such as pension funds, sovereign wealth funds, endowments, banks, insurance companies or wealthy individuals.

Private equity funds are funds whose strategy is to predominantly acquire majority stakes in established companies. They are typically structured as limited partnerships, where the LPs provide most of the capital while the GP manages the actual investments. In contrast to mutual funds, private equity funds are mostly "closed-end" funds, meaning that after having committed capital, the limited partners cannot cash out their investment before the fund closes (Kaplan & Strömberg, 2008). Figure 1 illustrates a typical private equity fund structure. Successful private equity firms stay in business by raising a new fund every three to five years (Metrick & Yasuda, 2010).

Private equity firms often arrange syndicates among multiple buyout firms to bid for a particular company. Partners in these so-called "*club deals*" co-invest in the firm and share a joint payoff. Potential benefits arise from the share of expertise, diversification of risk and improved access to debt financing. (Officer et al., 2010)

Figure 1 – Typical private equity fund structure

This figure depicts a typical private equity fund structure. Private equity firm raises capital from investors into a specially structured *private equity fund* and uses this capital accompanied with debt financing to acquire portfolio companies. In return for their services, private equity firm is often compensated in the form of performance-based *carried interest* and fixed *management fee*. Limited partners receive return for their investments as *capital interest* from the private equity fund when the investments are exited.



2.2.4. Fund lifespan and transaction process

The typical private equity fund has a fixed life, usually ten years, but can be extended into additional years. The GP generally devotes one year for fundraising. After the fund inception, the first five years form an *investment period*, where the GP invests the capital committed into portfolio companies. Finally the rest of the fund's lifetime is dedicated to return the capital to investors. The fund agreement imposes restrictions and covenants on the investment strategy. Typical covenants limit the amount of capital invested in a single company, types of securities and maximum debt at the fund level (Kaplan & Strömberg, 2008).

The private equity firm can raise the capital on a deal-by-deal basis (ex post financing), all at once to finance a number of future projects (ex ante financing) or as a combination of these. Ex ante financing fund structure has the benefits of aligning the compensation of the GP to the collective performance of the fund and limits the GP's incentive from investing in bad deals. For these reasons the ex ante fund structure dominates deal-by-deal capital raising. (Axelson et al., 2009)

Figure 2 depicts a typical lifespan of a private equity fund. Once capital commitments from LPs have been collected the GP can begin to make investments. When a suitable target company is identified, the GP sends an offer to the company's owners. The offer can typically be made

under an exclusivity agreement[3], as a syndicated club deal among multiple private equity funds or through an auction. Private equity firms often require contractual provisions, such as board seats, veto rights and other contingent control rights, which enable controlling the management of the company. (Cumming, 2009; Metrick & Yasuda, 2011; Kaplan & Strömberg, 2008)

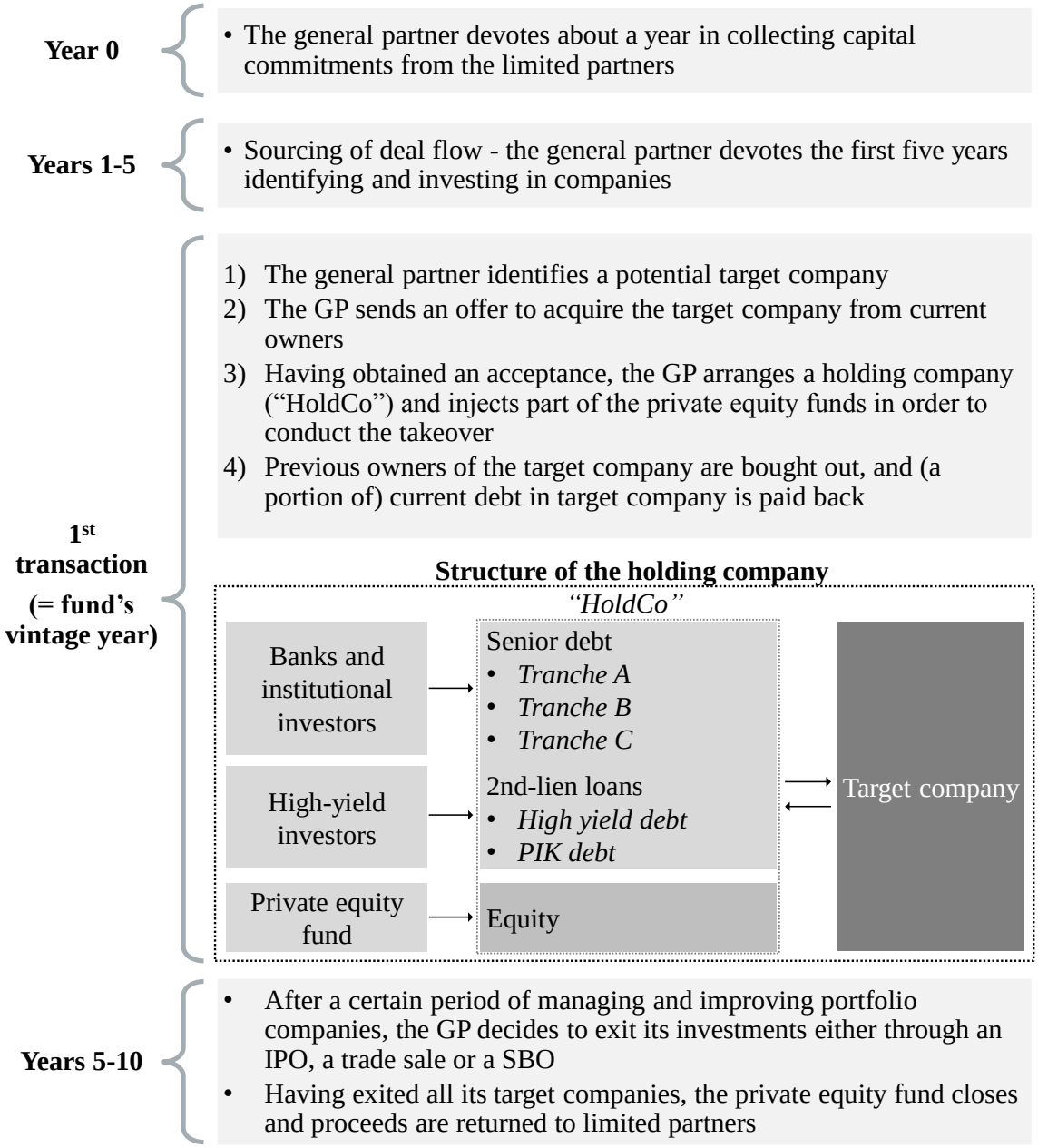
If the offer is accepted, the GP makes a *capital call* or *drawdown* and the LPs have to deliver their pledged share of capital to finance the investment. The investors' equity capital and debt arranged for the particular transaction to finance the acquisition are placed in a newly established holding company. From here, the fund pays off previous owners and commits payments to the company's creditors. In large transactions, a series of holding companies might be placed on top of each other, partly for tax timing reasons and partly because this enables differential treatment among different creditors. In order to service the holding company's debt, the portfolio company might be under significant pressure to generate sufficient profits to enable debt service payments. An alternative, though not preferable, solution could be to call in further capital from the fund's investors. (Cumming, 2009), (Metrick & Yasuda, 2011), (Kaplan & Strömberg, 2008)

The year when the private equity fund makes its first investment is referred to as the *vintage year*. Investors often compare funds of the same vintage, since the broader market has an effect on a fund's performance (Kelly, 2012).

[3] Exclusivity provision grants the private equity provider an exclusivity period during which the seller or management agree not to negotiate with anybody else in relation to the transaction.

Figure 2 – Typical private equity fund lifespan

This figure depicts a typical private equity fund lifespan and structure of the holding company through which the private equity fund makes investments.



2.2.5. Deal financing

A LBO is typically financed with 60 to 90 percent of debt. The debt often includes a portion of senior and secured debt arranged by banks, in addition to a portion of junior, unsecured debt either in the form of high-yield bond or mezzanine debt[4]. For the remaining part of the purchase

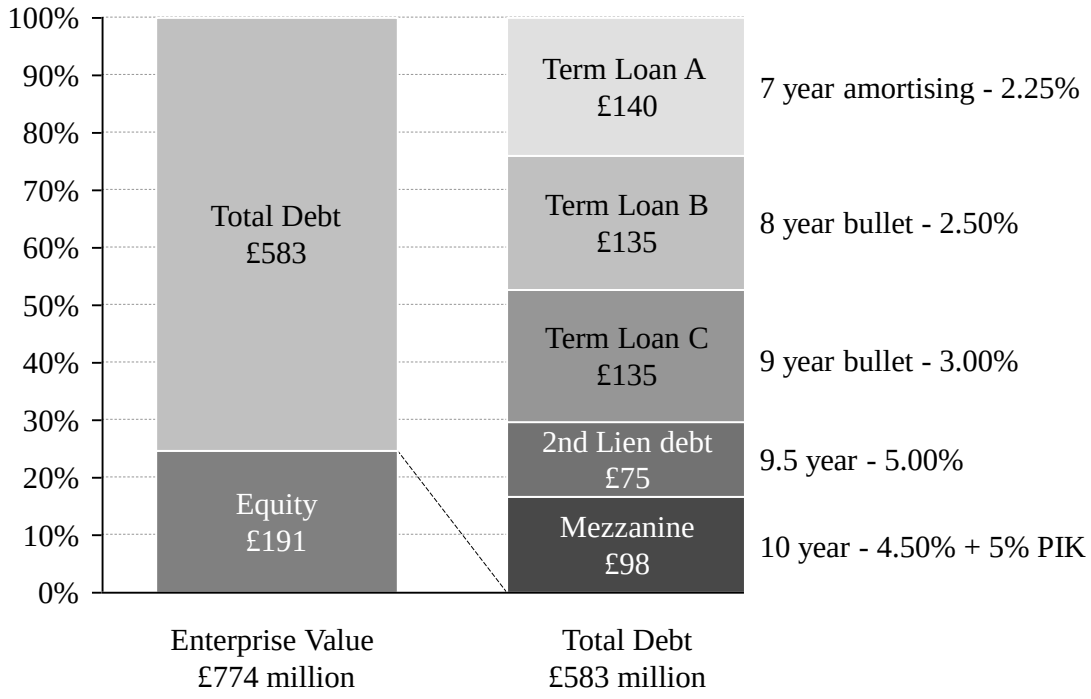
[4] Mezzanine debt is subordinated to senior debt and provides financial flexibility by having embedded equity instruments, which increase the value of debt.

price, the GP invests capital from the private equity fund. Typically, also the post-buyout management team is invited to inject capital into the investment. (Kaplan & Strömberg, 2008)

Axelson et al. (2012) study the financial structures of LBOs during 1980 to 2008 and find that senior debt constitutes on average 69% of capital. The total debt is further divided into 72.5% senior bank debt (including term and bridge loans), 12.4% subordinated debt (e.g. vendor note or mezzanine) and 11.6% bonds. The average leverage (Debt to EBITDA[5]) is 5.6x while an average Enterprise value to EBITDA-multiple paid for transactions is 8.2x. Figure 3, presents an example of a typical LBO financial structure.

Figure 3 - Typical private equity buyout

The figure depicts a typical private equity buyout structure using an example of the August 2005 secondary buyout of Kwik-Fit. The total transaction value equals £774 million, of which £582.5 (75%) is financed with debt. The total debt is, in the order of seniority, divided into senior debt (term loans A-C), 2nd lien junior debt and mezzanine financing. The maturities and interest rates (spread over LIBOR) are presented on the right hand side. PIK stands for "payments-in-kind". Adapted from (Axelson et al., 2012).



2.2.6. Performance metrics

Private equity fund returns are commonly reported on a portfolio level as Internal Rate of Returns (IRR) and Total Value to Paid-in Capital (TVPI). Given nature of private equity funds'

[5] EBITDA stands for Earnings Before Interest Taxes Depreciations and Amortisations. It reflects the company's cash flow and is often used as it is independent from variations in capital structures.

lifecycle, it not feasible to measure performance with annualised returns, but rather use measurement on a since-inception basis (SI-IRR). IRR takes into account the timing of cash flows and is relatively straightforward to interpret. Other performance metrics include a combination of multiples, such as, Distributed to Paid-in Capital (DPI), Residual Value to Paid-In Capital (RVPI) and Paid-in to Committed Capital (PIC). (Cumming, 2009)

Kaplan & Schoar (2005), using data from Venture Economics, report an average IRR of 19% for buyout funds and 17% for venture capital funds. Chung et al. (2012), using data from Preqin, report similar results; a mean IRR is 16.5% for buyout funds and 14.1% for venture capital funds. Kaplan & Schoar (2005) find strong evidence that performance by a private equity firm in one fund predicts performance by the firm's subsequent funds. Furthermore Chung et al. (2012) find that the performance of the preceding fund is positively correlated with the probability of the private equity firm raising a subsequent fund.

2.2.7. Compensation structure

The private equity firms are compensated through a fixed revenue component *management fee,* and a variable performance-dependent revenue component *carried interest*. In addition to these, private equity firms may charge *transa*ction and *monitoring fees.* In general, the private equity fee structure is particularly lucrative for GPs since a bulk of the revenue is paid regardless of the performance. Thus, the fixed revenue component allows the general partners to collect millions as fees even with negative yield from the investments. Metrick & Yasuda (2010) find that approximately two-thirds of the total revenues come in the form of fixed-revenue and about one-third as variable-revenue.

The terms of the fee structures vary considerably between different fund agreements and require some further scrutiny. Over the fund's lifetime, some of the *committed capital,* which LPs have injected into the fund, is used to pay the management fees and the remainder to make investments. The committed capital comprises of *lifetime fees* and *invested capital*, which is the portion of committed capital invested into portfolio companies. *Net investment capital* refers to investment capital less the cost basis of any exited investments. (Metrick & Yasuda, 2011)

Historically, the most common method to assess management fees is to pay a constant percentage of committed capital. Over the recent years funds have adopted a decreasing fee structure where for example the fee percentage decreases 25 basis points per year after fund's first five-year investment period. The fee structure can also use a constant rate which changes

the basis from committed capital to the net investment capital after the five year investment period. Finally, another common alternative the fee schedule applies both a decreasing fee percentage and a change from committed capital to net investment capital after the investment period. (Metrick & Yasuda, 2011)

GPs can also earn variable, performance-based, revenue in the form of carried interest. The carried interest is based on four different components: *carry level*, *carry basis*, *carry hurdle* and *carry timing*. The carry level defines the percentage of profits (often 20%) that is claimed by the GP. Carry basis defines the basis of capital (e.g. committed/invested) on which the profits are measured. Carry hurdle refers to the limit of return which the GP must provide to LPs before it is entitled to collect any carried interest. Carry timing governs the timing of carried interest distributions. (Metrick & Yasuda, 2011)

Metrick & Yasuda (2010) study the economics of 144 private equity buyout funds and provide insight into common fee structures charged by private equity firms. The most common initial management fee level is 2% of committed capital. 84% of buyout funds switch to the basis to invested capital and 45% lower their fee level after the investment period. 39% of funds apply both of these concessions. Based on these, the median level of lifetime fees for buyout funds equals 12% of committed capital. Moreover, with respect to variable performance-dependent fees, all buyout funds use 20% as their carry level, 83% use committed capital as a carry basis, 93% use a hurdle rate of which three-quarters of funds set the hurdle rate equal to 8%. Majority of funds also include a *carry catch-up* clause where the GP is entitled to receive all the returns after the 8% hurdle rate until the GP's compensation equals 20% share of the fund's returns. Additional return is divided by the GP and LPs at a 20/80 ratio.

Finally, GPs may charge *transaction and monitoring fees*. Whenever portfolio companies are acquired or sold, the GP charges transaction fees, by nature similar to M&A advisory fees, directly to the portfolio company. Approximately 85% of buyout fund agreements require that GPs share some portion of the transaction fees with LPs. Furthermore, monitoring fees may be charged to compensate funds for time and effort spent in working with their portfolio companies. Usually these fees are also shared, with LPs receiving 80% and GPs 20%. (Metrick & Yasuda, 2010)

Phalippou (2009) criticises the fee structure of private equity funds. He claims that the use of IRR to measure returns creates an incentive for GPs to shorten the holding period of the

investment in order to increase their incentive fees. Secondly, some fund agreements include a provision of capital reinvestment for investments shorter than 18 months, which again would incentivise the GPs to pursue shorter investment horizons. Thirdly, the transaction fees may make the GPs prefer larger deals. Finally, as funds report only the IRR instead of effective rate of return, the GPs are motivated to distribute large dividends to the fund early in the investment horizon.

2.2.8. Exit channels

Due to the limited lifetime of buyout funds, investments have to be realised within the investment horizon. While corporations are also active in buyout markets, their investment criteria differs greatly from private equity investors, due to corporations' greater emphasis on synergies and eternal investment horizon. Exits can be organised through a trade sale to a larger corporation, sale of the portfolio company to a subsequent private equity investor or through sale to the public markets as an initial public offering (IPO).

Strömberg (2008) reports that the most common exit route for private equity and MBO deals is a trade sale to another corporation, which accounts 38% of all exits. The second most common exit route is a secondary buyout (24%). IPOs account for 13% of exits and their importance as an exit route appears to have decreased over time. Bankruptcies form 6% of exits.

3. Related literature

In this chapter, I discuss the academic literature related to economic role, value creation and financial distress and bankruptcy laws regarding LBOs. Firstly, I discuss the economic role of private equity. Secondly, I describe the sources of value creation in the private equity model as means of operational, financial and governance engineering. Thirdly, I discuss the determinants of financial distress in LBOs. Fourthly, I introduce the foundation of creditor rights and discuss the economic impact of different bankruptcy laws. These form the theoretical background and framework for the empirical section in this thesis.

3.1.Economic discussion of private equity

The rapid growth of private equity and leveraged buyouts has yielded many success stories, such as Hertz buyout in 2005[6], but the industry has also attracted considerable attention among policymakers, the media and unions. The concerns arise particularly from the view that leveraged buyouts are characterised by conflicts of interest, profit-seeking activity, short-term horizons, reductions in employment, and increased risk of insolvency especially in an economic downturn (Wilson et al., 2012; Union, 2007). The academic discussion on the economic effects of LBO ownership is generally divided into two opposing strains.

Jensen (1989), one of the most cited supporters of private equity, argues that "*The publicly held corporation has outlived its usefulness in many sectors of the economy. [...]Active investors are creating a new model of general management. These investors include LBO partnerships such as Kohlberg Kravis Roberts and Clayton & Dubilier*". Jensen views that LBO firms' organisational structure represents a long-term superior governance structure, where efficient monitoring and managerial discipline are applied through a combination of ownership concentration and considerable leverage. Cuny & Talmor (2007) add to Jensen's view suggesting that in corporate turnarounds, private equity can emerge as an optimal solution, even when current ownership could conceivably implement the same operational changes as private equity. They argue that if a corporate turnaround strategy is implemented by the current management, the possibility of replacing an incompetent management is forgone. Also, if a turnaround strategy is led by the board, the incompetence of the current management may be

[6] Clayton, Dubilier & Rice, The Carlyle Group and Merrill Lynch Global Private Equity acquired Hertz from Ford in 2005 through a leveraged buyout. By streamlining how the Hertz cleaned and refueled vehicles, they doubled the number of cars that could be processed every hour and re-rented. Hertz was able to do so without huge reductions in the work force: it cut less than 5 percent of 32,000 jobs.(Sorkin, 2007)

acknowledged, but the turnaround may fail due to personal frictions between the management and board.

