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What determines the post IPO exit process for private equity investors?

An empirical analysis of private equity divestment strategies

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Abstract

The objective of this thesis is to investigate what determines the post IPO exit process for private equity (PE) investors, through an empirical approach. Our sample data for the analysis consists of 466 private equity (PE) backed companies listed on American stock exchanges through an initial public offering (IPO) in the period 1996-2005

We find that private equity investors seem to prefer an exit through a block sale or a less amount of sales. We also find that a low equity stake in the portfolio company is the most important characteristic for an easier exit for the investor. This includes a shorter divestment period and a higher probability of exiting through a block sale. The portfolio company with a higher pricing, represented by the price to book ratio, presents the easiest exit with a shorter divestment period and fewer sales. We also find that private equity investors stay invested well after the IPO in order to increase net income and profitability considerably, thereby increasing the value of their equity stake before exiting.

Keywords: Private Equity, Corporate Governance, Divestment Strategy

Preface

This thesis was written as a part of our Master of Science in Economics and Business Administration at the Norwegian School of Economics (NHH).

Initially we had some thoughts on private equity as topic for our thesis as we have had some guest lectures on the topic, but we did not decide until our supervisor, Steffen Juranek, kindly sent us some papers.

The past six months has been a long but rewarding journey into the world of private equity. Working on this thesis has given us a lot of knowledge, and improved our problem solving skills substantionally. Our good collaboration has undoubtedly strengthened the quality of this thesis, and by working together, we have been able to immerse ourselves even more in the topic.

We would like to thank Dr. Nikolai Visnjic for providing us with the core dataset, which is the foundation of this entire thesis.

Last but not least, we would like to express our sincere gratitude to our supervisor Steffen Juranek for his valuable inputs and help throughout the entire process.

Bergen, June 20, 2016

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1. Introduction

Private equity has experienced astounding growth the last five decades. Private equity (PE) investments are increasingly becoming an important asset for pension funds and other large institutional investors. In 2015, private equity companies raised a total sum of 489.6 billion dollars worldwide (Statista, 2016). Private equity returns have exceeded the S&P index returns when looking back two decades (Bain, 2016). Investors increasingly plan to allocate investments to private equity (Preqin, 2016), making the industry grow even more.

The way a private equity (PE) investor exits a portfolio company can potentially have a substantial effect on the financial success of the investment. Metrick & Yasuda (2011, p.179) argue that the vast majority of profit in venture capital is made in the exit. The three ways a PE investor may exit are through mergers, acquisitions (M&A) or through an initial public offering (IPO). The IPO exit is perhaps more challenging than an M&A exit, but it may also provide a potential higher profit. Yet there research on exit strategy of PE investors post IPO is not comprehensive. Considering the substantial amounts of capital that is raised and invested by PE investors, we argue the importance and the need for research in this field.

It is well documented[1] that PE investors stay invested for some time after the IPO. Research that is more recent finds that the PE investors dispose of shares gradually over time, and that both investor and portfolio company specific characteristics determine the exit process (Fürth and Rauch, 2014). However, we believe that there is much to add to these findings. In this thesis, we intend to expand on the current research by adding several new dimensions. We do this in four ways: First, we investigate if the sale patterns actually are gradual, or if the PE investors prefer to exit through a block sale. Following, we give extra attention to block sales. Second, we investigate if a higher pricing of a portfolio company, represented by a higher price to book ratio at the IPO, might influence the exit strategy, using an OLS regression. We also look for if certain investor or portfolio company characteristics might determine the number of sales it takes for the investor to exit. Third, we attempt to analyze possible determinants for the exit strategy using a sample data of mixed types of PE investors, while current research focus on either BO or VC investors. Fourth, current research looks at

[1] PE investors stay invested for a longer time after the IPO (Fürth & Rauch, 2014; Cao 2011).

information known at the IPO. We expand on this by looking at what changes happen in the portfolio company characteristics from the IPO to the point where the investor starts selling, and thereby try to provide a detailed answer to the question of why the investors stays invested for a longer time after the IPO.

We do this by using a data sample of 466 private equity backed portfolio companies that have been divested after an IPO. The data set contains both venture capitalist investors and buyout investors, and therefore extending on previous research in a broader sense.

We obtain four interesting findings through our research, that adds to previous findings and provide answers to the following research question: What determines the post exit process of PE investors. First, investors stay invested for some time after the IPO, however a substantial amount of the portfolio companies, 38,2%, are exited through a block sale. This confirms our expectation that investors prefer to exit through a lower number of sales and avoid negative price reactions from sales. This adds information to earlier research that concluded that shares were sold gradually over time (Fürth & Rauch, 2014). Further, we find that an investor owning a smaller equity stake is more likely to participate in a block sale. The portfolio company more likely to participate in a block sale is characterized as being more profitable and having a high price to book ratio. We also find that the divestment period of an investor exiting in a block sale is less half as long as the investors exiting through a gradual divestment process.

Second, we find that the equity stake of the investor significantly explains every exit indicator. Apparently, an investor owning a smaller stake has a shorter divestment period, sells more of his shares earlier, exits through less sales, and as mentioned above, is more likely to participate in a block sale. One might expect that a higher equity stake and more control could help facilitate a block sale, though it seems like a smaller stake presents an easier exit.

Third, the portfolio company with a higher equity to book ratio has a shorter divestment period and exits through less sales. It also increases the probability of a block sale. This confirms our expectation of a more attractive portfolio company, represented by a higher pricing, leads to an easier exit.

Fourth, and perhaps our most revealing, we find significant changes from the IPO to the first sale, showing that investors start selling when the portfolio company has a high increase in net income, return on assets, and an increased value of its shareholdings. This result also adds information to previous research that did not look beyond the IPO. The result is not very

surprising, we expected that the investor remained invested to be motivated by a profit, and that this would be obtained by increasing variables like income and profitability.

The remaining part of this thesis is structured as followed: Section 2 provides a presentation of the PE basic connected to the thesis. Section 3 presents a literature review where we present earlier research within the same area. Section 4 presents the construction of our sample data. Section 5 contains the methodology. Section 6 presents the results from the different tests and tables. In section 7 we discuss the results, and section 8 concludes the thesis.

2. Background

2.1 Private equity

Private equity (PE) is a collective term for investments made in companies that are traded privately, not on a public stock exchange. These investments are made by investors such as buyout (BO) companies, venture capitalist (VC) companies, large corporations or banks. The most prominent PE investors are the venture capital and buyout companies. The VC and BO companies create funds where large sums of capital are pooled to increase purchasing power, used to invest in portfolio companies. The managers of these PE funds are known as general partners (GP), while the investors that supply capital to these funds are referred to as limited partners (LP). A PE company may exist for decades, while a fund normally has a lifetime of 8 to 12 years (Cendrowski, Petro, Martin, & Wadecki, 2012). For the sake of this thesis, we refer to the PE companies as VC and BO investors and adressing them combined as either PE investors or just investors. Most research on private equity focuses on VC or BO investors, which represent two different investing strategies.

