**Aalto University
School of Business**

DETERMINANTS OF BUYOUT FUNDRAISING: Credit market conditions as a driver of capital commitments into buyout funds

Finance

Master's thesis

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Department of Finance
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Master's Thesis
Katrin Vatiska
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# ABSTRACT

**Author** Katrin Vatiska

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**Title of thesis** Determinants of buyout fundraising: Credit market conditions as a driver of capital commitments into buyout funds

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**Thesis advisor(s)** Professor Sami Torstila

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**Abstract:** The purpose of this thesis is to address the lack of understanding of drivers behind capital commitments into buyout (BO) funds. According to my knowledge, this is one of the first studies to solely focus on the drivers of buyout fundraising and moreover the first to show that capital commitments into buyout funds are driven by credit market conditions; when credit market conditions are loose more funds are raised and more money is committed to a particular fund.

I obtain a comprehensive sample of European and North American buyout funds from two different sources. Through Thomson VentureXpert (VE), I access the information of 5,420 buyout funds raised during 1980-2011 and from Preqin, I obtain the data of 1,273 buyout funds. VE is widely used among academics and thus a reliable source for an aggregate country and a firm level analysis. Preqin is a fairly new database and employed only by the most recent studies, thus giving access to a fairly new source of data for a fund-level analysis.

My results indicate that a 100 basis points decrease in the credit spread leads to a US$47billion aggregate increase in commitments to buyout funds in the following year. The significant increase in the aggregate buyout fundraising volume is due to an increase in the fund size by follow-on funds and higher number of first-time funds being raised. A 100bps decrease in the credit spread increases the number of first-time buyout funds by 12[1] in the following year and the size of a follow-on fund raised by an established private equity (PE) firm increases by 17%, when the credit spread decreases by 100bps.

Also, the probability of a PE firm raising a follow-on fund is affected by the prevailing credit market conditions. A decrease of 100bps in the credit spread increases the probability of raising a fund by 5% across the industry; however, when controlling for the performance of a previous fund for an established GP, the probability diminishes to 1.3%.

Finally, I end my study by comparing the performance characteristics of buyout funds to the existing literature on venture capital funds. I conclude that even though macro-economic drivers behind capital commitments into buyout funds differ from venture capital funds, the micro-level drivers of fund performance are the same. Across the industry larger funds earn lower returns, however a particular GP earns larger returns with larger funds; but the effect diminishes away at a very large fund size.

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**Keywords** Buyout funds, fundraising, credit market conditions

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[1] In the sample, 12 presents on average 20% of the new funds entering the buyout industry every year.

**ABSTRAKTI**

**Tekijä** Katrin Vatiska

**Työn nimi** Buyout-rahastojen varainkeruuseen vaikuttavat tekijät: Luottomarkkinat vaikuttavana tekijänä sijoituksien määrään

**Tutkinto** Kauppatieteiden maisteri

**Koulutusohjelma** Rahoitus

**Työn ohjaaja(t)** Professori Sami Torstila

| | | |
|---|---|---|
| **Hyväksymisvuosi** 2014 | **Sivumäärä** 79 | **Kieli** Englanti |

Tutkielman tavoitteena on tuottaa uutta tutkimustietoa buyout-rahastojen varainkeruusta. Parhaan tietämykseni mukaan tämä tutkielma on ensimmäisiä buyout-rahastoihin yksinomaan keskittyviä. Tutkimuksen tarkoituksena on osoittaa, että luottomarkkinoiden olosuhteet vaikuttavat buyout-rahastojen sijoituksiin; kun luottomarkkinat ovat löysät ja korot ovat alhaalla niin useampi buyout-rahasto ryhtyy varainkeruun ja enemmän rahaa sijoitetaan buyout-rahastoihin.

Tutkimuksen aineisto koostuu eurooppalaisista ja pohjois-amerikkalaisista buyout-rahastoista, joiden tiedot olen kerännyt kahdesta eri lähteestä. Olen Thomson VentureXpert (VE) kautta kerännyt 5,420 rahaston tiedot aikaväliltä 1980-2011 ja Preqinnin kautta 1,273 buyout-rahaston tiedot. VE:tä on käytetty paljon aiemmissa tutkimuksissa ja siksi se on luotettava lähde maa- ja yrityskohtaiseen analyysiin. Preqin on suhteellisen uusi tietokanta ja sitä on käytetty vain uusimmissa tutkimuksissa, täten antaen uuden tietolähteen rahastokohtaiseen analyysiin.

Tulokset osoittavat, että kun markkinaluottokorko laskee yhden prosenttiyksikön, niin sijoitukset buyout-rahastoihin kasvavat noin US$47 miljardilla. Tämä merkittävä kasvu sijoituksien määrässä johtuu sekä jatko-rahaston koon kasvusta jo perustetuissa pääomayrityksissä sekä siitä että perustetaan useampia pääomayrityksiä, jotka keräävät ensimmäisen rahastonsa. Lähemmin, yhden prosenttiyksikön lasku markkinaluottokorossa johtaa kahdentoista uuden, ensikertalaisen, rahaston keräämiseen ja jo perustetun pääomayrityksen jatko-rahaston koon kasvuun 17 prosentilla.

Lisäksi tutkin myös todennäköisyyttä millä jo perustetut pääomayritykset keräävät jatkorahastonsa. Tulosten mukaan löysä markkinaluottokorko nostaa tilastollisesti merkittävästi todennäkoisyyttä sille, että jatkorahasto kerätään, vaikkakin tulokset eivat ole taloudellisesti merkittäviä. Kun markkinaluottokorko laskee yhden prosenttiyksikön niin todennäköisyys sille että pääomayritykset keräävät buyout-rahaston nousee 5 prosentilla, kun otamme huomioon yrityskohtaiset tekijät, kuten edellisen rahaston tuoton, niin yrityksen todennäköisyys kasvaa vain 1.3 prosentilla.

Lopuksi vertaan buyout-rahastojen tuottoja venture capital rahastojen tuottoihin perustuen aiempaan kirjallisuuteen. Buyout-rahastoilla ja venture capital rahastoilla on eri varainkerun määrään vaikuttavat makrotaloudelliset tekijät, kun taas rahastokohtaiset, mikrotason tekijät sen sijaan ovat hyvin samanlaiset. Molemmille rahastotyypeille pätee että kooltaan suuremmilla rahastoilla on matalammat tuotot, kuitenkin jos otamme yrityskohtaiset tekijät huomioon, kuten edellisen rahaston tuoton, niin yritys parantaa tuottoa kun rahaston koko kasvaa.

**Avainsanat** Buyout-rahastot, varainkeruu, luottomarkkinoiden olosuhteet

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# 1 INTRODUCTION

## 1.1 Background and motivation

In the early 1980s, the annual commitments to buyout funds were around US$1billion[2], while today the commitments have grown to nearly US$165 billion[3]. The buyout market has gained significant importance as a financial market, however the buyout fundraising has received surprisingly little attention from academics compared to venture capital funds which have significantly less capital under management worldwide[4].

The buyout fundraising market is featured with cyclicality and clustering in time. Currently, we are undergoing third private equity wave which was largely triggered by loose credit markets and birth of collateralized debt obligations, which brought more liquidity to the markets (Shivdasani and Wang, 2011). The first buyout wave in the late 1980s was fuelled by the birth of junk bond market in 1985 and the second wave occurred during the dot-com boom in the late 1990s (Kaplan and Stein, 1993 and Axelson et al, 2010). In addition to these credit market related occurrences, a little is known about the dynamics of capital commitment into buyout funds.

To my best knowledge, this paper is the first one trying show that capital commitments into buyout funds are driven by credit market conditions; when credit market conditions are loose more funds are raised and more money is committed to a particular fund. Moreover, I identify the macro and micro factors that drive the buyout fundraising and assess the economy-wide importance of these factors. I run comprehensive analyses on country-, firm- and fund-level intending to show the relation between credit market conditions and aggregate buyout fundraising volume, number of first-time buyout funds entering the market, likelihood of raising a fund, fund size and performance.

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[2] The buyout fundraising figures are based on Thomson VentureXpert database and a sample period of 1980-2011. The figures exclude certain type of buyout funds for the purposes of this study, however, equally applicable for the whole period. See section 5.1 for more details of the exclusion criteria. The figures are inflation adjusted and represented as equivalent to 2011 dollars. $165 billion refers to 2011.

[3] $165 billion refers to 2011

[4] According to Metrick and Yasuda (2010) buyout funds have 60% of total private equity assets under management.

According to capital structure theories such as *mispricing theory* and *agency conflict theory* the leverage used in buyout transactions in driven more significantly by time-series variation than by the target firm characteristics (Axelson et al, 2010). The strategy of buyout funds is to use substantial level of leverage in acquisitions to finance the transaction as well as to boost the returns of the equity committed by investors. Thus, one of the key elements when assessing the attractiveness of a target is the state of credit markets; the ease of accessibility to debt financing and the current cost of debt. *Adjusted present value theory* suggests that private equity managers valuing the targets should price a firm according to its fundamental value adjusted with financial side-effects such as tax benefits of debt (Axelson et al, 2009). When credit market conditions are loose and access to debt is easy, financing of a deal is more viable. Also, lower cost of debt increases the valuation of a company through a lower cost of capital, simultaneously increasing the expected rate of return for an investment. Thus, when the credit conditions are loose the amount of attractive targets should increase through lower cost of debt and more available deal financing which supports my hypothesis that general partners are then more willing to raise funds and moreover raise larger buyout funds.

Additionally, mispricing theory implies that at times there exists opportunities between cost of debt and cost of equity in the market, from which private equity managers are able to benefit through better access to market wide information (Bachar, 1989)[5]. Agency conflict theory predicts that the limited liability of GPs and the option-like carry fee structure in compensation may lead to a tendency of GPs increasing the value of their option-like compensation scheme by investing more and making them more willing to overpay for targets relative to their fundamental value when credit market conditions are loose and access to debt is easy and interest rates are low (Axelson et al, 2009).

Overall, economy-wide macro factors and moreover, credit market conditions are an important determinant of leverage in a buyout deal, pricing of the target and potential returns from the investment (Ljungvist et al (2008), Axelson et al (2009), Kaplan and Strömberg, (2009), Axelson et al (2010) and Robinson and Sensoy (2011)). Thus, when a private equity firm is considering of raising a buyout fund, one of the main constraint they face is capital market conditions which could limit the amount they can borrow. I hypothesize that more

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[5] Bachar (1999) claims in his study that investment banker are better informed about the market than investors. Thus, private equity managers who frequently receive market updates from various investment banks should also be as informed about the market as investment bankers, if not even better informed due to the exposure to multiple banks across the industry.

buyout funds and larger funds should be raised during loose credit market conditions[6] than during tight credit market conditions, since (i) there should be better access to debt financing, (ii) lower cost of debt decreases the financing costs the transaction which (iii) lowers the average cost of capital thus increasing the valuation of the target. Thus, the investment opportunity set of potential target companies is larger at times of loose credit markets, which results in more private equity firms willing to raise a fund and raising larger funds. The opposite should be true when the credit market conditions are tight, leading to a fewer and smaller funds raised due to decreased investment opportunity set.

## 1.2   Research questions

This paper aims to show that buyout fundraising is driven by credit market conditions; when credit market conditions are loose more funds are raised, and more money is committed to a particular fund. I start by identifying various drivers behind the capital commitments into buyout funds based on previous literature. I do this by identifying factors of existing literature from private equity and venture capital funds, since no relevant literature of buyout funds exists. Then, I run comprehensive analyses on country-, firm- and fund-level to show that credit market conditions are related to (i) aggregate buyout fundraising volume, (ii) number of first-time buyout funds entering the market, (iii) likelihood of raising a fund, (vi) fund size and (v) performance. Finally, I will assess the economy-wide importance of credit market conditions on buyout fundraising and compare the results to the existing literature on venture capital market.

1) What are the key macro and micro drivers of capital commitments into buyout funds?
2) What is the impact of credit market conditions on aggregate buyout fundraising volumes, on number of new firms entering the buyout industry, likelihood of raising a fund, fund size and performance?
3) Do credit market conditions have any implications on buyout fund performance?
4) Are the dynamics of buyout market similar to venture capital?

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[6] One could question the timing, whether credit conditions at the time of fundraising affect the investment activity later on. I am going to discuss this more in Section 2.

## 1.3   Main results

I start by identifying various drivers behind the capital commitments into buyout funds based on previous literature. I find that the factors relevant for venture capital fund are not significant drivers for buyout funds. The most significant driver is credit spread and results indicate that at aggregate country level a 100 basis points decrease in the credit spread leads to an US$47billion increase in commitments to buyout funds across the industry in the following year. The significant increase in commitments is due to established GPs raising larger follow-on funds and more first time funds entering the buyout industry. A 100bps decrease in the credit spread increases the number of first-time buyout funds entering the market by 12[7] the next year. The size of a follow-on fund raised by an established private equity firm increases by 17% when the credit spread decreases by 100bps.

At the firm-level, the probability of a PE firm raising a follow-on fund is affected by the prevailing credit market conditions; however even though the results are statistically significant at a 1% level the economic significance is small. A decrease of 100bps in the credit spread increases the probability of a fund being raised by 5% across the industry[8], and after controlling for fund level factors, such as for the performance of previous fund, the probability diminishes to 1.3% but still being statistically significant at the 1% level.

I study GPs who decided to establish a PE firm and raise a buyout fund as their first fund. Compared to the prior literature by Kaplan and Schoar (2005) it seems that my results for buyout funds differ from venture capital funds – market returns do not affect the number nor size of new entrants – however indeed it seems that number of new entrants grows when the credit markets are loose, but the size of buyout funds is still not impacted. Moreover, the size of a first buyout fund raised by a new PE firm stays more or less constant over the period of 1980-2011, which is a different characteristic from venture capital funds which have increased significantly.

Although, my thesis does not go into detail on how the credit conditions affect the performance of a fund, I do test the matter briefly in order to find out more about the economy-wide implications of my research. My results show that funds that are initially

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[7] 12 might seem like a small number, but my sample includes 500 first-time funds over 30 years thus 12 is statistically significant result at 1% level.

[8] Across the industry means excluding firm and previous fund level factors, thus also includes first time funds.

raised and invested during the times of loose credit market conditions have a lower probability of raising follow-on funds, thus indicating poorer results. This is also in-line with findings from Axelson et al (2010) who also state that the reason behind this is that loose credit market conditions encourage to a misuse of debt which leads to a poorer fund returns.

Finally, I end my study by comparing the performance characteristics of buyout funds to the existing literature on venture capital funds. I conclude that even though the macro-economic determinants of capital commitments into buyout funds differ from venture capital funds, the micro-level factors of fund performance behave similarly; across buyout and venture capital industries larger funds earn lower returns, however a particular GP earns larger returns with larger funds but the effect diminishing away at very large fund sizes.

## 1.4    Contribution to the literature

I contribute to existing literature in three key ways. First, the existing literature of capital commitments into buyout funds is rather new area of research; the existing literature about buyout funds and fundraising is rather scarce. Second, to the extent that the topic has been briefly touched upon in 1990-2005 with private equity data[9], I bring at least 10 years of more recent data and thirdly, I run more comprehensive analysis studying my hypothesis at country-, firm- and fund-level.

According to my knowledge, this is the first paper to exclusively study the drivers of buyout fundraising and aims to show empirical evidence that buyout fundraising is strongly driven by credit market conditions. Furthermore, since no other academic paper has studied the subject before, I aim to make an effort to identify the key determinants potentially driving the buyout fundraising from multiple papers studying venture capital and private equity funds. I study the buyout market dynamics at macro- and micro-level and compare my results to the existing empirical evidence on venture capital funds.

I am using a more recent dataset which adds 10 years of more recent data compared to the prior literature on private equity fundraising, e.g. Kaplan and Schoar (2005). The literature on private equity fundraising is very scarce and limited only to a few papers which focus on venture capital (Gompers and Lerner, 1999) or private equity funds including both venture capital and buyout funds (Kaplan and Schoar, 2005). In the past, buyout funds have gained

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[9] Please refer to page 12section 2.5 for definition of private equity funds

less attention due to lack of data and the private nature of the information. Additionally, literature related to buyout funds is focused on performance. Now many new database companies such as Preqin have entered to the database market and collected fund specific information from both general partners and limited partners that enables me to obtain large enough sample of buyout funds and more reliable data, since data collected only from GPs is prone to selection bias regarding more poorly performing funds.

The previous literature is mainly focused on a single perspective such as a country-level aggregate analysis or only fund-level analysis. My analyses are divided into three distinctive sections; aggregate country- level, firm-level and fund-level; I also have decomposed the aggregate fundraising volumes into separate factors such as size of a fund and number of funds, which have their own specific characteristics. Buyout market consists of established firms which are known to investors according to their reputation and new funds which have no previous track record on the market. The decision to raise a fund by these two different types of firms can be timed different and the fund size will also be different, thus it makes sense to analyse these separately.

## 1.5 Methods, scope and limitations

This thesis shows support that capital commitments into buyout funds are driven by loose credit market conditions. I aim to improve the methodology employed by prior studies which focus on macro factors by conducting the analysis on multiple levels to ensure robustness of results. I also use more sophisticated methods such as tobit regressions and heckman selection model, which assess the problem of selection bias. The private nature of information and the absence of regulated reporting standards makes the sample prone to selection bias since worse performing firms are reluctant to report. This results in over representation of better performing and larger funds, which makes the sample skewed to the right.

Major limitation for this study is the private nature of the industry and difficulty to obtain reliable information; I aim to tackle this problem by obtaining data from two different databases, thus mitigating the problem of inconsistent observations. Especially, with performance analysis I do robustness checks with the more comprehensive VE data. The main limitation of this study is that I do not observe the exact dates that the fundraising was initiated, but I obtain the funds' closing dates as annual figures and rely on the assumptions

that on average first close of a fund takes place in the middle of a year[10]. I try to mitigate this problem by using various annual proxies for credit market conditions which are defined as averages over different months to see whether my results hold.

## 1.6   Structure

The paper is organized as follows. The second section describes the private equity business model and introduces the key concepts applied in this paper. The third section is about previous literature. The fourth section introduces the hypotheses. The fifth section describes the data and sample selection process. The sixth section introduces the methodology employed. The results from the empirical analysis are shown in the seventh section. The final section concludes the paper.

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[10] Prior study using the same method by Kaplan and Schoar (2005)

# 2 PRIVATE EQUITY

In general, private equity is defined as a medium or long-term equity investment into companies that are not traded on a stock exchange. Private equity investment is typically a transformational, value-added and active strategy. Investments include venture capital and buyout transactions as well as investments in hedge funds, funds of funds, distressed debt funds and other securities. In this section, I will introduce the private equity business model in general and then go through buyout funds in more detail.

## 2.1 Private equity business model

The prevailing structure for private equity fund investments in the United States (US) and in many European countries is limited partnership, in which the private equity firm serves as the general partner (GP) and the investors serve as limited partners (LPs). The limited partnership is a legally defined structure and is considered an attractive vehicle to investors mostly due to liability and tax reasons. The LPs' liability is limited to the committed capital and they are not allowed to participate in the active management of a fund while the GP is fully responsible for all investment activities and assumes unlimited responsibility for the consequences of management and investment decisions. Unlike corporations, these partnerships are set up as closed-end funds with finite life spans. Typically, a private equity fund has duration of ten years, often with a possible two-year extension (Gilligan and Wright, 2010).