Critics of private equity argue that private equity investors' compensation structures encourage a short-term profit-seeking agenda that is destructive to the economy. Former prime minister of Denmark, Poul Nyrup Rasmussen (2008) claims: "*The big private equity funds have proven to be a menace to healthy companies, to workers' rights, and to the European Union's Lisbon Agenda […] These LBOs leave the company saddled with debt and interest payments, its workers are laid off, and its assets are sold. A once profitable and healthy company is milked for short-term profits, benefiting neither workers nor the real economy"*. In general, concerns raised in political debates are often concentrated around the implications about stability of the financial system when large LBO credits fail. Moreover, among the academics, Rappaport (1989) acknowledges many of Jensen's criticism of public firms' inefficient practices, but argues that the LBO structure is not the optimal replacement. He views LBOs as a short-term "shock therapy", where inefficient and badly-performing firms with sub-standard corporate governance structures are entered into an intense period of corporate and governance restructuring. These firms, he argues, are then returned to public ownership after a few years. Moreover, Shleifer & Summers (1988) suggest that buyouts transfer wealth to investors through lay-offs and wage reductions. Tykvová & Borell (2012) suggest that private equity investors may also transfer value from the financial system, as increases in bankruptcy rates may negatively affect financial institutions' willingness and ability to provide transaction financing.

As the private equity industry has matured from the 1980's, the primary motivations have shifted from merely solving governance problems in public companies. Strömberg (2008) claims that in order to assess the economic role of private equity it is important to understand how long firms stay under LBO ownership. Kaplan (1991) studied LBOs in the 1980s and found that LBOs are "neither short-lived nor permanent", having a median time of 6.8 years under private equity ownership. Supporting the argument of LBOs long-term organisational form, Strömberg (2008) finds that almost 40% of all LBOs remain in the LBO organisational form 10 years after the original leveraged buyout was announced. Furthermore, only 42% of the private equity funds' investments are exited within 5 years of the initial transaction.

In addition, Kaplan & Strömberg (2008) argue that private equity backed firms are in fact better to withstand economic downturns, due to the private equity firms' focus on firms in stable sectors with strong cash flow and potential for performance and productivity improvements.

Furthermore, Wilson et al. (2012) claim that private equity investors' close monitoring and timely intervention in the event of financial problems implies better performance maintenance of the portfolio companies compared to similar non-buyout companies.

Strömberg (2008) finds that the growth of private equity has not been at the expense of public stock markets. Over the 1970-2002 period, the fraction of going-private LBO transactions amounted to 6%, compared to the greater 11% fraction of going-public firms. Thus, the flow from private-to-public equity markets is net positive over the long run. He suggests that private equity in fact promotes stock markets, in countries with developed financial markets, since LBOs in these countries are particularly likely to exit through an IPO. These findings would imply that the LBO organisational form is becoming more permanent.

Finally, LBOs are criticised to benefit private equity investors at the expense of employees and society (Union, 2007). From the private equity practitioner's point of view, reductions in the number of employees and wage levels would undeniably be rational with aims of improving productivity. However, the critics argue that firm-level gains are offset by overall economic losses through job destruction. However, Kaplan (1989b), Lichtenberg & Siegel (1990) and Davis et al. (2011) find evidence that instead of concerns of job destruction, employment grows in LBO firms, but at a slower rate compared to similar "normal" firms. In more detail, in the U.S., existing jobs are cut primarily in the service sector rather than in manufacturing. Outside of the U.S. Amess et al. (2008) finds that private equity backed LBOs in the U.K. had no significant impact on wages or employment while non-private equity backed LBOs have the largest negative impact on employment. Furthermore, Jääskeläinen (2011) studies Nordic private equity backed buyouts and finds no significant differences in wage or employment development after the buyout. These findings suggest that, despite certain sporadic examples, private equity portfolio companies in general create value through improved productivity.

The discussion is ongoing and, so far, it appears that the supporters of private equity have had the upper edge. However, as noted earlier, private equity funds are today sitting on record amounts of uninvested capital and the competition is increasing. This has resulted in a situation where attractive investment opportunities are more competed and have higher price tags. This is also likely to result in more investments made in less attractive opportunities that have higher likelihoods of failing. The discussion about LBO bankruptcies has already activated and been fuelled by e.g. the bankruptcy of TXU, the largest buyout ever conducted (see introduction). Judging from this, one could easily draw a conclusion that the LBO market has, in economics

terms, eventually turned into an efficient market and that the historical abnormally high returns could soon be replaced with abnormally high bankruptcy rates. However, in order to make any justified conclusions it is essential to understand which factors actually drive LBO bankruptcies. In section 3.3 I return to this topic and discuss the findings from existing literature.

3.2.Value creation in leveraged buyouts

The academic literature is not unanimous about private equity model's sources of value creation. The arguments vary whether LBO returns derive from value creation or value transfer.

Among academics, most agree that private equity investors create value by improving productivity and profitability of their portfolio companies. This is achieved through reducing agency costs with the use of debt bonding, aligning management incentives with equity ownership and active monitoring of the portfolio company (e.g. Davis et al., 2011; Harris et al., 2005; Jensen, 1989; Kaplan, 1989a; Lichtenberg & Siegel, 1990). In contrast, value creation is also argued to derive from wealth transfers from the target company's employees and/or previous owners to the LBO investors (Kaplan, 1989a; Wright et al., 2009).

Kaplan & Strömberg (2008) describe that while in the late 1980s *financial* and *governance engineering* were common methods of value creation in LBOs, today's most large private equity firms have added another type called *operational engineering* where industry and operating expertise is applied to add value to investments. Next, I discuss these issues in more detail by dividing the source of value creation into *operational engineering*, *financial engineering* and *governance engineering*.

3.2.1. Operational engineering

As leveraged buyouts emerged as an important phenomenon in the 1980s, Jensen (1989) predicted that the leveraged buyout organizations would eventually become the dominant corporate organizational form. The private equity firm would align management's incentives with performance-based compensation, apply highly leveraged capital structures, and introduce active governance in its portfolio companies. Today majority of prominent private equity firms' funds are organised around industries. A typical operational engineering value creation pan comprises of cost reductions, productivity improvements, revisions to strategy, add-on acquisitions, and management changes (Kaplan & Strömberg, 2008).

In addition to hiring merely dealmakers with a suitable skillset for financial engineering, the firms now hire also professionals with operating and industrial backgrounds. The private equity firms apply their industry and operating knowledge to identify attractive investments, and subsequently develop and implement value creation plans for these investments (Kaplan & Strömberg, 2008). Acharya et al. (2008) find that in organic deals which focus exclusively on internal value creation programs, GPs with an operational background outperform general partners with background in finance.

Wright et al. (1998) report on a U.K. data that productivity improves significantly over the years 3-5 after the buyout, compared to non-buyout firms (measured as the Return on Total assets and Profit to Employee). Focusing on U.K. manufacturing firms Amess (2003) show that LBO-firms have superior operational performance up to four years after the transaction and two years prior the transaction. One explanation for the prior transaction performance is that vendors might prepare the sale of the company or that transaction is preliminary agreed with unannounced transaction agreements. Wilson et al. (2012) find that during the global recession, private equity backed buyouts experienced higher growth, productivity, profitability and improved working capital management compared to non-buyout firms.

However, the source of the improvements in productivity remains a controversial issue. Lichtenberg & Siegel (1990) argue that resources previously used to produce long-term intangible investments are shifted to produce current output. This would result in a short-term improvement in efficiency at the expense of subsequent decline in performance due to low investments in intangible capital. Also, benefits of debt-bonding decrease over time. As leverage decreases, the constraints caused by debt covenants and potentially inflexible organisational structure might outweigh the benefits of incentive alignment.

3.2.2. Financial engineering

Private equity firms use leverage to construct optimal capital structures for their portfolio companies. Based on modelled financial estimates, debt structures are built from a variety of options (see section 2.2.5), often so that the company pays little or no taxes. The most common rationale for optimal capital structure originates to the trade-off theory (Myers, 1984). The theory explains that the optimal capital structure is achieved when the tax and debt bonding benefits offset, at the margin, the costs of financial distress. An expansion to the trade-off theory is the pecking order theory, which explains that firms prefer internal to external funds due to

information asymmetries, and thus result in companies to stray away from their optimal capital structures (Myers, 1984).

The trade-off and the pecking order theories suggest that the capital structure of the firm should be tailored according to the characteristics of its assets. For example, a profitable firm with strong cash flows should use more leverage since it can effectively utilise tax shields and have lower probability of financial distress. Moreover, a firm with more investment possibilities and more intangible assets is more likely to have higher costs of distress. Respectively, the pecking order theory implies that a historically more profitable firm will end up with less leverage because it has been able to finance its investments with internal cash flow. However, the pecking order theory is less likely to explain capital structures in LBOs since the leverage is calculated at the time of the transaction and there is no time to stray away from the optimal leverage. (Axelson et al., 2012)

The efficient use of tax shields, i.e. interest tax deductions from the use of debt, forms a valuable component in LBOs. Kaplan (1989a) reports that tax shields can explain between 4 to 40% of a firm's value in the 1980s. At the lower range of the estimates, debt is repaid in 8 years and personal taxes offset the benefit of corporate tax deductions. At the higher range, debt is assumed to be permanent and that personal taxes provide no offset. (Axelson et al., 2012) suggest that a reasonable value in the 1980s would be somewhere between 10-20%. However, with today's declined tax rates and use of leverage, the range is likely to be lower.

Baker & Wurgler (2002) argue that firms exploit the equity market timing and issue equity when the cost of equity is relatively high, and respectively repurchase shares when the cost of debt is relatively low. Similarly on debt markets, Axelson et al. (2012) report that buyout firms are aware of the market timing benefits when the debt market is overheated. When the market imperfections exist and debt investors are buying debt at overvalued prices, buyout managers issue more debt. Hence, the authors argue that prevailing credit conditions are a robust indicator of LBO leverage. The higher the credit risk premium, measured as high yield spread over LIBOR, the lower the buyout leverage. Consequently, the LBO leverage is by nature pro-cyclical, where the leverage peaks during hot credit markets (such as 2006-2007) and decreases during deteriorated credit conditions (such as 2008-2009). Interestingly, the authors find that for a matched set of public firms, leverage is countercyclical. This finding is against the trade-off theory. If the theory held, we should expect the public firms' leverage to also act pro-cyclically.

Demiroglu & James (2010) report that reputable private equity firms can create value by taking advantage of market timing in credit markets and having lower agency costs of LBO debt. Reputable private equity firms pay narrower bank and institutional loan spreads, having longer loan maturities and relying more on institutional loans. The private equity firm reputation is also associated with higher buyout leverage. However, Axelson et al. (2012) argue that while lax credit conditions improve ability to increase leverage, it makes them prone to overpay for deals which results to lower returns from investments.

Axelson et al. (2012) argue that if the funds are able to arbitrage debt and equity markets, leverage should have a positive impact on fund returns when debt market conditions provide cheap debt. However, the authors find that leverage in fact has a negative impact on returns for two possible reasons. Firstly, the cheap credit might lead to more intense bidding competition in the LBO market, which adversely affects returns. Secondly, the causality between fund returns and leverage might be the opposite. A fund that is expecting low returns might have an incentive to apply an overly leveraged and risky capital structure to gamble resurgence. Kaplan & Stein (1993) and Axelson et al. (2012) find that hot credit markets encourage excessive leverage which in turn might lead to higher subsequent default rates.

Finally, Kaplan & Schoar (2005) find that the median returns of U.S. private equity funds from 1985 to 2001 were 5-10% below the S&P 500. However, for the same period, the largest private equity funds outperformed the S&P 500 by 60-80% after the fees charged by the GP. The main source of success for this has been the ability to utilise aggressive leverage and to exit the investments at higher multiples than comparable firms. Acharya et al. (2009) study the outperformance of the most successful private equity firms and conclude that financial engineering and tactics do not tell the whole story. Their findings suggest that less than 30% of the outperformance derives from financial leverage and market timing. Thus, at least 70% represents actual outperformance. The residual outperformance can be attributed to the ability of the portfolio firm to produce more EBITDA growth compared to public peers; and the ability to exit at multiples above sector average.

3.2.3. Governance engineering

The inherent structure of publicly-held companies has received a fair amount of criticism among academics. Jensen (1989) claims that the public company structure impairs the value maximisation through legal and regulatory restrictions which lead to inefficient corporate

governance and misaligned interests between managers and owners. These corporate agency problems entail an opportunity for LBOs and MBOs to exploit the, so called, *governance arbitrage* (Cuny & Talmor, 2007). The evidence on the effectiveness of management buyouts implies intrinsic value in ownership change as the company performance improves significantly after the buyout (Lichtenberg & Siegel, 1990; and Wright et al., 1998).

There are generally four ways how private equity firms can benefit by fixing the governance arbitrage. These are alignment of management incentives, debt-bonding and board control.

Firstly, in order to align the management incentives in their portfolio companies, private equity firms typically give the management a large equity upside through stock and options. Kaplan (1989b) finds that the management equity ownership in the company increases significantly after the buyout. Before the buyout, the management team owns a median of 5.88% of the pre-buyout equity, whereas the post-buyout management owns a median of 22.63% of post-buyout equity. By requiring the management to invest a considerable stake of their personal wealth into the company in the form of equity, the private equity firms ensure that the management not only has a significant upside, but a downside as well. Also, due to the private nature of the company, the management's ownership is illiquid and cannot be easily sold or options exercised before the exit. Thus, the incentive for short-term performance manipulation decreases. (Kaplan & Strömberg, 2008)

Secondly, the use of post-buyout leverage pressures the management to service debt and not to waste money on negative NPV investments. Leverage reduces the "free cash flow problem" described by Jensen (1986), where the management of the cash flow strong company with weak corporate governance might invest the money below cost of capital or waste it on organisational inefficiencies. On the other hand, excessive leverage might create inflexibility due to obligatory debt service.

Thirdly, private equity investors control the boards of their portfolio companies by taking a seat on the board of directors and placing contractual restrictions on the management's actions. Kaplan & Strömberg (2008) suggest that incompetent incumbent management might be willing to prefer some private equity buyouts in order to protect their jobs. However, Acharya et al. (2009) report that private equity backed companies have smaller boards which meet more often, compared to their public peers. Furthermore, the authors find while these boards vigorously

recruit and support top executives, the underperforming managers are also quickly replaced. 39% of CEOs and 33% of CFOs are replaced in the first 100 days.

Finally, if the portfolio company faces problems servicing its debt, the private equity firms may carry out well-timed strategic restructuring efforts, which can reduce the likelihood of default Pawlina (2010). Moreover, Wilson et al. (2012) suggest that GPs' expertise in monitoring may improve portfolio firms' performance through implementing cost efficiency and growth opportunities. In the absence of effective monitoring, the management could proactively undertake high risk projects. Moreover, the incumbent management may possess superior information to outsiders while their objectives, motives and competencies are not aligned properly to maximise the value of this information. Phalippou (2009) argues that while the private equity governance model may alleviate some agency problems, it can also introduce new ones, particularly between GPs and LPs. He claims that GPs' fee structures encourage to time cash flows early, short investment horizons and target choosing (by leverage, size and capital structure changes) in order to maximise the transaction fees.

3.3.Financial distress and bankruptcy

Like previously discussed, private equity firms rely on highly leveraged capital structures dependent on the prevailing credit conditions, might be prone to overbid due to increasing competition between LBO firms, and under pressure to provide superior returns might undertake overly risky investments at the expense of LPs. Considering these factors, it would not be trivial to expect that a significant portion of these transactions would also encounter financial distress, default their debt payments, and eventually file for bankruptcy. In the next sections I will discuss financial distress in LBOs in more detail.

3.3.1. Research on distressed LBOs

Following the first buyout boom in the 1980s many most extremely leveraged buyouts ended up in bankruptcy (Andrade & Kaplan, 1998). Kaplan & Stein (1993) find that for MBOs performed between 1985 and 1989 approximately 30% defaulted compared to a 2% percent default rate for the five-year period before that.

Axelson et al. (2009) compare the leverage of LBO companies with similar publicly traded peer companies. The authors report average Net debt to Enterprise value of 67% (14%), and Net debt to EBITDA of 5.4x (1.1x) figures for LBO firms (public peer companies). Kaplan &

Strömberg (2008) find that when debt is cheaper relative to equity private equity firms aim to increase their returns by applying higher leverage. Thus, it is justified to expect significantly higher bankruptcy likelihood for LBO firms compared to public peer companies.

For LBO transactions during 1970-2007, Strömberg (2008) derives an annual default rate of 1.2% per year, assuming a six year average holding period. This is twice as high compared annual default rates of 0.6% for U.S. publicly traded firms over 1983 to 2002 (Ben-Ameur et al., 2008). Of all the firms undergoing a leveraged buyout, 6% eventually file for bankruptcy (Strömberg, 2008). Considering the amount of leverage used in LBOs the bankruptcy rate is rather low. Moreover, the annual LBO default rate is still lower than the annual default rate of 1.6% for average corporate bond issuers 1980-2002 (Hamilton et al., 2006). The eventual bankruptcy rates in the U.S. (9%) and the U.K. (8%) LBOs are considerably higher than in continental Europe and Scandinavia (2%). Strömberg suggests that the large difference is due to more aggressive use of leverage in more developed private equity countries.

Strömberg (2008) also finds that while private equity sponsored LBOs are more likely to achieve a successful exit, they are also somewhat more likely to face financial distress, controlling for other factors. There appears to be no significant relation between deal size and bankruptcy. Deals that were originally distressed are the most risky form of LBOs, being 5 percentage points more likely to subsequently end up in distress again. Also, deals conducted by publicly traded funds exhibit a higher incidence of bankruptcy and restructuring compared to private partnerships. Finally, contrast to general perception of higher bankruptcy rates occurring during economic downturns, Strömberg surprisingly finds no major difference in bankruptcy probability across time periods.

Tykvová & Borell (2012) study the bankruptcy likelihood of LBO firms. They find that while the risk of financial distress increases immediately after the buyout, three years after the buyout the risk levels are lower compared to comparable non-buyout companies. The authors argue that this is due to private equity firms' tendency to invest in companies which initially have lower bankruptcy likelihoods. Immediately after the transaction the financial distress risk of buyout companies increases. Yet, the risk level incrementally decreases and goes below the non-buyout peer company level already three years after the transaction.

3.3.2. Financial distress vs. economic distress

In order to examine the key sources of distress for buyout companies, it is essential to differentiate *financial distress* from *economic distress*. Andrade & Kaplan (1998) study a sample 31 of highly leveraged transactions between 1980 and 1989 that became financially, but not economically distressed. Poor firm and industry performance represent a source of economic distress and reflect the state of the industry or economic climate. Thus, a portfolio company without high leverage and satisfactory economic performance would not necessary experience any sort of financial distress. Likewise, a highly leveraged company facing economic difficulties would consequently face both economic and financial distress. In order to assess the particular effects of private equity ownership, it is appropriate to eliminate the impact of economic distress and focus on the determinants of financial distress.