2.1.1 Venture capital investors

Venture capital (VC) investors typically invest in portfolio companies that are in an early phase with high growth potential. The investments are made with low debt, and often only equity. These portfolio companies often do not yet have access to capital markets, and turn to venture capital investors to continue growing. The VC investor may provide both capital and expertise, and fund the portfolio company through different stages (Cendrowski et al., 2012).

2.1.2 Buyout investors

Buyout investors target bigger and more mature companies with well-known pasts, and known for leveraging their purchases with big amounts of debt (Cendrowski et al., 2012, p. 21-22). The high level of debt has led to controversy and public critique, which has given the so-called leverage buyout (LBO) investors, and PE in general, a bad reputation. This started especially in the 1980s when leverage levels were extremely high in LBOs. Since then, the leverage levels have dropped, but are still a target of criticism (Cendrowski et al., 2012).

2.1.3 Private equity funding

The funding for the PE investments can come from institutional investors like pension funds and insurance companies. It can also be from endowments like public charity, schools or trust funds. In some cases, the funding comes from wealthy individuals or family fortunes. The investments are long term and are highly illiquid, as the GP controlls the investment. This is specified in a contract between the GP and LP, often referred to as the ”limited partnership agreement” (LPA). The limited partnership agreement is a legal contract between the GP and LP, which binds both of them to their roles. The LPA defines the lifetime of the fund, states investment restrictions, distribution of profits and management fees for the GP. Limited partners have no influence on the management of investments, except for what is covered in the LPA. Meaning that the GP controls the investment completely. The LPA also commits the VC or BO general partner to investing in small or larger companies. (Cendrowski et al., 2012)

2.1.4 PE Investment process

The private equity investment goes through four stages. In the first stage, the investors organize and raise funding for their investment. In stage two the investors scout for potential targets, and the investment is made in the portfolio company. The investors manage the acquired portfolio company in stage three, and start to create value. The last stage of the investment is about exiting the portfolio company in the most profitable way (Cendrowski et al., 2012, p. 27).

2.1.5 Private equity objectives

> *The PE fund’s objective is to exit (i.e., liquefying or cashing out of) its investment in the company at a substantial profit and gain, typically from three to seven years after its initial investment. During that time, the PE fund will seek to maximize the returns on the company. To that end, the PE fund will undertake operational restructuring, add-on acquisitions, divestitures, and other measures with respect to the portfolio company, in order to make it as attractive of a potential investment for others as possible at the time of the PE fund’s exit.* (Cendrowski et al., 2012, p. 365).

When the investors create profit for the limited partners, they also create profit for themselves, through management fees and carried interest. Carried interest denotes the portion of profits that the GP will retain, which is typically 20 percent (Cendrowski et al., 2012).

Apart from the financial goals, the investor aims to cultivate a positive relationship to its limited partners providing the funding. The PE industry is very competitive, and investors push to achieve returns that place them in the top quartile of similar funds. Limited partners emphasizes the general partner having a strong record of accomplishment. Cendrowski et al., (2012) describes the limited partner behavior as "*When these firms seek to raise follow-on funds, they are generally oversubscribed, as investors attempt to gain access to these funds: past truly is prologue in private equity*" (Cendrowski et al., 2012, p. 13). When the investors compete to be among the top investors, the time factor becomes very important. This leads the investors to try to realize their investments as soon as possible (Cendrowski et al., 2012).

2.1.6 PE value creation

The value creation starts by identifying the right portfolio company for the investment. The value creation then continues through becoming majority owners, achieving voting rights, taking over board seats, restructuring, new management, offering expertise, monitoring, and other strategic, financial, operational and organizational changes. The venture capitalist investors do not go to the same lengths as buyout investors when it comes to active management. The VC investment creates value through the capital they provide, often by bringing expertise, and offering a professional social network. The investment process ends with an analysis of the most profitable divestment route and a strategically planned exit (Cendrowski et al., 2012).

2.1.7 The IPO

The initial public offering (IPO) is the event of a company goes from being a privately owned company, to being listed on a public stock exchange. The IPO helps the company raise more capital for growth and expansion, and open up for a number of other opportunities. The IPO can provide several benefits to the portfolio company. Customers and suppliers may view the public company as more attractive and stable than a private company, bringing more future business. A public company may also attract more talented employees. As the company's

information becomes public, the credit ratings normally improves and the portfolio company gets access to better financing terms (Cendrowski et al., 2012, p. 84).

For the owners and the PE investor, the IPO opens up for realizing their investments. However, the investors are often confined by a lockup period of 60 – 360 days, where the mean is 180 days. The lockup period prevents these shareowners from selling shares (Cendrowski et al., 2012).

The process of taking a company public bears huge financial costs, and is a complex and time-consuming process (Cendrowski et al., 2012, p. 360). The cost can sometimes exceed as much as 10 percent of the IPO offering amount, including legal fees, management commitment to the IPO and underwriter fees which is the biggest one, at typically 7 percent of the offering amount (Cendrowski et al., 2012, p. 101-102)

2.1.8 The private equity exit

The most usual private equity exits happen through mergers, acquisitions (M&A) or an initial public offering (IPO) (Cendrowski et al., 2012, p. 83). The exit strategy is an important part of the PE investment process. In venture capital, a majority of the profit is made in the exit Metrick & Yasuda, (2011, p.179). When deciding to choose a sale transaction or an IPO, it is a decision that involves understanding current market conditions, including debt and equity markets, currency and commodity prices, deal flows and different financial multiples and ratios (Cendrowski et al., 2012, p. 358). BO investors are know for monitoring their portfolio companies carefully, and can have a continous evaluation of exit timing.

2.1.9 The definition of a good exit

The definition of a good exit from venture capital is not obvious, Metrick and Yasuda (2011, p. 179) explain. Many variables cannot be controlled, meaning a definition of success will vary between different investments. One cannot expect every variable to work out perfectly, and that the exit becomes a flawless process. In venture capitalism, many investments end up being less profitable, or not at all. Metrick and Yasuda (2011) suggest focusing on the investments that are very profitable and ignore the others. A successful exit can be described as "*an Ipo or competitive sale, where a competitive sale means "we could have done an IPO, but the sale was better"*" (Metrick & Yasuda, 2011, p.179).

3. Literature review

There is not much literature published on the post IPO exit strategies of private equity investors. Especially when it comes to the post IPO share disposal.