**Figure 1 Private equity business model**
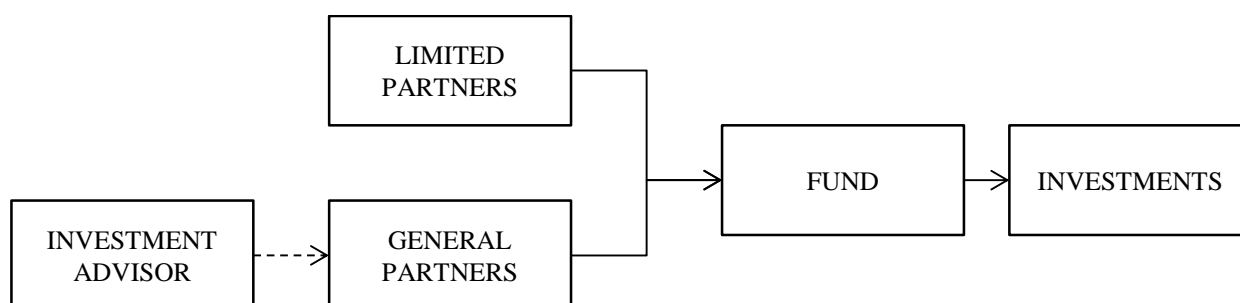
**Figure 2 Phases of private equity fund's cycle**

The four phases of private equity funds; first is the fundraising, second investing the fund, third managing the investments and finally the redistribution of capital. (Source: EVCA)

**Redistributing**

- Proceeds are turned to investors on pro-rata basis

**4**

**1**

**Fundraising**

- Creation of the fund
- Takes usually 6 – 12 months
- PE firms raise new fund every 3 – 5 years

**Managing**

- Average holding period 3 – 6 years

**3**

**2**

**Investing**

- Commitments are invested within 1-3 years
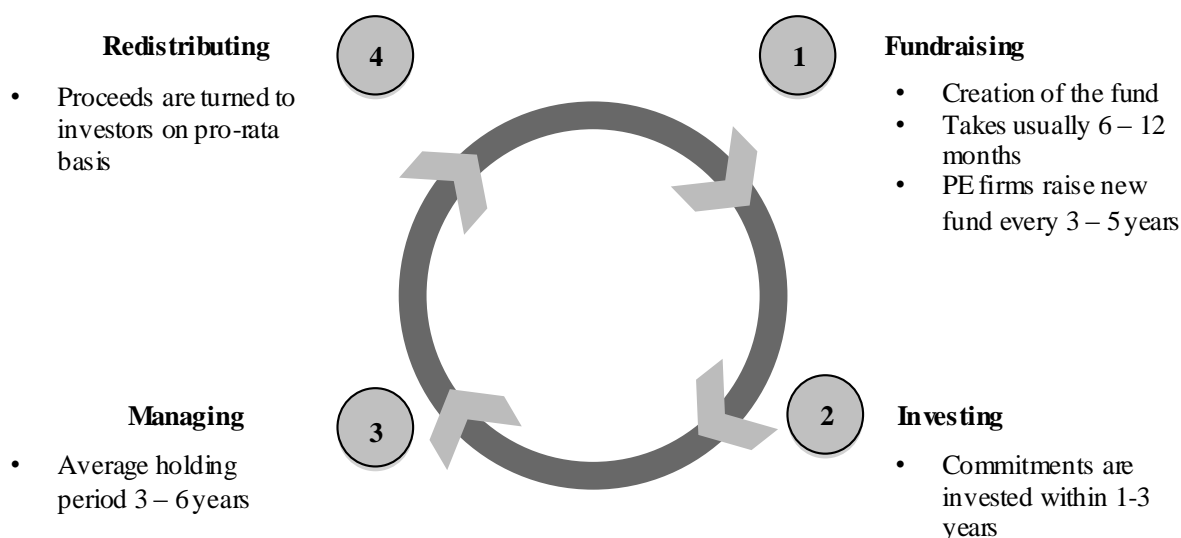
The creation of a fund occurs through private equity firms that collect capital from investors. Private equity firms could use placement agents, who on the behalf of the private equity fund manager talk to potential investors. In order to align interests and mitigate the information asymmetries between LPs and GPs, the LPs usually require the GPs to commit typically 1-3 percentages of the total committed capital. What happens in fundraising, in practice, is that LPs commit to invest in the fund up to predetermined level and GPs draw on the commitments when making the investments into various portfolio companies. Meaning that the investors pay no cash up front and thus the funds do not have any idle cash. Even though, the commitments are invested usually during the following few years, I classify the total aggregate commitment to the year it was raised. According to EVCA, the fundraising period usually lasts for six months to one year and GPs raise a new fund every 3 to 5 years as the previous fund is fully invested.

Second phase is the investing of the committed capital into target companies, known as investee companies or the portfolio. According to Gompers and Lerner (1999) venture capital funds draw on and invest the committed capital over a two to three year time period. The practice indicates that private equity firms are under a pressure to invest the committed capital promptly to generate returns for investors. The investment made can be anything between 100% full ownership or co-investment of smaller size. The fund's ownership in the portfolio

company is usually organized through holding company, thus not affecting portfolio company's taxation or cost structure.

The third phase is managing the investment. The fund managers are responsible for creating value to their LPs, thus they actively manage the portfolio companies and pursue to increase the value through e.g. divestments and add-ons. A widely studied area in private equity is the determinants of the wealth creation to LPs. In general, average holding period is three to six years. The GPs report back to LPs on regular basis, usually quarterly according to industry guidelines.

The fourth and last phase is redistribution. Usually, when the fund exits a portfolio company the proceeds are turned to investors on a pro-rate basis depending on the size of their initial investment. Altogether, the fund has normally a life span, time between commitments and redistribution, of 8-13 years.

## 2.2 Characteristics of the industry

Private equity is commonly described as rather illiquid and sticky, since there is no public active secondary market for the LPs interests. Recently, due to the need of institutional investors to stream line their private equity portfolios, the secondary market for LPs interests has experienced significant growth[11]. However, the secondary market volumes are still low and mostly comprise "tail-funds"[12].

## 2.3 Investors

The type of investors investing in private equity varies greatly between private equity asset classes. In 2012, the largest investors in European buyout funds were pension funds contributing 22% of total commitments, while banks contribute the second largest amount of 18% and funds of funds 17% of total commitments. While in venture capital funds government agencies are the largest investors with 34% and private individuals 15% (EVCA, Yearbook 2012). Significant differences in investors between asset classes stem mainly from policy and regulatory issues as well as investors' risk aversion.

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[11] Preqin Special Report: Private Equity Secondary Market (2013)

[12] Tail-funds refer to funds old vintage-year, e.g. in 2012 38% of funds sold were pre-2004 vintages i.e. tail-funds.

The investor base does not stay constant through time, moreover there has been significant shifts over time. The creation of a new vehicle "limited partnership" in the 1980s, regulatory changes such as the clarification of the Employee Retirement Income Security Act (ERISA) "prudent man rule" in 1978, which allowed corporate pension funds to invest in a variety of investment products beyond bond and stock of very large companies in US, play an important role in drivers behind the investor base development. In the UK, the move towards the Competition and Credit Control policy in 1971 gave banks greater investment flexibility.

Figure 3 demonstrates the magnitude of the shift in total commitments to private equity by investor type; panel A presents US market and panel B Europe. As noted, private equity is fairly new asset class in Europe, thus the data for investors in European funds is from 1998. Figures clearly present the overall trend in both markets. The figure for US, since the birth of private equity to current date, presents the shift from individual investors to pension funds, insurance companies and banks.

**Figure 3 Development of private equity investor types by capital invested**

Panel A presents the capital invested in US funds by various investor types as of total contributions into private equity industry. US 1978 data is from Gompers and Lerner (1999) and 2001-2011 is from Preqin. Panel B presents the capital invested in European funds. 1998-2002 data is from EVCA investor forum (2004) and 2011 from EVCA Yearbook (2012).

| Panel A: Capital invested in US funds | Panel B: Capital invested in European funds |
| --- | --- |
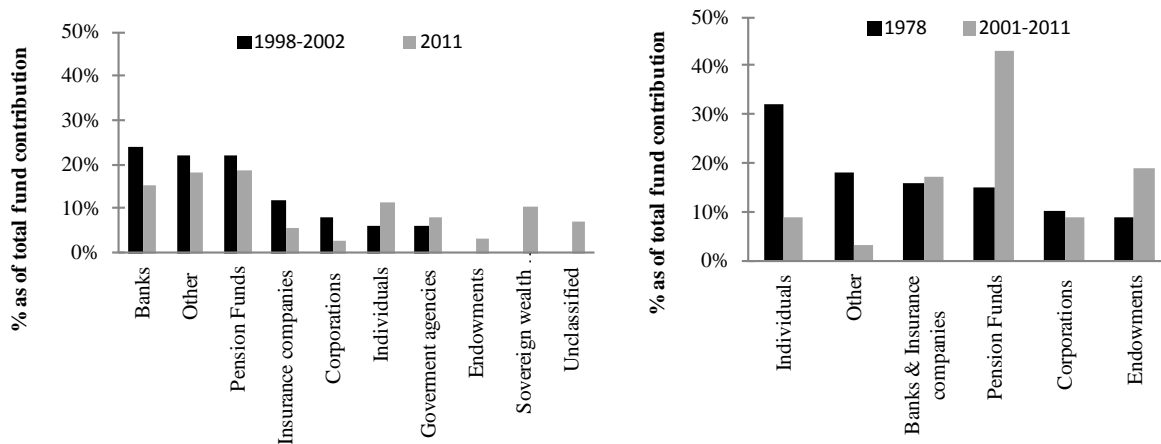


Whereas, the figure for Europe, over the last decade, shows how government agencies and endowments comprise increasing share of the total fund contributions while the contributions

by banks and insurance companies has decreased due to "denominator effect[13]" and will be intensified by impending regulatory changes relating to the Volcker Rule, Basel III and Solvency II and AIFMD as a general concern.

## 2.4 Private equity firms

A private equity firm, also known as private management company or GP is an investment management company, usually organized as a partnership or limited liability corporation. Private equity firms establish and manage investment funds by collecting capital from investors, make investing decision and take active role in the strategic management of investee companies. The management company is usually remunerated by an annual management charge which can be up to 2,5% of investor's initial commitments to the fund. Additionally, the GPs are entitled to carried interest, which is typically 20% of the profits of the fund. However, the carried interest is often paid after the investors have received the amount they invested in the fund plus a hurdle representing a basic pre-negotiated rate of return.

## 2.5 Private equity funds

A private equity investment fund is a vehicle for enabling pooled investment by a number of investors in equity and equity-related securities of companies. The vehicle can be structured as a company or an unincorporated arrangement such as a limited partnership. Private equity funds are commonly structured as closed-end funds meaning that the investors cannot redeem their interests and that the funds are self-liquidating. Private equity funds are usually categorized under "alternative investments" with hedge funds, real estate and interest rates to name a few, including several of different investment strategies and asset classes that are complimentary to the stock and bond assets. According to EVCA and this is also the definition used for this paper, private equity funds could be divided into four; venture capital, buyout, mezzanine capital and special situations. Buyout and venture capital funds compromise the largest share of private equity.

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[13] Denominator effect refers to a problem identified in private equity in which the investor's overall value of asset portfolio declines due to decreasing market values, which in turn leads to a selloff assets in order to maintains strict guidelines for asset allocations.

A buyout fund makes leveraged buyouts, management buyouts or acquisition investments and typically, targets acquisition of significant portion or majority control of businesses which normally entail a change of ownership, whereas venture capital funds invest with smaller equity stakes in undeveloped or developing products or revenue and thus less mature businesses. Buyout funds invest in more mature companies than venture capital funds to finance expansions, consolidations, turnaround and sales, or spinouts of divisions or subsidiaries. However, the investment styles can vary widely and buyout funds may take either active or passive management role. These funds use debt in addition to equity to leverage the size of their investments and increase the potential return on investment. Buyout fund sizes are defined as follows according to Legacy mode in Thomson One Platform; small buyout < US$250m, mid buyout US$250m < x < US$500m, large buyout US$500m < X < US$1,000m, mega buyout >US$1,000m.

# 3 LITERATURE REVIEW

In this section, I aim to provide theoretical background to my hypothesis from micro- and macro-economic point of view. First, I will discuss capital structure in buyout fund transaction based on existing literature. Second, I am going to introduce the theories behind capital allocations and then discuss how capital structure choices may impact the aggregate fundraising patterns. Third, I introduce theories that explain corporate finance waves and discuss the implications to buyout fundraising.

## 3.1 Capital structure in buyout fund transactions

As discussed above, buyout funds often aim to reach a majority ownership in the target which requires a large capital investment. Capital investments are financed both with equity and debt, and as the term leveraged buyout (LBO) indicates typically large proportion is financed with debt in order to shrink the amount of equity required. Leverage also intensifies the ownership incentives that are important to efficiency. Extensive level of leverage also means that it comes in many forms (Jensen, 1989). A typical LBO transaction includes various types of debt, which vary across time and type.

The early era of LBOs in the 1980s is featured with leverage leveling up to 90% of the transaction value and the use of below investment grade debt, junk bonds. After that the debt levels dropped a little in 1990s and 2000s. However, during 2004-2007 the leverage ratios climbed to all-time highs again driven by the growth in collateralized debt obligations and other forms of securitization. Current levels are down to 60-80% of debt employed in a deal (Kaplan and Strömberg, 2008).

While in the 1980s banks were the primary investors in the most senior and secured loans (Kaplan and Strömberg, 2009), nowadays the majority of the debt is provided by the syndicated loan market (Axelson et al, 2010). In the past, the syndicated loans operated as bridge financing facility for public (often high-yield) bond issues. However, during liquid syndicated loan market investors tend to hold the debt, either in original form or in collateralized loan obligations resulting in little refinancing of bank debt (Axelson et al.,2009). The leverage ratios employed in LBOs in US and Europe are not significantly different, however the type of debt used seems to vary. US markets are more characterized by bonds and subordinated debt, and greater use of bullet debt in the syndicated loans. For

European deals a higher fraction of the debt (89%) is bank loans and more tranches are employed in financing then in US bank debt, averaging 4.7 tranches for the European debt compared to 2.9 for the US debt (Axelson et al ,2009).

As leverage is such a major component in LBO transactions executed by buyout funds, it is reasonable to assume that credit market conditions play their role when GPs are deciding whether to raise a fund or not. As for my knowledge, there is no prior study about the relation between credit conditions and capital commitments into buyout funds. However, there are prior studies on the relation between credit markets and leverage buyout transactions. Ljungvist et al. (2008), Axelson et al (2009), Kaplan and Strömberg (2009), Axelson et al (2010) and Robinson and Sensoy (2011) provide evidence that average credit spreads are negatively related to investment activity by buyout funds, transaction prices, and leverage. In the following section, I will introduce the relevant capital structure theories and discuss existing empirical results on determinants in private equity fundraising, particularly about venture capital fundraising, since prior literature on buyout fundraising is limited. Furthermore, I also over briefly theories about merger waves since those are relevant for my aggregate country-level analysis.

## 3.2    Capital structure theories

Above, in section 3.1, I discussed the observations on the structure of LBO transactions over time and across countries. It seemed evident from the observations that macro factors, especially credit market conditions are the key drivers of buyout funds' transactions. Next, I will elaborate more about the existing capital structure theories and aim to provide theoretical background to support the potential link between credit markets and buyout fundraising volumes.

### 3.2.1   Perfect markets theory

According to Modigliani-Miller theorem[14] the capital structure in LBO s should be irrelevant. The value should be driven by fundamental asset value and no particular factor should explain the leverage used in a transaction. However, empirical evidence does not support this

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[14] Modigliani-Miller theorem suggests that in the absence of taxes, bankruptcy costs, agency costs, and asymmetric information and in an efficient market the value of the firm is not affected by its capital structure.

hypothesis, since the theorem ignores taxes, bankruptcy costs, agency costs and asymmetric information.

### 3.2.2 *Tradeoff theory and adjusted present value rule*

On the contrary to perfect market hypothesis, the tradeoff and adjusted present value –theories state that capital markets are not perfect thus leverage can affect the value of the transaction. Tradeoff theory states that tax and incentives from used debt level exactly offset expected financial distress costs at the optimal level. Moreover, the pecking order theory by Myers and Majluf (1984) complements the tradeoff theory. Pecking order states that due to information asymmetries the issuance of securities is costly, so firms stray from the optimal target leverage suggested by the pure tradeoff theorem. The adjusted present value theory suggests that GPs valuing the targets should price the company according to fundamental value adjusted with financial side-effect such as tax benefits of debt (Axelson et al, 2009).

### 3.2.3 *Mispricing theory*

Kaplan and Strömberg (2008) present a mispricing hypothesis as a possible explanation to industry wide buyout commitments and transaction patterns[15]. Buyout fund managers are able to benefit from the mispricing between cost of debt and cost of equity, when the cost of debt is significantly lower than the cost of equity compared to the company's risk, enabling the fund to create value through borrowing. Mispricing stems from market frictions which enable debt and equity markets to become segmented.

In the beginning of the previous wave in 2006, there was a mispricing in the cost of debt for a given credit rating according to Kaplan and Strömberg (2008). At the time, the interest rates were 250 basis points over the LIBOR (London Interbank Offered Rate) and by 2008 the interest rates had risen by 250 basis points to 500 basis points. If one had borrowed for a rate of 250 basis points too low and assuming a typical debt ratio of 70% in a transaction, then the mispricing would have justified 10% of the purchase price. Therefore, against this background I hypothesize that more investment opportunities should reach the IRR targets (aka high enough NPVs) when there exists mispricing in the cost of debt, which could lead to more or/and larger buyout funds being raised as a response to increased amount of potential

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[15]The working paper by Kaplan and Strömberg (2008) suggest a theoretical background however they do not conduct an empirical study of this.

investment opportunities. In my thesis, I use the variation in the corporate bonds's interest rate over risk free rate to measure when the credit spread is relatively lower over time.

Axelson et al (2010) and Baker and Wurgler (2002) support the mispricing view by showing evidence that GPs increase the leverage in LBO transactions when the debt markets are favorable to arbitrage the conditions between debt and equity markets. Their results show that buyout leverage responds more to credit conditions than to the firm characteristics suggested by the tradeoff theory, and additionally higher prices are paid when the debt financing is "cheap". They also state that according to practitioners, one way private equity funds make money is to arbitrarily time the mispricing on the markets. Furthermore, public firms are subject to same bias as debt market investors, therefore not observing the mispricing while GPs are rational and willing to pay higher prices and increase the leverage when the debt is "cheap". Axelson et al (2010) suggest that the market-timing hypothesis also predicts that fund returns should be higher when the private equity sponsors are able to use higher leverage to finance individual deals.

### 3.2.4 Agency conflicts theory

Axelson et al (2010) apply the classical corporate finance agency problem theory to private equity funds. The limited liability of GPs and the option-like carry fee structure in compensation may lead to overinvestment and gambling by the GPs. Therefore, when the credit markets are loose and access to debt is easy and interest rates are low, the GPs have a tendency to increase the value of their option-like compensation scheme by investing more and making them more willing to overpay for the targets relative to the fundamental value. Agency conflicts theory suggests that buyout leverage is more driven by market factors than firm-specific characteristics. Contrary to the market-timing theory, agency conflicts theory suggests that the extensive leverage is harmful to investors and will lead to lower returns on average. Also, Axelson et al (2010) suggest that the mispricing and agency conflicts can occur simultaneously; moreover the mispricing can exacerbate the agency conflict by making it easier for GPs to over lever at the expense of LPs.

## 3.3 Theories of corporate finance waves

I include this section, since I also run analysis at aggregate country-level. The prior literature on causes behind merger waves can be summarized into two competing theories; behavioral hypotheses and neoclassical hypotheses. Behavioral hypothesis suggests that stock valuations

drive the merger activity. Bidders use their overvalued stock to buy the real assets of undervalued targets through mergers. The neoclassical hypotheses claims that mergers are not driven by high stock market valuations, but rather mergers occur due to specific industry specific shocks which propagate into aggregate waves when there is enough liquidity on the market. First, I am going to discuss briefly about the two theories and second, elaborate more how the theories apply to buyout fundraising patterns.

### 3.3.1   Behavioral theory

Behavioral theory suggests that rational managers are arbitrarily able to benefit from the misvaluations on the inefficient markets (Shleifer and Vishny, 2003). They argue that target managers accept the bidder's temporarily overvalued equity, because they employ short time horizons when evaluating the benefits from the bid. Overvaluation in the aggregate or in certain industries would lead to wave-like clustering in time. Rhodes-Kropf and Viswanathan (2004) develop a model, in which the target managers are rational and willing to accept bids from overvalued bidders during high market valuations because they do not have perfect information and thus they overestimate synergies during these periods. Scharfstein & Stein (1990), Zhang (1997), Graham (1999), Milbourn, Boot and Thakor (1999) provide applications of herding models in finance, which could be extended and applied to acquisition decisions to generate a herding explanation for merger waves. Herding hypothesis refers to an action in which a firm follows the behavior of the preceding decision maker and allows it to affect its choice ignoring its own information. Herding hypothesis on merger waves implies that following firms are imitating the action of predecessor.

### 3.3.2   Neoclassical theory

Mitchell and Mulherin (1995) study the industry-level patterns in takeover and restructuring activity during the 1982-1989 across 51 industries. They found that industry shocks contribute to the extensive takeover and restructuring activity of that decade. Their work is complemented by Jarrad Harford (2005), who presents support for their study that merger waves occur in response to specific industry shocks that require large scale reallocation of assets. Furthermore, he shows that shocks need to be accompanied by sufficient capital liquidity to form aggregate waves. Harford (2005) finds that the proxy for capital liquidity and reduction in financing constraints is correlated with high asset values. He claims that the variables that separately measure capital liquidity and market valuations indicate that the relationship between merger waves and stock market valuations is misattributed to behavioral

misevaluation factors. Therefore, according to him merger waves are driven rather by higher macro-level capital liquidity and lower transaction costs than purely by market values as behavioral hypothesis suggests.

### 3.3.3 Buyout fundraising waves

There are currently no theories trying to assess the buyout fundraising patterns. An intuitive approach could be that the buyout funds serve as a financing instrument facilitating the merger activity. First, following the logic behind behavioral hypothesis, buyout funds would also be taking advantage of mispricing on the market. The GPs, that are better informed about the market condition through exposure to multiple investment banks that pitch constantly various ideas to them and send frequent market updates (Bachar, 1989), could be trying to time the market and benefit from the mispricing between the cost of equity and debt. Second, taking the neoclassical point of view, buyout funds may facilitate the large asset allocations that occur due to industry shocks. When there is enough liquidity on the markets and transaction costs are low, capital flows into buyout funds that may act as intermediates in asset allocations in industries where shocks take place. There are currently no papers studying the waves of buyout fundraising.