Andrade & Kaplan (1998) find that high leverage is the primary cause of distress in LBOs while the poor firm and industry performance while short-term interest changes play much smaller roles. The authors find that sample firms increase in value from pre-transaction to resolution of distress. Furthermore, the sample firms' operating margins exceed the industry averages at the time of distress. These findings are inconsistent with the view that LBOs in the 1980s were unsuccessful. They find that the operating and net cash flow margins increase immediately after the buyout, but decrease 10 to 15% at the time of distress. However, the evidence shows that the margins rebound to pre-distress levels once the distress has been resolved. Moreover, the authors estimate the costs of financial distress as 10 to 20% of firm value, calculated using debt and equity market values.

3.3.3. Leverage and availability of credit

Axelson et al. (2012) find that the buyout leverage increases when debt market conditions are favourable. When cheap debt financing is available, buyout firms are encouraged to increase leverage in order to reach higher returns (Kaplan & Strömberg, 2008). Axelson et al. (2009) argue that during recession the amount of valuable investment opportunities decreases and those that exists have difficulty of being financed. Likewise, during boom times, the amount of valuable projects is higher but also bad deals will be financed in addition to the good ones.

The power of creditor rights might also impact the bankruptcy rates. Lenders pay much attention to recovery rates in the event of a default. Recovery rates refer to the ability to repossess collateral and to reorganize debtors, and it depends largely on legal rights that

creditors have in reorganization and liquidation procedures. Bankruptcy laws define how the insolvency process is controlled and the priorities and rights to the bankrupted firm's assets. Banks are expected to charge higher interest rate spreads for firms operating in countries with weak creditor rights and poor enforcement. However, as the riskiness of the company increases, banks limit their lending amounts and shorten loan maturities instead of increasing interest margins. The shorter maturity of debt allows the lender to review the borrower more frequently and restrict it from engaging in overly risky investments. (Bae & Goyal, 2009)

Bae & Goyal (2009) find that better enforceability of contracts significantly increases the loan size, lengthens the loan maturity and reduces loan spreads. Moreover, the nature of a country's creditor rights and property rights affect the loan spreads, maturity and size. Loan spreads are lower in countries with strong property rights protection and loan maturities are shorter in countries with weak property rights. Also, loan size increases in countries where property rights are stronger and firms that operate in countries with weak creditor rights borrow less externally. The property and creditor rights impact the ability and terms of the LBO borrowing. LBOs conducted in countries with lower property and creditor rights might have to settle for worse borrowing terms which would result in more strict covenants and higher interest payments. This could consequently increase the likelihood of financial distress.

Moreover, Axelson et al. (2012) argue that due to the limited liability of GPs and their option-like contract on carried interest, GPs are prone to overinvestment and might gamble by making large and highly levered investments in portfolio firms. Furthermore, when credit markets provide low interest rates, GPs can take on more leverage and invest more aggressively. This would increase the value of their option and incentivise to overpay for deals in excess of their expected fundamental value. The possible agency problems between GPs and LPs might predict that buyout leverage is more driven by the debt market conditions than the potential of the target firm. Thus, the availability of cheap debt financing may come with higher bankruptcy risks compared to similar non-buyout companies.

3.3.4. Target company characteristics

Bae & Goyal (2009) list the borrower risk characteristics which affect the lenders' lending decisions and the structure of lending contracts. Similarly, they reflect the overall riskiness of the company and through the cost of lending might have a great impact on the overall performance of the LBO. Differences in, (a) firm size, (b) profitability, (c) leverage, (d)

collateral value of assets, and (e) growth opportunities, can significantly impact the cost of lending.

a) *Firm size*: Larger firms are generally more diversified, mature, better recognized in the debt markets and have a lower risk of default due to fewer contracting problems. (Log total assets)
b) *Profitability*: Profitable firms have better ability to service debt and are less likely to entail moral hazard problems where the company could expropriate assets and engage in overly risky investments. (EBIT to Total assets)
c) *Leverage*: Levered firms have greater agency costs since they have greater incentives to increase the riskiness of assets at the expense of lenders. However, the acquired reputation in the debt markets can also reduce contracting problems. (Total debt to Book assets)
d) *Tangibility*: Firms with more tangible assets, which can be collateralized, are likely to suffer smaller loss of value in the event of distress. Hence, tangibility reduces the costs of financial distress and makes it difficult to substitute high risk assets for low risk assets. (Fixed assets to Total assets)

Furthermore, Opler & Titman (1993) identify factors that affect the costs of financial distress and act as proxies for the uniqueness and durability of a firm's products, the collateral quality and the extent of its growth opportunities. The authors argue that cost of financial distress is likely to be highest among firms with relatively unique products that may require future service. Also, to the extent that debt can be collateralised, creditors are less vulnerable to expropriation. However, growth companies possess growth options and are not able to provide collateral for their debt, thus increasing the risk of expropriation for creditors and decreasing value of growth options for the company. The authors use proxies for these factors: uniqueness measured as R&D costs divided by Sales and expected growth measured as Tobin's q or EBITDA to Market value of assets.

Finally, Alperovych et al. (2013) study the effects of target company vendor source to post-LBO efficiency. The authors find that different pre-buyout ownership structures entail different degrees of agency costs which affect the post-LBO efficiency. Divisional buyouts have the highest potential for efficiency improvement while SBOs present only limited efficiency improvements. Regardless of the vendor source, the LBO efficiency improvements have an apparent inflection point around the second year post-transaction.

3.3.5. Club deals as a form of risk sharing

Filatotchev et al. (2006) argue that buyout investors undertake club deals as a means of risk sharing and portfolio diversification and are thus willing to invest in more risky companies and strategies compared to stand-alone investors. The riskiness of investments could thus entail a potentially higher risk of financial distress for syndicates. However, Tykvová & Borell (2012) finds that syndicates are better to handle financially distressed companies than stand-alone investors.

Academics accredit club deals' ability to manage particularly risky investments to several factors. Firstly, due to wider experience and access to different sources of information, syndication can provide more effective opinion sharing and target selection which may limit the risk of the company facing financial distress (Filatotchev et al., 2006). Secondly, as the syndicate has a combined set of complementary skills, it may be able to provide more intense monitoring and higher-quality support during the investment phase, which again would reduce the risk of financial distress (Casamatta & Haritchabalet, 2007). Thirdly, the existence of multiple partners in the syndicate, unlike in the case of a stand-alone investor, implies a potentially larger pool of financial resources which can turn out to be useful capital if the company faces financial difficulties (Brander et al., 2002).

However, club deals might also entail agency problems, which emerge from potential information asymmetries among partners (Tykvová & Borell, 2012). For example, if the leading investor has more information about the quality of the deal, it might lead to an adverse selection problem where the less informed partner is invited to join only to low-quality deals. Also, club deals may result in moral hazard and free riding problems if the partners do not mutually participate in the monitoring and support of the portfolio company. In the event of distress, these problems will only exacerbate. Moreover, Ivashina & Kovner (2011) argue that if a transaction fails, club deals reduce the reputational risks. The willingness of partners to invest further capital to a distressed company may be lower when more than one investor shares the reputational loss.

3.3.6. GP experience and reputation in risk taking

Kaplan & Schoar (2005) find that established private equity funds are less sensitive to industry cycles and perform on average better compared to less experienced private equity investors. Jelic et al. (2005) report that MBOs backed by highly reputable buyout companies perform

significantly better compared to less reputable buyout companies. Furthermore, Alperovych et al. (2013) find that private equity firm's experience positively and significantly correlates with post-transaction efficiency levels. These findings suggest that buyouts performed by more experienced GPs would be less likely to end up in bankruptcy.

The benefits of experience and reputation can be attributed to gained industry know-how and improved banking relationships (Kaplan & Strömberg, 2008). Demiroglu & James (2010) find that numerous interactions between lenders and LBO firms reduce information asymmetry between the borrowing and lending parties. As a consequence reputable GPs pay lower bank and institutional loan spreads, are provided with longer loan maturities, and rely more on institutional leverage. Moreover, the authors find that these factors are associated with higher buyout leverage. Ivashina & Kovner (2011) argue that a contributing factor for banks offering better terms is their incentive to sell other fee-based services to LBO financing.

In addition, Tykvová & Borell (2012) suggest that inexperienced private equity investors might be prone to "show up" by investing in riskier companies and strategies while experienced investors have better know-how and instruments to avoid bankruptcy. However, experienced investors may be better at transferring value through e.g. dividend recaps, which could increase the risk of financial distress in portfolio companies. The authors find that distress risk levels are higher for experienced investors than for inexperienced investors.

3.4.Bankruptcy laws

In this section, I introduce creditor protection and bankruptcy laws, which greatly affect the overall effectiveness of the financial markets and firms' capital structures. The nature of bankruptcy laws varies greatly by country and reflects in the likelihood of whether a company is restructured or liquidated. Bankruptcy laws matter to a great degree to private equity firms which are particularly concerned with protecting their reputation and assets of their portfolio companies. Hence, private equity investors often negotiate restructurings for distressed portfolio companies and refinance in order to decrease the likelihood of having the company entered into formal insolvency (Acharya et al., 2009).

3.4.1. Foundation of creditor rights

In order for the economy to function properly, firms need external debt financing for their investments. At the same time, creditors face risks that the capital they have lent may not be

returned. Controlling shareholders or managers may spend the capital on excessive perk consumption, invest in high risk investments not agreed upon and/or default on debt contracts. The potential for insider expropriation severely undermines the effectiveness of the financial system. The most effective way to limit expropriation is through the legal system, which enables creditors to finance firms to a significant extent since their rights are protected by the law. In the event of a default, the right to repossess and liquidate the collateral forms the most basic right of a senior collateralised creditor. However, the effectiveness of the enforcement these rights depends largely on legal rules. Some countries' laws prevent creditors from repossessing their claims because it leads to liquidation of firms, which is considered to be socially undesirable. In turn, these countries may allow creditors to vote in the decision of how to reorganise the company. (Claessens et al., 2001)

Creditors are more willing to finance firms when reorganisation and creditors' rights are extensive and well-enforced by regulators or courts. The effective bankruptcy procedures are essential to allow creditors to exercise their rights appropriately. Furthermore, in the event of a corporate debt crisis, the inability to repossess collateral could trigger a cascade effect of debtor defaults and magnifying the consequences for the whole economy. (Claessens et al., 2001)

3.4.2. The economic impact of differences in bankruptcy laws

Porta et al. (2007) report that the in the late 1990s, legal rules governing investor protection differed greatly among countries. For example, in some countries (e.g. United States and Finland) reorganisation procedure imposes an automatic stay on the assets, which prevents secured creditors from taking possession of loan collateral. The rule protects managers and unsecured creditors against secured creditors and prevents automatic liquidation. A decade later, the authors report that differences still exist, but there are signs of convergence due to globalisation.

Acharya et al. (2011) report that there still exists a central challenge in today's financial economics to integrate finance theory with legal frameworks to facilitate cross-country comparisons of financial data. Despite the slight convergence brought by the globalisation, there is a large degree of divergence in the rights accorded to claimholders in the event of default on debt contracts. For example in the U.K, a secured creditor can often liquidate the company and realise the collateral without considering the interests of other claimants and without the risk of being challenged in bankruptcy court (Davydenko & Franks, 2008).

Meanwhile other countries afford equity-holders with substantial rights, such as allowing management to seek protection from creditors unilaterally by filing for reorganisation, without creditor consent (Claessens et al., 2001). In the United States, this sort of protection is referred to as Chapter 11 and it gives management significant power, since creditors have to wait to get their money or collateral.

The other bankruptcy procedure in the United States is Chapter 7, which instead of reorganisation, results in liquidation where the company stops all operations and goes completely out of business. If the company fails in its Chapter 11 reorganisation efforts, the bankruptcy filing shifts to Chapter 7, resulting in liquidation. In liquidation the debtors can choose whether to liquidate the debtor's assets through a cash auction or structured bargaining. Managers often prefer Chapter 7 over Chapter 11, since they can retain their jobs at least for the initial stages of reorganisation. Managers also may file for bankruptcy early, which preserves distressed firms' value as a going concern. (Claessens et al., 2001)

Finally, Bris et al. (2006) compare the bankruptcy costs between Chapter 7 liquidation and Chapter 11 reorganisation in large U.S. corporate bankruptcies from 1995 to 2001. The authors find that in terms of direct expenses, Chapter 7 liquidations are not faster or cheaper than Chapter 11 reorganisations. Moreover, Chapter 11 is more able to preserve asset values and thereby allows a higher recovery rate for creditors. Acharya et al. (2011) report that the differences in cross-country bankruptcy codes affect firms' capital structure choices. The authors find that firms employ greater leverage under a bankruptcy code that favours equity-holders (such as the U.S.). Respectively, less leverage is employed if the code favours debt-holders (such as the U.K.).

4. Hypotheses

Based on issues raised in existing literature, I form the theoretical framework for my hypotheses to explain the determinants of failed LBOs. This framework outlines the subsequent empirical analysis. The theoretical background concerning most hypotheses is covered in sections two and three, but is also briefly introduced along with the hypotheses. Overall, the focus of this study is to explain determinants of failed LBOs rather than successful ones. All non-bankrupt buyouts, regardless of their eventual return-on-investment (even if highly negative), are considered as non-failed. Also buyouts, where the general partner has prevented bankruptcy by injecting additional capital to the portfolio company, are not considered among failed transactions.

I form hypotheses to approach the research questions from three angles. Firstly, I examine the effects of deal source and type on the bankruptcy probability and initial financial distress risk of the buyout. Secondly, I analyse how specific target firm characteristics, such as cyclicality, capital structure and operating metrics, are associated with the probability of bankruptcy. Thirdly, I assess the influence of exogenous factors, such as the economic climate, which are independent from target companies and general partners. Empirical tests in Chapter 6 are further divided into time-period wise subgroups in order to assess the significance of determinants across the changing dynamics of the private equity market.

4.1.Buyout characteristics

H1: *Deal source and type greatly affect the subsequent probability of bankruptcy*

	Buyouts labelled as…	***…are associated with…***	
H1.1:	*bankruptcy sale*	*higher*	
H1.2:	*corporate divestiture*	*lower*	
H1.3:	*secondary LBO*	*lower*	***…bankruptcy rates***
H1.4:	*privatisation of gov. entity*	*lower*	
H1.5:	*cross border*	*lower*	
H1.6:	*going private*	*higher*	

I expect that buyout vendor source significantly affects bankruptcy probability. Among previous literature, Alperovych et al. (2013) study the effects of vendor source on efficiency improvements in post-LBO companies and find the highest efficiency improvements in corporate divestitures. Accordingly, I expect that the efficiency improvement potential is also associated with lower bankruptcy probability. Strömberg (2008) analyses the exit routes of LBOs and finds that originally distressed companies are most likely to again go bankrupt. I form my expectation for buyouts originating from bankruptcy sales accordingly.

In addition to testing the findings in previous literature, I form hypotheses for additional features. Firstly, I expect that SBOs are less likely to go bankrupt. While Alperovych et al. (2013) find that SBOs exhibit the lowest post-LBO efficiency improvements, previous private equity ownership might also act as certification of the quality of the target company. Hence, prior-private equity-owned firms should be less risky investments. Secondly, I expect prior-government owned companies to be less prone to bankruptcy, since these companies tend to occur around infrastructure related low-risk businesses. Thirdly, I expect that cross-border buyouts are associated with lower bankruptcy rates. One might claim that these transactions entail additional challenges and risks for the private equity firm due to information asymmetry, culture and language barriers. However, for those very reasons private equity firms may in fact pose more strict screening criteria and invest only in the most promising opportunities. Also, in the 1980s and 1990s before private equity industry spread worldwide and U.S. or UK private equity firms began setting up international offices, cross-border transactions provided untapped investment opportunities without costly bidding wars Carey & Morris (2012).

H2: *Investors' experience, share of knowledge and aligned interests are associated with lower bankruptcy rates*

	Buyouts conducted…	***…are associated with…***	
H2.1:	*by experienced investors*	*lower*	***…bankruptcy rates***
H2.2:	*with management's equity participation*	*lower*	
H.2.3	*as club deals*	*lower*	

Findings from previous literature suggest that general partners' experience and reputation is reflected in improved post-buyout performance and exhibit lower bankruptcy likelihood

compared to less experienced and reputable investors (see e.g. Kaplan & Schoar, 2005; Tykvová & Borell, 2012; Alperovych et al., 2013). Accordingly, I form my hypothesis that buyouts conducted by investors with experience from more than five previous buyouts are associated with lower bankruptcy rates.

In the case of management's equity participation the previous literature is divided. Jensen (1989) appraises that LBOs superior organisational form which partly derives from the ability to align management's incentives efficiently through equity participation. In the same tone, Kaplan & Strömberg (2008) argue that management's equity ownership decreases management's incentive for short-term performance manipulation. Wilson & Wright (2013) provides opposing evidence that MBOs and MBIs in the U.K. have significantly higher failure rates compared to private equity backed buyouts. However, the higher failure rate in MBOs and MBIs might also derive from the management's biased view towards the company or incompetent managers' effort to engage in an MBO in order to protect their jobs. Private equity firms often replace the incompetent management and hence managers that invest in LBOs could be in general more able to run the business successfully. Hence, I align my expectation according to Jensen (1989) and Kaplan & Strömberg (2008) that management participation is associated with lower bankruptcy rates.

Finally, findings from Filatotchev et al. (2006), Tykvová & Borell (2012) and Casamatta & Haritchabalet (2007) suggest that club deals benefit from pooling of experience and are associated with improved ability to handle risky investments. Accordingly, I expect that buyouts including more than one private equity firm are associated with lower bankruptcy rates.

4.2.Target company characteristics

H3: *Buyouts of more cyclical and leveraged companies are associated with higher bankruptcy rates*

	Target company's…	***…are associated with…***	
H3.1:	*high cyclicality*	*higher*	***…bankruptcy rates***
H3.2:	*high leverage*	*higher*	
H3.3:	*low profitability*	*higher*	
H3.4:	*low tangibility*	*higher*	
H3.5:	*young age*	*higher*	

The founder of Blackstone, Stephen A. Schwarzman, attributed the determinants of Blackstone's failed investments in the 1990s and 2000s as follows: "*These were all medium-sized, cyclical businesses that we bought within two or three years of an economic top. We paid too much for some of them. We had ambitious turnaround plans for them that turned out to be very difficult to execute.*" In addition to being leveraged cyclical bets, the companies suffered from intractable issues in competitiveness and lack of understanding of the underlying business. (Carey & Morris, 2012)

At best, a leveraged investment in a cyclical company at the bottom of the cycle coupled with an exit at the top might greatly magnify returns. However, if invested at a wrong time in the cycle, the consequences may prove to be very detrimental. As portfolio firms' capital structures are often aggressively leveraged, materialisation of projected cash flows is critical for the success of the investment. If a portfolio company's cash flows are highly dependent on the general economy, a negative turn in the cycle may be drive the company into bankruptcy. Hence, I expect that the cyclicality of the target company's business is associated with higher bankruptcy rates. I assess the relationship by applying cyclicality measures based on target companies' SIC-codes. The measures are adopted from Berman & Pfleeger (1997) and reflect the particular industry's dependence on GDP.