Previous research shows that the IPO in itself is not an exit. In fact, only a small amount of shares is sold at the IPO. The majority of the shares are sold in the years following the IPO[2].

Fürth and Rauch (2014) use a data set of 222 buyout-backed IPOs in the US to make a detailed roadmap of the post IPO exit strategies, and investigate what micro and macro indicators might influence the exit strategy. They find that investors stay invested after the lockup period and gradually dispose of their shares. They find that the exit strategy depends on the financial success of the deal for the buyout fund, and characteristics of both the portfolio and investor companies. Previous research also shows that the private equity divestment is driven by the type of buyout fund (Gompers, 1996; Lin & Smith, 1998; Strömberg, 2007). Schmidt, Steffen and Szabó (2010), find that the exit strategy for private equity investors may depend on the financial success of the portfolio company. Fürth and Rauch (2014) also find that different periods are driven by different factors. Portfolio company-specific factors drive the length of the investment prior to the IPO, while fund-specific variables drive the post IPO period. When a BO investor dispose shares in a public company, Fürth and Rauch (2014) find that market reactions are significant and act negative to the investors share disposal. They find that the strongest market reaction arises from the first sale, and that the reactions are more negative in bear markets than bull markets. The investors also seemed to react intelligently, for example the reaction from the market is different depending on the financial success of the deal for the investor. They also react differently during stages of the divestment process.

Lerner (1994) investigates the timing of IPOs, from a data sample of 350 venture capital backed biotechnology firms. Using an index of publicly traded biotechnology firms, he finds that the VC backed IPOs are timed to high equity valuations, and that private financing is used when values are lower. Lerner (1994) finds that the VC investors are better at timing the IPO than the average companies that go public. By timing the IPO to a high valued market, the VC

[2] The IPO is shown not to be an exit, the majority of shares are sold later. (Barry, C. B., Muscarella, C. J., Peavy J. W. III., Vetsuypens, M. R., 1990; Gompers & Lerner 1998; Fürth & Rauch, 2014; Cao, 2011).

investor minimizes the dilution of the ownership stake (Lerner, 1994). Cao (2011) finds that market timing is critical for reverse leveraged buyouts (RLBO), and that they time IPOs to high valued markets through shortening the LBO period if the markets allow for it. Investors are in a good position to influence the timing of the IPO, through having large equity stakes, board seats and control rights. Often, the investors have more experience with IPOs than normal managers, and may therefore be better at timing the IPO (Lerner, 1994).

Cao (2011) finds that the RLBO investors stay invested for some time after the IPO, and play an important monitoring role. His results show that post IPO decisions of RLBOs regarding exits, are based on portfolio company characteristics and market conditions. His research also shows that investors with more reputation are more likely to facilitate takeover exits.

Gill and Walz (2016) show that VC backed companies are significantly more likely to be targets for takeover deals and taken off the exchange, compared to non VC-backed companies. Moreover, that these sales can be interpreted as delayed trade sales. This means that even though the portfolio company is taken public, its goal was not necessarily to sell shares to the public. As many as 69 percent of the VC backed companies were taken over and delisted from the stock exchange, while 22% of none VC backed companies.

4. Data

Our data set consist of 466 U.S. based companies with monthly observations from May 1996 to February 2016. This represents 30,4%[3] of all PE backed IPO's within the timespan. The companies are publicly listed on American stock exchanges through an Initial Public Offering (IPO) in the timeframe May 1996 to December 2005. A common feature for all companies is that one or more venture capital companies or buyout funds owned a large percentage of the shares at the time of the IPO.

4.1 Core data

The core data was provided by Dr. Nikolai Visnjic (2013) and consists of basic information about the portfolio company as well as the invested PE investor. The data was hand collected through EDGAR (Electronic Data-Gathering, Analysis, and Retrieval system), and screened using Thomson One VentureXpert database and filings with the Securities and Exchanges Commission (SEC)[4] to ensure the availability of data and general comparability. The availability of data through EDGAR limits the sample to observations after 1996, as documentation prior to this was not electronic. In order to leave enough time to track the complete divestment process, the sample was cut off after 2005. Companies where the investor owns less than 20% after the IPO are dropped, as selling strategy of investors that have a controlling interest are of key interest. The size of the core dataset where the minimum initial data requirements are met is 807.

The core data also contains characteristics for the investor like age, historical number of trades and historical capital raised. This data is a snapshot from 2011, but we deem it a valid representation of the investors.

[3] According to statistics gathered by Ritter (2016, p. 17) there are 1533 PE backed IPO's from 1996 to 2005.

[4] The IPO prospectus, known as Form S-1, is filed whenever a company first registers securities with the SEC. At least once a year, shortly before the annual shareholder meeting, proxy statements known as Form DEF 14A are issued. By SEC rule 16(a), trades by owners of at least 10 percent of a class of equity securities must be disclosed no later than the second business day following a change on ownership, making it possible to track the date and volume of share sales through funds with an ownership greater than 10 percent after the IPO threshold (Ownership Reports and Trading by Officers, Directors and Principal Security Holders, 2002).

4.2 Identifying sales, exits and timings

To identify sales, final exit and holding period, we use the core data received from Visnjic (2013). A sale is identified when the number of shares held by the investor decreases from one observation to the next. Likewise, a final exit is identified when the number of shares held by the investor decreases to zero. We also define a block sale as a single-sale exit, or in other words, when a PE investor's final exit is conducted by only one single sale. The dates provided in the core data are used to identify the investment period and divestment period, where the investment period equals the difference in dates between the initial investment made by the investor and the IPO of the portfolio company. The divestment period starts with the IPO, and ends when the stake of the investor decreases to zero.

4.3 Firm specific information

Firm specific information was gathered from WRDS (Wharton Research Data Services), respectively the Compustat Capital IQ database. Information such as Standard Industrial Identification Code (SIC), date of inception, market capitalization, net income, liabilities and shares outstanding were obtained by extracting the CUSIP[5] from the the core data and matching it with the data found in the Compustat database. In cases where the use of CUSIP did not result in a match, we used the ticker from the core data and cross-referenced it with the corresponding ticker and IPO date from Compustat. Portfolio companies where the availability of financial data was absent were dropped, resulting in a final data size of 466 companies.

Comparing the shares outstanding to the shares held by the investor we identify lag in the change of shares held by the investor as a potential result of stock splits or reverse stock splits. We confirm the stock splits by searching EDGAR, and correct the number of shares held by the investor by using the split ratio reported in the SEC prospectus Form 424B.

Based on the data gathered from Compustat, we calculate key ratios for use in the analysis and regression. We calculate return on assets (ROA) as net income divided by total assets, leverage

[5] CUSIP numbers consist of a nine-character alphanumeric code that uniquely identify a company or issuer and the type of financial instrument (U.S. Securities and Exchange Commission, 2015).

as total liabilities divided by market equity and equity to book ratio as common equity divided by shares outstanding. We also calculate the market capitalization as the number of shares outstanding multiplied by the share price.