In this thesis, the proxy used to estimate the credit market conditions also proxies for capital liquidity in the markets. Harford (2005) claims that higher capital liquidity in the market is associated with lower transaction costs, financing constraints and ease of financing. Therefore, a proxy that estimates the condition of credit markets could also be a proxy for capital liquidity in the market. Furthermore, Shleifer and Vishny (1992) provide further support that loose credit market conditions are associated with capital liquidity. They argue that the increase in asset liquidity made possible the large growth of the public junk bond market in the early and mid-1980s.

While in this thesis, I aim to study the relation between credit conditions and capital commitments into buyout funds using a Moody's BAA corporate bond spread as a proxy of credit market conditions, I cannot rule out the possibility that the credit spread also proxies the capital liquidity on the market since the two are highly correlated. The buyout fundraising at macro level could be driven by the overall capital liquidity as suggested by neoclassical hypothesis. As a conclusion, at micro level the potential investments opportunity set for a given fund could increase through more favorable financing terms and lower cost of debt and,

on the macro level the economy-wide clustering in buyout fundraising could be explained by the capital liquidity hypothesis.

**Table 1 Overview of existing literature on merger waves**

The table summarizes the existing literature on the key theories behind merger waves. The table is not an exhaustive summary of all the merger wave literature.

| Study | Author (Published) | Time period | Region focus | Data |
|---|---|---|---|---|
| What drives merger waves? (Journal of financial economics, *References #601*) | Jarrad Harford (2005) | 1981-2000 | 48 industry groups | SDC |
| The impact of industry shocks on takeover and restructuring activity (Journal of financial economics, *References #929*) | Mark Mitchell & Harold Mulherin (1995) | 1981-1989 | 51 Industries in US | Moody's & Value Line Investment Survey |

## 3.4 Empirical evidence from credit markets

Next, I will discuss the existing empirical evidence of the relation between credit market conditions and private equity funds. Prior literature is mostly focused on credit market conditions being a major driver for capital structure in LBOs, quantity of investments made by buyout funds, LBO pricing and calls and distributions[16]. However, no prior empirical evidence exists from credit markets being a driver of capital commitments into buyout funds.

Ljungvist et al. (2008), Axelson et al (2009), Kaplan and Strömberg (2009), Axelson et al (2010) and Robinson and Sensoy (2011) provide evidence that loose credit markets measured with average credit spreads[17] are negatively related to investment activity by buyout funds, transaction prices, and leverage. In other words, during loose credit markets buyout funds make more investments and pay higher prices for targets. Furthermore, buyout funds also use more debt financing in their transactions and existing literature shows that the leverage levels are more affected by time-variant changes in the economy-wide cost of borrowing than by firm specific characteristics. After controlling for industry fixed-effects such as profitability, earnings volatility and growth opportunities, which explain the variation among public companies, the result still holds, indicating that leverage in LBOs is driven more by time-series effects than cross-sectional effects. Furthermore, Axelson et al. (2010) and Robinson

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[16] Calls refer to capital calls by GPs. GPs have a legal right to demand a portion of the money promised to it by LPs. Distribution refers to money paid back to LPs by GPs, after the fund has exited an investment.

[17] Prior literature uses credit spread between corporate bond returns and risk-free rate as a proxy for credit market conditions. This choice of proxy has been discussed more in section 5.4 on page 44.

and Sensoy (2011) show evidence that the yield spread also affects private equity calls and distributions. The distributions are affected more since rising yield spread makes it difficult for potential acquirers to finance the acquisitions, and thus exiting the investment becomes complicated.

Axelson et al. (2010), Kaplan and Stein (1993), Axelson et al (2009) and Shivdasani and Wang (2011) show that availability of financing relates to boom and bust cycles in the private equity market. They provide evidence that leverage is pro-cyclical, peaking in "hot" markets and deteriorating when the debt markets fall. Kaplan and Stein (1993) provide evidence from the 1980s by studying the pricing and leverage in LBO deals. Their results suggest that junk bond market that began around 1985 increased the pricing and debt financing in buyouts compared to early 1980s. The credit market turmoil during 2007 - 2008 suggests that overly favorable terms from debt investors may have contributed to the buyout wave from 2005 through mid-2007 (Axelson et al., 2010). Moreover, Shivdasani and Wang (2011) find a correlation between a bank's LBO lending and its access to CDO (collateralized debt obligations) capital through underwriting capabilities, indicating that banks more active in CDOs lent more for LBOs. Thus, they find evidence that structured credit fuelled the LBO boom during 2004-2007.

As a conclusion, investments, leverage and pricing patterns in LBOs indicate that during recession the financing of few potential deals is difficult and during boom times there is plenty of financing so that even poorer quality deals get financed (Gompers and Lerner, 1999). Therefore it is likely that private equity activity is highly correlated with the liquidity in the market for corporate debt (Axelson et al. 2008 and Kaplan and Strömberg, 2009).

**Table 2 Summary of previous literature on credit markets and buyout funds'
investments, leverage and cash flows**

This table summarizes the previous literature from the studies analyzing the relation between buyout funds and credit markets. The results are summarized in section 0. Previous literature in more focused on quantity of LBO transactions, leverage and pricing, rather than buyout funds and capital flows. LP refers to anonymous limited partner.

| Study | Author (Published) | Time period | Region focus | Data | Source | Focus |
|---|---|---|---|---|---|---|
| Cyclicality, performance measurement and cash flow liquidity in private equity (*Working paper, References 18*) | Robinson and Sensoy (2011) | 1984-2010 | US & Europe | 837 BO and VC funds | LP | Investments |
| Did structured credit fuel the LBO boom? (*Journal of finance, References 40*) | Shivdasani and Wang (2011) | 1996-2008 | US | 345 LBOs | SDC | CDOs and LBOs |
| Borrow cheap, buy high? (*Working paper, References 66*) | Axelson et al. (2010) | 1980-2008 | US & Europe | 1,175 LBOs | Capital IQ | Leverage |
| Leveraged buyouts and private equity (*Journal of Economic perspectives, References 311*) | Kaplan and Strömberg (2009) | 1996-2004 | US | 43 LBOs | Capital IQ | Transactions |
| Leverage and pricing in buyouts; Empirical analysis (*Working paper, References 98*) | Axelson et al. (2009) | *N/A* | N.Am | 153 LBOs | Capital IQ | Leverage and pricing |
| Why are buyouts levered? The financial structure of private equity funds (*Journal of finance, References 135*) | Axelson et al. (2009) | *N/A* | *N/A* | N/A | - | Financial structures |
| Investment behavior of buyout funds; Theory and evidence (*Working paper, References 93*) | Ljungvist et al.(2008) | 1981-2000 | US | 207 BO funds, 2,274 | LP | Investements |
| Evolution of buyout pricing and financial structure in the 1980s (*Quarterly Journal of Economics, References 349*) | Kaplan and Stein (1993) | 1980-1989 | *N/A* | 124 LBOs | *N/A* | Pricing and leverage |

## 3.5 Empirical evidence on private equity fundraising

In contrast to the extensive literature on the determinants affecting the venture capital fundraising volume, literature on buyout determinants is very limited due to lack of data on buyout funds previously and the private nature of information. However, recent developments such as the buyout fund boom in 2007 and entrance of many new database companies that have collected fund specific information from both GPs and LPs, have enabled this study about buyout fundraising that would not have been possible otherwise. As for my knowledge, Kaplan and Schoar (2005) are the first ones to carry out a comprehensive study on the drivers of private equity fundraising, and mostly focusing on venture capital funds which represent 80% of their dataset. Additionally, Balboa and Marti (2003) study the macroeconomic

determinants of aggregate country level fundraising volume, however their study limits to country-level analysis and is potentially exposed to many errors[18]. While, the existing literature of buyout fundraising is limited, the past literature on venture capital fundraising is more extensive (Gompers and Lernern, 1999, Jeng and Wells, 2000, and Poterba, 1989).

Kaplan and Schoar (2005) analyze the relation between capital flows and performance from various viewpoints such as market timing dynamics and entry of new funds. However, their analysis related to capital commitments are conducted only at annual aggregate level including 20 annual observations; thus, providing only rough estimates of industry trends, which I will try to confirm at fund-level. Overall, their analyses are more focused on the effect of micro determinants such as sequence of the fund, size and performance on fund flows. And from macroeconomic perspective their conclusions of economic condition are based solely on the market return[19] variable. As a conclusion, their study analyzes few, mostly fund-level variables, but from various perspectives such as from the probability of raising a new fund, number of new entrants and annual aggregate amount of capital raised by new GPs.

Balboa and Marti (2003) focus solely on macroeconomic variables at the aggregate country level providing less confidence than fund-level analysis. They employ a short time period and also fail to control for fund-specific variables which are major drivers according to prior literature. Therefore, their results should be interpreted with caution, since even though there could be some correlation between the macroeconomic factors and fund flows at aggregate country level, it is not strong enough proof that the fund flows are actually driven by the macroeconomic factors. The correlation could be present due to some third omitted variable, i.e. endogeneity problem could be present, which they fail to control for.

Overall, the prior literature on determinants affecting the buyout fundraising is insufficient and not robust. Therefore, I use more sophisticated methods, which I am going to discuss more in the methods section 6, and run the regression on macro and micro-level in order to increase the confidence levels and make sure the macroeconomic variables are significant even after controlling for fund-level factors. Next, I am going to briefly cover the previous

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[18] The variables tested by prior literature are partly overlapping and are prone to multicollinearity. Namely, Balboa and Marti (2003) have included in the same model GDP growth, growth of market capitalization and stock market returns. There is a great danger of multicollinearity, since capital inflow into private equity tend to increase with rising economy, which is likely to result in growth in market capitalization, meaning that the stock market returns will simultaneously increase.

[19] Market return is measured with S&P 500 and Nasdaq.

empirical evidence on the factors driving the capital inflow into private equity and discuss their relevance to buyout funds.

### 3.5.1 Macro determinants

In this section, I am going to discuss the macro determinants of private equity fundraising. Table 3 on page 31 indicates that prior literature is almost entirely focused on venture capital or total private equity sample, due to low number of buyout observations in the past. The key macro-economic determinants are such as; GDP, market return and capitalization, interest rate on Treasury bill, regulation of pension funds, industry returns, R&D expenses, labor market rigidity, capital tax rate, financial accounting standards, investments and divestments and aggregate domestic savings. In the next section, I am going to discuss the micro factors.

### State of economy

Private equity fundraising is potentially affected by the general health of the economy. The state of the overall economy affects both supply and demand side of the fundraising according to prior academic research. Jeng and Wells (2000), Gompers and Lerner (1999) and Balboa and Marti (2003) suggest that if the economy is rising, measured with GDP growth, there might be more business opportunities for entrepreneurs, which should increase the demand for venture capital funds. Increased demand for funds should lead to a growth in the opportunity set for investors, which in turn should increase the supply i.e. the amount of commitments to venture capital funds. Additionally, Jeng and Wells (2000) argue that increase in market capitalization leads to more favorable investor environment, which in turn means greater supply of fund committed to venture capital industry. Additionally, Kaplan and Schoar (2005) find that more VC partnerships are started after a period in which the industry performed well (measured with market returns) and that the first-time funds tend to raise larger funds. Their results for buyout funds are insignificant, though.

### Interest rates on Treasury bills

Gompers and Lerner (1999) find that the Treasury bill return in the previous year is negative and significant at state-level, however positively related to the probability of raising a new fund. They claim that the effect might result from the early 1980s when rapid increase in number of funds raised occurred and real interest rates were high, indicating that their result may not entirely be robust. Balboa and Marti (2003) include Treasury bond yield and claim

**Table 3 Summary of literature on macroeconomic determinants on PE fundraising**

Table below provides a summary of macro-economic determinants related to the private equity fundraising presented by previous literature. Independent variable refers to variable used as explanatory variable for dollar-volume or number of funds raised. Academic paper refers to a study which provides the evidence. PE refers to private equity sample and includes both buyout and venture capital funds. VC is venture capital funds solely and BO is buyout funds solely. PE signif, VC signif and BO signif refers to whether the coefficient of the variable was found to be significant or not; "Yes" means the coefficient is reported significant at least at 1%, 5% or 10% level and "No" means that it is significant at >11%-level or higher. PE -/+, VC -/+ and BO -/+ refers to whether the coefficient had negative sign or positive.

| Independent variable | Academic paper (Published) | PE Signif. | PE -/+ | VC Signif. | VC -/+ | BO Signif. | BO -/+ |
|---|---|---|---|---|---|---|---|
| Growth in GDP | Gompers and Lerner (1999) | | | Yes | Pos | | |
| | Jeng and Wells (2000) | No | Pos | No | Pos | | |
| | Balboa and Marti (2003) | Yes | Pos | | | | |
| Growth of market capitalization | Jeng and Wells (2000) | No | Pos | No | Pos | | |
| | Balboa and Marti (2003) | No | Pos | | | | |
| Market returns | Kaplan (2005) | Yes | Pos | | | | |
| | Balboa and Marti (2003) | No | Pos | | | | |
| | Gompers & Lerner (1999) | | | Yes | Pos | | |
| Interest rates on Treasury bills | Gompers and Lerner (1999) | | | Yes/No | Yes/Yes | | |
| | Balboa and Marti (2003) | Yes/No | No/No | | | | |
| Pension fund reg. | Gompers and Lerner (1999) | | | No | Pos | | |
| Pension fund levels | Jeng and Wells (2000)' | Yes | Pos | | | | |
| Industry returns | Kaplan and Schoar (2005) | | | Yes | Pos | No | Neg |
| Return (IPOs) | Gompers and Lerner (1999) | | | Yes | Pos | | |
| Labor market rigidity | Jeng and Wells (2000) | No | Neg | No | Neg | | |
| Accounting standards | Jeng and Wells (2000) | No | Pos | Yes | Neg | | |
| Tax on capital gains | Gompers and Lerner (1999) | | | Yes | Neg | | |
| | Poterba (1989) | | | Yes | Neg | | |
| IPO activity | Jeng and Wells (2000) | Yes | Pos | Yes | Pos | | |
| | Balboa and Marti (2003) | Yes | Pos | | | | |
| R&D expenses | Gompers and Lerner (1999) | | | No | Pos | | |
| Domestic savings | Balboa and Marti (2003) | No | Pos | | | | |
| Investments & divestments | Balboa and Marti (2003) | Yes | Pos | | | | |

that an increase in the long term interest rate of Treasury bond[20] has negative impact on the volume of funds raised, since Treasury bonds represents alternative investment choice and when the interest rate goes up, more available capital flows into Treasury bonds and less to private equity. However, their results are ambiguous and insignificant.

*Pension fund levels*

As mentioned in the 2.3 investor section, an important factor in the private equity fundraising are the institutional investors who are holding a large proportion of available assets in a nation under their management. Jeng and Wells (2000) test for pension fund levels across countries in their analysis. They find that private pension fund levels are significant determinant over time but not across countries. They think that it results from different regulation across countries, and once they control for fixed effects, they get significant results.

*Regulation of private equity*

Gompers and Lerner (1999) find greater probability of a fund being raised following the clarification to *ERISA*[21] in late 1970s since it allowed investments in early-stage funds. After the amendment, venture organizations could raise focused funds without worrying that pension funds would avoid investing in these due to the concern over its perceived riskiness. I am controlling for time fixed effects and cross-sectional fixed effects, catches the country and time specific factors and legal and regulatory environment, thus removing the problem of omitted variable.

*Industry returns*

Prior papers studying the relation between capital inflows into private equity and industry returns from a given industry get noticeably different results regarding whether they use venture capital or buyout fund sample. Gompers and Lerner (1999)[22] find that fund-level results are significant and positive; however aggregate industry returns are an insignificant

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[20] 10-year Treasury bond, since it matches the investment period

[21] The clarification of the Employee Retirement Income Security Act (ERISA) is "prudent man rule" in 1978, which allowed corporate pension funds to invest in a variety of investment products beyond bond and stock of very large companies in US; the investments would be judged "prudent" not by their individual risk, but by their contribution to portfolio risk.

[22] Gompers and Lerner (1999) use the value of firms brought public through IPOs (Initial public offering) as a proxy for venture capital industry return in the previous year. They calculate both fund specific values, the market value of a firm brought public by a given venture capital organization, as well as annual aggregate industry values.

factor. Jeng and Wells (2000) find that industry returns[23] are a driver of later stage venture capital investments. Kaplan and Schoar (2005) find that fund flows into venture capital are positively and significantly correlated with the prior year venture capital industry return, however the result for buyout funds is negative and insignificant[24]; they do not elaborate reasons for this.

*Factors excluded from my analysis*

The variables introduced next, are relevant for venture capital funds, however the link to buyout funds is weak, and thus the following variables are not included in my regressions.

*IPO activity* - Jeng and Wells (2000) find that an IPO is the most attractive exit for a venture capitalist for two reasons. First, a survey by Venture Economics shows that exit through an IPO is the most profitable and second, in an IPO entrepreneur is able to regain control. Their result holds after controlling for reverse causality[25]. Black and Gilson (1997) add that a well-developed stock market that permits venture capitalists to exit through an IPO is critical to the existence of a vibrant venture capital market. Also, Gompers and Lerner (1999) and Balboa and Marti (2003) find that increase in IPO activity is followed by an increase in fundraising. Conversely, as discussed in section 2, venture capital funds invest small stakes, while buyout funds seek for majority ownership and at divestment they seek to exit fully, thus trade sales being a better option for a buyout fund. Therefore, I exclude IPO activity in my study and the trade sales data specific for LBOs is difficult to access; even many of the prior papers excluded trade sales due to lack of data.

*R&D expenses* - Gompers and Lerner (1999) argue that R&D expenses are a proxy for demand of venture capital by high-technology firms; higher R&D expenses mean that there is greater potential of entrepreneurs with promising ideas. They find that R&D expenses within a nation are positively related to venture capital inflow.

*Labor market rigidity* - Labor market rigidity affects the free movement of resources. Jeng and Well (2000) provide an example from Japan, where changing an employment is

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[23] Jeng and Wells (2000) define industry returns by the total market value of IPOs divided by average GDP.

[24] I will elaborate more on the relation on section 5.2 and present my results in section 7.1.

[25] Jeng and Wells (2000) high levels of IPOs in a country will lead to more venture capital evidence from cross-sectional regression and within regression. Danger of reverse causality; not that higher levels of IPOs will lead to increased funding amounts, but that higher levels of funding will eventually show up as higher levels of IPOs. They use shorter time periods to test for this and reject the reverse causality hypothesis.

considered dishonorable and individual may lose valuable social benefits. Rigidities of the labor market are widely discussed and considered to be one reason why venture capital is not as widespread in Europe as it is in US.

*Capital tax rate* - a reduction in personal capital tax could either make venture capital more attractive for investors or attract more entrepreneurs to the industry. Poterba (1989), Gompers and Lerner (1999) and Jengs and Wells (2000) all find that reduction in capital gains tax does not affect the investors, possibly due to the rapid increase of tax-exempt institutional investors since 1978. However, Poterba (1989), Gompers and Lerner (1999) find more entrepreneurs to enter the market during times of low capital tax rate; making it relatively more attractive to start an own company than receiving a salary.

*Financial accounting standards* - In a private equity deal, an extensive due diligence is carried out before the investment is made in a target company. Nevertheless, if the country in which the company operates has poor accounting standards, even a profound due diligence process does not reveal trustworthy results, therefore strict accounting standards should have a positive effect on the supply of funds. Jeng and Wells (2000) find the opposite; accounting standards are statistically significant at with negative coefficient. They argue that the proxy employed is not suitable for a private company.

*Investments and divestments* – Results obtained by Balboa and Marti (2003) show that the lagged investment and divestment activity[26] does have a positive and significant effect on the amount of funds raised. They conclude that the impact of investment and divestment is especially strong in countries with developing private equity markets, since lack of track record makes investors to use this type of information in order to conduct investment decisions. I am not including investments and divestments as a variable since it is highly correlated with the commitments and the accurate data for such a large sample as I have, is difficult to obtain.

*Aggregated domestic savings* - Balboa and Marti (2003) include a proxy of liquidity for private equity funds; aggregate domestic savings as a percentage of GDP. They claim that

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[26] IPOs and sales to third parties are positive and significant, but divestments through write-off and buy-back have insignificant coefficients. However, as discussed above the study has been carried out only on aggregate country-level and they do not control for reverse causality as Jeng and Well (2000) do in their study; they fail to show whether the increase in investment-divestment activity actually leads to an increase in the private equity fundraising, or alternatively whether the increase in fundraising for some other reason results in private equity funds to invest and divest more.

aggregate domestic savings reflects the availability of fund for different investment purposes of which one is private equity funds. They find that the variable has positive and significant results. I excluded this due to lack of reliable data.

### 3.5.2 Micro determinants

Next I will discuss the fund-level factors affecting the fundraising volume. For fund-specific variables there is some prior evidence from buyout funds, mainly from Kaplan and Schoar (2005). The micro determinants introduced by prior literature are past performance, reputation, size of the fund and the time lag between the next and previous fund raised.