I also form hypotheses concerning leverage, profitability and tangibility. Bae & Goyal (2009) argue that leveraged firms have greater incentives to increase the riskiness of assets at the expense of lenders. Likewise, less profitable have worse ability to service debt and are more

likely to entail in moral hazard problems. Also, firms with less collateralisable tangible assets have higher costs of financial distress because they are more able to substitute high risk assets for low risk ones. I expect all of these to be associated with higher bankruptcy rates.

Finally, mature firms often have more established business plans, client relationships and enable more accurate projections. Furthermore, Tykvová & Borell (2012) report that more mature companies exhibit lower bankruptcy likelihoods. Hence, I expect that younger firms are more likely to end up in bankruptcy.

4.3.Economic climate

H4: *Buyouts performed during favourable macro-economic conditions are associated with higher bankruptcy rates*

	Buyouts conducted during…	***…are associated with***	
H4.1:	*favourable credit conditions*	*higher*	***…bankruptcy rates***
H4.2:	*positive GDP growth*	*higher*	

Axelson et al. (2012) find that buyout leverage increases when debt market conditions are favourable. When cheap debt financing is available, buyout firms are encouraged to increase leverage in order to reach higher returns (Kaplan & Strömberg, 2008).

I form my hypothesis accordingly. The favourability of credit markets is measured as the spread between BofAML high yield index and Libor, both for the U.S. and Europe. A high spread implies uncertainty among investors and reflect unfavourable credit conditions. Respectively, low spreads denote low risk requirements and more favourable credit conditions. Furthermore, buyouts conducted during periods of strong economic growth might be more exposed to overbidding and overly optimistic about financial plans. Hence, I expect that positive GDP growth is associated with higher bankruptcy rates.

5. Data

In this section, I describe the data used in my thesis. In order to source determinants of failed LBOs according to my hypotheses, I collect data of two natures. Firstly, I analyse the exogenous factors, such as the economic climate, which are independent of both the target company and general partner. Secondly, I evaluate endogenous target company or deal specific features where the private equity firm has power to influence the structure and riskiness of the deal. Due to private nature of LBO companies, the availability of financial information is scarce. Thus, for the latter analysis, the sample size is considerably smaller.

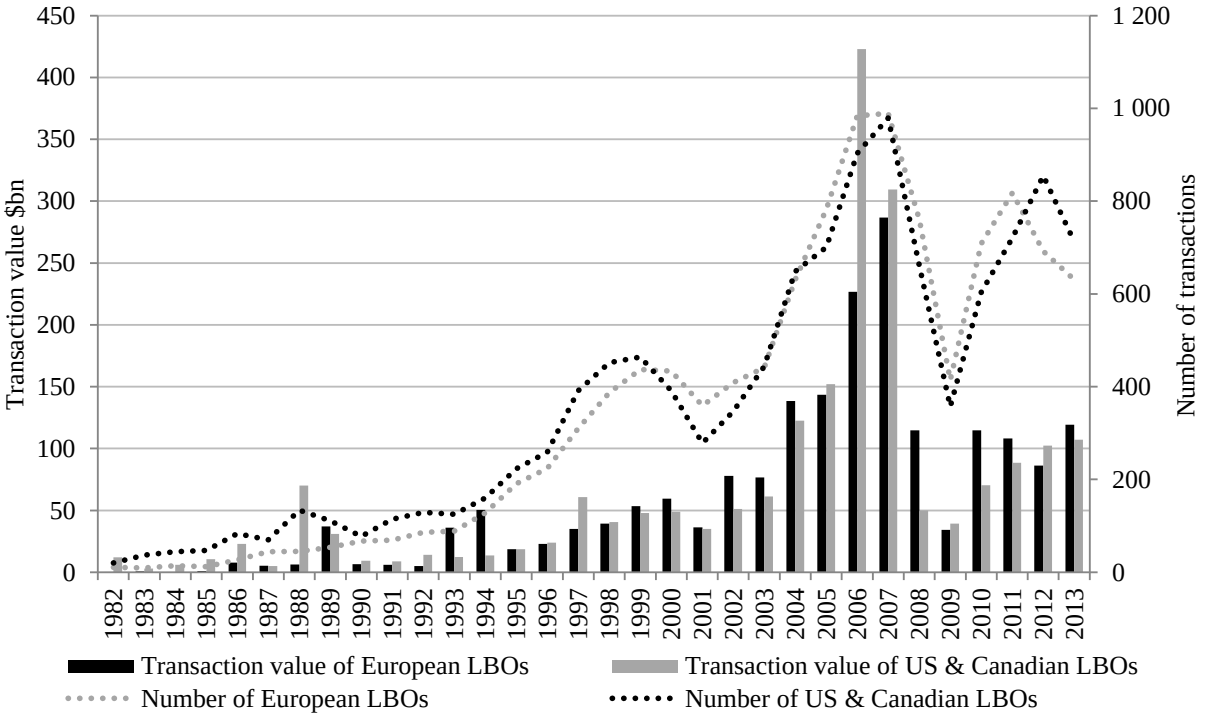
Next I discuss the retrieval process of the data and provide descriptive summary statistics of the sample. Transaction data and target company financials are retrieved from Capital IQ and supplemented with Bureau Van Dijk's Orbis database and Mergermarket data (M&A intelligence media company). Control variables capturing the effects of the economic climate are retrieved from Datastream, OECD, World Bank and US Federal Reserve.

5.1.Sample formation

I retrieve the LBO transaction data using the Capital IQ database. Capital IQ covers over 355,000 M&A transactions globally, 21,000 bankruptcies mainly in North America, financial information for over 2.2 million private companies and details for over 18,000 private equity firms. I include transactions labelled as private equity buyouts conducted during January 1982-December 2013. I limit the geographic reach to U.S., Canada and Europe on the basis of the target company's headquarters. I exclude buyouts with transaction statuses labelled as cancelled, pending, failed or unknown. Also, in order to focus exclusively on leveraged buyouts, I include only transactions where a majority stake is acquired. Within these criteria Capital IQ database provides details for total 22,796 transactions with a total disclosed transaction value of $4 trillion. In terms of transaction count and value, LBOs conducted in Europe and North America comprise both virtually 50% of the sample. The sample is in line with Strömberg (2008) who, using the same Capital IQ data, reports approximately 21,000 LBOs during 1970-2007 with a transaction value of $3.6 trillion. Figure 4 depicts the frequency of LBOs over time in my sample.

Figure 4 – Sample LBOs over time

The total transaction value of all sample LBOs amount to $4 trillion. Of the sample transactions, Capital IQ provides transaction values for 41% of transactions, and thus the real value is in reality far higher. The geographic region is determined by the location of target company's headquarters.



In order to analyse target company characteristics and measures of financial distress, I retrieve consolidated financial statement information for the target companies. Financials are from Capital IQ which covers financial data from 1994 onwards. Due to the private nature of target companies, the availability of financial data is rather scarce which limits the sample size on financials-dependent analyses.

5.2.Bankruptcies of sample companies

The process of determining the bankruptcy status is not quite straightforward. Capital IQ and Orbis provide information for the company's current status; for example whether the company is still operating, in bankruptcy or under restructuring proceedings. However, the reliability of the company current status code is questionable as the company may have exited its bankruptcy proceeding and continues its operations. The company status code considers a company being bankrupt only if its operations are dissolved permanently after bankruptcy proceeding. Thus, the company status code would exclude insolvency events for companies that have become

insolvent or applied for bankruptcy, but later successfully exited the process and continued their operations. If the company status code is simply applied, it would most likely distort the data.

A case in point from the sample: Station Casinos LLC, a gaming company based in Lase Vegas, was acquired by Colony Capital LLC through a leveraged buyout in 2006. In July 2009, Station Casinos breached its loan covenants and filed for chapter 11 bankruptcy. However, in April 2010, the company's key lenders JPMorgan Chase and Deutsche Bank announced to take control of the company and the company subsequently exited bankruptcy as an operating company. For Station Casinos LLC, Orbis and Capital IQ label the company as "active" or "operating". These company status codes would incorrectly imply that the Station Casinos did not face any materialised financial distress during Colony Capital's ownership. Hence, I have applied multiple methods to correct these sort of errors.

Among previous studies, Strömberg (2008), studying the exit routes and longevity of private equity ownership, identifies the same problem with company status codes using Capital IQ data. He aims to solve the problem by tracking the ultimate fate of the LBO firms through later M&A transactions and finally by conducting extensive web-searches on a firm-by-firm basis. In another study, Tykvová & Borell (2012) analyse bankruptcy likelihood of private equity backed firms. The authors use Orbis data and also determine the ultimate fate of the company through the company status code. The authors however do not disclose bankruptcy ratios in their sample and thus benchmarking the bankruptcy rates to their data is not possible. In a somewhat similar way to Strömberg (2008), I apply multiple additional methods to determine whether the company has become insolvent at some point of time during its operations:

a) Capital IQ bankruptcy database: Capital IQ collects information on U.S. and Canadian bankruptcies and provides information on 520 bankruptcies in the sample. This amounts to bankruptcy percentage of 6.9% for North American companies.

b) Transaction secondary feature: By retrieving a complete list of transactions labelled as "bankruptcy sale" from Capital IQ, I am able to identify bankruptcies for buyout companies that exited the bankruptcy proceeding under new ownership. Through this procedure I find 249 more bankruptcies.

c) Mergermarket deal type: Similarly to the transaction secondary feature, I retrieve a list of 6,910 private equity related LBOs from Mergermarket database. Mergermarket, a

media company, specialises in corporate financial news and analysis, and provides detailed deal descriptions for transactions. I am able to match 1,820 transactions and find 4 more buyouts acquired from bankruptcy proceedings. Bankruptcy years are manually collected from deal descriptions.

d) Capital IQ company status: Bankrupt if labelled as "Out of business", "Reorganising" or "Liquidating". The year of bankruptcy is assumed to equal the last year of available financials. The criteria returns 287 bankruptcies in the sample.

e) Orbis company status: By matching the companies through their legal entity identifier, when available, I consider companies as bankrupt if the historical status code includes label "Bankruptcy" or "Active(insolvency)". Bankruptcy years for these companies are manually checked with internet searches. The criteria returns 9 more bankruptcies in the sample.

As a result I am able to identify 1,069 bankruptcies within the sample that match the incumbent private equity owner. In the following I discuss the descriptive statistics of the sample.

5.3.Descriptive statistics

Table 2 describes an overview of sample LBOs and bankruptcies. Vast majority (71%) of LBOs occur in the most recent decade 2002-2013, which demonstrates the fast growing pace of the industry during the latest buyout boom period. Despite having being mostly an American phenomenon in the 1980s, the buyout activity in Europe and North America has evened out during the sample period 1982-2013. European LBOs constitute for 49.4% of the sample, while U.S. and Canadian LBOs account for the remaining 51.6%.

The sample comprises of 1,069 LBOs that have either filed for bankruptcy or failed to make the required debt payments thus ending up in debt restructuring procedure. The bankruptcy rate for the whole sample during 1982-20013 amounts to 4.7%. However, considering that the average pre-bankruptcy holding period of 5 years in the sample, the bankruptcy rate of 6.1% during 1982-08 is a more realistic figure. This figure is in line with Strömberg (2008) and Wilson & Wright (2013) who find that 6% and 5.3% of LBO firms eventually enter financial restructuring or bankruptcy. Buyouts for North American target companies show higher 6.4% bankruptcy rates compared to European 5.7% during 1982-2008.

The most active LBO bankruptcy period (8.1% bankruptcy rate) was during the dot-com bubble in late 1990s which was characterised by inflated transaction prices and risky bets on uncertain business models. Somewhat surprisingly, buyouts performed during 2003-2008 exhibit only a relatively low 4.7% bankruptcy rate. One could expect that the ample availability of credit and swollen transaction multiples preceding the global financial crisis in 2007-2008 would had made LBOs particularly vulnerable. The low bankruptcy rate however supports the suggestion of Kaplan & Strömberg (2008) that default rates in the recent recession would probably be lower than those that were following previous boom periods. The authors suggest that buyouts conducted during mid-2000s generally had better interest coverage ratios and looser covenants. Moreover, Wilson et al. (2012) provide parallel evidence. The authors report that private equity backed buyouts in the U.K. during the global recession experienced higher growth, productivity, profitability, and improved working capital management, relative to comparable non-buyout sponsor-backed firms.

Among different deal types (labelled as secondary transaction features by Capital IQ) there appears to be vast differences in bankruptcy rates. Target companies that have originally been distressed are most likely to subsequently end up in bankruptcy (23.8% bankruptcy rate). On the other hand, Cross-border (4.1%) and secondary LBOs (4.3%) appear to be the safest kind of regular buyouts. While the traditional opportunities for operational and governance improvements in secondary LBOs are generally lower, the low bankruptcy rate for those transactions might signal superior quality for prior private equity-backed companies as buyout targets. As a comparison, going private transactions, where the target company is public-listed, exhibit a far higher bankruptcy rate of 10.2%. This finding is contrary to the view of Jensen (1989) about the superiority of the LBO-model compared to public entity model.

Buyouts conducted by experienced investors (history for least five prior deals) exhibit a 6.2% bankruptcy rate, which is in line with the sample average. Hence, it appears that experienced investors are not more able to handle risky investments and prevent eventual bankruptcy. On a same note, neither does it seem that inexperienced private equity firms would be particularly likely to engage in "all-in" strategies to build reputation. On the other hand it may be that experienced investors are better at handling risky investments, but the superior lender relationships facilitate higher use of leverage and increases the riskiness of investments. Hence, the use of more aggressive leverage may balance out the possible difference between experienced and inexperienced investors.

Table 3 depicts the distribution of industries for sample transactions. In order to control for industry-specific risks, I divide the buyouts into 47 different industry portfolios according to target companies' 4-digit SIC industry codes. In the procedure, I apply the Fama/French 48 industry portfolios[7]. Of all the industry portfolios, Business Services accounts form the majority (12%) of all transactions and exhibit a modest 3% bankruptcy rate during 1982-2013. The most bankruptcy-prone industries are Retail and Automobiles & Trucks with 12% bankruptcy rates. For a large number of transactions (31%), Capital IQ does not provide an assigned industry code. These transactions are included in the Unknown portfolio. However, the average bankruptcy rate in the unknown group is 4%, relatively close to sample average, and hence does not distort the rest of the sample greatly.

Figure 5 depicts the relationship between cyclicality and bankruptcy rate of sample LBOs arranged according to the Fama/French 48 industry portfolios. Cyclicality measures are adopted from Berman & Pfleeger (1997) and matched for portfolio companies through their SIC-industry codes. The cyclicality measure reflects the correlation of industry demand with GDP.

A visual inspection reveals that the relationship is rather scattered, even though some sort of linearity seems to appear. Nevertheless, the figure does provide some support for the anecdotal evidence of Blackstone's failed cyclical investments (see 4.2). The two industries that suffer from highest bankruptcy rates, Automobiles & Trucks and Retail, exhibit very high cyclicality measures. This implies that at least for these industries, some part of bankruptcy can be accredited to the cyclical nature of the business. However, market timing plays an essential role in the fate of cyclical investments. It makes a great difference whether cyclical businesses are acquired at the top of the cycle with inflated multiples or at the bottom at discount. If the price tag is high, more aggressive leverage may need to be used to reach satisfactory returns. A comparison to the time-period-wise bankruptcy rates in Table 2 reveals that there is in fact large variation in bankruptcy rates for the Automobiles & Trucks and Retail industries across time periods. Respectively, there is also variation in the general economic performance across time periods. Hence, in order to draw coherent conclusions from cyclicality, the measure needs to be analysed together with the state of the economy.

[7] Available at http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html

Table 4 illustrates financial statement information for buyout companies separated by the bankrupted and non-bankrupted buyouts. The median values indicate significant differences in most of the ratios. Mean values tell similar stories, but are not reported in the table for brevity.

One year after the buyout, bankrupted buyouts have an average leverage of 5.5x (Net debt to EBITDA) compared to 3.5x for non-bankrupted buyouts. These buyouts also have higher leverage already before the buyout. Bankrupted buyouts have lower interest coverage of 1.0x compared to also relatively low 1.6x for non-bankrupted buyouts. Profitability however does not seem to be related to bankruptcy. Bankrupted buyouts even exhibit slightly higher EBITDA-margins. Bankrupted buyouts are also characterised by higher capital expenditures which reflects in lower cash conversion ratio and larger amount of fixed assets. Bankruptcy likelihood score Altman Z indicates consistently larger distress for bankrupted companies even from one year before the buyout to two years after it.

The scope of the financial statement analysis is limited to transactions taking place from 1994 onwards due to availability of years for financial statement information in Capital IQ. Also due to private nature of buyout companies, the availability of financial statement information is significantly more scarce compared to public companies. The lack of available data imposes an issue of possible sample selection bias, which is a common problem also recognised in existing private equity literature (see e.g. Valkama et al., 2013; Strömberg, 2008). These studies overcome the issue by applying Heckman methodology, which I also use to control the possible sample selection bias.

Finally, Table 5 reports bankruptcy filing statistics for sample buyouts when data is available. The data is based on Capital IQ bankruptcy database which considers U.S. bankruptcies. The table is compiled for descriptive purposes only and its information is not used in later analysis. In the sample, majority of bankrupted buyouts have entered into Chapter 11 bankruptcy protection. Here, companies try to reorganise their debt and re-emerge as a healthy organisation. In the other option, Chapter 7, bankrupted firms' assets are liquidated in order to pay creditors. Only 12.5% of sample buyouts enter Chapter 7 proceeding. The duration of Chapter 11 is on average longer than Chapter 7. In majority of cases, the bankruptcy plan financing includes issuance of new equity and debt. As debtor-in-possession financing (DIP), the financing for a company under Chapter 11 is arranged most often in the form of revolving credit facility. This credit usually has priority over existing debt, equity and other claims.

Table 2 – Overview of the sample

The sample of 22,796 leveraged buyouts during 1982-2013 is obtained from Capital IQ database. Panel A describes the sample transactions with respect to time period, geographic region, deal characteristics and valuation multiples. Panel B similarly describes the distribution of bankruptcies. Panel C depicts corresponding bankruptcy rates. Experienced investor refers to transactions where the investor(s) have experience from at least five prior buyouts. Club deal indicates buyouts with more than one buyer.