4.4 Investor specific information

Based on the core data and the portfolio specific data collected from compustat, we calculate additional characteristics. The most important of which is the investor's equity stake[6], calculated as the shares held by the investor divided by the total shares outstanding. We also calculate the fund vintage age as the difference in years between the fund's vintage year and the portfolio company's IPO year.

4.5 Characteristics

The following table displays the summary statistics on general information about the investors as well as the 466 portfolio companies in our sample.

	Mean	**Median**	**SD**
Investor			
Investor stake at IPO (%)	44,67	42,36	15,57
Number of trades	158,19	98,00	182,44
Historic Capital Raising (USD MILL)	2866,81	1035,20	6026,54
Fund Vintage Age (Years)	18,08	16,93	10,54
Portfolio Company			
Total Assets at IPO (USD MILL)	320,40	117,35	750,13
Liabilities at IPO (USD MILL)	190,89	24,26	641,48
Market Cap at IPO (USD MILL)	831,54	414,92	1405,37
Income at IPO (USD MILL)	18,03	8,23	67,72
Leverage at IPO (%)	39,68	27,05	35,42
Return on Assets at IPO (%)	15,70	7,95	29,79
Equity to book at IPO (%)	8,17	4,07	15,53

Table I – Characteristics

[6] The PE Investor's equity stake is calculated on the portfolio company level.

Splitting the portfolio companies by the two-digit Standard Industrial Classification (SIC) code leads to the distribution you can see in table II. Although the portfolio companies are not evenly distributed among the industries, neither of the industries exceeds a ratio of 50%.

Industry	**# of Companies**	**Percent**
Consumer Discretionary	50	10,73
Consumer Staples	8	1,72
Energy	13	2,79
Financials	19	4,08
Healthcare	105	22,53
Industrials	26	5,58
Information Technology	214	45,92
Materials	8	1,72
Telecommunication services	21	4,51
Utilities	2	0,43
Sum	466	100

Table II – Industry distribution of portfolio companies

5. Methodology

The goal for this paper is to investigate what determines the post IPO exit process for private equity investors.

Litterature shows that PE investors stay invested for a while after the lockup period, and sell their shareholdings gradually over time. Market reactions when PE investors start selling is significantly negative, and are greatest after the first sale (Fürth and Rauch, 2014). We believe that there is more to the sales of PE investors than decreasing averages the years following the IPO. Concidering the negative price reactions, we also believe that there is an incentive for the PE investor to minimize the number of sales, and perhaps seek a block sale to avoid reactions completely. This is why we intend to extend the research beyond the yearly averages and look extensively at the PE investor's share patterns, and investigate the PE investor's relationship to block sales. Further, we investigate whether characteristics of the portfolio company or PE investor have any correlations to the number of sales, which is done by including it in a regression. Literature also shows that PE investors time their IPO and sales activity in bull markets[7], which we also set out to explore with our sample data.

Beyond looking at sales, we also wanted to investigate if the exit strategy would be different with portfolio companies having a higher pricing. Fürth and Rauch (2014) find significant determinants for exit strategies at the IPO, however they do not focus on a higher pricing. As mentioned above, we the add number of sales when we set out to explore possible determinants in a regression model. We will also focus on a higher pricing of the share, thinking that it might be more tempting to exit. Our data set contains a variety of BO and VC investors, which is a contrast to existing literature that focus on either BO or VC investors. We think this will make our regression more interesting, and potentially provide new findings.

The PE investors seek to maximize the profit for both the LP and themselves. The competition for LP funding is tough, and the PE investor strive to be positioned at the top quartile of similar funds and having a good track record, which the LPs value in their search for GPs (Cendrowski et al., 2012). In other words, the investor has high incentives to maximize profit. At the same

[7] Cao (2011) and Lerner (1994) find that PE investors time their IPOs to higher valued markets. Fürth and Rauch (2014) find that sales are also timed to higher valued markets, in bear periods.

time, investment has a predetermined lifetime, contracted by the LPA, giving the PE investors a finite time line to exit the investment. The investor also has to consider the time value of money, that the sooner the investment is realized, the more it is worth. In other words, the investor has strong incentives for both shortening time and maximizing profits.

However, even with an incentive to shorter the divestment period, PE investors do not sell shares immediately after the IPO or the lockup period[8], Concidering that the IPO comes at a high cost (Cendrowski et al., 2012), we argue that the investor must have a strategy behind this whole process, and expect a bigger profit in the future.

The PE investor intends to make the portfolio company as attractive as possible for buyers[9], which is a process that naturally continues all the way to the last sale. The IPO provides more capital, which can be utilized for investing, growth and debt reduction. Often it also provides a better credit rating (Cendrowski et al., 2012), improving the portfolio company financially. Going public also means that information becomes publicly available, which verifies the valuation of the portfolio company by stock analytics.

Current literature does not extend their research further than the IPO. We strongly expect that the PE investor has a carefully planned strategy behind staying invested. This is why we set out to observe the changes in the portfolio company characteristics from the IPO to the first sale, intend to provide an explanation to answer why the investors stay invested, and what processes are happening. At one point, the investor will sell, and we also seek to investigate what triggers this sale.

5.1 Ownership summary

Table IV – Ownership Summary is designed to show summary information about the whole investment process. We divide the holding period into two parts, split by the IPO. The time from the first investment to the IPO, the investment period, display the time it takes the

[8] Shares are not immediately sold after the lockup period. (Barry et al., 1990; Gompers and Lerner, 1998); Fürth & Rauch, 2014; Cao, 2011)

[9] The PE investor is profit driven and will sell the company, and therefore wishes to make the portfolio company as attractive as possible (Cendrowski et al., 2012).

investor to develop the portfolio company for an IPO. The time from the IPO to the final share, the divestment period, shows the time it takes for the PE investor to dispose of all shares in the portfolio company. We are mainly interested in the divestment period, but we also include the investment period in order to observe if it, or its factors, has any effect on the divestment period.

A third exit indicator, the duration[10], is calculated a value-weighted length of the divestment period. The duration works as an indicator for showing at what time during the divestment period, the highest percentage of shares is disposed. That way we can observe if the investors sell larger or smaller equity stakes, early or late in the divestment period.

We include the investment period, divestment period and duration as they are used as three out of four exit indicators later in the thesis. Our aim is to examine how different characteristics might influence these exit indicators.

The table also shows the development of shareholdings over time, looking at what amount of the investor stake is sold in each of the first three years after the IPO. We do this to observe if the PE investors exit their portfolio companies at first chance after the lockup period, or if they stay invested.