*Past performance and persistence of returns* - Kaplan and Schoar (2005) show in their paper that higher previous fund returns are related to larger follow-on fund size. Furthermore, Gompers and Lerner (1999) find that it is more likely that a venture capital fund will be raised in a given year, when the previous fund returns have been positive. Prior literature on mutual funds shows that past fund returns[27] do not explain well the future fund returns, so why would one invest in a private equity firm based on the past return of a fund. Academics argue that private equity funds have a learning curve, meaning that funds that outperform one year are also going outperform the following year due to the heterogeneity in GPs' skills; (i) GPs have access to particular transactions "proprietary deal flow", meaning that more skillful GPs are better able to invest in better investments, (ii) GPs usually provide advisory inputs along with capital (Kaplan and Schoar, 2005), (iii) venture capital funds are able to get better deals, 10-14% discount on price, when negotiating with start-ups, since they provide substantial amount of management, advisory and reputational inputs (Hsu ,2004).

*Size of the fund* - Kaplan and Schoar (2005) find that the GPs that perform well have larger funds and the fund size grows with time. Capital inflows increase in relation to past performance, but not linearly. The best performers grow slower, so the relationship is concave, because there is just not enough attractive deals and lack of GPs with the qualified skillset[28]. Also, Gompers and Lerner (1999) find that the firm performance has a strong effect on fundraising. The probability of raising a fund increases in relation to performance, but the

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[27] Gompers and Lerner (1999) measure performance with the market value of the equity held by venture capital firm that went public in a certain year. Kaplan and Schoar (2005) measure performance with IRR (internal rate of return) of the fund calculated by VE and fund's cash flow, as well as PME (public market equivalent, which is cash flows discounted with stock market return). I will discuss my choice of proxy more in section 5.4.

[28] Survey from LPs provides evidence that the top funds are highly oversubscribed and they choose to stay smaller (Kaplan and Schoar, 2005).

size of the fund is not affected by performance. Older firms are less likely to raise a new fund, however if a fund is raised, the fund will be larger than the previous one.

*Reputation* - Kaplan and Schoar (2005) suggest that the fund's sequence number may pick up some features of fund quality and past performance, thus representing the reputation of the fund. Higher sequence number could indicate the survival of the fund, and therefore better performance. Additionally, Gompers and Lerner (1999) state that the sequence number may capture some future believes about the fund's performance, which are not captured by current performance figures, because those do not give time perspective. According to Metrick and Yasuda (2010) using sequence as a proxy for reputation is justified; if the current fund performs well then investors will interpret the performance as "skill" rather than "luck".

*Years since previous fund raised* - Gompers and Lerner (1999) argue that if the venture capital follow-on fund is raised too soon, it could be an indication of GPs greediness for management fees and thus marketing new fund too soon could be perceived negatively by investors.

### 3.5.3 Fund performance and credit conditions

Private equity performance is beyond the scope of this study. The aim of my study is to show the relation between buyout fundraising and credit market conditions. However, it would be interesting to see how the credit market conditions affect the performance of the fund sample that I obtain. Therefore, I run quick analysis on the performance of the fund and the prevailing credit conditions at the time the fund was raised following Axelson et al. (2010).

The evidence from the relation between credit market conditions and fund's performance is mixed. Phalippou and Zollo (2005) argue that corporate yields reflect the cost of buyout debt and that credit spreads capture the average expected likelihood of default and rates of recovery; as a result, both variables should have a negative impact on returns; meaning that when rates are high, returns are low. They find that when either credit spreads or corporate bond yields are low at the time investments are made, fund performance is higher. Ljungqvist et al. (2008) propose that the credit spread measures the tightness of credit markets and, therefore, lower spreads should correspond to higher returns. They find that Moody's BAA corporate bond premium over risk-free rate at the time of investment has negative and significant effect on the investment of each portfolio company, implying that loose credit markets lead to higher returns. Axelson et al (2010) study credit spread at aggregate vintage-

year level PME[29] and fund level PME, and find in both cases that higher spread leads to higher returns, indicating that loose credit markets result in poorer performance, thus providing support for GP-LP agency conflict theory. There is also evidence from LBOs; Valkama et al (2013) find ambiguous and weak evidence of the credit spread and LBO transaction IRR %.

**Table 4 Summary of prior literature on PE fundraising**

The table below presents the summary of private equity fundraising literature of macro and micro determinants. The literature is very limited and mostly focused to venture capital. First column presents the article- and journal name and number of references. Second column presents the author and year published. Third column shows time-period employed in the study. Fourth column presents the region focus. Fifth column is the fund type and last column is the source for the data. BO is buyout funds, VC is venture capital funds, PE is private equity funds; so both buyout and venture capital funds.

| Study | Author | Time period | Region focus | Funds | Data |
|---|---|---|---|---|---|
| The economics of private equity funds (The review of financial studies, *Ref #231*) | Metrick and Yasuda (2010) | 1993-2006 | *N/A* | 238 BO & VC funds | Large investor |
| Leveraged buyouts and private equity (Journal of Economic perspectives, *Ref #311*) | Kaplan and Strömberg (2009) | 1996-2004 | US | 43 LBOs | CapitalIQ |
| Private Equity Performance: Returns, Persistence, and Capital Flows (Journal of Finance, *Ref #848*) | Kaplan and Schoar (2005) | 1980-2001 | Not disclosed | PE | Venture Economics |
| Illiquidity puzzle: theory and evidence from private equity (Journal of Financial Economics, *Ref #149*) | Lerner and Schoar (2004) | 1946-2001 | US | 243 funds | Large investor |
| An integrative approach to the determinants of PE fundraising (Working paper *Ref #10*) | Balboa & Marti (2003) | 1987-2000 | Western EU | Country-level | EVCA |
| The determinants of VE funding; evidence across countries (Journal of Corporate Finance *Ref #276*) | Jeng & Wells (2000) | 1986-1995 | 21 countries | *N/A* | Venture Associations |
| Venture Capital and Capital gains taxation (Working paper, *Ref #227*) | Poterba (1989) | 1977-1987 | US, UK, Canada | VC | Venture Economics |

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[29] PME = Public market equivalent

# 4 HYPOTHESES

Based on the literature review presented above, it is fair to assume that availability of debt financing and cost of debt potentially drives the commitments into buyout funds. Capital structure theories suggest that average credit spreads are negatively related to investment activity by buyout funds, transaction prices, and leverage. Tradeoff theory and adjusted present value theories argue that investors should take into account financial side effects such as tax and interest incentives when maximizing the value of their investments. Additionally, when the cost of debt decreases it drives down the required rate of return of investment and thus makes the target more attractive from valuation perspective. Mispricing theory suggests that occasionally, there exists mispricing between cost of equity and cost of debt that investors are able to arbitrarily benefit from. Also, prior empirical evidence on credit spread represents support that the leverage in LBO transactions is more driven by the economic-wide cost of debt than firm specific characteristics. To conclude, when the credit conditions are favorable, individual investment targets become more attractive increasing the potential investment portfolio set available for buyout funds, and additionally favorable credit markets should also provide liquidity and access to financing, thus the GPs should be more desirous of raising a buyout fund.

**H 1:** *More capital is committed into buyout funds when the credit markets are loose*

Agency conflict theory suggests that buyout leverage is more driven by market factors than firm-specific characteristics; when credit markets are loose and access to debt is easy and interest rates are low, the GPs have a tendency to increase the value of their option-like compensation scheme by investing more and making them more willing to overpay for the targets relative to the fundamental value. Capital structure theories provide further support why leverage and cost of debt make such a difference for buyout funds and suggest that credit conditions could be a driver for buyout fundraising. I aim to show support that economy-wide debt market conditions should explain buyout fundraising better than cross-sectional GP characteristics; meaning that when credit conditions are loose more GPs will be raising funds despite of their firm specific characteristics.

**H2**: *Loose credit conditions should lead to more commitments into buyout funds despite the firm specific characteristics*

Prior literature suggests that there are differences between funds raised by new entrants and established firms. Kaplan and Schoar (2005) find that more first-time private equity funds are raised by new entrants after periods in which the stock market performed well. Furthermore, they find that venture capital partnership are started more aggressively after periods in which the venture capital industry performed well and that also first-time funds tend to raise larger funds. However, the results were insignificant for buyout funds, which might be due to the very low sample size. Therefore, I aim to study the timing of first-time buyout funds and hypothesize that more first-time buyout funds[30] will be raised after a period of low credit spreads and high market returns.

**H3***: New entrants are pro-cyclical*

**Table 5 Summary of hypotheses**

| Macro determinants of buyout fundraising volume | |
|---|---|
| H1 | More capital is committed into buyout funds when the credit markets are loose |
| H2 | Loose credit conditions should lead to more commitments into buyout funds despite firm specific characteristics |
| H3 | New entrants are pro-cyclical |

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[30] First-time buyout fund means that this is the first buyout fund raised by a particular GP

# 5   DATA

I use two complementary databases VentureXpert (VE) and Preqin. From VE I obtain 5,420 new buyout funds raised between 1980-2011 and from Preqin 1,273 buyout funds. Thus, VE is more suitable for aggregate-level analysis, however I am not able to access the funds' performance figures through VE, and thus I am using Preqin to conduct the fund-level analysis such as controlling for the performance of previous fund.

VentureXpert is employed by Kaplan and Schoar (2005), Balboa and Marti (2003), Jeng and Wells (2000), Gompers and Lerner (1999) and Poterba (1989). VentureXpert$^{TM}$ (VE) is a database of Venture Economics, which is a Thomson Financial company. Venture Economics collects quarterly information on individual funds in the private equity industry. The data set is based on voluntary reporting of fund information by the GPs as well as by their LPs. Kaplan and Schoar (2005) argue that according to Venture Economics there is "little opportunity for inconsistent reporting", since they receive information from both GPs and LPs. Venture Economics estimates that this data set covers 70% of the overall private equity market. Obviously, Venture economics database is prone to self-reporting and survivor biases; fund managers that fail to raise a fund do not likely report and poorly performing funds are reporting less frequently. However, reporting by LPs should make up for this to some extent. I also compare my set of funds to those of prior literature during the same time periods and it seems that VE has complemented their database, since I obtain more funds than the previous studies. This could be true, since the LPs are requiring better reporting, and funds may be more willing to report and thus increase their level of transparency to gain investors.

Preqin database is fairly new, founded in 2003 and thus not yet widely used in the prior literature. However, some of the most recent studies for example Axelson et al (2010) use Preqin's data to study determinants of LBO leverage levels and performance. Table 6 compares VE and Preqin on an aggregate fundraisings level. As we see from Table 6, Preqin covers approximately 60% of VE's funds in dollar terms, however only about 23% in number of funds; meaning that Preqin presents fairly well the total buyout fund universe in terms of larger funds, however there is inconsistent performance reporting among the smallest funds. However, as Table 6 presents, Preqin does not significantly deviate from VE's data, except for the data in early 1980s which includes larger variation however then the dollar amounts were fairly small, thus not affecting the overall analysis. I also ran some manual checks on the figures and the data seem to be accurate.

**Table 6 Comparison of VE and Preqin databases**

The table below compares the Venture Economics (VE) and Preqin databases. Panel A presents the aggregate annual fundraising volumes in US$billions in 2011 dollars for both databases. Panel B presents the aggregate number of new funds raised for both databases. In both panels, the third column shows Preqin's observations in relation to VE.

Aggregate volume of funds raised in US and Europe

| | Panel A: (US$bil in 2011 dollars) | | | Panel B: (Number of new funds) | | |
|---|---|---|---|---|---|---|
| Vintage Year | VE | Preqin | Preqin as a % of VE | VE | Preqin | Preqin as a % of VE |
| 1980 | 0 | 1 | 261 % | 10 | 4 | 40 % |
| 1981 | 1 | 0 | 0 % | 16 | 0 | 0 % |
| 1982 | 1 | 1 | 69 % | 25 | 1 | 4 % |
| 1983 | 6 | 0 | 7 % | 32 | 3 | 9 % |
| 1984 | 7 | 3 | 39 % | 36 | 6 | 17 % |
| 1985 | 7 | 1 | 12 % | 44 | 4 | 9 % |
| 1986 | 16 | 4 | 23 % | 53 | 12 | 23 % |
| 1987 | 38 | 16 | 41 % | 85 | 10 | 12 % |
| 1988 | 30 | 11 | 38 % | 94 | 17 | 18 % |
| 1989 | 32 | 13 | 41 % | 133 | 14 | 11 % |
| 1990 | 24 | 11 | 44 % | 106 | 22 | 21 % |
| 1991 | 15 | 5 | 34 % | 55 | 11 | 20 % |
| 1992 | 24 | 15 | 61 % | 95 | 22 | 23 % |
| 1993 | 43 | 11 | 25 % | 112 | 22 | 20 % |
| 1994 | 51 | 56 | 109 % | 133 | 41 | 31 % |
| 1995 | 56 | 25 | 45 % | 138 | 31 | 22 % |
| 1996 | 60 | 28 | 46 % | 131 | 38 | 29 % |
| 1997 | 126 | 67 | 53 % | 213 | 58 | 27 % |
| 1998 | 147 | 107 | 73 % | 234 | 69 | 29 % |
| 1999 | 120 | 79 | 66 % | 239 | 61 | 26 % |
| 2000 | 173 | 136 | 79 % | 275 | 89 | 32 % |
| 2001 | 150 | 75 | 50 % | 279 | 47 | 17 % |
| 2002 | 98 | 73 | 75 % | 202 | 49 | 24 % |
| 2003 | 91 | 73 | 80 % | 195 | 46 | 24 % |
| 2004 | 115 | 80 | 70 % | 221 | 51 | 23 % |
| 2005 | 313 | 178 | 57 % | 350 | 100 | 29 % |
| 2006 | 424 | 307 | 72 % | 359 | 104 | 29 % |
| 2007 | 470 | 317 | 68 % | 429 | 106 | 25 % |
| 2008 | 350 | 192 | 55 % | 418 | 91 | 22 % |
| 2009 | 142 | 73 | 51 % | 248 | 46 | 19 % |
| 2010 | 75 | 41 | 55 % | 207 | 46 | 22 % |
| 2011 | 194 | 109 | 56 % | 253 | 52 | 21 % |
| Total | 3 400 | 2 106 | | 5 420 | 1 273 | |

Sources: International Financial statistics, Venture Economics and Preqin

Panel A: US$bil in 2011 dollars          Panel B: Number of new funds raised
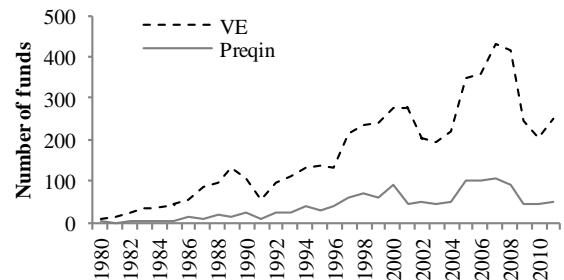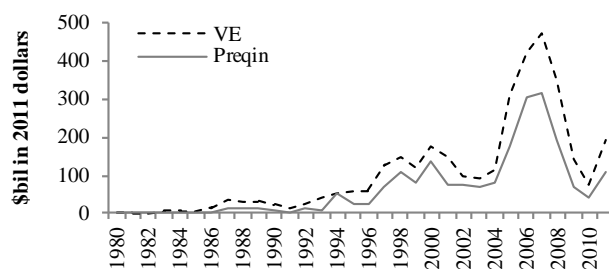


Sources: International Financial statistics, VentureXpert and Preqin

## 5.1 The sample collection process

My sample of funds will focus purely on buyout funds and I exclude all other funds from the statistics such as venture capital, generalist funds, mezzanine funds, infrastructure funds, real estate funds, distress debt funds, primary funds-of-funds, and secondary funds-of-funds. I also exclude mezzanine because they have a different investment strategy compared to buyout funds, they offer financing between company's senior debt and equity for companies, even though one could hypothesize that also their activity is related strongly to credit market conditions. They invest actual debt stakes in companies, while buyout funds lend the money from outsiders and invest it in the portfolio companies' balance sheet and thus avoid the direct exposure themselves. VentureXpert sample is obtained from private equity funds database (VIFD) and I obtain 7,700 buyout funds.

My study is based on a time period of 1980-2011, since prior to 1980 reporting is less frequent and I observe on average less than 5 funds per country per year, which is too small sample size in order to get high enough confidence levels. After I exclude all the funds raised prior to 1980, I obtain 7,283 buyout funds and by removing the funds raised during 2012-13, I obtain in total 6,957 buyout funds. I remove the vintage years of 2012-2013 due to lack of macroeconomic data such as GDP figures.

Next, I will limit my data according to country focus to markets which are in my interest; Europe and North America according to firm nation, and furthermore, I exclude funds with investment focus on countries like Cayman Islands due to the tax haven nature of the country. I mostly include European countries which belong to OECD due to better accessibility to reliable data. This reduces the sample size to 5,420.

For Preqin, I start altogether with 1,468 buyout funds. Then I control for the region factor and the sample reduces to 1,273 buyout funds raised between 1980-2011 in Europe and North America, which resembles approximately one quarter of the VE sample. After balancing the Preqin data with years when no fund was raised, I end up with a balanced panel data set of 13,299 observations for 403 private equity firms which have raised buyout funds.

## 5.2 Descriptive statistics

In this section, I cover the descriptive statistics which are relevant to my study. Moreover I will be comparing the data obtained from the two databases, since much of the fund-level

analysis such as the probability of raising a fund, fund size, the probability of raising a follow-on fund and micro-level analysis are dependent on the less-comprehensive Preqin database. Of course, as a robustness check I have run the analysis with both samples, however VE sample does not allow me to control for the fund's performances.

For the aggregate level analysis I use VE data, since it is more comprehensive. In Figure 4, I compare the aggregate levels of buyout fundraising to merger waves and LBO transactions to get confidence for my data set in relation to some well-known corporate finance patterns. The co-movement of three various corporate finance waves is obvious, buyout fundraising pattern following closely the merger waves. Moreover, the recent buyout boom is obvious from the graph.

**Figure 4 Development of M&As, LBOs and commitments into buyout funds**

The figure below compares the three various corporate waves; merger waves in terms of annual transaction value, leveraged buyout (LBO) waves in terms of transaction value and buyout fundraising waves in terms of capital commitments into buyout funds. The figures are presented in US$billion in 2011 dollars, inflation adjusted. Source: Thomson
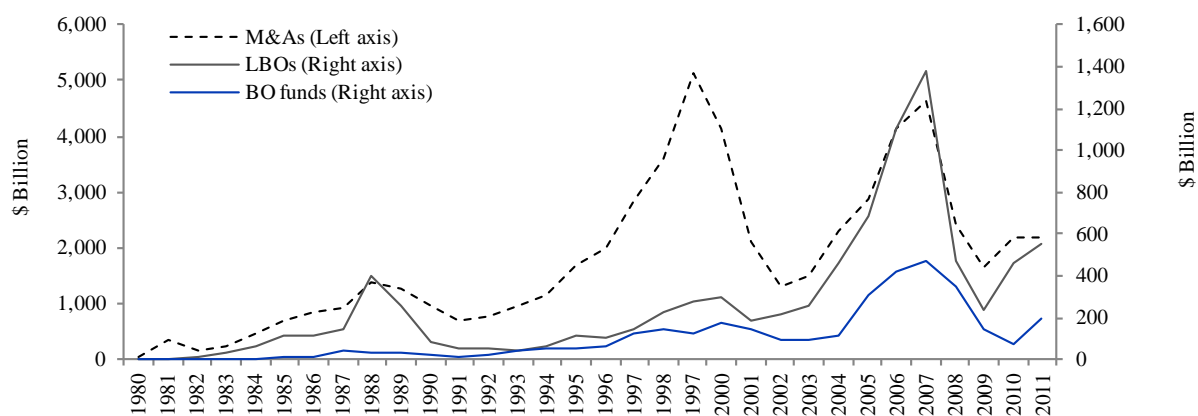


Table 7 shows the same aggregate fundraising volumes as in Table 6 however in number of funds by comparing the data obtained from Preqin and VE, more clearly presenting the observation noted above that the Preqin sample includes on average larger funds. Moreover, the maximum fund size figures are generally consistent bringing more confidence that Preqin presents fairly well the buyout fund universe in terms of larger funds. Even though, some of the fund characteristics vary a little across the databases.

Figure 5 reveals that overall trend between number of funds and average fund size is similar; when capital inflow into buyout funds increases also the average fund size increases.

**Figure 5 Comparison of fund-level characteristics**

The chart present the average fund size in US$billion in 2011 dollars and the number of new BO (buyout) funds raised per vintage year. Panel A present the statistics for sample obtained from Preqin and Panel B presents for VentureXpert (VE). The figures include the sample used in the analysis, thus only US, Canada and selected countries from Europe. Vertical bars present the number of BO funds observed within the database, dotted line presents the average fund size, horizontal black bars present loose credit markets; measured with Moody's BAA corporate bond spread over risk-free rate. I have only included years in which the spread increased; the higher the horizontal black bar, the lower the spread, presenting favorable credit market conditions.