Panel A: Transactions and deal types

Period	1982-88	1989-95	1996-02	2003-09	2010-13	Total (#)	% of total
Number of all transactions	597	1,623	5,142	9,693	5,741	22,796	100.0 %
Region							
U.S. & Canada	435	939	2,582	4,692	2,892	11,540	50.6 %
Europe	162	684	2,560	5,001	2,849	11,256	49.4 %
Deal type (% of all transactions)							
Bankruptcy Sale	0.5 %	1.2 %	1.7 %	2.8 %	3.8 %	603	2.6 %
Club deal	19.4 %	29.9 %	29.9 %	28.7 %	27.1 %	6,480	28.4 %
Corporate divestiture	21.1 %	17.3 %	18.4 %	17.7 %	18.1 %	4,108	18.0 %
Cross-border	10.6 %	20.0 %	22.9 %	25.4 %	24.8 %	5,451	23.9 %
Experienced PE firm	53.1 %	66.9 %	71.6 %	74.3 %	78.9 %	16,815	73.8 %
Going private transaction	7.5 %	3.0 %	4.0 %	4.0 %	3.2 %	869	3.8 %
Management participated	41.5 %	40.7 %	43.0 %	35.6 %	25.7 %	8,036	35.3 %
Privatization of government entity	0.3 %	1.0 %	0.4 %	0.2 %	0.2 %	77	0.3 %
Secondary LBO	2.3 %	6.9 %	14.7 %	19.4 %	15.4 %	3,653	16.0 %
Valuation							
EV/EBITDA (median)	10.2x	9.0x	8.0x	9.4x	9.0x	1,402	6.2 %

Panel B: Bankruptcies (by transaction years)

Period	1982-88	1989-95	1996-02	2003-09	2010-13	Total (#)	% of total
Number of bankruptcies	39	128	415	451	36	1,069	100.0 %
Region							
U.S. & Canada	25	83	227	219	18	572	53.5 %
Europe	14	45	188	232	18	497	46.5 %
Deal type (# of bankruptcies / % of all transactions)							
Bankruptcy Sale	3	5	28	55	8	99	9.3 %
Club deal	9	46	114	128	5	302	28.3 %
Corporate divestiture	8	17	67	85	3	180	16.8 %
Cross-border	3	16	63	83	9	174	16.3 %
Experienced PE firm	18	88	308	342	27	783	73.2 %
Going private transaction	6	4	30	30	2	72	6.7 %
Management participated	15	49	149	147	7	367	34.3 %
Privatization of government entity	0	0	0	0	0	0	0.0 %
Secondary LBO	1	7	43	69	5	125	11.7 %
Valuation							
EV/EBITDA (median)	7.0x	7.2x	7.2x	8.0x	9.7x	97	11.7 %

Panel C: Bankruptcy rates (%)

Period	1982-88	1989-95	1996-02	2003-09	2010-13	1982-09	*1982-13*
Bankruptcy rate (%)	6.5 %	7.9 %	8.1 %	4.7 %	0.6 %	6.1 %	4.7 %
Region							
U.S. & Canada	5.7 %	8.8 %	8.8 %	4.7 %	0.6 %	6.4 %	5.0 %
Europe	8.6 %	6.6 %	7.3 %	4.6 %	0.6 %	5.7 %	4.4 %
Deal type (bankruptcy rate % within deal type)							
Bankruptcy Sale	100.0 %	25.0 %	31.8 %	20.3 %	3.6 %	23.8 %	16.4 %
Club deal	7.8 %	9.5 %	7.4 %	4.6 %	0.3 %	6.0 %	4.7 %
Corporate divestiture	6.3 %	6.1 %	7.1 %	4.9 %	0.3 %	5.8 %	4.4 %
Cross-border	4.8 %	4.9 %	5.3 %	3.4 %	0.6 %	4.1 %	3.2 %
Experienced PE firm	5.7 %	8.1 %	8.4 %	4.7 %	0.6 %	6.2 %	4.7 %
Going private transaction	13.3 %	8.2 %	14.6 %	7.7 %	1.1 %	10.2 %	8.3 %
Management participated	6.0 %	7.4 %	6.7 %	4.3 %	0.5 %	5.5 %	4.6 %
Privatization of government entity	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %	0.0 %
Secondary LBO	7.1 %	6.3 %	5.7 %	3.7 %	0.6 %	4.3 %	3.4 %

Table 3 – Sample LBOs and bankruptcies by industry

In order to determine the riskiness of particular industries, I construct individual industry portfolios. I divide the sample LBOs according to their 4-digit SIC codes to 48 Fama French industry portfolios and form time-variant subgroups. All transactions missing a SIC code are labelled as Unknown at the bottom of the table.

All transactions by industry							**Bankruptcy rates**					
Period	82-88	89-95	96-02	03-09	10-13	**Total**	82-88	89-95	96-02	03-09	10-13	**Total**
Business Services	32	120	521	1,258	700	**2,631**	7 %	5 %	5 %	3 %	1 %	**3 %**
Wholesale	30	77	304	734	378	**1,523**	6 %	5 %	8 %	5 %	1 %	**5 %**
Retail	49	87	185	422	176	**919**	7 %	6 %	12 %	13 %	4 %	**12 %**
Trading	6	43	198	443	213	**903**	8 %	7 %	3 %	5 %	2 %	**4 %**
Construction Materials	12	49	172	365	137	**735**	9 %	8 %	6 %	6 %	1 %	**5 %**
Machinery	22	49	171	333	138	**713**	11 %	9 %	6 %	4 %	1 %	**4 %**
Transportation	9	35	90	213	116	**463**	9 %	7 %	4 %	5 %	1 %	**4 %**
Consumer Goods	18	31	99	184	88	**420**	8 %	7 %	11 %	8 %	0 %	**7 %**
Rubber and Plastic Products	12	31	110	171	86	**410**	3 %	2 %	8 %	11 %	3 %	**8 %**
Food Products	11	38	94	172	75	**390**	2 %	2 %	6 %	6 %	0 %	**5 %**
Personal Services	7	17	71	201	92	**388**	2 %	2 %	8 %	3 %	1 %	**4 %**
Construction	4	14	74	180	107	**379**	5 %	4 %	8 %	4 %	0 %	**4 %**
Restaraunts, Hotels, Motels	11	18	77	178	84	**368**	10 %	8 %	12 %	8 %	0 %	**8 %**
Healthcare	2	17	73	159	87	**338**	12 %	10 %	4 %	3 %	0 %	**2 %**
Communication	6	27	75	144	69	**321**	6 %	5 %	11 %	3 %	0 %	**6 %**
Printing and Publishing	10	21	81	149	59	**320**	6 %	4 %	9 %	12 %	0 %	**9 %**
Electronic Equipment	9	30	95	127	51	**312**	9 %	8 %	7 %	3 %	0 %	**5 %**
Chemicals	5	16	80	136	58	**295**	9 %	8 %	6 %	4 %	0 %	**4 %**
Automobiles and Trucks	16	19	75	126	46	**282**	5 %	4 %	19 %	10 %	2 %	**12 %**
Electrical Equipment	10	20	59	116	51	**256**	4 %	3 %	5 %	1 %	0 %	**3 %**
Steel Works Etc	16	22	60	100	33	**231**	14 %	12 %	7 %	7 %	0 %	**8 %**
Business Supplies	6	22	60	92	48	**228**	5 %	4 %	10 %	5 %	0 %	**7 %**
Medical Equipment	9	18	45	95	48	**215**	4 %	3 %	4 %	2 %	0 %	**2 %**
Computers	10	26	57	77	39	**209**	0 %	0 %	7 %	1 %	0 %	**4 %**
Fabricated Products	4	14	52	90	36	**196**	0 %	0 %	12 %	7 %	0 %	**8 %**
Entertainment	2	11	61	85	31	**190**	8 %	8 %	13 %	5 %	0 %	**8 %**
Pharmaceutical Products	2	18	41	78	47	**186**	3 %	2 %	0 %	3 %	0 %	**2 %**
Measuring & Control Equipment	5	15	58	74	31	**183**	3 %	2 %	2 %	0 %	0 %	**1 %**
Textiles	11	17	59	67	27	**181**	8 %	6 %	14 %	9 %	0 %	**10 %**
Insurance	6	16	23	90	41	**176**	4 %	4 %	4 %	0 %	0 %	**2 %**
Banking	2	10	30	77	45	**164**	4 %	3 %	3 %	12 %	0 %	**6 %**
Apparel	8	15	33	71	20	**147**	5 %	4 %	12 %	6 %	0 %	**7 %**
Recreation	5	18	41	61	20	**145**	6 %	5 %	5 %	10 %	0 %	**7 %**
Petroleum and Natural Gas	0	7	26	68	38	**139**	1 %	1 %	0 %	4 %	0 %	**2 %**
Real Estate	1	4	38	54	33	**130**	9 %	7 %	3 %	4 %	0 %	**4 %**
Utilities	0	2	5	56	24	**87**	5 %	4 %	20 %	2 %	0 %	**2 %**
Aircraft	1	11	20	32	15	**79**	5 %	4 %	10 %	3 %	0 %	**4 %**
Candy & Soda	3	5	15	27	16	**66**	6 %	5 %	7 %	7 %	0 %	**5 %**
Agriculture	1	2	18	26	18	**65**	13 %	12 %	17 %	0 %	6 %	**8 %**
Other	0	3	14	35	13	**65**	10 %	8 %	14 %	3 %	0 %	**5 %**
Shipping Containers	2	6	14	20	11	**53**	8 %	6 %	0 %	0 %	0 %	**4 %**
Mines	2	2	7	15	9	**35**	2 %	2 %	0 %	0 %	0 %	**0 %**
Shipbuilding, Railroad Equipment	1	4	7	15	7	**34**	5 %	4 %	0 %	0 %	0 %	**3 %**
Beer & Liquor	4	9	9	5	4	**31**	4 %	4 %	0 %	0 %	0 %	**6 %**
Defense	0	5	1	8	3	**17**	6 %	5 %	0 %	0 %	0 %	**0 %**
Coal	1	2	4	6	0	**13**	5 %	4 %	0 %	0 %	0 %	**8 %**
Unknown	214	580	1,640	2,458	2,273	**7,165**	9 %	8 %	10 %	3 %	0 %	**4 %**
Total	**597**	**1,623**	**5,142**	**9,693**	**5,741**	**22,796**	**7 %**	**8 %**	**8 %**	**5 %**	**1 %**	**5 %**

Figure 5 – Cyclicality and bankruptcy rates across industries in the sample

This figure depicts the relationship between cyclicality and bankruptcy rate of buyout companies in the sample during 1982-2009. The industry portfolios are arranged according to the Fama/French 48 industry portfolios. Cyclicality measures are adopted from Berman & Pfleeger (1997) and matched through portfolio companies' SIC-industry codes. The cyclicality measure reflects the correlation of industry demand with GDP. Y-axis denotes the average bankruptcy rate within the sample's industry portfolio. X-axis indicates the average cyclicality within the industry portfolio. Size of the ball resembles the number of companies within the industry portfolio.

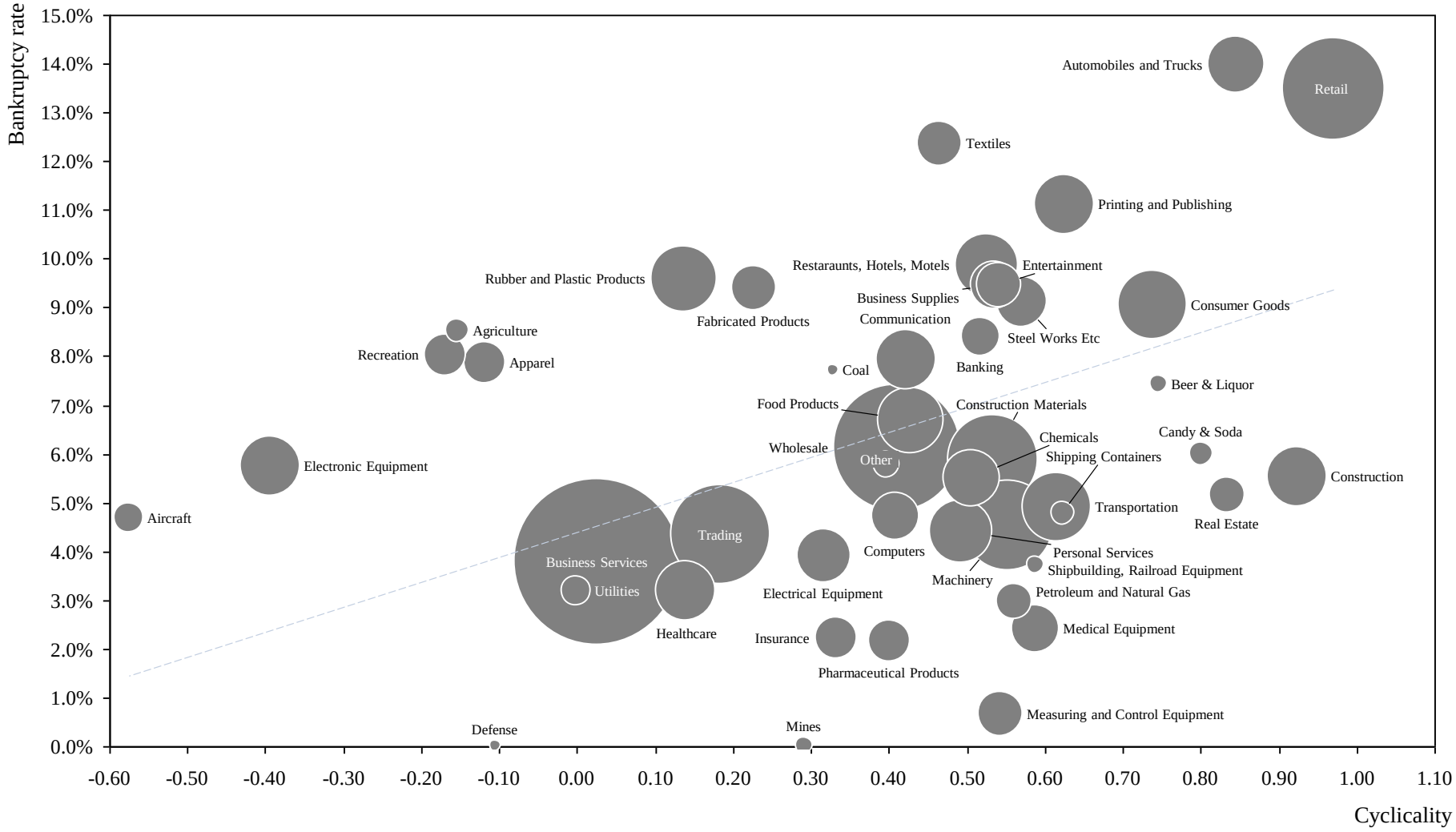


Table 4 – Financial statement information for buyout companies

This table reports the summary of financial statement information for sample buyout companies. The ratios here represent the median values and changes for all the firm-year observations where available data exists. The availability of data between financial ratios is scattered. Hence, the median values may slightly differ from the latter analysis in section 6 where the sample consists of those buyouts that have all of the ratios below. Mean values for these estimation samples are reported in Appendix. Title t+0 refers to the year when the transaction is announced and b+0 when the company goes bankrupt. *Values* column exhibits the financial ratios. *Changes* column reports the year-on-year changes (e.g. b-2 is the %-change from b-3 to b-2).

Financials		Values							Changes		
Time		t-1	t+0	t+1	t+2	b-2	b-1	b+0	b-2	b-1	b+0
Net debt to EBITDA (x)											
Bankrupt	Median	2.4x	5.2x	5.5x	5.2x	6.6x	8.6x	1.8x	3.0%	5.0%	-14.0%
	N	121	121	129	131	168	102	95	157	119	72
Non-bankrupt	Median	0.8x	2.7x	3.5x	3.0x	-	-	-	-	-	-
	N	1,393	1,030	1,145	1,176	-	-	-	-	-	-
Interest coverage (x) (calculated as EBIT/Interest expenses)											
Bankrupt	Median	2.4x	1.5x	1.0x	0.9x	0.6x	0.1x	0.3x	-36.0%	-58.0%	-44.0%
	N	122	120	128	132	169	126	95	151	115	72
Non-bankrupt	Median	3.9x	2.4x	1.6x	1.7x	-	-	-	-	-	-
	N	1,198	1,007	1,095	1,140	-	-	-	-	-	-
EBITDA margin (%) / Change in EBITDA (%)											
Bankrupt	Median	12.5%	12.5%	13.0%	11.5%	8.6%	6.6%	2.3%	-9.0%	-29.0%	-23.0%
	N	145	134	144	143	184	133	122	159	120	78
Non-bankrupt	Median	11.3%	11.5%	12.3%	12.6%	-	-	-	-	-	-
	N	1,654	1,271	1,347	1,391	-	-	-	-	-	-
Capex to Sales (%)											
Bankrupt	Median	3.5%	3.3%	3.6%	4.5%	3.0%	2.8%	2.4%	-2.0%	-16.0%	-14.0%
	N	138	126	131	132	165	128	84	154	116	75
Non-bankrupt	Median	3.1%	3.1%	3.2%	3.3%	-	-	-	-	-	-
	N	1,267	934	1,022	1,087	-	-	-	-	-	-
Cash conversion (%) (calculated as (EBITDA-Capex)/EBITDA)											
Bankrupt	Median	69.0%	73.0%	70.0%	65.0%	67.0%	70.0%	72.0%	-5.0%	-5.0%	-7.0%
	N	130	119	128	127	152	116	79	141	100	95
Non-bankrupt	Median	76.0%	77.0%	78.0%	78.0%	-	-	-	-	-	-
	N	1,203	886	960	1,027	-	-	-	-	-	-
ROA (%)											
Bankrupt	Median	4.5%	2.5%	3.0%	2.3%	1.4%	0.0%	0.2%	-29.0%	-47.0%	-8.0%
	N	127	127	137	136	177	129	105	155	118	69
Non-bankrupt	Median	4.0%	3.5%	3.2%	3.8%	-	-	-	-	-	-
	N	1,560	1,197	1,285	1,316	-	-	-	-	-	-
Total debt to Total assets (%)											
Bankrupt	Median	67.0%	74.6%	79.9%	78.3%	77.6%	78.5%	76.3%	5.0%	16.0%	14.0%
	N	185	195	215	205	267	199	149	150	108	59
Non-bankrupt	Median	61.8%	67.9%	71.0%	71.3%	-	-	-	-	-	-
	N	3,239	3,093	3,201	3,186	-	-	-	-	-	-
Fixed assets to Total assets (%)											
Bankrupt	Median	28.0%	20.0%	20.0%	24.0%	21.0%	34.0%	38.0%	0.0%	22.0%	11.0%
	N	128	83	108	110	96	117	69	89	75	64
Non-bankrupt	Median	17.0%	15.0%	12.0%	14.0%	-	-	-	-	-	-
	N	1,544	663	767	879	-	-	-	-	-	-
Altman Z (lower value indicates larger distress)											
Bankrupt	Median	1.76	1.1	1.08	1.16	1.19	0.85	1.15	-	-	-
	N	128	122	134	130	174	127	105	-	-	-
Non-bankrupt	Median	2.19	1.67	1.46	1.5	-	-	-	-	-	-
	N	1,358	1,019	1,090	1,149	-	-	-	-	-	-

Table 5 - Descriptive bankruptcy filing statistics

This table describes bankruptcy filing statistics for sample buyouts when data is available. The data is based on Capital IQ bankruptcy database which considers U.S. bankruptcies. Chapter 11 refers to a bankruptcy protection where the company aims to reorganise its debt and re-emerge as a healthy organisation. In Chapter 7, bankruptcy firms' assets are liquidated in order to pay creditors. Debtor-in-possession financing (DIP) refers to financing arranged for a company under Chapter 11 which usually has priority over existing debt, equity and other claims.