5.2 Divestment process and all sales

In Table IV – Divestment Process, we present the average sale, the first sale, last sale and highest share sale. We look at what time the sales takes place, the reduction in holdings due to the sale, transaction value and the time between sales. This table enables an even more exact understanding of how the investors dispose of shares, and builds on sales information from the average decrease in shareholdings over the years after the IPO (Table IV – Ownership Summary).

[10] The duration is calculated as: $\frac{\sum Time * Transaction\ Value}{\sum Transaction\ Values}$. The time is measured in years, and the transaction value is calculated as the number of shares sold times the share price.

Due to the negative market reactions following a sale (Fürth & Rauch, 2014), we expect the first sales to be larger than the rest. We also expect the highest share sale to happen quite early after the IPO, because of the time constraint incentive from the LPA.

5.3 Final exit sales

We create Table VI to measure the number of sales each company engages in to dispose of all shares, as well as the timing and size of these sales. The table also provides information on how many portfolio companies are exited through a block sale, and when the block sale takes place. With these observations we can determine if the PE investors prefer to participate in fewer or more sales. The table is designed to extend the understanding of sales beyond the yearly averages and the observation in previous tables. In addition, it is possible to identify block sales. By adding the dimension of final exit sales and looking at the sales in more detail, we are extending on previous research. The key reason for looking at this is to investigate if investors prefer, or seek, to sell all shareholdings in a block sale, and thus disposing all of the shares in one single sale. This is based on the incentive created by the negative market reactions after PE sales exits, where the first sale has the strongest negative effect (Fürth and Rauch, 2014). For this reason, we anticipate that a substantial number of PE investors prefer block sales or a small number of sales.

5.4 Behavior in different market environments

Cao (2011, p. 1023) finds evidence that the IPO timing is affected by market conditions. In order to show whether different market environments affects the exit strategies, we classify bull and bear market conditions as where the index either increases or decreases by at least 20 percent over a six month period. One of the approaches suggested by Chen (2009), is to use a 250-day moving average of the Dow Jones Industrial Average Index (^DJI)[11] to classify bull and bear market conditions, where the moving average is calculated as the mean of the Index values over the 250 previous trading days. In periods where the end-of-day value exceeds the

[11] The 250-day moving average of Dow Jones Industrial Average is calculated on historical data gathered from Yahoo! Finance.

value of the moving average are classified as bull markets, and the opposite bear markets. In order to identify sustained market periods, we alter this methodology to look for an increase or decrease of 20 percent over six month periods. When these conditions are met, we identify the peaks and troughs to locate the exact beginning and end of the market periods. By doing so, we find 5 major market periods during our time series, two bull market conditions and three bear market conditions. These market conditions are used throughout our analysis and regressions in order to compare, and compensate for, different behaviors during the bull and bear market conditions. In table VI, the identified market periods are used to determine the investment and IPO timing, as well as the timing and comparison of the sales and exits in bull and bear periods. This is done to have a complete overview of the investment behavior when it comes to the different market conditions, in all the pivotal investment points; first investment, the IPO, sales, and the final exit. Furthermore, we also create dummy variables for use in our multivariate analysis.

5.5 Exit strategy determinants

In the final part of our analysis, we use a multivariate cross-sectional OLS regression to analyze how possible determinants influence the PE investors exit strategy.

We look for correlation between the independent variables and the four exit indicators; investment period, the divestment period, the duration and the number of sales. The first three exit indicator are presented in section 5.1, while the fourth and last exit indicator, number of sales, is designed to add a new dimension to previous research through observing if any characteristics lead to a higher or lower number of share sales. The reason for adding this exit indicator is our discussion in section 5 Methodology, where we explain why we look more extensively at the sales pattern of the PE investors than previous research. Both PE investor and portfolio company characteristics represent the independent variables, as well as dummy variables for bull and bear market conditions. Further explanation of all the variables can be found in the appendix.

Whereas previous research uses sample data focused on either BO or VC backed companies, our sample data contains a variety of PE investors, including different BO and VC investors. For that reason, our thesis might add to previous research, investigating possible exit determinants for a broader specter of PE investors.

Starting with a correlation matrix of the characteristics, we find the variables that are best suited for the analysis and look for potential levels of multicollinearity between them. We then experiment by adding the variables one by one in order to achieve the highest R squared, before checking the model according to the assumptions for ordinary least squared (OLS) regression model found in appendix 9.2. The result is a combination of variables that represents the aspects we want to discover, and adding dimensions of our own not previously researched, as well as using the correlation matrix in order to achieve the highest R-squared.

5.5.1 Private equity investor characteristics

The four PE investor characteristics used in the regression are PE investor stake at the IPO, historic capital raising, fund vintage age and historic number of trades.

Investor stake is included in order to uncover whether the size of the stake of the portfolio company may lead to a longer divestment period and perhaps more sales. We expectat that a higher investor stake will make it harder for the investor to exit, both in terms of time and number of sales.

Historical capital raising and historical number of trades are also added as a characteristic of the investor. In a data sample strictly containing BO or VC investors, these two variables could work as indicators for investor experience. In our data set on the other hand, with both VC and BO investors, we expect that the variables can work as indicators for determining what kind of investor is exiting earlier. This is due to the fact that VC investors typically participate in a higher number of smaller deals, and BO investors engage in a lower number of bigger deals.

5.5.2 Portfolio company characteristics

Portfolio company characteristics used in the analysis are total assets, return on assets, leverage, market equity to book ratio and the market cap. To represent the size of the portfolio company, we include total assets. We expect that a larger portfolio company might be harder to exit. At the same time, a larger portfolio company might represent a typical buyout backed company, as they are normally bigger than VC backed companies. The profitability of the portfolio company is represented by return on assets (ROA). We expect that a company with a higher profitability might be easier to exit, as it is more attractive for the buyer. On a public

stock exchange with all information available for analytics, the higher profitability may result in a higher price. Profit through a higher price is one of the main objectives of the investors, as discussed in introduction to this section. If a portfolio company can obtain a higher profitability through the capital raised in the IPO, the investors might prefer to wait for a positive development in both profitability and price before they exit.

The portfolio company's leverage is also included. We expect that a higher leverage at the IPO may lead to a longer divestment period. If the portfolio company receives a better credit rating and better financing terms, this might lead to a higher price in the future, which the investors prefer to wait for. This is supported by the fact that the capital raised through the IPO may over time be used for growth and debt reduction. Value creation through debt reduction, was suggested as a reason for a longer divestment period by Fürth and Rauch (2014). A higher leverage can also turn out to be a separating characterization between the types of portfolio companies the typical BO and VC investors back, given that VC investors tend to have very little debt and BO investors often use high leverage in their investments.