Total aggregate fundraising in US and Europe

Panel A - Preqin sample                                    Panel B - VE sample
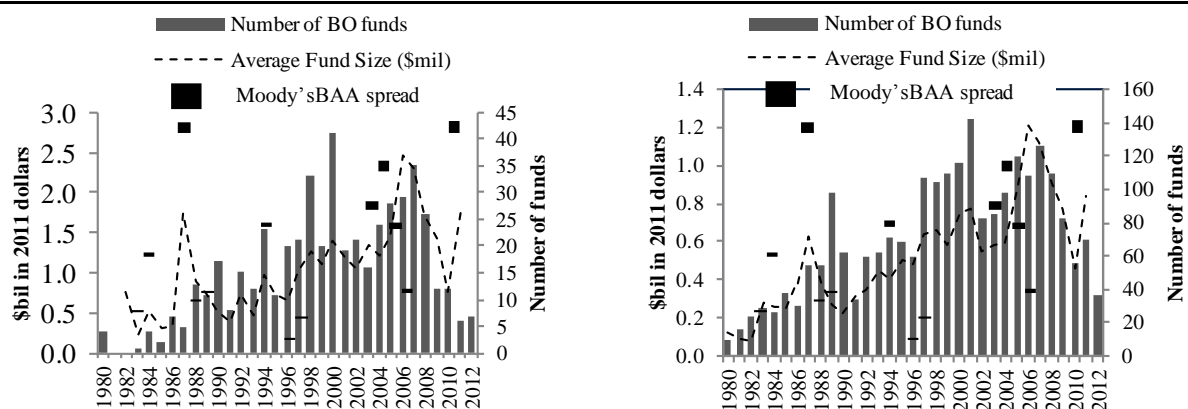


This implies that when capital liquidity is high and there are more funds raised then also more capital is allocated to funds, thus the average fund size increases. Moreover, we see from the graph that the time periods which are featured with loose credit market conditions such as the birth of junk bonds in 1985-88 and birth of CDOs in 2003-2006 are featured with above average fund sizes. Moreover, even though the Preqin data contains larger funds on average the two graphs represent the same trend, therefore the use of Preqin data is justified for fund size analysis and I expect significant results, however the magnitude of the result could be overestimated. The statistical analysis for the fund size is reported in section 7.3.1.

So far, I have compared the aggregate volume, number of new funds raised per vintage year and fund size. Next, in Figure 6 and in Figure 7 I present the relation between credit market conditions and funds raised split to first-time buyout funds and follow-on funds, by number of funds and dollar amount of capital raised by the funds. Figure 6 presents a strong relation between the number of funds and credit market conditions; when the credit spread is below average the number of funds increases substantially and vice versa. The correlation seems to be true for both first-time and follow-on funds, however number of follow-on funds has grown significantly more. The statistical analyses for the new entrants are presented in section 7.1.2.

**Table 7 Comparison of fund-level characteristics**

The number of observations indicates the total number of new funds raised per vintage year and average and maximum fund sizes in US$mil 2011 dollars for these funds. "Liq. funds" refers to a number of liquidated funds as of vintage year. "Avg" size refers to the average fund size and "Max size" to the largest fund size in that particular vintage year in US$ millions in 2011 dollars. For Preqin data, I also report the average, max and min IRR for the vintage year. IRR is Internal Rate of Return net of fees.

| Vintage Year | Venture Economics | | | | Preqin | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total Obs. | Liq. funds | Avg. Size | Max Size | Total Obs. | Liq. funds | Avg. Size | Max Size | Avg. IRR | Max IRR | Min IRR |
| 1980 | 10 | 4 | 122 | 179 | 4 | 4 | 318 | 947 | N/A | N/A | N/A |
| 1981 | 16 | 6 | 84 | 174 | 0 | 0 | 0 | 0 | N/A | N/A | N/A |
| 1982 | 25 | 10 | 77 | 343 | 1 | 1 | 750 | 750 | 39.2 | 39.2 | 39.2 |
| 1983 | 32 | 18 | 284 | 1 249 | 3 | 3 | 214 | 250 | 15.8 | 41 | -2 |
| 1984 | 36 | 22 | 257 | 2 120 | 6 | 6 | 528 | 2 120 | 32.9 | 96.2 | 7.3 |
| 1985 | 44 | 20 | 253 | 1 543 | 4 | 4 | 306 | 366 | 13.4 | 27 | 5.1 |
| 1986 | 53 | 31 | 380 | 4 267 | 12 | 12 | 328 | 1 353 | 49.5 | 280 | 3.7 |
| 1987 | 85 | 45 | 629 | 10 954 | 10 | 10 | 1 736 | 11 991 | 19.6 | 31.3 | 6.8 |
| 1988 | 94 | 64 | 383 | 3 584 | 17 | 15 | 904 | 3 559 | 18.8 | 54.3 | 4.7 |
| 1989 | 132 | 82 | 266 | 1 942 | 14 | 14 | 735 | 2 303 | 30.5 | 64 | 11.4 |
| 1990 | 106 | 70 | 226 | 1 953 | 22 | 22 | 518 | 2 885 | 22.2 | 72 | 2.4 |
| 1991 | 55 | 34 | 311 | 3 293 | 11 | 11 | 398 | 1 399 | 29.1 | 54.7 | -0.5 |
| 1992 | 95 | 45 | 348 | 2 977 | 22 | 21 | 740 | 3 639 | 19.4 | 58.1 | -49.9 |
| 1993 | 112 | 58 | 443 | 3 042 | 22 | 17 | 479 | 1 149 | 21.1 | 58 | -1.9 |
| 1994 | 133 | 91 | 400 | 3 066 | 41 | 33 | 969 | 11 423 | 22.8 | 92.2 | -22.6 |
| 1995 | 138 | 67 | 507 | 6 869 | 31 | 23 | 728 | 2 717 | 16.6 | 59.9 | -19.9 |
| 1996 | 131 | 56 | 483 | 4 445 | 38 | 21 | 653 | 3 883 | 16.6 | 147.4 | -19.6 |
| 1997 | 213 | 81 | 641 | 8 999 | 58 | 37 | 1 040 | 9 000 | 9.4 | 84 | -21.6 |
| 1998 | 234 | 89 | 662 | 6 069 | 69 | 27 | 1 255 | 5 956 | 5.9 | 31.3 | -100 |
| 1999 | 239 | 85 | 579 | 10 641 | 61 | 16 | 1 112 | 5 101 | 10.3 | 35.7 | -25.1 |
| 2000 | 274 | 39 | 747 | 8 935 | 89 | 12 | 1 393 | 8 730 | 17.7 | 41.6 | -9.2 |
| 2001 | 279 | 30 | 777 | 8 529 | 47 | 6 | 1 183 | 5 537 | 23.7 | 46.9 | -11.6 |
| 2002 | 202 | 11 | 552 | 8 244 | 49 | 3 | 1 054 | 5 845 | 21.1 | 72 | -13.4 |
| 2003 | 195 | 8 | 587 | 8 680 | 46 | 1 | 1 335 | 8 680 | 16.8 | 57 | -86.2 |
| 2004 | 221 | 5 | 589 | 8 319 | 51 | 1 | 1 211 | 7 488 | 17.0 | 80 | -17.3 |
| 2005 | 350 | 5 | 882 | 12 700 | 100 | 1 | 1 466 | 10 768 | 13.0 | 76.9 | -7.5 |
| 2006 | 359 | 2 | 1 207 | 26 630 | 104 | 0 | 2 461 | 26 630 | 6.5 | 30.4 | -25.2 |
| 2007 | 429 | 4 | 1 120 | 24 210 | 106 | 1 | 2 293 | 24 210 | 9.4 | 43 | -28 |
| 2008 | 418 | 0 | 912 | 23 101 | 91 | 0 | 1 708 | 22 019 | 12.7 | 48.7 | -31.1 |
| 2009 | 248 | 1 | 775 | 12 956 | 46 | 0 | 1 413 | 5 965 | 12.6 | 91.5 | -28 |
| 2010 | 207 | 0 | 459 | 4 155 | 46 | 0 | 772 | 4 566 | 2.4 | 46.8 | -59.5 |
| 2011 | 253 | 0 | 846 | 16 000 | 52 | 0 | 1 735 | 16 200 | N/A | N/A | N/A |

**Figure 6 Credit market conditions and number of first-time funds**

The figure below shows the number of new entries into buyout market, which is defined as new GPs established or GPs that have previously focused on other asset class and have decided to raise their first BO fund. Credit market conditions are measured with Moody's BAA corporate bond spread over risk-free rate. Source:VE.
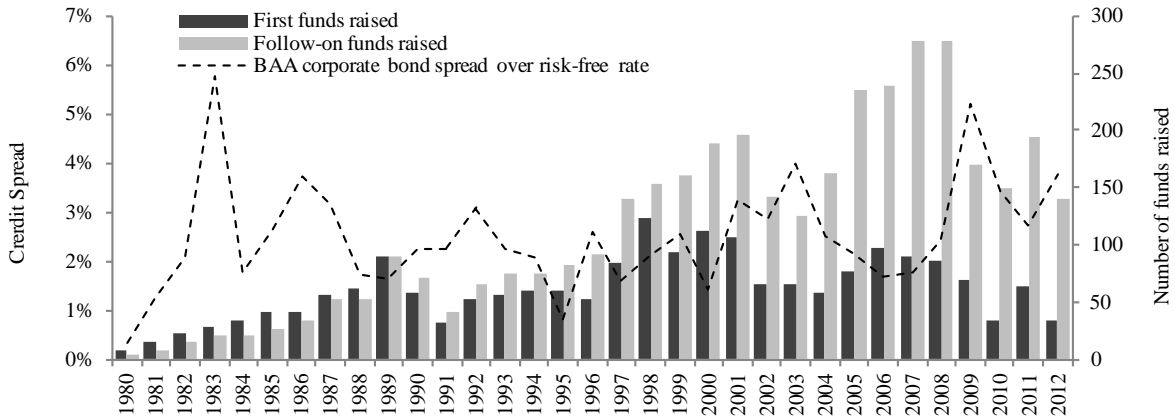


In Figure 7, it is shown the relation between credit market condition and dollar value of capital raised by new entrants. The negative relation is obvious for follow-on funds, and it seems from the chart that also the capital raised by first time funds peeks when credit spread is low. However, while the capital raised by follow-on funds over time presents tremendous growth, the first-time funds illustrate flat growth. The danger in here is that there could be a severe misreporting by the first-time funds, which perform poorly and fail to raise a follow-on fund. It seems surprising that over 30-year time period the growth of first-time buyout funds is flat, while follow-on funds present tremendous growth.

**Figure 7 Credit market conditions and capital raised by first-time funds**

The figure below shows the capital raised by the new entries into buyout market, which is defined as new GPs established or GPs that have previously focused on other asset class and have decided to raise first BO fund. Credit market conditions are measured with Moody's BAA corporate bond spread over risk-free rate. Source:VE.
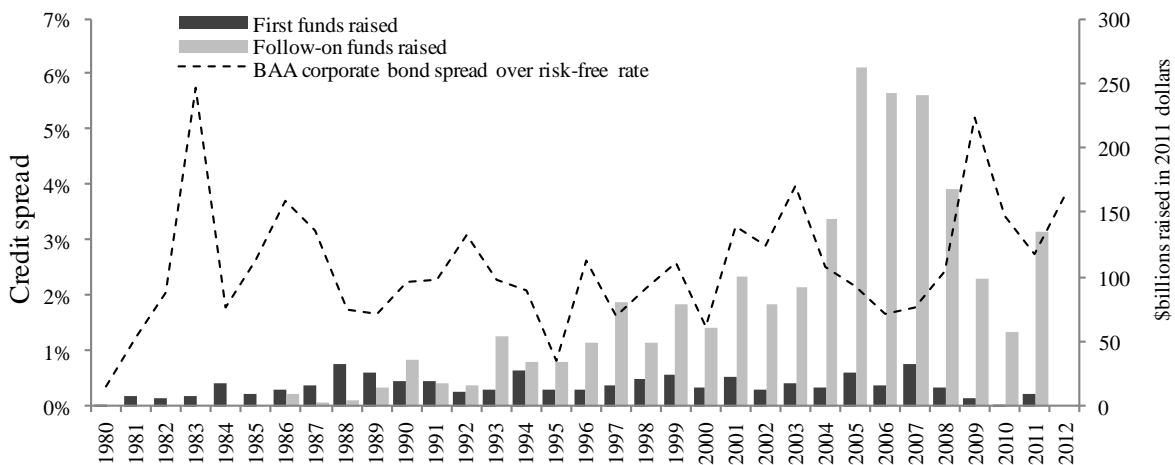
Furthermore, the entry of first-time buyout funds could be driven by completely different set of factors than what drives the decision of raising a follow-on fund. The decision for a person to establish a GP or for an existing GP that focuses in some other asset class e.g. venture capital, to enter the buyout market could be potentially driven by factors related to the industrial factors or alternatively personal preferences. The prior literature indicated that new entrants should be pro-cyclical and based on the graphs it seems that the number of new entrants correlates with credit market conditions, whereas the capital raised by new entries seems to have insignificant relation. We will see whether the results hold after controlling for all the other factors.

### 5.2.1 Defining buyout waves

Prior literature on buyout fundraising waves relies on graphs and figures to identify the waves, thus I make an effort to use a more sophisticated effort following the method by Harford (2005). I collect all the buyout funds raised 1982-2012 from Thomson Financial's Securities Data Company (SDC). I split the observations into three periods[31]; 1980s, 1990s and 2000s, since all the period are characterized with different type of waves; 1980s are featured with junk bonds, 1990s with dot-com boom and 2000s with CDOs (Collateralized debt obligations). Based on Mitchell and Mulherin (1996), I will study the waves in two-year periods[32]. Thus, for each decade, I calculate the highest two-year concentration of the funds raised. This two-year period is identified as a potential wave. I simulate 1000 times the total number of funds raised over the entire decade by assigning each occurrence equal probability 1/10 for each year. Next, I take the maximum two-year concentration from my simulation and compare it to the actual concentration. If the actual peak concentration exceeds the peak of empirical distribution, the period is considered as a fundraising wave.

My result of the simulation are shown in Figure 8 indicating that there occurred two-year waves during 1989-90, 2000-2001 and 2007-2008. During the period of 1982-1992, 31% of the funds were raised within a two-year period starting in 1989-90. Out of the 1000 simulations of the 754 bids the maximum concentration was 29%. In 2002-2012, the actual maximum concentration out of 3044 new funds raised occurred in 2007-2008 presenting 28%,

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[31] I have identified the decades followingly, since there was not much activity in early 1980s and moreover, because the waves occur in the turn of the year; 1980s = 1982-1992, 1990s = 1992-2002, 2000s = 2002-2012

[32] I also study the waves in three-year periods and get the same results, however I only report the two-year results.

while the simulation yielded maximum concentration of 24%. In the 1980s, the peak of actual concentration exceeds that of the simulation over two-year period, in 2000s the maximum concentration extends over a three-year period; indicating that the wave lasted longer.

**Figure 8 Buyout fundraising wave simulation**

The graph below presents the maximum two-year concentration of a simulated buyout fundraising by assigning equal probabilities for each funds and the actual average two-year concentration. The actual two-year concentration in number of buyout funds exceeds the simulation in 1989-90, 2000-2001 and 2007-2008 indicating that there occurred two-year waves during these periods.
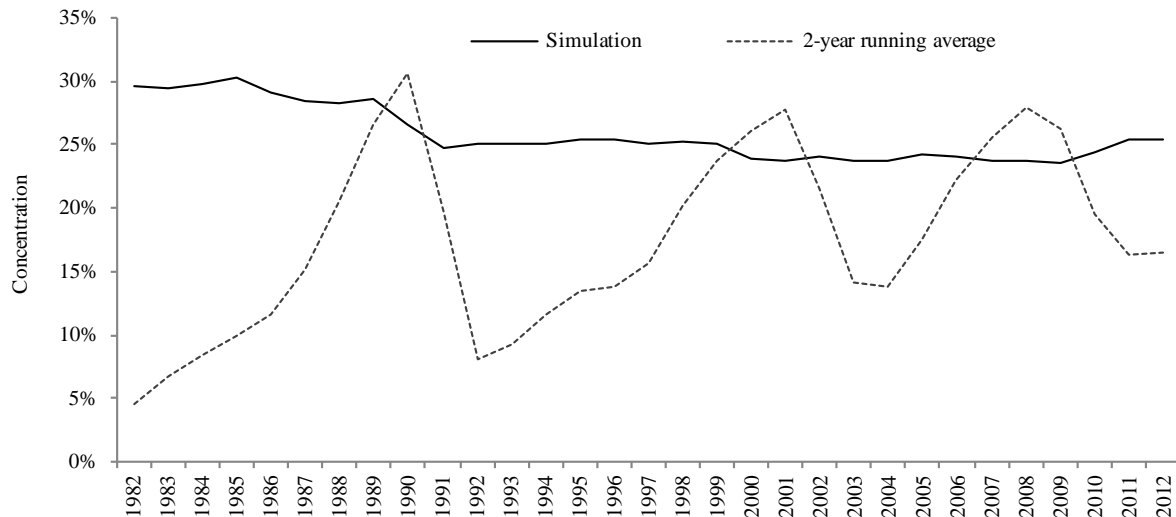


## 5.3 Size of buyout markets

Prior literature has been mainly focusing on US and UK, with a few additional articles on Western Europe and maturing private equity markets. Balboa and Marti (2003)[33] include in their study 17 Western European countries such as Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and UK. Jeng and Wells (2000) include 21 countries, in addition to Balboa and Marti (2003) they add Australia, Canada, Israel, Japan, New Zealand, US and exclude Greece from their sample. I include 20 European countries in my analysis; Austria, Belgium, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Poland, Portugal, Spain, Sweden, Switzerland, UK and also Canada and US.

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[33] Balboa and Marti (2003) European countries included (1987-2000 with following exceptions): Austria (1991-1992), Greece (1987-1990, 1993-1994), Finland, Iceland, Norway (1987)

Table 8 shows the size of each country's buyout market in relation to its GDP. As expected, mature markets such as UK and US are the largest buyout markets with buyout market comprising 10-20% of GDP and maturing markets are around 1-2%. Interestingly, Sweden stands out with 6-8% buyout market as of GDP, due to large PE firms such as Altor and Nordic Capital, which raised over USD 2 billion in 2008 and nearly USD 6 billion, respectively. Prior literature from early 2000 (Karaömerlioglu and Jacobsson), also shows evidence that Sweden has been actively developing its private equity market. Furthermore, Luxembourg has significantly large buyout market due to its tax haven nature. Overall, the two databases yield similar results, however there are some differences in individual countries.

**Table 8 The size of the buyout market in relation to GDP**

Table below indicates the size of a buyout fund market in every respective country with VE and Preqin databases. BO/GDP is the aggregate amount of buyout funds raised in a given country divided by the country's GDP in a given vintage year and all the vintage years from 1980-2011 are summed together. As a % of total is calculated by summing all the countries together and every country's BO market size is divided by the total amount.

| VE | | | | Preqin | | | |
|---|---|---|---|---|---|---|---|
| # | Country | BO / GDP | As a % of the total | # | Country | BO / GDP | As a % of the total |
| 1 | United Kingdom | 0.1725 | 28 % | 1 | United Kingdom | 0.1370 | 27 % |
| 2 | United States | 0.1281 | 21 % | 2 | Luxembourg | 0.1038 | 21 % |
| 3 | Canada | 0.0656 | 11 % | 3 | United States | 0.0834 | 17 % |
| 4 | Sweden | 0.0558 | 9 % | 4 | Sweden | 0.0790 | 16 % |
| 5 | Luxembourg | 0.0327 | 5 % | 5 | Poland | 0.0165 | 3 % |
| 6 | Finland | 0.0269 | 4 % | 6 | France | 0.0125 | 2 % |
| 7 | France | 0.0264 | 4 % | 7 | Canada | 0.0121 | 2 % |
| 8 | Netherlands | 0.0247 | 4 % | 8 | Netherlands | 0.0113 | 2 % |
| 9 | Switzerland | 0.0170 | 3 % | 9 | Norway | 0.0081 | 2 % |
| 10 | Denmark | 0.0141 | 2 % | 10 | Switzerland | 0.0072 | 1 % |
| 11 | Norway | 0.0120 | 2 % | 11 | Denmark | 0.0070 | 1 % |
| 12 | Portugal | 0.0089 | 1 % | 12 | Finland | 0.0066 | 1 % |
| 13 | Spain | 0.0080 | 1 % | 13 | Italy | 0.0035 | 1 % |
| 14 | Italy | 0.0077 | 1 % | 14 | Ukraine | 0.0033 | 1 % |
| 15 | Belgium | 0.0068 | 1 % | 15 | Germany | 0.0031 | 1 % |
| 16 | Germany | 0.0067 | 1 % | 16 | Spain | 0.0022 | 0 % |
| 17 | Poland | 0.0045 | 1 % | 17 | Turkey | 0.0017 | 0 % |
| 18 | Austria | 0.0025 | 0 % | 18 | Greece | 0.0015 | 0 % |
| 19 | Greece | 0.0018 | 0 % | 19 | Estonia | 0.0015 | 0 % |
| 20 | Hungary | 0.0000 | 0 % | 20 | Portugal | 0.0007 | 0 % |
| 21 | Iceland | 0.0000 | 0 % | | | | |
| 22 | Ireland | 0.0000 | 0 % | | | | |

## 5.4 Variables

This section presents the variables chosen for this study and explains some of the choices made.