Bankruptcy filing type	Involuntary	Voluntary	All
Chapter 11	10.7 %	70.9 %	67.7 %
Chapter 11 Liquidation to Chapter 7	0.0 %	1.2 %	1.2 %
Chapter 11 Reorganization to Chapter 11 Liquidation	3.6 %	11.4 %	11.0 %
Chapter 11 Reorganization to Chapter 7	10.7 %	6.7 %	6.9 %
Chapter 7	67.9 %	9.3 %	12.5 %
Chapter 7 to Chapter 11 Liquidation	0.0 %	0.2 %	0.2 %
Chapter 7 to Chapter 11 Reorganization	7.1 %	0.2 %	0.6 %
All filings	5.4 %	94.6 %	100.0 %
Observations	*28*	*492*	*520*

Average of months to emergence/liquidation	Involuntary	Voluntary	All
Chapter 11	8.5	9.2	9.2
Chapter 11 Liquidation to Chapter 7	-	17.3	17.3
Chapter 11 Reorganization to Chapter 11 Liquidation	-	9.8	9.8
Chapter 11 Reorganization to Chapter 7	10.7	14.0	13.4
Chapter 7	5.8	4.0	4.7
Chapter 7 to Chapter 11 Liquidation	-	1.4	1.4
Chapter 7 to Chapter 11 Reorganization	19.6	2.5	13.9
All filings	8.6	9.2	9.2
Observations	*28*	*492*	*520*

Bankruptcy plan financing sources	Number of financings	% of all financed
Issuance of Debt	84	65.1 %
Cash in Hand	27	20.9 %
Sale of Assets	42	32.6 %
Issuance of Equity	92	71.3 %
Observations	*129*	*100.0 %*

Debtor-in-posession financing types	Number of financings	% of all financed
Term Loan	66	27.7 %
Revolving Credit	132	55.5 %
Credit Facilities	52	21.8 %
Corporate Bond/Note	1	0.4 %
Letter of Credit	7	2.9 %
Commercial Paper	1	0.4 %
Observations	*238*	*100.0 %*

5.4.Variables

Table 6 describes the variables which I use in latter analyses to explain bankruptcies for buyout companies in the sample. In addition to variables described in the table, I formulate an interaction variable in order to capture the relationship of cyclicality with economic state.

As discussed in section 5.3, in order to properly explain bankruptcy probability with cyclicality, the simultaneous effects of the state of the economy and underlying cyclicality of the business should be analysed together. I apply continuous pairwise-products representing pairwise interactions of (1) two-year GDP change three years before the transaction and to the announced transaction year, and (2) Berman & Pfleeger (1997) cyclicality measure.

Table 6 – Variable descriptions

This table provides a descriptive summary of variables used in the statistical analysis. They are introduced with brief descriptions and data sources.

Dependent variable	**Description**
Bankruptcy	Binary variable that takes the value of one if the buyout company bankrupts or goes through debt reorganisation under incumbent private equity ownership within period January 1982- June 2014. Source: Capital IQ, Orbis, Mergermarket.
Independent variables	**Description**
Buyout characteristics	*Dummy variables. Source: Capital IQ*
Bankruptcy Sale	1 = if buyout company is acquired from bankruptcy
Club deal	1 = if the buyout company is acquired by more than one PE firms
Corporate divestiture	1 = if the acquired buyout company is a partial spin-off of another continuing firm
Cross-border	1 = if the buyout company and acquirer(s) headquarters locate in different countries
Experienced investor	1 = if the acquirer(s) have experience from at least five prior buyouts
Geography	1 = if the buyout company is located in the U.S. or Canada
Going private transaction	1 = if the buyout company is publicly listed before the buyout
Industry	1 = if the buyout SIC code matches industry, 47 dummy variables (See Table 2)
Management participated	1 = if the buyout company's post-buyout management invests equity into the firm
Privatization of gov. entity	1 = if the buyout company is government owned before the buyout
Secondary LBO	1 = if the buyout company is acquired from another PE firm
Target firm characteristics	*Continuous variables. Source: Capital IQ*
Altman Z	Measure of financial distress and bankruptcy likelihood
Cash conversion	Share of operational cash flow converted to free cash flow = (EBITDA-Capex)/EBITDA
Cyclicality	Measure of the buyout's industry correlation with GDP. Source: Berman & Pfleeger (1997)
Firm age	1= if the buyout firm younger than five years at the time of buyout
Firm size	Size of the firm = Log (Total Assets)
Interest coverage	Company's ability to pay interest on outstanding debt = EBIT/Interest Expenses
Leverage1	Proportion of assets financed by debt = Total Debt/Total Assets
Leverage2	Ratio of debt compared to cash flow = Net Debt/EBITDA
Profitability1	Company's profitability with regard to operations = EBITDA/Revenue
Profitability2	Company's profitability with regard to capital = Net Income/Total Assets
Tangibility	Collateralisability of firm's assets = Fixed Assets/Total Assets
Transaction price	Transaction price multiple = Enterprise Value/EBITDA
Economic climate	*Continuous and categorical variables. Multiple sources*
Confidence	General business confidence according to transaction year and buyout country. Source: OECD
Credit	Domestic credit to private sector as a percentage of GDP according to transaction year and buyout country. Source: Worldbank
Growth	Economic growth, GPD change in the transaction year. Source: OECD
Inflation	Change in buyout company's consumer price index according to transaction year and buyout country. Source OECD
Creditor rights	Measure of buyout company country's legal rights of creditors against defaulting debtors. Ranges from zero (poor) to four (strong). Source: Djankov et al. (2007)
Credit spread	Indicator of credit risk premium and favourability of credit markets with respect to buyout location and transaction month. Measured as BofA ML high yield index minus Libor with respect to transaction month (for both U.S. and Europe). Source: Datastream
Credit tightening index	Net percentage of U.S. loan officers at medium and large banks reporting tightening of standards for loans. Source: US Federal Reserve

6. Analysis and results

The following analysis section is divided into two distinct parts. Firstly in section 6.1, I analyse the impact of capital structure and profitability ratios. Next, in part 6.2, I study the impact of deal type/source, cyclicality and economic climate on bankruptcy probability and initial financial distress risk (measured as Altman Z score). Furthermore, I explain my methodology with the analyses. Descriptions for variables are reported in Table 6.

6.1.Portfolio firm financials

Next, I report the methodology and results for the analysis regarding financial strength of portfolio companies in the sample. For the estimation I apply probit regression, a binary classification model, with Bankruptcy as the dependent variable. Probit model estimates the probability of an event occurring through maximum likelihood procedure for a set of explanatory variables (Dougherty, 2002). In a simplified form, the regression equation is as follows:

$$\Pr(Bankruptcy_i = 1) = \Phi(\beta_0 + \sum \beta_i \, Explanatory\ variables + \varepsilon_i) \qquad \textit{(Equation 1)}$$

The coefficients for dependent variables from the probit estimation are subsequently converted to marginal effects at mean values. Mean values for estimation samples are reported in Appendix. Marginal effects enable interpretation of the probit model: for the mean company in the sample, each unit increase in the independent variable increases/decreases the probability of the dependent variable by the marginal effect expressed as a percent.

However, as noted in section 5.3 the lack of financial data may expose the analysis to sample selection bias. The selection bias error arises when a non-random sample of a population causes some observations in the population to be less likely included than others. This results in a biased sample where all observations are not equally balanced or objectively represented (Dougherty, 2002). As the number of buyout companies that have adequate financial information is significantly lower compared to the sample, selection bias might yield inconsistent results. In the following subsections I will first describe methods to overcome the sample selection bias. Then, I analyse the effects of capital structure and profitability on buyout bankruptcy.

6.1.1. Controlling for sample selection bias

I use probit model with sample selection to take into account the self-selection bias (Van de Ven & Van Praag, 1981). The latent model assumes that there exists an underlying relationship for the dependent variable y_i

$$y_i^* = x_i\beta + u_{1i} \qquad \textit{(Latent equation)}$$

such that only the binary outcome is observed

$$y_j^{probit} = (y_j^* > 0) \qquad \textit{(Probit equation)}$$

However, if sample selection bias exists, the dependent variable is not always observed. Instead, the dependent variable for observation *i* is observed if

$$y_i^{select} = (z_j\lambda + u_{2i} > 0) \qquad \textit{(Selection equation)}$$

where

$$u_1 \sim N(0,1)$$
$$u_2 \sim N(0,1)$$
$$\text{corr}(u_1, u_2) = \rho$$

When $\rho \neq 0$, standard probit techniques applied to the first equation would yield biased results. The inclusion of selection equation provides consistent, asymptotically efficient estimates for all the parameters in such models. The selection model should have a minimum of one variable that does not belong to the main probit equation. (Press, 2005)

The selection correction procedure estimates the sample-selection correlation term denoted as Mills ratio λ. I structure the selection equation on the basis of whether there is adequate financial data to calculate interest coverage ratios for the observations. I obtain estimates for the coefficients ω of observable variables Z_i *(Selection equation)* by using transaction year, portfolio company country dummies, creditor rights, transaction secondary features and company age as explanatory variables.

Depending on whether the firm has adequate financials, Mills ratio is determined as follows:

$$\lambda_i = \frac{\phi(\hat{\omega} * Z_i)}{\Phi(\hat{\omega} * Z_i)} \quad \text{if } \textit{Financials}_i = 1$$

$$\lambda_i = \frac{-\phi(\hat{\omega} * Z_i)}{1-\Phi(\hat{\omega} * Z_i)} \quad \text{if } Financials_i = 0$$

where Φ denotes the density distribution function and ϕ the density distribution function of the standard normal distribution. After the coefficients for λ_i are determined, it is added as an independent variable to the probit regression. According to Edelen & Kadlec (2005), adding λ into a regression is similar to adding a correlated omitted variable to a misspecified regression. Adding λ causes the explanatory coefficients to be estimated with less bias, or no bias if λ completely captures the in-sample covariance between η_i and Z_i.

Having controlled for sample selection bias, I analyse how the firm specific capital structure, profitability and bankruptcy likelihood ratios are associated with buyout bankruptcy. The equation form is as follows (Dougherty, 2002):

$$E(Bankruptcy_i | E_i = 1, X_i) = \beta_0 + \sum \beta_i \, Explanatory\ variables + \frac{\sigma_{u\varepsilon}}{\sigma_\varepsilon}\lambda_i \quad \textit{(Equation 2)}$$

where $\sigma_{u\varepsilon}$ is the population covariance of the selection category u and ε. σ_ε is the standard deviation of ε and the inverse Mill's ratio λ_i. The results for the second step of the model are reported in Table 7 along with the normal probit model estimations.

6.1.2. Impact of portfolio company financial strength on bankruptcy

Table 7 reports the results for both Probit and Probit with Heckman correction model. The models estimate buyouts conducted during 1994-2009 and aim to explain hypotheses about portfolio firm characteristics presented in section 4.2. Mean values for variables in the estimation are reported in Table 12 in appendix. The target company financials refer to financial statement information one year after the buyout. The statistical significance of the Inverse Mill's ratio in the Heckman model indicates that sample selection exists, but even with the corrected error terms the model yields significant results despite small differences in coefficients.

The results indicate that higher leverage significantly increases the probability of bankruptcy, as expected. One unit increase in leverage increases the likelihood of bankruptcy by 0.7%. For the mean company in the sample, this means an increase in leverage from 5.05x to 5.09x. The benefits of leverage derive from magnifying returns and avoiding taxes, but yet many LBOs use much higher leverage than needed (Opler & Titman, 1993). High levels of leverage leave

little leeway for buyout companies in case the projected cash flows do not realise, which makes LBOs very vulnerable to unexpected changes. The finding is also in line with Axelson et al. (2012) who find that transaction-level leverage is negatively related to fund-level returns. The authors suggest that that private equity firms apply highly leveraged structures more in their own (carried) interest than their investors'.

Companies that have higher cash conversion are less likely to go bankrupt, as expected. One unit increase in cash conversion % from its mean decreases the probability of bankruptcy by 3.6%. For the mean company in the sample, this means an increase from 62.2% to 79.6%. This indicates that firms with lower investment needs, and hence higher share of free cash flow to service debt, are significantly less likely to go bankrupt.

Higher interest coverage (calculated as EBIT/Interest expenses) appears to decrease the probability of bankruptcy, as expected. Interest coverage measures the ability of a company to pay interest on its debt outstanding and lenders often require minimum levels for this in their covenants. One unit increase in interest coverage decreases the likelihood of bankruptcy by 2%. For the mean company in the sample, this means an increase from 2.2x to 2.3x.

The strength of the portfolio company country's creditor rights appears has a very significant effect on the bankruptcy probability. The results suggest that in countries with high creditor rights, buyouts are significantly less likely to bankrupt. This in line with the findings of Acharya et al. (2011) who report that less buyout leverage is used in countries where the potential liquidation value is lower (i.e. higher creditor rights).

Finally, larger buyouts are less likely to bankrupt while more profitable companies measured by Return on Assets are less likely to bankrupt, as expected. Also, the tangibility of company's assets does not appear to significantly affect the probability of bankruptcy.

Table 7 – Impact of portfolio company financial strength on bankruptcy

This table reports the results for Probit and Heckman correction regressions estimating the cross-sectional portfolio firm characteristics' effect on the probability of buyout bankruptcy during 1994-2009. Financials refer to financial statement information one year after the buyout. The dependent variable, Bankruptcy, a binary variable has the value of one if the buyout bankrupts. *Leverage1* is the portfolio company's cash-based leverage, calculated as Net debt to EBITDA. *Interest Coverage* is the ability to pay interest on debt outstanding, calculated as EBIT to Interest expenses. *Firm size* is the logarithm of Total Assets. *Profitability1* is cash flow-based profitability calculated as EBITDA to Revenue. *Tangibility* is Fixed assets to Total assets. *Leverage2* is Total debt to Total Assets. *Profitability2* is Net income to Total assets. *Cash conversion* is the share of operational cash flow converted into free cash flow, calculated as (EBITDA-Capital expenditures)/EBITDA. Inverse Mill's ratio adjusts the error term for missing observations. All the ratios are winsorised with p(0.1).

White's heteroskedasticity robust standard errors are reported in parentheses. Marginal effects at variable means are reported in square brackets. ***, **, and * denote the statistical significance of regression coefficients at the level of 1%, 5%, and 10% respectively.

Dependent variable	Exp.	Bankruptcy					
Model	Sign	Probit (1)	Probit (2)	Heckprobit (1)	Heckprobit (2)	Dif. (1)	Dif. (2)
Leverage1	(+)	0.119***		0.070**		0.049	
		(0.026)		(0.033)			
		[0.005]		[0.007]			
Profitability1	(+)	-0.004		-0.002		-0.002	
		(0.007)		(0.008)			
		[-0.000]		[-0.000]			
Cash conversion	(-)	-0.316**		-0.387**		0.071	
		(0.158)		(0.174)			
		[-0.014]		[-0.036]			
Leverage2	(+)		0.010***		0.010***		0.000
			(0.003)		(0.003)		
			[0.001]		[0.003]		
Profitability2	(-)		-0.041***		-0.041***		0.000
			(0.014)		(0.015)		
			[-0.006]		[-0.013]		
Tangibility	(-)		0.289		0.232		0.057
			(0.357)		(0.390)		
			[0.040]		[0.071]		
Interest Coverage	(-)	0.012	0.001	-0.182**	-0.024	0.194	0.025
		(0.410)	(0.030)	(0.091)	(0.035)		
		[0.001]	[0.000]	[-0.017]	[-0.007]		
Firm size	(+/-)	-0.293**	-0.247**	-0.387**	-0.285**	0.094	0.038
		(0.142)	(0.125)	(0.154)	(0.131)		
		[-0.013]	[-0.034]	[-0.036]	[-0.087]		
Creditor rights	(-)	-0.557***	-0.328***	-0.320***	-0.188	-0.237	-0.140
		(0.089)	(0.113)	(0.036)	(0.071)		
		[-0.024]	[-0.045]	[-0.051]	[-0.058]		
Inverse Mill's ratio				-0.262*	-0.323*		
				(0.205)	(0.189)		
Constant		-5.219***	-1.789***	-4.281***	-0.932		
		(0.444)	(0.481)	(0.799)	(0.667)		
Observations		693	794	558	629		
Adjusted R2		0.2320	0.2020	-	-		
Wald chi2		931.31	89.85	456.22	77.39		
Year fixed effects		Yes	Yes	Yes	Yes		
Industry fixed effects		Yes	Yes	Yes	Yes		
Bankruptcy rate		13.6 %	12.8 %				

6.2.Buyout characteristics, cyclicality and economic climate

In order to answer my hypotheses about the impact of deal source/type, cyclicality and economic climate, I conduct multiple regressions to test the significance across time periods using probit estimation. In addition to testing the actual bankruptcy events, I analyse the initial distress risk one year after the buyout has been conducted. In the latter analysis, as a dependent variable I use the Altman Z-score which measures companies' financial distress likelihood (Altman, 1968). It is calculated as follows:

$$Z' = 0.717T_1 + 0.847T_2 + 3.107T_3 + 0.420T_4 + 0.998T_5$$

where T_1 = (Current Assets − Current Liabilities) / Total Assets, T_2 = Retained Earnings / Total Assets, T_3 = Earnings Before Interest and Taxes / Total Assets, T_4 = Book Value of Equity / Total Liabilities, T_5 = Sales/ Total Assets. The Altman Z yields a ratio for financial distress where a higher value indicates lower distress.

The OLS-regression equation formula is as follows:

$$Altman\ Z_i = \beta_0 + \sum \beta_i\ Explanatory\ variables + \varepsilon_i) \qquad \textit{(Equation 3)}$$

Buyout characteristics are in the form of binary variables, which take the value of one if the criterion applies for the buyout. Factors of economic climate indicate the prevailing economic or credit conditions at the time when the buyout is announced in the country of the portfolio company's headquarters. Since the availability of many indicators for economic climate are limited to up to 20 years of backwards data, the analysis focuses on buyouts conducted 1994 onwards. Furthermore, allowing buyouts some time to go bankrupt, I also restrict the analysis to consider transactions conducted before the year 2010 (median years-to-bankruptcy in the sample is 5 years). In addition, the analysis is divided into separate subgroups in order to analyse differences in the effects during the very distinct boom and bust periods (see section 2.1.2). The first sub-sample covering years 1994-1997 takes place during the beginning and middle of the second private equity boom period, which was characterised by mostly buyouts of private firms and new industries such as ICT and financial services. The second sub-sample (1998-2001), captures the effects of the Dot-com bubble where a large number of LBOs was performed with very high valuation multiples and were concentrated around companies with less traditional business models (Carey & Morris, 2012). The third sub-sample (2002-2005) takes place after the burst of the internet bubble and was characterised by a weak credit market and sluggish

stock market until mid-2000s. The fourth sub-sample (2006-2009) captures the radical growth in liquidity in the credit markets and the subsequent subtraction due to the collapse of the sub-prime market in 2007.

6.2.1. Impact of buyout deal source and type on bankruptcy and financial distress

Table 8 reports the results for Probit regressions about bankruptcy probability and Table 9 for OLS-regressions about the initial financial distress measured at one year after the transaction.

The results indicate that buyouts that are originally acquired from under bankruptcy proceedings are 10% more likely to go bankrupt again compared to other sample buyouts, as expected. The effect is statistically significant and meaningful in each time period. At the same time Altman Z scores are insignificant (except 1994-1997), implying that bankruptcies in these cases do not derive from issues related to capital structure or profitability. This highlights the riskiness of the strategy of so called "vulture investors" who buy distressed entities with the hope of magnifying profits with a successful turnaround.