To extend on previous reserach, we include the market equity to book ratio, representing a high or low valuation of a company. We were interested in whether a higher priced share price could influence the exit indicators. We expect that portfolio companies with a higher price to book ratio might be exited earlier, that perhaps that more shares are sold earlier, and the exit to take place through fewer sales.

5.5.3 Probit model

A probit model is a type of regression where the dependent variable can only take two values, for example 1 or not 1. We use this model to determine what characterizes the investor or portfolio company that is exited through a block sale. In order to do so, we create a dummy variable for block sale, giving portfolio companies that exited through a block sale the value 1, and 0 for those who did not. With the help of the probit model, we can estimate the probability for an observation with particular characteristics will fall into one of the two categories.

Based on the output from the probit regression, we have the possibility to calculate the probability of an outcome given we know the value of the variable. The probability can be calculated by using the following formula:

$$Probability = \frac{1}{1 + \exp(-(\mu_i + \mu_x * v_x))}$$

Where μ_i represent the coefficient for the intercept, μ_x represent the intercept for variable x and v_x represent the value of variable x.

5.6 Triggers initiating the sale process

Based on our initial discussion in section 5 we want to investigate what changes in portfolio company variables from the IPO to the first sale, triggers the sales process. This expands on previous research and our regression, which only include information known at the IPO. As PE investors seem to stay invested after the IPO (Fürth & Rauch, 2014) and they presumably have incentives to create max profit in the shortest time possible, they stay invested for a reason. Here we investigate why they stay invested.

In order to research what triggers the PE firms to start selling their shares, we look for differences in the variables from the IPO to the first sale. To determine whether a difference in variable from the IPO to the first sale is present, we could use either a parametric test or a nonparametric test. Though they do not require assumptions regarding the sample distribution, the nonparametric methods do however have less statistical power than their parametric equivalents. A t-test require the differences to be normally distributed, but in turn have a higher statistical power (Ball & Whitley, 2002, p. 511). As pointed out by Sokal and Rohlf (1987, p. 107), the central limit theorem implies that the distribution is approximately normal if the sample size is large, and that a sample size of at least 30 will be sufficient. As our sample size is 466, we consider a t-test to be valid.

Before employing a t-test, we tested for, and revealed that, the variance of several variables were unequal. Ruxton (2006, pp 690) states that an unequal variance t-test should always be used in preference to the Student's t-test when comparing the central tendency of two populations based on samples of unrelated data. We opted for Welch's t-test, which is an adaption of the Student's t-test designed for testing differences in means between two unequal samples assumed to have unequal variances (Ruxton, 2006, p. 688; Welch, 1938, pp. 350-362).

Comparison between Student's t-test and Welsh's t-test		
	Student's t-test	**Welsh's t-test**
Test statistic	$t = \frac{\overline{X}_1 - \overline{X}_2}{s_p^2 * \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$	$t = \frac{\overline{X}_1 - \overline{X}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$
Degrees of freedom	$v = n_1 + n_2 - 2$	$v = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{s_1^4}{n_1^2(n_1 - 1)} + \frac{s_2^4}{n_2^2(n_2 - 1)}}$
	$\overline{X}_i$ = mean for sample I (i=1,2) s_p^2 = pooled std. dev. of sample 1 and 2 n_i = number of observations in sample *i*	$\overline{X}_i$ = mean for sample I (i=1,2) s_i = std. dev. of sample *i* n_i = number of observations in sample *i*

Table III - Comparison between Student's t-test and Welsh's t-test

When choosing a point in time after the IPO, we consider the fact that the PE investors can exit their portfolio companies through one big sale, or through a series of smaller sales. The sales every PE exit goes through are the first and last sale. And sometimes the first sale might also be the last one. The reason we chose the first sale was because of what it signals; the beginning of share sales after the IPO, that they somehow are ready to sell at that point in time. The fact that the first sale is the sale where negative market reactions are strongest (Fürth and Rauch, 2014) also makes it a pivotal point in the sales process.

We use the same portfolio company variables in the T-test as used in the regression in part, and add three new. Variables used in the regression were total assets, return on assets, leverage ratio, market equity to book ratio and the market cap. We also add the net income and total liabilities. The third variable we add is constructed to represent the change in the PE investor's holdings value in the portfolio company from the IPO to the first sale. The holdings value is calculated at the IPO and before the first sale as shares multiplied by the price.

The changes we expect to trigger the IPO are connected to the introductory discussion of the methodology section. The PE investor seeks to make the portfolio as attractive as possible for the buyer, leading to a higher price and max profit. We expect that the findings will be in the

direction of value creation, that the PE investor is making the portfolio company more attractive for buyers. We expect to find increase in earnings and profitability, as these are some of the variables that can increase the price of the portfolio company. We also expect to observe a decrease in total liabilities and leverage ratio, as this would also be the kind of change that could increase the price and let the investor realize a higher profit. We expect the created variable that shows the value of the PE investor's holdings to be significant, showing that the reason investors chose to stay invested is incentivized by profit.

6. Results

In this section, we present the results from the various calculations and models used in our research. We also include a brief interpretation of our findings. We will further elaborate on the results in section 7.

6.1 Ownership Summary

The table below presents presents the average time from the first investment to the IPO, and from the IPO to the final exit sale. It also presents the investors equity stake from the IPO and the following three years.

	Mean	Median	SD
Investment Overview			
Investment Period	3,45	3,08	2,19
Divestment Period	2,25	1,75	1,74
Divestment Duration	1,86	1,47	1,40
Investor Stake (%)			
At IPO	44,67	42,36	15,57
Stake at the end of:			
IPO Year	39,70	39,18	16,13
IPO + 1 Year	30,17	30,92	20,21
IPO + 2 Year	17,26	0,00	21,08
IPO + 3 Year	11,06	0,00	19,25

Table IV - Ownership Summary

The average time from first investment to the IPO stretches for 3,45 years, while the divestment period is is 2,25 years. The divestment duration, indicating when the major part of shares are sold, is 1,86 years, which is in lines of earlier research (Fürth & Rauch, 2014). These are the averages of the exit indicators which are later used in the multivariate analysis.

We also observe that the investor stake at the IPO is 44,67% and that the percentage seems to gradually decrease following the years after the IPO. This is used as a starting point for our

objective to look closer at how the investors dispose of their shares. As earlier research also shows that buyout backed portfolio companies are exited gradually over time (Fürth & Rauch, 2014), we choose to add a new dimension by taking a closer look at the investors sale patterns.

Comparing the duration of 1,86 years with mean divestment period of 2,25 years, we see that investors sell the a larger part of their shares towards the end of the divestment period.

6.2 Divestment Process

The following table provides specific information on the average sale, the first sale, the last sale and he highest share sale. This includes the size of the sales, time from the IPO to the sale, transaction value and time between sales.