*Credit conditions proxy* - Following Ljungvist, Richardson and Wolfenzon (2008), my credit market variable includes BAA corporate bond spread, defined as Moody's BAA corporate bond return minus risk-free rate, which I have calculated from 10-year government bond rate. Ljungvist et al (2008) assume that a low yield spread implies loose credit conditions and "easy" access to credit. Obviously, also many other factors impact the credit conditions, however yield spread is extensively used in the prior literature as a proxy for the tightness of credit, since it conditions on credit rating.

Previous literature has mainly used two different proxies to measure credit market conditions. Ljungvist et al (2008) and Maula et al (2013) use BAA-AAA corporate bond return[34] and Axelson et al (2010) use high yield spread as a proxy for credit market conditions. I use logarithm of year-to-year change in the credit spread. The absolute level of credit spread tells little about the easing or tightening of credit spread, however the relative change from year to the next gives better view. If we take a look at the Figure 6 on page 46, we see clearly from the graph that the amount of new entrants is at the same level during dot-com boom as during the CDS boom, while during the early 2000 the credit spread is around 3%; being at the all-time high over the previous decade and in the mid-2000 it represented all-time low during the past decade. Thus, the credit spread as an absolute figure is not representative proxy and a change in credit spread proxies better the easing or tightening of credit market conditions.

Prior literature from venture capital funds mainly uses macro-economic proxies with one-year lag to assess the impact of macro factors to fundraising due to the sticky supply of funds and the average time of six to twelve months that it takes to raise a fund. Some of the critiques fall upon the proxies used; even though lagged variables indicate certain relation between independent and dependent variables, the current year proxies may not. I regress the Moody's BAA corporate bond spread over risk-free rate at the time the fund was raised as well as the absolute change in corporate credit spread the year fund was raised and one year prior. The outcome indicates that the absolute change in corporate credit spread is a significant driver at

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[34] Ljungvist et al (2008) use BAA-AAA corporate bond return over risk-free rate and Maula et al. (2013) use the average Barclay's 5-10 year sterling non-gilt corporate BBB-AAA par rate

1% confidence level as expected. Additionally, the current year measures are both also negative, even though insignificant, implying that decrease in corporate credit spread is a major trigger for buyout fundraising at aggregate-level, and at the time fund is raised, the credit market conditions remain loose, even though they are not a significant driver.

*State of economy* - I will test the economic health hypothesis by including real growth in country's GDP as a proxy to measure the state of country's economy. I use log current and past 12 month stock market returns of capitalization weighted indices such as S&P 500 for US and FTSE All-share Index for Europe to measure stock returns.

*Logarithm correction* - Logs should be taken of variable that are expected to grow exponentially like GDP, but not of variables that fluctuate around fixed level such as interest rates. Therefore, I use log return of GDP and market return. The first differences are taken of BAA and high yield corporate bonds and T-bill rate, because the data is exposed to a severe trend and without detrending the regression would be spurious[35]. The only disadvantage with taking first differences is that one level of degrees of freedom will be lost. Additionally, the interpretation of the variables may be difficult (Brooks). The interest rate variables are defined followingly:

$$X_t = x_t - x_{t-1} \qquad\qquad\qquad (1)$$

*Performance of a fund* - When assessing the performance of a fund, three various metrics are usually used; internal rate of return (IRR), distributions to paid-in capital (DPI) or total value to paid-in capital (TVPI). I chose IRR as a main measure of performance, since generally LPs follow the IRR performance measure, which provides an easy comparison to their other public investments.

*Industry performance* - Moreover, I use pooled IRR %[36] to measure the aggregate buyout industry performance, since it provides more accurate measure than average IRR. I estimate the industry IRR following Gombers and Lerner (1999), by tracking down the previous funds raised by a GP at a given vintage year and taking value weighted average over all such funds. At aggregate level, this IRR percentage should reflect the average historic return for GPs that managed to raise a fund at a current year. I compare my industry returns to vintage year

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[35] Spurious regression refers to a a regression in which a unit root is present (Brooks).

[36] Pooled IRR is a IRR of a portfolio for several funds calculated by combining the cashflow, which is then used to calculate the IRR. Thus, providing a better measurement then average IRR which may not give an accurate picture of overall performance.

returns calculated by VE over the total universe of buyout funds, and the overall trend is similar, expect I have more variation, especially in the earlier years due to fewer observations. The early 1980s returns are featured with all time high pooled-IRRs close to 40%, after that there occurs a significant drop in the level of returns in 1986. My data excludes some of the worst performing funds, since the overall level of returns quickly rebounds in the early 1990s. My data and VE similarly illustrate the second large drop in 1995, which continues all the way to early 2000s when started tech-boom and momentarily the funds' performances shoot back up to all-time highs. This did not last for long, after a peak in 2001, returns started steadily to decline hitting the bottom in 2006 and after that staying at low levels. For illustrative purposes later on, I also include the aggregate level of fund raised in the Figure 9 on page 62. As the figure strongly indicates, there might be negative relation between the two, however I am going to statistically examine this in the results section.

The private equity industry is getting more competitive and reaching high returns gets more difficult. As Figure 9 illustrates in the early 1980s, the pooled average IRRs were in the heights of 40% and the fundraising volumes were at low dozen billion dollars raised. In 1990s, the first hundred billion dollars was raised and the pooled average IRRs dropped to mid-20%. In 2000s, nearly 300 billion dollars was committed to buyout funds and the IRRs were on average between 15-20% and furthermore, in 2006 all-time high 470 billion dollars was raised in US and Europe together and the returns have simultaneously hit rock bottom at level of below 10%. So overall, while the buyout industry aggregate level pooled-IRRs have declined over-time, the aggregate fundraising levels have gone up. The previous literature supports this view, by showing that a capital inflow into buyout industry drives down the returns (Kaplan and Schoar, 2005). Of course, the buyout industry performance variates with up and downs, but on average the pooled-IRR% has declined steadily across the buyout industry. Alternative explanation is that I do not simply observe the correct pooled-IRR% figures, which would reflect the perception of funds' returns by investors at the time. As we know, it takes multiple years for returns to materialize and due to poor access to historic numbers it is difficult to estimate the perception of industry returns back then, especially when the reporting was even more insufficient than now.

*Treasury bill* - I also include return of Treasury bonds, which represents alternative investment choice; when the interest rate goes up, more available capital flows into Treasury bonds and less goes to private equity. However, the results should be interpreted with care,

since the Treasury bill returns have declined significantly over time and it might be that due to the low level of return, it no more presents alternative investment choice to private equity.

*Pension funds* - In my analysis, I add the pension fund assets as of GDP as an independent variable, since it is one of the key determinants of private equity fund level variation between countries. I obtain the pension fund assets as a percentage of GDP for 2001-2011. The data includes all types of plans occupational and personal, mandatory and voluntary arrangements, additionally both funded and book reserved pension plans are included. The data includes plans where benefits are paid by a private sector entity (classified as private pension plans by the OECD) as well as those paid by a funded public sector entity.

**Table 9 Summary of variables**

The table below presents the variables used in this thesis and describes how the variables are obtained and provides the source for each variable.

| Variable | Description | Sources |
|---|---|---|
| | **Dependent variables** | |
| BO funds raised | • Total aggregate buyout funds raised in mil$ in 2011 dollars <br> • Total number of funds raised | Thomson VentureXpert/Preqin |
| New entrants | • Number of new buyout funds raised by new partnership or players previously been focusing on other fields (e.g. venture capital funds) | Thomson VentureXpert |
| Net-of fees IRR% | • Net of fees IRR% for a specific fund <br> • Pooled Net of fees IRR% on an annual aggregate level basis | Preqin |
| Net-of fees IRR% benchmarked | • IRR difference to benchmark is the difference between fund's net of fees IRR% to equivalent market benchmark according to geographic focus and vintage year. | Preqin |
| | **Explanatory variables** | |
| GDP growth | • Country specific gross domestic product annually | International Financial Statistics |
| Market capitalization growth | • Annual percentage change in market capitalization (e.g. 1.1.2011-31.12.2012) calculated based on unadjusted index. For Europe I use FTSE-ALL shares index and for US S&P 500 | Thomson Financial Datastream |
| Market return | • Calculated based on dividend adjusted index. For Europe I use FTSE-ALL shares index and for US S&P 500 | Thomson Financial Datastream |
| Credit market conditions | • Moody's BAA corporate bond index over risk free rate <br> • BofA Merrill Lynch high yield Index Total Return over risk free rate (Risk free rate measured with 10-year government bond yield) | Federal Reserve Economic Data |
| T-Bill | • One-year government bill return for a given country | Datastream |
| Pension levels | • Total pension assets and liabilities at country-level; proxy for the size of country's pension funds (Data available 2003-2011) | OECD iLibrary |
| Industry IRR | • Industry IRR is calculated following Gompers and Lerner (1999). I estimate the "value-weighted IRR of previous funds" by tracking previous fund of every fund in a given vintage year raised by a given firm, and then taking value-weighted average IRR of those funds for that particular vintage year | Preqin |

# 6 METHODOLOGY

This section introduces the methodology used in this thesis. One of my main contributions to the existing literature is the use of more sophisticated methods, since prior papers which have focused on the buyout fundraising patterns, have been criticized of their poor methodologies used potentially resulting in unreliable results. Therefore, I aim to control for truncation and selection bias in my sample, additionally I obtain fund-level data and thus, my analysis on the credit market conditions are controlled for firm specific factors; meaning that the coefficients should be robust and reliable.

## 6.1 Panel-data methodology

A panel-data methodology is used since I have data comprising both time series and cross-sectional elements; employing information across both time and space. Panel data contains observations on multiple phenomena observed over multiple time periods for the same firms or individuals. Importantly, a panel keeps the same entities and measures some specific quantity about them over time. Econometrically, the setup I have is described in the following equation

$$\gamma_{it} = a + \beta x_{it} + u_{it} \qquad i = 1,2,...,N; t = 1,2...,T \qquad (2)$$

where $\gamma_{it}$ is the dependent variable, $\alpha$ is the intercept term, $\beta$ is a k x 1 vector of parameters to be estimated on the explanatory variables, and $x_{it}$ is a 1 x k vector of observations on the explanatory variable.

Panel data methodology offers several advantages. First, I can address a broader range of issues and tackle more complex problems with panel data than would be possible with pure time-series or pure cross-sectional data alone. It allows to control for the effects of variables that specifically affect the dependent variable of each fund but are unobservable (the co-called individual heterogeneity); meaning that the coefficients estimated reflect the real impact of $x$ on $\gamma$. Second, this larger amount of information allows increasing the degree of freedom of the tests and mitigates the problems of multicollinearity among the explanatory variables. Third, it can resolve certain forms of the problem of omitted variables bias in regression results, when structured in an correct way.

## 6.2 Fixed-effect model

I choose fixed effects model over random effects model, since my selection of countries is not random; I focus on a selected European and North American countries and moreover, fixed-effects model suits well for analyzing the impact of variables that vary over time; as in this case the return on Moody's BAA corporate bond and other macro-economic data. Fixed-effects method allows to control for variables that cannot be observed or measured such as cultural factors or difference in business practices across companies; or variables that change over time but not across entities (i.e. national policies, federal regulations, taxation). Therefore, its greatest advantage is that it controls for omitted variables. However, the fixed effects model does not control for unobserved variables that change over time. So, for example a failure to include GPD in the model could still cause coefficients of the fixed effects model to be biased.

In my thesis, I use three different ways to include fixed effects due to the specifications of various regression models. First, the simplest way is running least square dummy variable regression (LSDV), which can at times be heavy since it consumes many degrees of freedom. However, I use it in the heckman model since it is the only possible way to include the fixed effects. Additionally, LSDV is an easy way to control for the time fixed effects by including year dummies. The LSDV equation;

$$Y_{it} = \beta x_{it} + \mu_1 D1_i + \mu_2 D2_i + \mu_3 D3_i + \ldots + \mu_N DN_i + v_{it} \tag{3}$$

in which $\gamma$ is the dependent variable, $x$ is the independent variable and $D$ is the dummy variable either for time-fixed effects or for cross-sectional fixed effects, which equals one if the condition is met and zero otherwise. Second, in within regression average value of the variable is subtracted from each observation, thus eliminating all the between-subject variability and leaving only within-subject variability for analysis. The within equation

$$y_{it} - \bar{y}_i = \beta(x_{it} - \bar{x}_i) + u_{it} - \bar{u}_i \tag{4}$$

Third, there is also the possibility to use between regression, which can be run with the time-averaged values of the variables and avoiding all the hassle of estimating variables, however it only allows one-way fixed effects either time- or entity-fixed effects.

Taking first differences also eliminates the unexplained component and controls for fixed-effects, the equation is;

$$\Delta y_t = y_t - y_{t-1} \tag{5}$$

However, as the equation indicates one level of observations will be lost. All the three methods would yield the same coefficients and standard errors, however there are significant differences in degrees of freedom. I control for time-fixed effects, since I am interested in the changes in variables that occur through time, furthermore I do not assume that the changes would be the same across entities and thus, I also include entity-fixed effects such as country- or firm-level effect depending on the level of analysis. I have employed the fixed-effects model in OLS regressions, tobit and logit regression. The equation for LSDV including both time- and entity-fixed effects,

$$\gamma_{it} = \beta x_{it} + \mu_1 D1_i + \mu_2 D2_i + \mu_3 D3_i + \ldots + \mu_N DN_i + \lambda_1 D1_t + \lambda_2 D2_t + \lambda_3 D3_t + \cdots + \lambda_T DT_t + v_{it} \tag{6}$$

where $\gamma$ presents the dependent variable, x is dependent variable, $D1_i$, $D2_i$, $D3_i$, .., $DN_i$ is the entity-fixed effects and $D1_t$, $D2_t$, $D3_t$, .., $DN_t$ are the time-fixed effects.

## 6.3    Logit regression

Logit regression is a binary choice regression that estimates the likelihood of a event occurring. In my analysis, I use logit regression to estimate the probability of a fund being raised by a GP following Gompers and Lerner (1999); if a fund was raised in a given year it gets value 1 and if not it gets value 0. Cumulative logistic distribution function F is used

$$F(z_i) = \frac{e^{zi}}{1+e^{zi}} = \frac{1}{1+e^{-zi}} \tag{7}$$

where e is the exponential under the logit approach and Z is function to be estimated. This implies that the fitted regression model will be S-shape instead of linear. The non-linear probability model estimated is

$$P_i = \frac{1}{1+e^{-(\beta_1+\beta_2 x_{2i}+\cdots+\beta_t x_{ti}+u_i)}} \tag{8}$$

where again Pi is the probability that $y_i = 1$. By means of maximum likelihood estimation, the logit model assesses the impact of macro and micro determinants to the likelihood of GP raising a fund. The coefficients reported are not probabilities but transformed logs and I will calculate the marginal effect at the mean value of the explanatory variables. I also report Huber-White robust standard errors controlled for heteroscedasticity. To estimate the

explanation power of the regression, I use z-statistics and pseudo-$R^2$ similarly to t-statistics and chi$^2$ probabilities.

## 6.4   Tobit regression

Tobit regression is effectively a hybrid between a standard regression model and a binary choice model (Dougherty, 2006). I employ tobit regression in the aggregate coutry level analysis, since my data omits the funds that have not been able to raise any capital and also funds that performed poorly and were not able to raise follow-on funds, and thus have dropped out of the sample. Thus, OLS would yield inconsistent estimates if used to fit the regression, since it fails to control for the left truncation in the sample.

$$y_i^* = \beta_i + \beta_2 x_{2i} + \beta_3 x_{3i} + \cdots + \beta_k x_{ki} + \varepsilon_i \tag{9}$$

where $y_i = y*i$ for $a*i>0$ and, yi is unobserved for $a*i<0$ I. Tobit model is also used by Kaplan and Schoar (2005) for their VE data to estimate the relation between fund size and performance. I will use Tobit regression for total capital commitments into private equity.

## 6.5   Heckman selection model

I apply Heckman correction to estimate the relation between credit market conditions and fund size. Smaller funds are reporting more infrequently and inconsistently than larger funds, creating a selection bias could problem. Heckman (1979) invented solution to come around selection bias problem and control for the bias in sample selection. Heckman correction is applied by many recent academics (e.g. Maula et al 2013) and has firm basis in statistical theory to overcome the problem of poor access to the data of GPs that failed to raise a fund or smaller funds that report inconsistently. The model is two step procedure which involves first estimating the probability probit model, which is similar to logit model except it uses cumulative standardized normal distribution, of observation participating in a regression,

$$Y *_i = Z_i \gamma + \varepsilon_i \tag{10}$$

where $Y_i=1$ if the GPs have raised a fund and 0 otherwise, $Z_i$ are the macro and micro variables that explain the probability of a fund being raised, $\gamma$ are the parameters to be estimated, which define the individual probability of a fund being included in the sample and ei is a random error term. Other way to present the model is;

Prob(Y=1|Z)= Φ(Zγ), (11)

where Y indicates a fund being raised (Y = 1 if the GP raises a fund and D = 0 otherwise), Z is a vector of explanatory macro and micro variables, γ is a vector of unknown parameters, and Φ is the cumulative distribution function of the standard normal distribution. The model yields an estimation of the probability a fund being included in the sample, which is denoted with lambda. In the second stage, I correct for self-selection by including the lambda in the second regression in which the dependent variable is the follow-on fund size. The fund size equation is,

$$W *= X\beta + u \tag{12}$$

where Wi is the fund size, Xi observed variables relating to micro and macro determinants of fund size and εi is an error term. W is observed fund that is included in the sample.

# 7 EMPIRICAL RESULTS

## 7.1 Aggregate country-level results

This section presents and discusses the results from empirical analyses that I perform to address the key research questions of the thesis. The results on relation between credit market conditions and capital commitments into buyout funds are divided into three distinctive sections; aggregate country-, firm- and fund-level to benefit from the two databases I obtain and to analyze the research questions from various perspectives.

The country level aggregate fundraising volume is a sum product of number of funds in the market and the size of these funds. Market is put together of first-time fundraisers and follow-on funds; all of which have slightly different characteristics and drivers. For example, the commitments into follow-on funds are affected by the performance of the firm's previous funds whereas the first-time funds lack direct performance indicator, and also, the size of a follow-on fund greatly depends on the size of the previous fund as the follow-on funds are usually the same size or larger.

First, I start my analysis at aggregate country-level with VE database which is more comprehensive in terms of number of funds including also smaller funds. I intend to expand the understanding of drivers behind the entrance of new players into the buyout industry and capital raised by first-time funds. Second, I analyze the probability of a given GP raising a fund under loose credit conditions, and furthermore study follow-on funds by utilizing the Preqin database to control for the performance of GPs' previous fund and thus eliminating the impact fund-level performance factors. Third, I assess the size of a follow-on fund with conditional selection model which takes into account the probability of the fund being raised and thus enables the examination of the factors more directly impacting the size of the fund. In the last section, I also briefly discuss the effect of credit market conditions on fund performance and the micro characteristics of buyout funds and compare those to the existing empirical evidence on venture capital funds.

### 7.1.1 What drives fund commitments at aggregate country-level?

Aggregate country-level results reported in Table 10 indicate negative relation between commitments to buyout funds and credit market conditions. When the spread increases, less capital is committed into buyout funds and when the spread decreases more capital is

committed. I split the analysis into capital raised in dollar value and number of funds raised; both analysis yield the same highly significant results that more capital is allocated to buyout funds and more GPs decide to raise a buyout fund when credit market conditions are loose measured with Moody's BAA corporate bond spread.

My results shown in Table 10 indicate that one percentage point decrease in the corporate credit spread should increase the fundraising volumes by nearly US$47 billion. This seems like a large increase but, when looking at the Figure 6 on page 46, the maximum annual variation in spread over time is 1,9% and the average annual variation in the spread is as low as 0.06%. Thus, one percentage variation could be considered rather large and exceptional, and therefore US$47 billion shift seems reasonable. My results suggest that when the spread changes significantly, it has a strong impact on the buyout fundraising volumes. Furthermore, model 3 shows that a decrease of 100 bps in the credit spread also increases the number of funds raised on average by 57. This compares to the average number of 169 funds raised annually as quite reasonable when taking into account the significant increase in number of funds over the time period as shown in Table 6 on page 41.