Going private transactions, where the portfolio company is publicly listed before the LBO, appear to be significantly (3%) more likely to go bankrupt. Similarly these transactions entail also higher initial distress risks. The effect is particularly significant during the dot-com bubble, when the private equity firms were challenged by the stratospheric returns venture capital investors were making from IPOs for firms such as eBay, Netscape, Yahoo! and Amazon (Carey & Morris, 2012). In an effort to reach similar returns with a conventional LBO model, private equity firms might have taken excessive risks and bet on uncertain business models, which eventually went bust.

The results on cross-border transactions indicate (2%) lower bankruptcy probability. The pattern of decreasing significance over the years indicates that during the earlier years, cross-border transactions may have been considered to entail additional risks due to higher information asymmetry, and hence undertaken only if the outlook seemed very positive. Furthermore, cross-border transactions might have been less prone to bidding wars and hence private equity practitioners could have achieved sufficient returns with lower leverage. A closer look at the data supports this hypothesis. Cross-border transactions conducted during 1994 to 2005 were carried on average approximately 0.5x lower leverage levels (Net debt to EBITDA). As the private equity industry has matured, private equity firms have set up international offices which might have caused the significance to disappear in the later years.

The perhaps most controversial finding among buyout characteristics is the effect of private equity firm experience on the bankruptcy probability. The findings suggest that during 1994 to 2001, private equity firms with experience from at least five prior transactions are (2%) more likely conduct buyouts that eventually go bankrupt. In addition, experienced investors also have higher initial risk figures. I perform sensitivity alterations to the threshold number which determines the amount of prior transactions needed to be qualified as an experienced investor (analysis not reported), and find that the data yields similar results with longer transaction experience. Hence, it seems that established private equity firms make riskier investments and with a larger number of overall investments can also cope with higher average bankruptcy rates. In this sense, I check whether there exists survivorship among private equity firms based on bankruptcy, which would affect the number of later investments they make (analysis not reported). However, I find no evidence that bankruptcy events would significantly limit the amount of subsequent transactions for a private equity firm. Rather, it is likely that for private equity firms having low number of total transactions, they have avoided bankruptcies relatively well but not have not been able to provide high enough returns to raise capital for additional investments, as Chung et al. (2012) report.

Management participation appears to have some decreasing effect (1-2%) on bankruptcy probability, as expected. Meanwhile, financial distress risk is not significantly different for these transactions. The significance and meaningfulness of management participation seems to decrease over time, in line with the percentage of deals having management inject their own equity capital into the portfolio company. As reported in Table 2, the fraction of deals including management participation has come down approximately 40% from its peak years in 1996-2002. This perhaps represents a distinct change in the habits of private equity firms. This could indicate that private equity firms in general no longer see so much value in aligning the incentives of incumbent management with equity participation. As private equity firms often do not hesitate to replace underperforming management (Acharya et al., 2009), performance-based schemes might have substituted for management's direct stock ownership.

Secondary buyouts are also associated with (2-3%) lower bankruptcy probability but higher initial financial distress risk, as expected. The effect on bankruptcy probability is significant and meaningful thorough the sample. This suggest that private equity ownership in general develops companies that are of better quality in terms of avoiding distress, compared to other sample buyouts. While investments in SBOs might not provide spectacularly high returns

because many of the operational or governance engineering opportunities have already been realised, the evidence suggest that they can be seen as less risky. Hence, private equity firms can apply capital structures that entail more risk.

The findings for club deals provide some evidence for multiple investors' improved ability of avoiding distressed buyouts. The hypothesis is however statistically significant only during 1994-1997 and the mark of the coefficients varies among time-periods. Since there are variety of motivations for private equity firms to co-invest with other investors, I conclude that club deals is not significantly and consistently associated with bankruptcy probability.

Finally, buyouts of companies founded less than five years from the transaction are associated with (1-3%) higher probability of bankruptcy, as expected. Logically, the effect exists especially during the Dotcom-bubble when many companies' financial projections were loaded up with positive expectations about scalable possibilities brought by the Internet. A case in point in the data can be found from the buyout of Outsourcing Solutions Inc. conducted by two private equity firms Pamlico Capital and Madison Dearborn Partners in December 1999. Outsourcing Solutions, then a four-year old company, provided specialized outsourcing services to SMEs. Pamlico and Madison Dearborn paid a hefty 13 times EBITDA for the company amounting to $844 million and loaded it up with heavy leverage of 7.3x Net debt to EBITDA. The company soon ran into trouble by being unable to finance some of its operations and eventually failed to pay principal and interest due in late 2002. New business was almost impossible to obtain since customers knew that the debtors were in default on its bank loans. The company finally fell into hands of creditors and filed for Chapter 11 (Chapter 11 Cases, 2012).

6.2.2. Impact of economic climate and cyclicality on bankruptcy and financial distress

The second part of Table 8 reports the probit regression results for explanatory variables that capture the effects of economic climate and cyclicality on buyout bankruptcy. These aim to answer hypotheses about cyclicality in section 4.2 and economic climate in section 4.3.

The results consistently indicate that buyouts conducted during favourable economic conditions are more likely to go bankrupt. Especially, changes in the portfolio company country's gross domestic product in the year when the transaction is performed, explain the effect particularly well. Two percent point increase in GDP from its mean (2%) appears to increase bankruptcy probability by two percent. Valuations generally reflect the state of the economic outlook, and

hence high economic growth associated with higher price tags may facilitate for more risky transactions. Furthermore, the insignificant coefficients for Altman Z score indicate that the determinants for bankruptcies conducted during high growth periods are found somewhere else than in capital structures. One possible explanation could be that the pre-buyout projections might be more upbeat if the economy is growing. If the portfolio company later fails to reach its ambitious projections, the risk of not being able to manage its debt load intensifies. Unfortunately, due to secretive nature of the private equity industry, the availability of transaction multiples does not enable sufficient analysis about the effect of valuations.

Furthermore, the favourability of credit market appears also to be associated with higher probability of bankruptcy. For transactions conducted during 1998-2001 one unit increase in credit spread decreases the likelihood of bankruptcy by 1%. For the mean company in the sample, this means an increase from 4.6% to 7.2%. During 1994-2001, low spreads (high yield index minus Libor) and favourable credit conditions enabled high levels of leverage for borrowers. This consequently reflected in higher risk and default rates, in line with the findings of (Tykvová & Borell, 2012) who, however instead of bankruptcy events analyse bankruptcy likelihoods.

Finally, I report that the cyclicality of the underlying business is also associated with higher bankruptcy probability for the sample period 1994-2009 despite lower initial financial distress risk. One unit increase in cyclicality measure increases the likelihood of bankruptcy by 3%. For the mean company in the sample, this means an increase from 0.19 to 0.36. However, by interacting the cyclicality measure with GDP (three-year change before the transaction), the results indicate that when invested at the right time in an economic cycle, the default probability is in fact lower.

Table 8 – Impact of deal characteristics, cyclicality and economic climate on bankruptcy

This table reports the results for probit regression on the effects of buyout characteristics and prevailing economic climate on buyout bankruptcy probability. Buyout is considered as bankrupt, if it is assigned with a value of one. *Bankruptcy sale* refers to buyouts where the company is acquired from bankruptcy. *Going private transaction* refers to buyouts where the company is publicly listed prior to buyout. *Corporate Divestiture* refers to buyouts where the portfolio company is a unit of another entity before the buyout. *Cross border* is a transaction where the portfolio company and the private equity firm's headquarters locate in different countries. *Experienced investor* is when the private equity firm has experience from at least five prior transactions. *Management participated* refers to transactions where the portfolio company's top executives have injected their personal money to the equity capital. *Secondary LBO* is when the portfolio company is also private equity backed prior to buyout. *Club deal* is when there is more than one buyer in addition to the private equity firm. *Younger than 5y* refers to buyout companies founded less than five years before the buyout is announced. Mean values for estimation sample are reported in Table 13 in Appendix to enable statistical inference of the marginal effects.

White's heteroskedasticity robust standard errors are reported in parentheses. Marginal effects at variable means are reported in square brackets. ***, **, and * denote the statistical significance of regression coefficients at the level of 1%, 5%, and 10% respectively.

Dependent variable	Exp.	Bankruptcy				
Time period	Sign	1994-2009	1994-1997	1998-2001	2002-2005	2006-2009
Buyout characteristics						
Bankruptcy Sale	(+)	0.973***	0.687**	1.168***	0.976***	1.036***
		(0.083)	(0.328)	(0.202)	(0.139)	(0.129)
		[0.098]	[0.074]	[0.151]	[0.090]	[0.074]
Going Private Transaction	(+/-)	0.278***	0.348	0.468***	0.135	0.136
		(0.077)	(0.253)	(0.139)	(0.151)	(0.139)
		[0.028]	[0.037]	[0.061]	[0.013]	[0.010]
Corporate Divestiture	(-)	-0.087*	0.188	-0.120	-0.162*	-0.048
		(0.049)	(0.121)	((-0.1)	(-0.09)	(0.094)
		[-0.009]	[0.020]	[-0.016]	[-0.015]	[-0.003]
Cross-Border	(+/-)	-0.185***	-0.348***	-0.169*	-0.153*	-0.115
		(0.046)	(0.131)	((-0.1)	(0.092)	(0.079)
		[-0.019]	[-0.037]	[-0.022]	[-0.014]	[-0.008]
Experienced investor	(-)	0.062	0.205**	0.198**	0.027	-0.009
		(0.041)	(0.104)	(0.081)	(0.077)	(0.077)
		[0.006]	[0.022]	[0.026]	[0.002]	[-0.001]
Management Participated	(-)	-0.064*	0.084	-0.175**	-0.072	-0.023
		(0.037)	(0.098)	(0.075)	(0.069)	(0.066)
		[-0.006]	[0.009]	[-0.023]	[-0.007]	[-0.002]
Secondary LBO	(-)	-0.209***	-0.298*	-0.16	-0.329***	-0.104
		(0.051)	(0.174)	(0.106)	(0.095)	(0.085)
		[-0.021]	[-0.032]	[-0.021]	[-0.030]	[-0.007]
Club deal	(+/-)	0.002	-0.204**	0.096	0.046	-0.023
		(0.039)	(0.102)	(0.076)	(0.071)	(0.072)
		[0.000]	[-0.022]	[0.012]	[0.004]	[-0.002]
Younger than 5y	(+)	0.110**	0.035	0.203**	0.016	0.119
		(-0.05)	(0.121)	(0.085)	(-0.11)	(0.106)
		[0.011]	[0.004]	[0.026]	[0.001]	[0.009]

Continues….

Table 8 – Impact of deal characteristics, cyclicality and economic climate continued

GDP change is the change in the portfolio company country's gross domestic product in the transaction year. *Credit spread* is the spread in high yield index and libor rates in the month when the transaction is announced, values are separate for the U.S. and Europe. *Cyclicality* is the dependence of the portfolio company's industry demand on GDP (adopted from Berman & Pfleeger (1997). *GDP change*Cyclicality* as an interaction variable measures the effect of cyclicality along with the prevailing economic cycle. Here the GDP change is the three-year change before the buyout. *Credit tightening* is the net percentage of banks reporting tightening standards for loans in the transaction year. *Creditor rights* is the legal rights of creditors against defaulting debtors, ranging from zero (poor) to four (strong), adopted from Djankov et al. (2006).

Continues….

Dependent variable	Exp.	Bankruptcy				
Time period	Sign	1994-2009	1994-1997	1998-2001	2002-2005	2006-2009
Economic climate						
GDP change	(+)	0.156***	0.067	0.101**	0.209***	0.077***
		(0.017)	(-0.05)	(0.043)	(0.047)	(0.028)
		[0.016]	[0.007]	[0.013]	[0.019]	[0.006]
Credit spread	(-)	-0.01	-0.153**	-0.067**	0.009	-0.012
		(0.008)	(0.071)	(0.026)	(0.024)	(0.015)
		[-0.001]	[-0.016]	[-0.009]	[0.001]	[-0.001]
Cyclicality	(+)	0.336*	-0.991*	0.254	0.186	0.309
		(0.174)	(0.587)	(0.481)	(0.295)	(0.263)
		[0.034]	[-0.106]	[0.033]	[0.017]	[0.022]
GDP change*Cyclicality	(+/-)	-0.029**	0.01	-0.025	-0.018	-0.018
		(0.014)	(0.049)	(0.033)	(-0.03)	(0.025)
		[-0.003]	[0.001]	[-0.003]	[-0.002]	[-0.001]
Credit tightening	(+)	0.002*	0.003	0.003	0.004	-0.001
		(0.001)	(-0.01)	(0.003)	(0.004)	(0.002)
		[0.000]	[0.000]	[0.000]	[0.000]	[-0.000]
Creditor rights	(+)	0.022	-0.038	0.040	0.013	0.055**
		(0.014)	(0.036)	(-0.03)	(0.028)	(0.026)
		[0.002]	[-0.004]	[0.005]	[0.001]	[0.004]
Constant		-2.022***	-5.184***	-1.518***	-2.355***	-2.207***
		(0.084)	(0.400)	(0.276)	(0.2400)	(0.142)
Observations		14,602	1,709	3,071	4,182	5,640
Adjusted R2		0.0770	0.1060	0.0790	0.1010	0.0900
Wald chi2		442.06	1424.24	130.44	192.25	172.35
Industry fixed effects		Yes	Yes	Yes	Yes	Yes
Bankruptcy rate		6.2 %	9.7 %	8.2 %	5.8 %	4.3 %

Table 9 – Impact of deal characteristics, cyclicality and economic climate on financial distress

This table reports the results for an OLS-regression estimating the effects of buyout characteristics and economic climate on the initial bankruptcy likelihood of the buyout. The dependent variable is Altman Z bankruptcy likelihood score, calculated with the financials of the year following the transaction announcement. Economic climate variables represent the values of the year when the buyout is announced.

T values based on White's heteroskedasticity robust standard errors are reported in parentheses. Marginal effects at variable means are reported in square brackets. ***, **, and * denote the statistical significance of regression coefficients at the level of 1%, 5%, and 10% respectively

Dependent variable	Exp.	Altman Z (higher value indicates lower distress)				
Time period	Sign	1994-2009	1994-1997	1998-2001	2002-2005	2006-2009
Buyout characteristics						
Bankruptcy Sale	(-)	0.281	-1.633***	0.02	0.628	0.732
		-(0.70)	(-3.48)	-(0.03)	-(0.85)	-(0.76)
Going Private Transaction	(+/-)	-0.614***	-0.599**	-0.28	-0.437***	-0.639***
		(-4.89)	(-2.48)	(-0.66)	(-2.68)	(-2.64)
Corporate Divestiture	(+)	-0.170	-0.596**	-0.083	0.108	-0.331
		(-1.12)	(-2.04)	(-0.19)	-(0.35)	(-0.92)
Cross-Border	(+/-)	0.028	0.28	0.119	-0.432**	0.323
		-0.22	-0.76	-0.31	(-2.06)	-1.2
Experienced investor	(-)	-0.631***	-0.577*	-0.953*	-0.375	-0.710
		(-3.59)	(-1.96)	(-1.97)	(-1.43)	(-1.35)
Management Participated	(+)	0.155	-0.130	0.375	0.077	0.356
		-(1.37)	(-0.57)	-(1.08)	-(0.44)	-(1.19)
Secondary LBO	(-)	-0.421***	-0.757***	-0.415	-0.324*	-0.233
		(-3.44)	(-2.71)	(-1.17)	(-1.82)	(-0.77)
Club deal	(+/-)	-0.133	0.221	-0.576*	-0.143	-0.223
		(-1.17)	-(0.85)	(-1.97)	(-0.79)	(-0.87)
Younger than 5y	(-)	0.108	-0.253	0.919**	-0.243	-0.745*
		-(0.64)	(-0.86)	-(1.98)	(-1.15)	(-1.81)
Economic climate						
GDP change	(-)	-0.041	-0.185	-0.074	-0.193	-0.053
		(-0.89)	(-1.60)	(-0.49)	(-1.62)	(-0.33)
Credit spread	(+)	0.036	0.337**	0.086	0.033	0.137***
		-(1.60)	-(2.06)	-(0.98)	-(0.46)	-(3.25)
Cyclicality	(-)	0.876**	0.225	1.059	0.515*	-0.584
		-(2.25)	-(0.39)	-(0.84)	-(1.90)	(-1.40)
Credit tightening	(-)	0.001	0.049	-0.012	-0.013	-0.016
		-(0.18)	-(1.65)	(-1.03)	(-1.15)	(-1.58)
Creditor rights	(+)	-0.020	-0.183	0.041	-0.006	-0.114
		(-0.29)	(-0.76)	-(0.24)	(-0.05)	(-0.93)
Constant		1.893***	2.165**	2.515**	2.097***	2.021**
		-4.81	-2.23	-2.05	-3.25	-2.17
Observations		986	245	244	319	178
R2		0.1330	0.3070	0.1980	0.2590	0.4040
F value		3.582	2.702	2.061	5.228	3.314
Industry fixed effects		Yes	Yes	Yes	Yes	Yes

6.3.Robustness of the results

All the regression analyses are conducted with White's heteroskedasticity robust standard errors. Hence, the sub-populations do not suffer from differing variance and should not yield biased standard errors and disturb statistical significance.

Moreover, all the models are tested for multicollinearity. I use Variance inflation factors (VIF) to identify possible signs of multicollinearity. A generally accepted maximum value for VIF is 10 in order to safely conclude that the model does not suffer from multicollinearity. Since the VIF test only applies for linear regression, I change the order of my probit-model variables and then conduct the VIF tests with OLS-regression. As another test I compose correlation matrices for the models and inspect whether any variables have particularly high correlation between each other. As the VIF-values for all the models are well below 10 and the correlation matrices do not report alarming correlations, I conclude that my models are free from multicollinearity.

Furthermore, like discussed in section 6.1.1, the lack of financial data may expose the analysis including financial rations to sample selection bias. In order to overcome this, I use Heckman methodology. The significant coefficient in the Inverse Mill's ratio indicates that there exists some sample selection bias in the model. However, the corrected coefficients indicate similar results as the normal probit regression.

The variables comprising of financial statement information might be heavily influenced by extreme values, which would in turn significantly disturb the mean values of the variable. In order to provide a more robust computation of the statistic, I use winsorising. Here, I replace 10% of the values in each tails with the next value counting inwards from the extremes.

7. Conclusions

The goal of my thesis is to analyse factors that could increase/decrease the probability that a leveraged buyout would fail and go bankrupt. Utilising a dataset of 22,796 LBOs in North America and Europe conducted during 1982-2013, I perform a variety of analyses that test the impact of deal type/source, portfolio firm financial strength, macro-economic environment and cyclicality of business. Furthermore, I test how these factors are associated with the initial financial distress risk (Altman Z).

My empirical results support the hypothesis suggesting that deal source greatly influences the outcome of the buyout. The results indicate that on the safer front, secondary buyouts appear to be some 2% less likely to go bankrupt compared to other sample buyouts. This implicates that despite secondary buyouts' generally lower upside potential (Alperovych et al., 2013), these deals can also be considered to be of better quality and have lower risk. The results also indicate that SBOs are generally performed with riskier financing structures. Hence, despite lower operational improvement potential, SBOs appear to be particularly good *credit cases*, meaning that banks would be more willing to provide higher leverage which improves return upside for private equity firms.