	# Firms	Mean	Median	SD
All Share Sales post IPO	466			
Reduction in Holdings		48,78 %	41,78 %	37,05
Time Between Sale Transactions		0,91	0,96	0,82
Transaction Value		133,31	42,62	260,03
First Share Sale post IPO	466			
Years from IPO		1,07	0,83	1,04
Reduction in Holdings		49,77 %	32,90 %	41,41
Transaction Value		143,06	35,30	319,07
Last Share Sale post IPO	466			
Years from IPO		2,25	1,75	1,74
Reduction in Holdings		82,13 %	90,37 %	20,84
Transaction Value		203,79	83,08	338,56
Highest Share Sale post IPO	466			
Years from IPO		2,18	1,67	1,73
Reduction in Holdings		83,04 %	90,37 %	19,23
Transaction Value		205,87	86,06	337,75
Average number of sales	466			
Average number of sales to final exit		2,06	2,00	1,12

Table V - Divestment Process

By looking at the table above, we see that the average sale constitutes 48,78% of the investors equity stake, and that the time between the sales is 0,91 years. It is important to emphasize

that the time between sales exclude 38% of the data sample, as they exit in the first sale. The first post IPO sale happens 1,07 years after the IPO, where the investors on average dispose of 49,77% of their shares. 2,25 years after the IPO, the average exit occurs, with a reduction in stake by 82,13%. The share sale with the highest average reduction in equity stake, 83,04%, takes place 2,18 years after the IPO.

6.3 Final exit sales

This table displays at what number of sale the average investor exits their portfolio company, and the number of investors exiting. It also shows the timing and size of the same exit sales. The first sale represents the block sales we examine more thoroughly in this thesis.

			Timing			Ownership		
Sale Number	**# of sales**	**Percent**	**years after IPO**	**Median**	**Std.d**	**Sale in %**	**Median**	**Std.d**
1	178	38,20	1,30	1,08	0,92	100 %	100 %	0,80
2	154	33,05	2,22	1,83	1,50	79 %	83 %	17,2
3	86	18,45	3,03	2,67	1,76	67 %	68 %	16,2
4	32	6,87	3,73	3,88	1,60	55 %	49 %	15,7
5	11	2,36	5,41	5,58	1,56	44 %	43 %	12,5
6	3	0,64	8,31	6,50	3,27	41 %	38 %	5,19
7	2	0,43	6,04	6,04	0,30	47 %	47 %	19,9

Table VI - Final exit sales

We find that a large number of investors, 38,2%, exit through a block sale, and that this sale occurs 1,3 years after the IPO. Investors exiting through only two sales is also substantial at 33,05%. The number of investors that exit in the first two sales accumulates to 71,24% of all investments in the data sample. Including 18,45% of the investors exiting by the third sale, the accumulated proportion accumulates to 89,70% of the entire data sample. As part of our objective, we wanted to investigate if investors prefered a smaller number of sales during their divestment period. Table VI show that this is true for the majority of our sample.

6.4 Behavior in different market environments

The following table distributes the investor's time of investment, timing of IPO, share sales and final exits into "bull" and "bear" markets conditions.

	Bull Market 1	**Bear Market 1**	**Bull Market 2**	**Bear Market 2**	**Bull Market 3**	**Bull Markets Sum**	**Bear Markets Sum**	**Difference in Sum**	
	01.01.1989-14.01.2000	15.01.2000-08.10.2002	09.10.2002-09.10.2007	10.10.2007-09.03.2009	10.03.2009 02.05.2016				
First Investments									
Number of first Investments	379	59	28	0	0	407	59	348	
IPOs									
Number of IPOs	192	139	135	0	0	327	139	188	
						Mean	**Mean**	**Mean**	
Share Sales									
Number of Share Sales	1,49	1,43	1,96	1,31	1,70	1,98	1,42	0,56	*
Reduction in stake (%)	73,28	82,52	83,81	52,28	71,58	86,73	79,33	7,40	***
Transaction Value	255,98	179,44	251,78	132,14	322,92	277,88	174,62	103,26	***
						Sum	**Sum**	**Sum**	
Final Exits									
Number of Exits	46	196	180	21	23	249	217	32	
Reduction in stake (%)	90,88	88,46	77,70	65,43	60,55	78,82	86,59	-7,77	
Transaction Value	335,71	174,66	205,93	124,73	243,59	221,67	170,64	51,03	

Table VII - Behavior in different market enviroments

We see that significantly more sales occur during a bull market, and that the size of these sales are significantly larger both in terms of percentage and transaction value. With 407 of the first investments made in bull periods, and 59 in bear, this represents that 87% of all investments are made in bear markets. The timing of the IPOs however, are almost the opposite, with 70% of the IPOs taking place during bull market periods.

6.5 Exit Strategy Determinants

The results of our multivariate cross-sectional OLS regression displayed below, shows the correlation and significance of the investor and portfolio company variables as possible determinants to the exit indicators.

	Investment Period			**Divestment Period**			**Divestment Duration**			**Number Sales**		
	OLS			OLS			OLS			OLS		
Variables	Coef.	t-stat		Coef.	t-stat		Coef.	t-stat		Coef.	t-stat	
PE Investor Variables												
Investor stake at IPO	0,202	2,44	*	0,344	5,31	***	0,137	2,57	*	0,027	8,28	***
Log(Historic Capital Raising)	-4,230	-3,55	***	3,013	3,06	**	2,843	3,51	***	0,045	0,91	
Log(Fund Vintage Age)				2,893	1,81		2,144	1,63		0,139	1,71	
Log(Historic Number of Trades)	6,760	3,72	***	-3,633	-2,06	*	-3,349	-2,31	*	-0,094	-1,04	
Portfolio Company Variables												
Log(Market Cap)	-5,731	-3,35	***	-0,687	-0,51		-2,118	-1,91		-0,058	-0,85	
Return on Assets at IPO	-0,143	-3,40	***	-0,037	-1,13		-0,008	-0,29		-0,003	-1,65	
Log(Total Assets at IPO)	-1,222	-0,66		-2,742	-1,86		-0,664	-0,55		0,050	0,66	
Leverage	-0,005	-0,14		0,075	2,55	*	0,047	1,96		0,003	1,99	*
Equity to Book	-0,122	-1,46		-0,182	-2,79	**	-0,105	-1,96		-0,008	-2,55	*
Market Conditions												
Bear Market Investment	-6,485	-1,81		1,803	0,65		3,004	1,31		0,039	0,28	
Bull Market IPO	-0,784	-0,29		-2,965	-1,40		-4,987	-2,86	**	0,078	0,73	
Investment Period				-4,148	-2,87	**	-3,355	-2,82	**	0,013	0,17	
Constant	115,919	6,21	***	38,728	2,36	*	50,955	3,78	***	0,995	1,2	
Observations	466			466			466			466		
Adj. R-Squared	0,128			0,177			0,142			0,264		

* p<0.05, ** p<0.01, *** p<0.001

Table VIII - Exit Strategy Determinants

6.5.1 Investment period

For the investment period, we find three significant investor variables, where investor stake and number of trades are positively correlated, while the historic capital raising are negatively

correlated. This means that the investor with a shorter investment period, is significantly characterized as having a lower equity stake, more raised capital and participated in a lower number of trades. The portfolio with a shorter investment period, seem to be bigger and have a higher return on assets.