My findings on relation between capital commitments past buyout industry returns are in-line with findings by Kaplan and Schoar (2005) showing a surprising negative relation. Even though, it initially seems counterintuitive that more commitments are made to buyout funds after the buyout industry has performed poorly, the data in Figure 9 on page 62 clearly indicates that even though the average annual return of buyout funds has declined dramatically, as poorer fund have entered the market and competitiveness has increased, the amount of money committed to buyout funds has increased significantly. My statistical analysis also provides significant results.

Kaplan and Schoar (2005) find that stock market returns have a positive relation to private equity fundraising. My findings on buyout funds indicate that the lagged market returns seem to have a negative relation with the aggregate buyout capital commitments; however the coefficients are insignificant in my results. Their sample includes both venture capital and buyout funds, of which venture capital funds are over presented in the sample and thus probably driving the results. I test this by running a similar regression with a sample of venture capital funds, and indeed the coefficients are positive and significant now[37].

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[37] I have not reported the results since the comparison between venture capital funds and buyout funds fundraising is not the core focus of this thesis.

Interestingly, the interest rate of Treasury bill has a positive effect on the aggregate fundraising amount, somewhat similar direction compared to findings by Gompers and Lerner (1999), even though insignificant. This may stem from the fact that Treasury bill's interest rate has been at very low levels compared to 1980s, at around 0-4% during 2007-2011 and close to 14% in the early 1980s. Even after detrending the T-bill rate, the effect remains, thus indicating a possibility that nowadays. T-bill is more correlated to overall economic conditions, overheating and recessions, than considered as alternative investment choice to buyout funds as in the early 1980s when it offered relatively high returns.

**Figure 9 Buyout industry returns and aggregate fundraising**

The chart below represents the relation between buyout funds' pooled net-of-fees IRR as a percentage and the aggregate commitments into buyout industry in US$ billion in 2011 dollars.
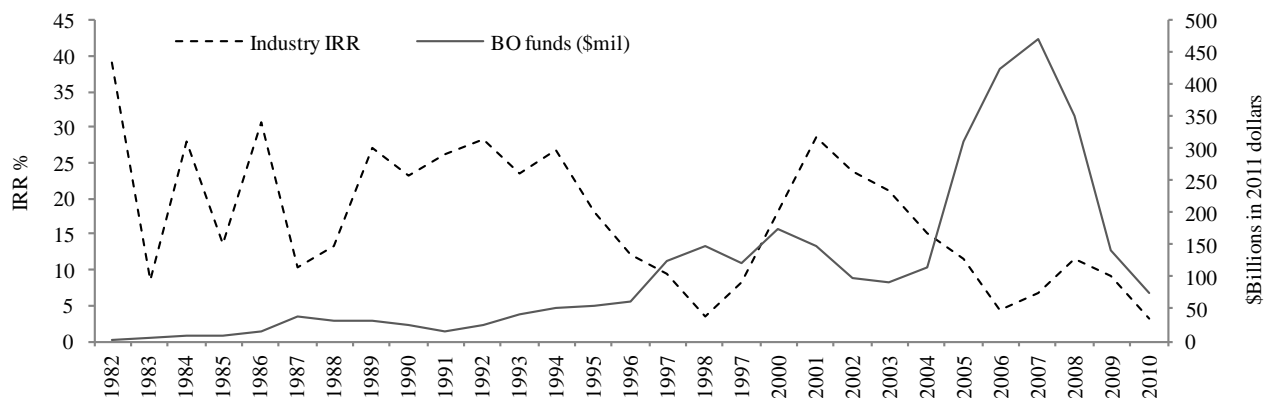


To conclude, BAA corporate bond spread stays significant and negative in all the various models even after controlling for time-fixed effects and country-fixed effects, indicating that credit conditions indeed are a significant driver of fund commitments at aggregate level. However, my result is not completely robust yet, as the past literature argues that micro factors such as the reputation of GP and past performance drive fund commitments. My analysis has so far provided support that at aggregate country-level fundraising is strongly dependent on credit conditions, next I will analyse first-time funds more closely.

**Table 10 Aggregate buyout fundraising at country-level**

VE sample is used with 17 European countries and US and Canada between 1980-2011. Dependent variables are country-level total aggregate fundraising in 2011 dollars (US$bil) and total number of funds raised within a country. Funds are allocated to countries according to GPs origin. Independent variables are macro-level variables. BAA Corporate bond spread is BAA Corporate bond return rate over risk-free rate. Risk-free rate measured as a 10-year Treasury bond. $GDP_{t-1}$ is log return of Gross Domestic Product specific to a country with a one year lag. Market return is dividend adjusted log stock market return; S&P 500 for US and FTSE All Shares for Europe with a one year lag. T-Bill is one-year Treasury bill defined by country with a one year lag. Industry IRR is the value-weighted IRR of previous funds; calculated by tracking previous fund of every fund in a given vintage year raised by a given firm, and then taking value-weighted average IRR of those funds for that particular vintage year. F.E refers to fixed effects. Pseudo-R2s is reported as a measure of model explanatory power. All the standard errors are robust Eicker-Huber-White standard errors for the panel data regressions. (P-values in brackets). Where *, ** and *** denote to statistical significance of the relationship at 10%, 5 % and 1 % levels respectively.

Dependent variable: Country-level total aggregate fundraising in 2011 dollars (US$bil) and total number of funds raised within a country

| Independent variables | Capital raised | Total number of funds |
|---|---|---|
| $\Delta$BAA Corporate bond spread$_{(t-1)}$ | -47.44*** | -56.56*** |
|  | (0.00) | (0.00) |
| Log change GDP$_{(t-1)}$ | -8.07 | -5.69 |
|  | (0.55) | (0.59) |
| Log market return$_{(t-1)}$ | -74.59 | -18.80 |
|  | (0.27) | (0.73) |
| Industry IRR$_{(t-1)}$ | -0.04 | -0.775** |
|  | (0.93) | (0.03) |
| T-Bill$_{(t-1)}$ | 4.35 | 0.94 |
|  | (0.37) | (0.74) |
|  |  |  |
| Country F.E | Yes | Yes |
| Year F.E | Yes | Yes |
| Clustered at country level | Yes | Yes |
|  |  |  |
| Pseudo - R2 | 0.06 | 0.20 |
| Nr of observations | 495 | 495 |
| Prob > Chi2 | 0.00 | 0.00 |

### 7.1.2 What drives the entry of new players into the buyout market?

Aggregate buyout fundraising volume is dependent on the number of GPs raising a fund and the size of their fund. GPs can be divided into established firms and new players entering the market. Previous literature (Kaplan and Schoar, 2005) has indicated that capital commitments to new funds and existing funds could be driven by very different drivers; fund commitments to follow-on funds by established GPs could be driven by the performance and characteristics of their previous funds rather than market conditions. Next, I am going to discuss the dynamics of new market entries and in the following section I am going to present the results of established GPs at a firm-level since we need to control for fund-level factors.

Table 11 presents the results for dollar value of capital raised by first-time buyout funds and the number of buyout funds raised by either new partnerships that have been set-up or by private equity firms which have previously been focusing in other areas e.g. venture capital, and have now decided to raise their first buyout fund. I include the latter because the underlying factors driving the investment decision is potentially similar i.e. related to the overall condition of the industry and opportunities available, rather than the performance of previous non-buyout funds since, for example, the skill-set and platform required are very different.

The results indicate that 12 new funds are raised when credit spread decreases by 100 bps. This may seem like a small number but my data set includes only 500 observations over 30 years, thus indicating a strong statistical significance that new funds entering the market is negatively related to the credit market conditions. Whereas, the amount of capital raised by first-time funds has negative but insignificant coefficient. As the Figure 7 on page 46 indicates, the capital raised by fist-time funds stays at rather constant level during the time period of 1980-2012 compared to the sharp increase in the number of follow-on funds.

Furthermore, the results of other variables are the same as already discussed above with total capital and total number of funds; stock market return and growth in GDP indicates negative, however insignificant relation with capital commitments and number of new funds, what is contradictory to the findings by Kaplan and Schoar (2005), however this might be due to venture capital fund driven sample. My result on buyout industry return is line with them. They report that current and lagged negative buyout industry return leads to more commitments and more funds being raised, but as discussed above the returns from buyout funds have dropped tremendously, while the amount of money committed to buyout funds has increased sharply.

**Table 11 New entries into buyout industry**

VE sample is used with 17 European countries and US and Canada between 1980-2011. Dependent variables are capital raised by new buyout funds in 2011 dollars (US$bil) and number of new buyout funds raised within a country. Funds are allocated to countries according to GPs origin. Independent variables are macro-level variables. BAA Corporate bond spread is BAA Corporate bond return rate over risk-free rate. Risk-free rate measured as a 10-year Treasury bond. $GDP_{t-1}$ is log return of Gross Domestic Product specific to a country with a one year lag. Market return is dividend adjusted log stock market return; S&P 500 for US and FTSE All Shares for Europe with a one year lag. T-Bill is one-year Treasury bill defined by country with a one year lag. Industry IRR is the value-weighted IRR of previous funds; calculated by tracking previous fund of every fund in a given vintage year raised by a given firm, and then taking value-weighted average IRR of those funds for that particular vintage year. F.E refers to fixed effects. Pseudo-R2s is reported as a measure of model explanatory power. All the standard errors are robust Eicker-Huber-White standard errors for the panel data regressions. (P-values in brackets). Where *, ** and *** denote to statistical significance of the relationship at 10%, 5 % and 1 % levels respectively.

Dependent variable: Capital raised by new buyout funds in 2011 dollars ($bil) and number of new buyout funds raised within a country

| | Capital raised by new funds | Number of new GP entrants |
|---|---|---|
| **Independent variables** | | |
| $\Delta$BAA Corporate bond spread$_{(t-1)}$ | -1.61 | -12.04*** |
| | (0.25) | (0.00) |
| Log change GDP$_{(t-1)}$ | -0.93 | -2.30 |
| | (0.56) | (0.44) |
| Log market return$_{(t-1)}$ | -0.41 | 15.70 |
| | (0.96) | (0.34) |
| Industry IRR | -0.03 | -0.24** |
| | (0.50) | (0.03) |
| T-Bill$_{(t-1)}$ | 0.48 | 2.82*** |
| | (0.22) | (0.00) |
| | | |
| Country F.E | Yes | Yes |
| Year F.E | Yes | Yes |
| Clustered at country level | Yes | Yes |
| | | |
| Pseudo - R2 | 0.06 | 0.31 |
| Nr of observations | 495 | 495 |
| Prob > Chi2 | 0.00 | 0.00 |

## 7.2    Firm-level results

As the prior literature indicates the capital commitments into a particular firm are strongly dependent on the past performance of the previous funds. Investors are expecting that the returns persist for a particular GP. Therefore, omitting the performance of previous fund from the regression may lead to biased coefficients and invalid standard errors. To make sure the robustness of my results, I control fund specific characters at firm-level. Following Gompers and Lerner (1999), I control for years since the last fund was raised, age of the firm[38] and performance of previous fund measured with IRR. I follow the methodology by Gompers and Lerner (1999), by assigning 1 for a year in which the firm raised a buyout fund and zero for years in which no fund was raised. This regression also overcomes the problem of selection bias in my sample, since I apply the assumption that a fund could have been raised in any given year. Additionally, while controlling for fund-level factors that contribute to the success of raising a fund, the timing of fundraising should be explained by macro-level factors and I expect to find that credit market conditions are a major drivers of fund commitments.

I study the factors that have an impact on the probability of raising a fund with two time periods; with total sample and then I limit the sample to 1994-2011, since the private equity market in many countries started to develop in the early 1990s due to regulatory changes as discussed above. Many of the countries prior to 1994 had infrequent fundraising; almost non-existent compared to the current fundraising levels, except for US.

### 7.2.1    What factors increase the probability of raising a fund at firm-level?

The probability of a GP raising a fund increases when BAA corporate bond spread decreases. I also find that across time series credit conditions has higher economic impact on probability of capital committed into buyout funds than cross-sectional[39]. These results remain highly significant also after controlling for the fund specific factors, as shown in the model 1 of Table 12 on page 69. I find that 100 basis points decrease in the credit spread increases the probability for a particular PE firm raising a buyout fund by 5.3% without controlling for the firm-fixed effects and analysis indicate that credit spread contributes only 1.38%.

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[38] I run the regression with both the age of the firm and with the years of specific experience in buyout industry, as a proxy for skill and reputation in the particular field. The results from the two slightly different proxies are not statistically different.

[39] Cross sectional analysis means that the model is controlled for the firm-fixed effects, but not for time series; meaning that it controls for firm-specific issues but not time specific.

The sample size for European buyout funds is not sufficiently[40] large to control both the performance of previous fund and the firm fixed effects in the same model, thus I run the analysis with US sample solely in model 5. The results still hold and are very much significant; however the economic significance has diminished slightly, also because we are consuming many degrees of freedom. A 100 basis points increase in credit spread leads to a 0,54% increase in the probability of a fund being raised by a given GP and 1,38% increase when time period is limited to more recent period of 1994-2011.

In model 3, following the example of Gompers and Lerner (1999) and Kaplan and Schoar (2005), I add a square term of micro-level factors that should even further emphasize the effect of fund specific factors and additionally, help me to study the functional form of the micro factors' relation. In the first two models which include the first-time funds, the coefficient for *years since previous was raised* is positive and significant, indicating that the probability of fund being raised increases when time passes. However, for models with only follow-on funds time passing reduces the probability after long enough time period. The squared term in model 3 is negative and significant indicating a concave relation between the probability of raising a fund and time-passing after previous fund was raised; meaning that at first the time-passing increases the probability of raising a follow-on fund, however after long enough time period has passed the relation turns to negative and additional year passing decreases the probability. The same concave relation applies for GPs experience in the buyout industry. The more the GP has experience the more likely it is that they will raise a fund, however it seems that the squared term is negative however insignificant, possibly indicating that after a certain level of experience in the industry an additional marginal increase in experience would not increase the probability of raising a fund, and thus the relation turns to flat. My results with buyout fund sample are in line with findings on venture capital funds by Kaplan and Schoar (2005).

In model 4, I include T-bill return and change in pension levels as in the aggregate-level regression. As it was obvious on the page 69, the T-Bill and pension levels fail to explain the fund commitments. T-Bill obtains opposite sign to expectations; possible explanation being that T-bill rate of return could more be reflecting the condition of economy than presenting an alternative investment choice to buyout funds as argued by Gompers and Lerner (1999). In model 4, I test the effect of pension levels within a country; the coefficient is positive however insignificant. I only

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[40] Models 1 and 2 allow controlling for firm-fixed effects, since in these regressions I do not control for the performance of the previous fund, unlike in models 3 and 4, in which the number of observations per GP drops below 10, meaning that logit regression does not reach convergence and thus it is statistically impossible to include firm-fixed effects.

obtain pension fund levels from 2003 to 2011, thus the number of observations reduces by 400 to 4,393 and time period shortens significantly; however all the other variables maintain their coefficients. Furthermore in model 4, I include the IRR difference to benchmark variable, which controls for buyout industry returns. The industry return that I observe is the aggregate return for the total buyout market. However, Preqin conducts more specific comparison and compares the fund performance to other funds with same vintage year and geographical focus. Thus, the IRR difference to benchmark is more accurate measure of the industry returns relative to comparable peers. While the industry benchmark variable is positive and significant, also the BAA corporate bond spread remains negative and significant. Also, the market returns are now positive and significant, and in-line with prior literature. The coefficients of GDP growth and market capitalization[41] are also positive, even though weakly significant.

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[41] Market return and market capitalization have high correlation, thus they cannot be included in the same regression. I obtain no significantly different results, and thus I do not report the regression with market capitalization variable.

## Table 12 Probability of raising a fund at GP level

Preqin sample with 18 European countries and US and Canada. Models 1-5 are binary logit fixed effects regressions with different variable specifications. Model 1 includes the total sample period from 1980-2011. Models 2-4 include shorter period of 1994-2011 as robustness check of results and model 5 includes only US sample. The dependent variable is a binary variable, which obtains value of 1 when fund raised and 0 if no fund was raised during that particular year. The independent variables are macro-level variables and I also include set of control variables at fund-level. BAA Corporate bond spread is BAA Corporate bond return rate over risk-free rate. Risk-free rate is measured as 10y Treasury bond. US high yield is US high yield corporate bond return over risk-free rate. $GDP_{(t-1)}$ is log return of Gross Domestic Product specified by country with a one year lag. Market return is dividend adjusted log stock market return; S&P 500 for US and FTSE All Shares for Europe with a one year lag. T-Bill is one-year Treasury bill defined by country with a one year lag. Industry IRR is "value-weighted IRR of previous funds"; calculated by tracking previous fund of every fund in a given vintage year raised by a given firm, and then taking value-weighted average IRR of those funds for that particular vintage year. Pension levels is the log change in pension levels (defined as pension liabilities) in a country-level with a one year lag. Fund level control variables include years since previous fund was raised and a square of years since previous fund was raised for a particular GP. Experience in buyout is defined as years since the first buyout fund was raised. IRR of previous year is the net of fees IRR% that Preqin reports for every fund. IRR difference to benchmark is the difference between fund's net of fees IRR% to equivalent market benchmark according to geographic focus and vintage year. F.E is fixed effects. Clustering refers to clustering of standard errors. Pseuro-R is represented and Prob > Chi2 is a test with a null hypotheses that all the coefficients are zero. All the standard errors are robust Eicker-Huber-White standard errors for the panel data regressions. Where *, ** and *** denote to statistical significance of the relationship at 10%, 5 % and 1 % levels respectively. Pseudo-R2 and LR statistic are reported as measures of model explanatory power. (P-values in brackets).

Dependent variable: Binary variable Raised a fund (1 if yes, 0 if no)

| Independent variables | 1980-2011 Model 1 | 1994-2011 Model 2 | Model 3 | Model 4 | US sample Model 5 |
|---|---|---|---|---|---|
| $\Delta$BAA corporate bond spread$_{(t-1)}$ | -2.36*** | -1.92*** | -0.28** | -0.84*** | -0.22* |
| | (0.00) | (0.00) | (0.05) | (0.00) | (0.10) |
| Log Change GDP$_{(t-1)}$ | 0.06 | 1.22 | 1.95* | 0.77 | -1.38 |
| | (0.93) | (0.21) | (0.06) | (0.57) | (0.77) |
| Log Market return$_{(t-1)}$ | 1.74** | 2.78* | 2.99** | 0.78 | 0.69** |
| | (0.01) | (0.06) | (0.03) | (0.24) | (0.03) |
| Industry IRR$_{(t-1)}$ | -0.03*** | 0.01 | | -0.03 | -0.07*** |
| | (0.00) | (0.41) | | (0.12) | (0.00) |
| T-Bill$_{(t-1)}$ | -0.53*** | | | 0.29* | |
| | (0.00) | | | (0.06) | |
| Log change pension levels$_{(t-1)}$ | | | | 0.18 | |
| | | | | (0.70) | |
| *Fund-level control variable:* | | | | | |
| Years since previous fund raised | 0.09*** | 0.09*** | 0.97*** | -0.59*** | 0.51*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Experience in buyout industry | -0.39*** | -2.91*** | 0.08*** | 0.04*** | -0.09*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Square years since previous fund raised | | | -0.09*** | | |
| | | | (0.00) | | |
| Square experience in BO industry | | | -0.001 | | |
| | | | (0.18) | | |
| IRR of previous fund | | | 0.02*** | 0.01*** | 0.01 |
| | | | (0.00) | (0.00) | (0.11) |
| IRR difference to benchmark | | | 0.01*** | | |
| | | | (0.00) | | |
| Firm F.E | Yes | Yes | No | No | Yes |
| Year F.E | Yes | Yes | Yes | Yes | Yes |
| | | | | | |
| Nr of observations | 14526 | 8028 | 4851 | 4393 | 2508 |
| Prob > Chi2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pseudo R2 | | | 0.06 | 0.06 | |

## 7.3 Fund-level results

First, I show support that decrease in credit spread leads to a significant increase in the fund size. Second, my results show that fund raised during tight credit market conditions are more likely to raise a follow-on fund. This indicates that performance of funds which are raised during tight credit conditions is better than funds raised during loose credit conditions when credit is easily available. Third, I follow Kaplan and Schoar (2005) study on the micro-level factors affecting performance of buyout funds. Kaplan and Schoar (2005) sample includes 80% of venture capital funds and only 20% of buyout funds. I will be running analysis with a buyout fund sample and comparing my results to the past literature on venture capital funds, concluding that the performance characteristics of venture capital and buyout funds are very similar.

### 7.3.1 Fund size

The fund size depends among other factors on geographical region and industry focus, i.e. Nordic funds focusing on small-mid markets raise significantly smaller funds than GPs in US focusing on much larger markets. Therefore, to assure the robustness of my results, I control for the size of the previous fund which should take into account the strategy choice and preference for certain type of funds.

My findings on Table 13 on page 72 show that GPs increase significantly the size of a buyout fund following a period of loose credit market conditions due to potentially larger number of attractive investment opportunities and better access to transaction financing. One unit, 100 basis points, increase in the credit spread increases the fund size by 17% which indicates significant growth even after controlling for fund-level factors. The observation from buyout market indicates that usually follow-on funds are twice as large as the previous fund. Thus, 17% increase in the fund size sounds reasonable.