On the riskier front, buyouts that are perhaps opportunistically acquired from bankruptcy proceedings, are some 10% more likely to go bankrupt compared to other sample buyouts. The results do not indicate that these transactions would have significantly riskier financing structures. Hence, these bankruptcies are likely to stem from other factors than leverage. This highlights the riskiness of the investment strategy of turnaround funds or so called *vulture investors*, as they primarily target distressed firms.

Moreover, cross-border transactions appear to be some 2% less likely to go bankrupt. This is an interesting finding, since one might claim that these transactions would be more prone to bankruptcy as they entail additional challenges and risks due to information asymmetry, as well as, culture and language barriers. My results furthermore indicate that the capital structures of these buyouts are not significantly more or less risky compared to other sample buyouts. Instead, it may be that private equity firms pose more strict qualitative screening criteria and invest only in the most promising opportunities. Also, in the 1980s and 1990s before private equity industry spread worldwide and U.S. or UK private equity firms began setting up

international offices, cross-border transactions provided untapped investment opportunities without costly bidding wars Carey & Morris (2012).

With regards to investor experience and deal syndication my results do not support the hypothesis that increased knowledge and experience would be associated with lower bankruptcy rates. Interestingly, during the periods of 1994-1997 and 1998-2001, which were characterised by the dotcom bubble, buyouts conducted by experienced investors were actually more likely to go bankrupt. These results contradict the previous literature (see e.g. Tykvová & Borell, 2012) which argues that experienced investors would be more able to avoid bankruptcies compared to inexperienced investors. However, initial distress risk levels show that during these periods, deals by experienced investors had also distinctively riskier financing structures than deals by less experienced investors. Hence, it may be that the higher leverage, supported by good lender relationships, caused a substantial number experienced private equity investors' LBOs to backfire.

Moreover, in terms of financial strength, my results indicate that higher leverage, lower profitability and weaker interest coverage are all significantly associated with a higher bankruptcy probabilities. Correspondingly, more highly leveraged deals are performed when credit markets are more favourable. These findings are in line with findings from previous studies by Tykvová & Borell (2012), Wilson & Wright (2013) and Kaplan & Stein (1993). As an additional feature, I study the impact of cash conversion (EBITDA-capex/EBITDA) on the probability of the buyout going bankrupt. The results indicate that firms with lower investment needs, and hence higher share of free cash flow to service debt, are significantly less likely to go bankrupt.

Finally, my results indicate that from macro-economic perspective, buyouts performed during positive GDP growth are significantly more likely to go bankrupt. Historically, a two percentage point increase in GDP from its mean (2%) has increased the probability of a buyout going bankrupt by two percent. This indicates that during boom periods both private equity firms and lenders should be critical towards optimistic projections and sustainable leverage levels.

Also, my results indicate that buyouts of companies operating in cyclical industries are particularly vulnerable if unexpected negative turns in the economy occur. As capital structures in LBOs are often aggressively leveraged, materialisation of projected cash flows is critical for

the success of the investment. If the portfolio company's cash flows are highly dependent on the general economy, a negative turn in the cycle may push the company into bankruptcy.

My research primarily focuses on distinguishing statistically available metrics that influence the probability that a buyout would go bankrupt. With my findings private equity practitioners and lenders may be more able to review their investment decisions, recognise potential pitfalls and align appropriate risk metrics as a basis of specific deal types, capital structures, cyclicality and economic climate. The main caveat with this approach is that qualitative factors such as CEO quality, wrong recruitments, success of R&D projects, performance of marketing efforts etc. are likely to have even greater impact on whether a buyout fails or thrives. Hence, one potential area of improvement would be a case analysis (as done by Andrade & Kaplan 1998) of various LBOs covering e.g. before-mentioned qualitative analyses on the factors that have caused the buyout to wind down.

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Appendix

Table 10 - Buyout characteristics and economic climate (European firms)

This table reports the results for a cross-sectional probit regression on the effects of buyout characteristics and prevailing economic climate on buyout bankruptcy probability. Buyout is considered as bankrupt, if it is assigned with a value of one. *Bankruptcy sale* refers to buyouts where the company is acquired from bankruptcy. *Going private transaction* refers to buyouts where the company is publicly listed prior to buyout. *Corporate Divestiture* refers to buyouts where the portfolio company is a unit of another entity before the buyout. *Cross border* is a transaction where the portfolio company and the private equity firm's headquarters locate in different countries. *Experienced investor* is when the private equity firm has experience from at least five prior transactions. *Management participated* refers to transactions where the portfolio company top executives have injected their own funds to the equity capital. *Secondary LBO* is when the portfolio company is also private equity backed prior to buyout. *Club deal* is when there is more than one buyer in addition to the private equity firm. *Younger than 5y* refers to buyout companies founded less than five years from when the buyout is announced.

White's heteroskedasticity robust standard errors are reported in parentheses. Marginal effects at variable means are reported in square brackets. ***, **, and * denote the statistical significance of regression coefficients at the level of 1%, 5%, and 10% respectively.

Dependent variable	Exp.	Bankruptcy				
Time period	Sign	1994-2009	1994-1997	1998-2001	2002-2005	2006-2009
Buyout characteristics						
Bankruptcy Sale	(+)	1.061***	0.643	1.411***	1.242***	0.955***
		(0.120)	(0.554)	(0.287)	(0.214)	(0.187)
		[0.100]	[0.070]	[0.162]	[0.104]	[0.072]
Going Private Transaction	(+/-)	0.349***	0.485	0.316	0.375*	0.329*
		(0.109)	(0.423)	(0.193)	(0.202)	(0.191)
		[0.033]	[0.052]	[0.036]	[0.031]	[0.025]
Corporate Divestiture	(-)	-0.132*	0.095	-0.151	-0.139	-0.117
		(0.071)	(0.196)	(0.145)	(0.135)	(0.130)
		[-0.012]	[0.010]	[-0.017]	[-0.012]	[-0.009]
Cross-Border	(+/-)	-0.190***	-0.269	-0.309**	-0.091	-0.209*
		(0.063)	(0.179)	(0.134)	(0.130)	(0.109)
		[-0.018]	[-0.029]	[-0.036]	[-0.008]	[-0.016]
Experienced investor	(-)	0.124**	0.032	0.453***	0.129	-0.015
		(0.061)	(0.173)	(0.137)	(0.117)	(0.101)
		[0.012]	[0.004]	[0.052]	[0.011]	[-0.001]
Management Participated	(-)	-0.047	0.072	-0.193*	0.003	0.004
		(0.052)	(0.152)	(0.106)	(0.101)	(0.090)
		[-0.004]	[0.008]	[-0.022]	[0.000]	[0.000]
Secondary LBO	(-)	-0.268***	-0.207	-0.326**	-0.377***	-0.230*
		(0.073)	(0.265)	(0.150)	(0.134)	(0.127)
		[-0.025]	[-0.022]	[-0.038]	[-0.032]	[-0.017]
Club deal	(+/-)	0.057	-0.018	0.104	0.027	0.044
		(0.054)	(0.151)	(0.109)	(0.103)	(0.099)
		[0.005]	[-0.002]	[0.012]	[0.002]	[0.003]
Younger than 5y	(+)	0.169**	0.219	0.300**	-0.096	0.242*
		(0.071)	(0.191)	(0.127)	(0.164)	(0.140)
		[0.016]	[0.024]	[0.035]	[-0.008]	[0.018]

Continues….

Table 8 – Impact of deal characteristics, cyclicality and economic climate (European firms) continued

GDP change is the change in the portfolio company country's gross domestic product in the transaction year. *Credit spread* is the spread in high yield index and libor rates in the month when the transaction is announced, values are separate for the U.S. and Europe. *Cyclicality* is the dependence of the portfolio company's industry demand on GDP (adopted from Berman & Pfleeger (1997). *GDP change*Cyclicality* as an interaction variable measures the effect of cyclicality along with the prevailing economic cycle. Here the GDP change is the three-year change before the buyout. *Credit tightening* is the net percentage of banks reporting tightening standards for loans in the transaction year. *Creditor rights* is the legal rights of creditors against defaulting debtors, ranging from zero (poor) to four (strong), adopted from Djankov et al. (2006).

Continues….

Dependent variable	Exp.	Bankruptcy				
Time period	Sign	1994-2009	1994-1997	1998-2001	2002-2005	2006-2009
Economic climate						
GDP change	(+)	0.139***	0.087	0.182***	0.264***	0.061*
		(0.023)	(0.074)	(0.061)	(0.066)	(0.034)
		[0.013]	[0.009]	[0.021]	[0.022]	[0.005]
Credit spread	(-)	-0.019*	-0.096	-0.037	-0.059*	-0.006
		(0.012)	(0.118)	(0.034)	(0.035)	(0.020)
		[-0.002]	[-0.010]	[-0.004]	[-0.005]	[-0.000]
Cyclicality	(+)	0.196	-1.216	0.618	0.228	0.21
		(0.250)	(0.743)	(0.673)	(0.458)	(0.414)
		[0.019]	[-0.132]	[0.071]	[0.019]	[0.016]
GDP change*Cyclicality	(+/-)	-0.012	0.019	-0.06	-0.046	0.036
		(0.019)	(0.056)	(0.047)	(0.045)	(0.040)
		[-0.001]	[0.002]	[-0.007]	[-0.004]	[0.003]
Credit tightening	(+)	0.003**	0.007	0.006	0.015***	-0.001
		(0.002)	(0.015)	(0.004)	(0.005)	(0.003)
		[0.000]	[0.001]	[0.001]	[0.001]	[-0.000]
Creditor rights	(+)	0.024	0.012	0.001	-0.051	0.084**
		(0.019)	(0.053)	(0.041)	(0.042)	(0.036)
		[0.002]	[0.001]	[0.000]	[-0.004]	[0.006]
Constant		-2.052***	-5.605***	-2.232***	-2.033***	-2.273***
		(0.119)	(0.642)	(0.397)	(0.346)	(0.190)
Observations		7353.0	680.0	1475.0	2051.0	2773.0
Adjusted R2		0.0860	0.1020	0.1070	0.1300	0.1100
Wald chi2		-268.82	-458.69	-95.37	-138.41	-113.37
Industry fixed effects		Yes	Yes	Yes	Yes	Yes
Bankruptcy rate		5.9 %	9.4 %	7.7 %	5.4 %	4.5 %

Djankov et al. (2006)

Table 11 - Buyout characteristics and economic climate (North American firms)

This table reports the results for a cross-sectional probit regression on the effects of buyout characteristics and prevailing economic climate on buyout bankruptcy probability. Buyout is considered as bankrupt, if it is assigned with a value of one. *Bankruptcy sale* refers to buyouts where the company is acquired from bankruptcy. *Going private transaction* refers to buyouts where the company is publicly listed prior to buyout. *Corporate Divestiture* refers to buyouts where the portfolio company is a unit of another entity before the buyout. *Cross border* is a transaction where the portfolio company and the private equity firm's headquarters locate in different countries. *Experienced investor* is when the private equity firm has experience from at least five prior transactions. *Management participated* refers to transactions where the portfolio company top executives have injected their own funds to the equity capital. *Secondary LBO* is when the portfolio company is also private equity backed prior to buyout. *Club deal* is when there is more than one buyer in addition to the private equity firm. *Younger than 5y* refers to buyout companies founded less than five years from when the buyout is announced.

White's heteroskedasticity robust standard errors are reported in parentheses. Marginal effects at variable means are reported in square brackets. ***, **, and * denote the statistical significance of regression coefficients at the level of 1%, 5%, and 10% respectively.

Dependent variable	Exp.	Bankruptcy				
Time period	Sign	1994-2009	1994-1997	1998-2001	2002-2005	2006-2009
Buyout characteristics						
Bankruptcy Sale	(+)	0.901***	0.795*	0.952***	0.840***	1.117***
		(0.115)	(0.447)	(0.305)	(0.194)	(0.180)
		[0.096]	[0.088]	[0.141]	[0.085]	[0.071]
Going Private Transaction	(+/-)	0.207*	0.267	0.658***	-0.09	0.048
		(0.111)	(0.333)	(0.208)	(0.242)	(0.216)
		[0.022]	[0.029]	[0.097]	[-0.009]	[0.003]
Corporate Divestiture	(-)	-0.039	0.301*	-0.118	-0.169	0.057
		(0.067)	(0.167)	(0.138)	(0.123)	(0.138)
		[-0.004]	[0.033]	[-0.017]	[-0.017]	[0.004]
Cross-Border	(+/-)	-0.187***	-0.453**	-0.028	-0.248*	-0.02
		(0.068)	(0.207)	(0.150)	(0.136)	(0.118)
		[-0.020]	[-0.050]	[-0.004]	[-0.025]	[-0.001]
Experienced investor	(-)	0.012	0.330**	0.035	-0.086	-0.038
		(0.057)	(0.141)	(0.106)	(0.108)	(0.119)
		[0.001]	[0.037]	[0.005]	[-0.009]	[-0.002]
Management Participated	(-)	-0.086*	0.128	-0.173	-0.139	-0.110
		(0.052)	(0.131)	(0.111)	(0.100)	(0.102)
		[-0.009]	[0.014]	[-0.026]	[-0.014]	[-0.007]
Secondary LBO	(-)	-0.140**	-0.401*	-0.045	-0.311**	0.059
		(0.071)	(0.233)	(0.155)	(0.134)	(0.118)
		[-0.015]	[-0.044]	[-0.007]	[-0.031]	[0.004]
Club deal	(+/-)	-0.054	-0.402***	0.104	0.069	-0.105
		(0.056)	(0.146)	(0.110)	(0.102)	(0.110)
		[-0.006]	[-0.044]	[0.015]	[0.007]	[-0.007]
Younger than 5y	(+)	0.063	-0.119	0.133	0.124	-0.003
		(0.070)	(0.168)	(0.115)	(0.153)	(0.173)
		[0.007]	[-0.013]	[0.020]	[0.012]	[-0.000]

Continues….

Table 11 - Buyout characteristics and economic climate (North American firms) continued

GDP change is the change in the portfolio company country's gross domestic product in the transaction year. *Credit spread* is the spread in high yield index and libor rates in the month when the transaction is announced, values are separate for the U.S. and Europe. *Cyclicality* is the dependence of the portfolio company's industry demand on GDP (adopted from Berman & Pfleeger 1997). *GDP change*Cyclicality* as an interaction variable measures the effect of cyclicality along with the prevailing economic cycle. Here the GDP change is the three-year change before the buyout. *Credit tightening* is the net percentage of banks reporting tightening standards for loans in the transaction year. *Creditor rights* is the legal rights of creditors against defaulting debtors, ranging from zero (poor) to four (strong), adopted from Djankov et al. (2006).

Continues….

Dependent variable	Exp.	Bankruptcy				
Time period	Sign	1994-2009	1994-1997	1998-2001	2002-2005	2006-2009
Economic climate						
GDP change	(+)	0.168***	0.046	0.012	0.137**	0.092*
		(0.024)	(0.072)	(0.062)	(0.069)	(0.050)
		[0.018]	[0.005]	[0.002]	[0.014]	[0.006]
Credit spread	(-)	-0.002	-0.258***	-0.103***	0.070**	-0.03
		(0.011)	(0.092)	(0.038)	(0.034)	(0.025)
		[-0.000]	[-0.028]	[-0.015]	[0.007]	[-0.002]
Cyclicality	(+)	0.439*	-1.033	-0.132	0.189	0.372
		(0.233)	(0.908)	(0.703)	(0.406)	(0.330)
		[0.047]	[-0.114]	[-0.020]	[0.019]	[0.024]
GDP change*Cyclicality	(+/-)	-0.039**	0.012	0.018	0.025	-0.063*
		(0.019)	(0.080)	(0.051)	(0.045)	(0.034)
		[-0.004]	[0.001]	[0.003]	[0.002]	[-0.004]
Credit tightening	(+)	0.000	0.003	0.002	-0.006	0.001
		(0.002)	(0.013)	(0.004)	(0.005)	(0.003)
		[0.000]	[0.000]	[0.000]	[-0.001]	[0.000]
Creditor rights	(+)	0.022	-0.081	0.081*	0.077*	0.019
		(0.020)	(0.052)	(0.046)	(0.042)	(0.042)
		[0.002]	[-0.009]	[0.012]	[0.008]	[0.001]
Constant		-2.012***	-4.757***	-0.889**	-2.669***	-2.080***
		(0.119)	(0.572)	(0.381)	(0.342)	(0.213)
Observations		7095.0	883.0	1441.0	1913.0	2600.0
Adjusted R2		0.0780	0.1370	0.0800	0.1160	0.1180
Wald chi2		-234.09	-938.76	-69.26	-130.09	-110.78
Industry fixed effects		Yes	Yes	Yes	Yes	Yes
Bankruptcy rate		6.7 %	11.2 %	9.6 %	6.4 %	3.9 %

Table 12 - Mean values for estimates in Table 7

This table reports mean values for independent variables in estimation samples in Table 7. The mean values enable statistical inference of the size of marginal effects in estimations. Corresponding standard errors and marginal effects are provided in Table 7.

Mean values in estimation samples

Model	Probit (1)	Probit (2)	Heckprobit (1)	Heckprobit (2)
Leverage1	5.054		5.054	
Profitability1	16.347		16.347	
Cash conversion	0.622		0.622	
Leverage2		78.676		78.676
Profitability2		5.460		5.460
Tangibility		0.212		0.212
Interest Coverage	2.211	2.832	2.211	2.832
Firm size	2.711	2.660	2.711	2.660
Creditor rights	1.242	1.272	1.242	1.272
Observations	693	794	558	629

Table 13 – Mean values for estimates in Table 8

This table reports mean values for independent variables in estimation samples in Table 8. The mean values enable statistical inference of the size of marginal effects in estimations. Corresponding standard errors and marginal effects are provided in Table 8.

Mean values in estimation samples

Time period	1994-2009	1994-1997	1998-2001	2002-2005	2006-2009
Buyout characteristics					
Bankruptcy Sale	0.0244	0.0094	0.0150	0.0273	0.0319
Going Private Transaction	0.0404	0.0298	0.0456	0.0375	0.0429
Corporate Divestiture	0.1811	0.1627	0.1876	0.2059	0.1647
Cross-Border	0.2247	0.1884	0.2130	0.2449	0.2271
Experienced investor	0.7402	0.7045	0.7336	0.7274	0.7640
Management Participated	0.3895	0.3950	0.4425	0.4070	0.3461
Secondary LBO	0.1790	0.0913	0.1501	0.2226	0.1890
Club deal	0.2900	0.3008	0.2940	0.3121	0.2681
Younger than 5y	0.1246	0.1691	0.1801	0.1126	0.0899
Economic climate					
GDP change	0.0244	0.0094	0.0150	0.0273	0.0319
Credit spread	0.0404	0.0298	0.0456	0.0375	0.0429
Cyclicality	0.1811	0.1627	0.1876	0.2059	0.1647
GDP change*Cyclicality	0.2247	0.1884	0.2130	0.2449	0.2271
Credit tightening	0.7402	0.7045	0.7336	0.7274	0.7640
Creditor rights	0.3895	0.3950	0.4425	0.4070	0.3461
Observations	14,602	1,709	3,071	4,182	5,640