For the fund size analysis, I use the conditional probability regression; heckman two-step model. The first regression estimates the probability of a fund being included in the sample and second regression, step-two, estimates the effect of various determinants on the size of a fund. The first regression is similar to that of the model 4 in

Table 12 on page 69, however I exclude the IRR of a previous fund since otherwise all the first-time funds would be excluded from the sample. The downside of heckman model is that fixed-effects cannot be included; thus I include year dummies to control for time variation. For the second regression, I include the same control variables as Gompers and Lerner (1999) and Kaplan and Schoar (2005); credit market condition being a new variable, since the relation has not been studied before.

The findings on control variables are in line with Kaplan and Schoar (2005), but differ from Gompers and Lerner (1999) who run their analysis with venture capital funds. My sample includes 684 buyout funds while Kaplan and Schoar (2005) include 169 buyout funds in their analysis with tobit regression and Gompers and Lerner (1999) include 1,117 venture capital funds in their study with heckman model. Macro-level variables are significant and have opposite signs, additionally also fund-level results differ except for experience in buyout industry. My results differ from Gompers and Lerner (1999) since I employ different set of funds and time frame. Kaplan and Schoar (2005) have results more in line with mine. The size of previous fund is positively and significantly related to the size of the next fund, sequence of fund is positive however insignificant in both cases and better previous performance leads to larger follow-on funds being raised.

**Table 13 The size of a follow-on fund**

Preqin sample with 18 European countries and US and Canada between 1994-2012. Heckman selection model with binary dependent variable which obtains value of 1 when fund raised and 0 if no fund was raised during that particular year. The independent variables are macro-level variables and I also include set of control variables at fund-level. BAA Corporate bond spread is BAA Corporate bond return rate over risk-free rate. Risk-free rate measured as 10y Treasury bond. GDP(t-1) is log return of Gross Domestic Product specified by country with a one year lag. Market return is dividend adjusted log stock market return; S&P 500 for US and FTSE All Shares for Europe with a one year lag. T-Bill is one-year Treasury bill defined by country with a one year lag. Industry IRR is "value-weighted IRR of previous funds"; calculated by tracking previous fund of every fund in a given vintage year raised by a given firm, and then taking value-weighted average IRR of those funds for that particular vintage year. Fund level control variables include years since previous fund was raised and a square of years since previous fund was raised for a particular GP. Experience in BO is defined as years since the first buyout fund was raised. IRR of previous year is the net of fees IRR% that Preqin reports for every fund. IRR difference to benchmark is the difference between fund's net of fees IRR% to equivalent market benchmark according to geographic focus and vintage year. F.E is fixed effects. Clustering refers to clustering of standard errors. Pseuto-R is represented and Prob > Chi2 is a test with a null hypotheses that all the coefficients are zero. All the standard errors are robust Eicker-Huber-White standard errors for the panel data regressions (P-values in brackets). Where *, ** and *** denote to statistical significance of the relationship at 10%, 5 % and 1 % levels respectively.

Dependent variable: Binary variable raised a fund (1 if yes, 0 if no) if yes then OLS regression of size of fund

| Independent variables | Was a fund raised? | If Yes, logarithm of a fund size (US$2011s) |
|---|---|---|
| $\Delta$BAA Corporate bond spread$_{(t-1)}$ | -0.11** | -0.17*** |
| | (0.03) | (0.01) |
| Log change GDP$_{(t-1)}$ | 1.34*** | |
| | (0.00) | |
| Log market return$_{(t-1)}$ | 0.15 | 0.37** |
| | (0.22) | (0.03) |
| Industry IRR | -0.01*** | |
| | (0.00) | |
| T-Bill$_{(t-1)}$ | 0.05*** | |
| | (0.00) | |
| *Fund level control variables* | | |
| Log fund size$_{(t-1)}$ | | 0.67*** |
| | | (0.00) |
| Log sequence | | 0.07 |
| | | (0.13) |
| Years since previous fund raised | 0.00 | |
| | (0.69) | |
| Experience in BO industry | 0.06*** | |
| | (0.00) | |
| IRR of previous fund | | 0.003** |
| | | (0.04) |
| Lambda | | 0.01 |
| Firm F.E | No | No |
| Year F.E | Yes | No |
| Nr of observations | 8,583 | 684 |
| Prob > Chi2 | 0.00 | 0.00 |

### 7.3.2 What factors increase the probability of raising a follow-on fund?

Tight credit markets lead to a higher likelihood of raising a follow-on fund. Table 14 presents the results of a logit regression on the probability that an established GP raises a follow-on fund. In order to assure the unbiasness of results, I exclude recently raised funds and obtain data with vintage years 1980-2007. My results indicate that loose credit markets lead to a lower probability of raising a follow-on which is in-line with Axelson et al (2010) who also states that loose credit market conditions encourage to a misuse of debt which explains the poorer fund returns. Axelson et al (2010) take their analysis down to transaction level and thus, they are able to show support for GP-LP agency conflict theory.

I use Preqin and also VE sample due to its large amount of observations, but since VE data does not include fund return figures, I am using a proxy for performance metric based on Kaplan and Schoar (2005), who find that the ability to raise a follow-on fund is a rough proxy for a good fund performance. As we see from Table 14 on page 74 the results are very similar with both data sets. The only major difference is with sample of only follow-on funds; the coefficient for credit market conditions is negative and insignificant for VE sample and positive and significant for Preqin. There are two good explanations for this. First, VE sample includes many smaller funds as well which may not use as much leverage in smaller transactions. Second, as VE sample is more comprehensive; it could indicate that follow-on funds are already more dependent on the returns of the previous fund, however, I test this in Model 6 with Preqin data and find it un-true. I control for the performance of previous fund and get a positive and significant coefficient for credit spread.

On a fund-level, the likelihood of raising a follow-on fund increases with the experience of the PE firm, fund size[42] and good performance, which is in line with previous literature. However market return coefficients yield different coefficients compared to prior literature. I include three different market return variables; (1) at the time when the fund is closed, (2) at the time of fundraising and (3) three years after the fund was closed, following Kaplan and Schoar (2005). Kaplan and Schoar (2005) find that GPs that enter the market in boom times are less likely to raise a follow-on fund. However, the likelihood of being able to raise a follow-on fund, improves significantly if the market returns are positive 3 years after the initial funds were raised. My results on market returns obtain opposite and insignificant signs. As mentioned above, I believe this is because stock market returns are not a significant driver for buyout funds as it is for venture capital funds.

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[42] Fund size has a positive coefficient for VE sample, however the coefficient for Preqin sample is negative and insignificant. This could be because Preqin sample excludes smaller funds.

# Table 14 Probability of raising a follow-on fund

The regressions below are logit regressions of the likelihood that an existing fund raises a follow-on fund. Panel A includes all funds and Panel B only follow-on funds excluding the first-time funds. The dependent variable is a dummy equal to 1 if a fund raises a next fund and 0 otherwise. The regression includes macro variables and control variables at fund-level. The macro variables are BAA Corporate bond spread is BAA Corporate bond return rate over risk-free rate. Risk-free rate is measured as 10y Treasury bond. $GDP_{(t-1)}$ is log return of Gross Domestic Product specified by country with a one year lag. Market return is dividend adjusted log stock market return; S&P 500 for US and FTSE All Shares for Europe with a one year lag. Market capitalization is unadjusted log stock market return; S&P 500 for US and FTSE All Shares for Europe with a one year lag and with an indicator of market conditions three years after the fund was raised. Fund-level variables are log of sequence, which is indicates the sequential order of the fund raised. Buyout sequence is the rank of buyout funds raised by a given GP. Fund size is log of fund size in US$mil in 2011 dollars. IRR is the net pooled IRR % of current fund and previous IRR is the net-pooled IRR% of the previous fund by the same GP. F.E is fixed effects. Clustering refers to clustering of standard errors. Pseuro-R is represented and Prob > Chi2 is a test with a null hypotheses that all the coefficients are zero. All the standard errors are robust Eicker-Huber-White standard errors for the panel data regressions. (P-values in brackets). Where *, ** and *** denote to statistical significance of the relationship at 10%, 5 % and 1 % levels respectively.

| Dependent variable: Binary variable if follow-on BO fund was raised (if yes 1, otherwise 0) | | | | | | |
|---|---|---|---|---|---|---|
| Independent variables | Panel A: All funds | | | Panel B: Follow-on funds only | | |
| | VE sample | Preqin sample | | VE sample | Preqin sample | |
| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
| $\Delta$BAA Corporate bond spread$_{(t-1)}$ | 0.45*** | 1.27* | 6.47*** | -0.21 | 2.13*** | 2.43*** |
| | (0.00) | (0.09) | (0.00) | (0.76) | (0.00) | (0.00) |
| Log market return T=0 | 1.01*** | 5.77** | 7.09* | 0.21 | 6.68*** | 1.19 |
| | (0.00) | (0.05) | (0.05) | 0.80 | (0.01) | (0.30) |
| Log market return T-1 | 1.67*** | 2.41 | -3.00 | 0.05 | 1.93 | -1.05 |
| | (0.00) | (0.27) | (0.24) | 0.97 | (0.32) | (0.48) |
| Log market return T+3 | 0.11 | -0.75 | 4.57 | 0.27 | 2.06 | -0.51 |
| | (0.61) | (0.83) | (0.17) | 0.73 | (0.39) | (0.24) |
| Log change GDP (t-1) | 9.33** | | | 21.30 | | |
| | (0.02) | | | (0.34) | | |
| Log buyout fund sequence | 1.01*** | 0.92*** | 1.12*** | 1.20*** | 2.85*** | 1.13*** |
| | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) | (0.00) |
| Log fund size | 0.133*** | 0.10 | -0.17 | 0.08** | -0.03 | -0.20* |
| | (0.00) | (0.25) | (0.15) | (0.04) | (0.86) | (0.10) |
| Fund IRR | | 0.08*** | | | 0.06*** | |
| | | (0.00) | | | (0.00) | |
| Previous IRR | | | 0.06*** | | | 0.07*** |
| | | | (0.00) | | | (0.00) |
| Firm F.E | No | No | No | No | No | No |
| Year F.E | Yes | Yes | Yes | Yes | Yes | Yes |
| | | | | | | |
| R2 | 0.11 | 0.24 | 0.23 | 0.12 | 0.18 | 0.19 |
| Nr of observations | 2 561 | 917 | 584 | 1 324 | 546 | 584 |
| Prob > Chi2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |

### 7.3.3 What fund-level factors affect the performance of buyout funds?

My results are in-line with Kaplan and Schoar (2005) that larger buyout funds earn lower returns. This outcome holds both at aggregate industry level and after I control for firm fixed effects; larger funds earn lower returns in general and a given GP earns lower returns when raising larger funds, respectively. The relation between fund sequence number and returns is weaker and more ambiguous[43]; at industry level the relation is positive, but for a given GP it is negative, indicating that at industry level the performance persist when raising subsequent funds, however after controlling for firm-fixed effects it is no longer true.

Next, I add square terms for both size and sequence in order to study the functional form of the relation. In model 2, I study the cross-sectional relationship (without controlling for firm fixed effects). Ln(size) variable has negative coefficient indicating that larger funds earn lower returns, however the relationship is convex (actually more like a J-shape); large enough funds experience higher returns. In model 4 which controls for firm-fixed effects, the coefficient for ln(size) turns positive and the squared term is negative indicating concave relationship between fund size and performance; GP earns larger returns with larger funds, however the effects diminishes away at very large fund size. This is in line with Kaplan and Schoar (2005).

I conduct the same analysis for the fund sequence variable. Cross-sectional regression (without controlling for firm fixed effects) indicates that funds with higher sequence number earn higher returns, however the opposite is true for individual GPs; a given GP raising a subsequent fund will experience lower returns. The functional form of the relationship between the sequence and performance is convex both at cross-sectional level and after controlling for firm-fixed effects, which is also highly significant and also the coefficient increases significantly indicating a strong relation.

Next, in models 5 and 6 I find highly significant results that performance persist in subsequent buyout funds as the prior literature has indicated. However, here as well the market returns yield a result opposite to the one by venture capital funds, namely at a significant level higher market returns lead to a poorer fund performance. Furthermore, models 7 and 8 present the results of credit market conditions and fund performance. The results are insignificant but negative on industry level

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[43] It is difficult to draw any conclusions from the relation between sequence and performance, since my sequence sample is inadequate; I only obtain more than 10 funds for sequences 1,2,3,4 namely 186, 75, 32, 12 respectively, thus not able to study sequences beyond 4.

and weakly significant and negative after controlling for firm-fixed effects indicating that loose credit market conditions lead to higher fund performance.

## Table 15 Fund-level characteristics and performance of the fund

IRR after 5 years of existence, sample includes funds1980-2007. OLS firm-fixed effects with year dummies and robust; ln(size) is a logarithm of fund size, ln(size) is logarithm of fund size to power of 2, ln(sequence) is a logarithm of fund's sequence number, and ln(Sequence)^2 is the same to power of 2, IRR (t-1) is the return of previous fund, IRR(t-2) is the return of a fund before the previous fund, market return (t=0) is the market return at the time of raising the fund. Model 1: Studies at industry level and not controlling for firm fixed effects. Model 2: Studies at industry level and without controlling fixed effects the concave vs convex behavior of size and sequence to fund performance. Model 3: Is the same model as model 1 but it controls for GP specific characteristics. Model 4: Is the same as model 2, but it controls for firm fixed effects and thus the concave vs convex behavior implies to a particular GP. Model 5: Persistence of buyout fund returns. Model 6: Persistence of returns and market returns at the time of raising a fund. Pseudo-R is represented and Prob > Chi2 is a test with a null hypotheses that all the coefficients are zero. All the standard errors are robust Eicker-Huber-White standard errors for the panel data regressions. (P-values in brackets). Where *, ** and *** denote to statistical significance of the relationship at 10%, 5 % and 1 % levels respectively.

Dependent variable: Realised net-of-fees IRR% at fund-level
Independent variables

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 | Model 6 |
|---|---|---|---|---|---|---|
| ln(Size) | -0.02*** | -0.14*** | -0.04 | 0.02 | | |
| | (0.01) | (0.01) | (0.13) | (0.83) | | |
| ln(Size)^2 | | 0.004*** | | -0.01 | | |
| | | (0.01) | | (0.37) | | |
| ln(Sequence) | 0.001 | -0.11 | -0.05 | -0.18** | | |
| | (0.41) | (0.27) | (0.21) | (0.03) | | |
| ln(Sequence)^2 | | 0.07 | | 0.10* | | |
| | | (0.31) | | (0.07) | | |
| IRR t-1 | | | | | 0.01*** | 0.01*** |
| | | | | | (0.00) | (0.00) |
| IRR t-2 | | | | | 0.00 | 0.00 |
| | | | | | (0.88) | (0.88) |
| Market return (T=0) | | | | | | -0.30** |
| | | | | | | (0.03) |
| | | | | | | |
| Firm F.E | No | No | Yes | Yes | No | No |
| Year F.E | Yes | Yes | Yes | Yes | No | No |
| | | | | | | |
| R2 overall | 0.18 | 0.20 | 0.05 | 0.05 | 0.33 | 0.25 |
| Within | | | 0.35 | 0.38 | | |
| Between | | | 0.01 | 0.01 | | |
| Nr of observations | 284 | 284 | 284 | 284 | 61 | 61 |
| Prob > Chi2 | | | 0.02 | 0.01 | | |

# 8 CONCLUSIONS

The purpose of this thesis is to address the lack of understanding of drivers behind capital commitments into buyout funds. According to my knowledge, this is one of the first studies to solely focus on drivers of buyout fundraising and moreover the first to show that capital commitments into buyout funds are driven by credit market conditions; when credit market conditions are loose more funds are raised and more money is committed to a particular fund.

I obtain a comprehensive sample of European and North American buyout funds from two different sources. Through Thomson VentureXpert (VE), I access the information of 5,420 buyout funds raised during 1980-2011 and from Preqin, I obtain the data of 1,273 buyout funds. VE is widely used among academics and thus a reliable source for an aggregate country and a firm level analysis. Preqin is a fairly new database and employed only by the most recent studies, thus giving an access to recent source of data for a fund-level analysis.

My first hypothesis is fully accepted with supportive results at country, firm and fund level. The aggregate country level results indicate that a 100 basis points decrease in the credit spread leads to an US$ 47billion increase in commitments to buyout funds across the industry in the following year. The significant increase in commitments is due to two key drivers; established GPs raising larger follow-on funds and more first time funds entering the buyout industry. A 100bps decrease in the credit spread increases the number of first-time buyout funds entering the market by 12[44] the next year. The size of a follow-on fund raised by an established private equity firm increases by 17% when the credit spread decreases by 100bps.

Also the firm level results bring support to my first hypothesis; the probability of a PE firm raising a follow-on fund is affected by the prevailing credit market conditions. However, even though the results are statistically significant at the 1% level, the economic significance is small. A decrease of 100bps in the credit spread increases the probability of a fund being raised by 5.3% across the industry[45], and after controlling for fund level factors such as the performance of previous fund, the probability diminishes to 1.4% but still remains statistically significant at the 1% level.

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[44] 12 might seem like a small number, but my sample includes 500 first-time funds over 30 years thus 12 is statistically significant result at 1% level.

[45] Across the industry means excluding firm and previous fund level factors, thus also includes first time funds.

My second hypothesis suggests that economy-wide debt market conditions should explain commitments into buyout funds better than cross-sectional GP characteristics; meaning that when credit conditions are loose more GPs will be raising funds despite their firm specific characteristics, such as poor performance of a previous fund. This is partly true as discussed above, a 100bps decrease in the credit spread results in a 5.3% increase in the probability of a fund being raised, however when we take GP's characteristics into account this diminishes to 1.4%. Showing that after we control for GP's characteristics the impact becomes less effective, however loose credit markets still positively impacts the probability. The results remain statistically significant at the 1% significance level indicating that there is indeed a relation between the probability of a fund being raised and the credit market conditions, but economically the results are rather meaningless.

My third hypothesis studies the choice to establish a private equity firm from macro-economic perspective. Compared to the prior literature by Kaplan and Schoar (2005), it seems that my results for buyout funds differ from general private equity funds – market returns affect neither the number nor size of new entrants, however indeed it seems that the number of new entrants grows when the credit markets are loose; although the size of buyout funds is still not impacted. Moreover, the size of first-time buyout funds stays more or less constant over the period between 1980 and 2011. This is a different characteristic from venture capital funds, which have increased significantly over time.

Although, my thesis does not go in depth on how the credit conditions affect the performance of a fund, I do test the matter briefly in order to find out more about the economic implications of my research. My results show that funds that are initially raised and invested during the times of loose credit market conditions have a lower probability of raising follow-on funds, thus indicating poorer results. This is also in-line with findings from Axelson et al (2010), who also state that the reason behind this is that loose credit market conditions encourage to a misuse of debt which leads to poorer fund returns.

Finally, I end my study by comparing the performance characteristics of buyout funds to the existing literature on venture capital funds. I conclude that even though the macro-economic determinants of capital commitments into buyout funds differ from venture capital funds, the micro-level factors of fund performance behave similarly; across buyout and venture capital industries larger funds earn lower returns, however a particular GP earns larger returns with larger funds, with the effect diminishing at very large fund sizes.

**Table 16 Summary of hypotheses**

| | Macro determinants of buyout fundraising volume | Accepted / Rejected |
|---|---|---|
| H1 | More capital is committed into buyout funds when the credit markets are loose | Accepted and economically strong |
| H2 | Loose credit conditions should lead to more commitments into buyout funds despite the firm specific characteristics | Accepted and economically weak |
| H3 | New entrants are pro-cyclical | Partly accepted |

The purpose of this research paper is to explore and deepen the understanding of US$165billion cash flows that are committed into buyout funds every year[46], and to show that capital allocations into funds are not only driven by investors' perception of the PE firms' quality but also that macroeconomic factors play a significant role. The findings of this paper show that buyout funds differentiate from venture capital funds, and buyout funds' capital raising is mainly driven by credit market conditions; when money is loose, more money is invested into buyout funds.

For the purpose of future research, buyout funds offer an interesting topic due to a lack of previous studies (except for the numerous studies on buyout fund performances). Especially, now that buyout funds are becoming more popular and are raised across many countries, the topic becomes more feasible as a research topic. Further research could be done around the sector focus of funds; why is capital committed to PE funds with a particular industry focus and what is this driven by? Are PE firms are able to pick the hot industries before it becomes hot and able to make good returns out of it?

Furthermore, as said "buyout waves" have not been studied before, so one could question my research whether loose credit markets really drive the capital commitments into buyout funds or whether the liquidity in the markets just offers the means for it, but actually the broader country-wide "buyout waves" are triggered by industry shocks as neoclassical theory and Harford (2005) suggests. Also, an interesting topic would be to study the investing behavior and how the capital is allocated between different asset classes such as private equity funds, ETFs, commodities, stock and bonds at different times and whether some new asset classes have become substitutes for the old ones.

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[46] The sum varies every year and £165billion is as of 2011.

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