6.5.2 Divestment period

In the divestment period, we also find three significantly correlated investor characteristics. Again, it is the investor stake, the historic capital raising and number of historic trades. The two significant portfolio company characteristics are leverage and the market equity to book ratio. The divestment period as an independent variable is also significantly correlated.

The significant investor stake indicates that the divestment period is shorter for the investor with a lower equity stake in its portfolio company. The positively correlated historical raised capital, and negatively correlated number of trades, characterize the investor with a shorter divestment period, not unlike a VC investor. This is the exact opposite result of the observations in the investment period. The portfolio company with a shorter divestment period seem to have less leverage and a higher market equity to book ratio. The significant investment period as an independent variable, indicate that the portfolio company with a longer investment period has a shorter divestment period.

6.5.3 Divestment duration

The duration is calculated as a value weighted length of the divestment period, and we find three significant investor variables correlated to this. The variables are as previously the investor stake, historic capital raising and number of trades. The investment period as an independent variable, is also correlated with the divestment duration. The significant variables correlates in the same way as for the divestment period, showing that a VC type of investor with more deals and less raised capital, sell more of their shares earlier in the divestment period. An investor with a lower equity stake also sell more of its shares earlier.

As in the divestment period, the investment is period used as an independent variable, indicates that a company with a shorter investment period has a higher divestment duration. In other words, the investor sells more of its shares later.

6.5.4 Number of sales

Only one of the investor characteristics, the investor stake, is significantly correlated with the number of sales. For the portfolio company, there are two significant variables, namely leverage and the market equity to book ratio.

6.5.5 Block Sale probit

Table IX uses a probit regression to determine what characterizes the investor or portfolio company that is exited through a single sale exit. The variables are observed at the IPO.

	Block Sale		
	Probit		
Variables	Coef.	z-stat	
PE investor Variables			
Investor stake at IPO	-0,029	-5,96	***
Log(Historic Capital Raising)	-0,057	-0,79	
Log(Fund Vintage Age)	-0,080	-0,71	
Log(Historic Number of Trades)	0,110	0,85	
Portfolio Company Variables			
Log(Market Cap)	0,002	0,02	
Return on Assets at IPO	0,006	2,32	*
Log(Total Assets at IPO)	0,117	1,04	
Leverage	-0,004	-1,50	
Equity to Book	0,017	2,56	*
Market Conditions			
Bear Market Investment	-0,070	-0,34	
Bull Market IPO	0,134	0,87	
Investment Period	0,030	0,28	
Constant	0,167	0,14	
Observations	466		
Adj. R-Squared	0,143		

* p<0.05, ** p<0.01, *** p<0.001

Table IX - Block Sale probit regression

We find that there are three significant determinants, the investor stake, return on assets and market equity to book ratio. It appears that owning less of the portfolio company increases the chanses for exiting through a single sale. For a portfolio company to have a higher return on assets and higher market equity to book ratio, increases the probability of exiting though a block sale.

6.6 Triggers initiating the sale process

The table below uses Welsh's t-test to determine the significance of the changes in variables from the IPO to the first sale. We find four variables to have a significant change in characteristics: net income, return on assets, equity to book ratio and change in holdings[12].

Welch's t-test					
Variable	**Mean first sale**	**Mean IPO**	**difference**	**t-value**	
Total Assets	384,7	320,4	64,34	1,25	
Total Liabilities	218,8	190,9	27,88	0,65	
Leverage	42,1	39,7	2,47	1,02	
Equity to book	5,1	8,2	-3,07	-3,63	***
Net Income	37,6	18,0	19,59	2,51	*
ROA	34,4	15,7	18,65	3,88	***
Investor Holdings	282891,6	349173,2	-66281,00	-2,12	*
Market Cap	777600,0	830867,5	-53266,87	-0,58	
Variable	**Mean Block Sales**	**Mean Regular Exit**	**difference**	**t-value**	
Divestment Period	1,38	2,92	1,54	11,86	***

* p<0.05, ** p<0.01, *** p<0.001

Table X (a) - Change in variables from IPO to first sale

[12] The investor holdings are calculated as the number of shares held by the investor multiplied with the share price. This represents the market value of the investors stake in the portfolio company at the time of the observation.

Having found the variables with a significant change from the IPO to the first sale we then calculate the exact change of the variables on a portfolio company level, the result of which are displayed in table X (b). We see that the investors start to sell when there is an increase in net income, return on assets and an increase in its holdings. The significant equity to book ratio is surprising

Change from IPO to first sale	
TotalAssets	41,39 %
Liabilities	86,09 %
Net Income	65,24 %
Leverage	2,47 %
Equity to book	-3,07 %
Return on Assets	18,65 %
Investor Holdings	5,38 %

Table XI - Change in variables from IPO to first sale

7. Discussion

7.1 Gradual sales and Block Sale exits

In table Table IV we observe that the average divestment period is 2,25 years and that the average investor stake gradually decreases in the years following the IPO. We find that the bigger part of shareholdings is sold later in the divestment period, shown by the constructed duration indicator. In line with previous research[13], this shows that the investors do not sell their shares at first chance, but stay invested after the IPO

The decreasing investor stake is in line with the research of Fürth and Rauch (2014), who find that buyout investors gradually sell shares over time. A part of our objective however, is that there is more detail to the sales than only the decreasing average investor stake in the years following the IPO. The investors may stay invested for some time, but we attempt to extend on previous research by further investigating the sales patterns used in the divestment strategy.

Table V presents information on the sales in which the investors participate, showing that the average sale is 48,78% and the average time between sales to be 0,91 years. The first sale occurs 1,07 years after the IPO, and amount of shareholdings sold measures 49,77% which is almost the same size as the average sale. At almost the extact same time, 2,18 versus 2,25 years, the highest and last share sale occurs with the almost identical size respectively at 82,13% and 83,04%. However, from the odd sizes of the sales, one sees that this needs more explaining.

Table VI adds a new dimension to the investor's sales patterns. We observe that 38% of portfolio companies are exited through a block sale, and the companies exited through one or two sales represents 71,24% of all the portfolio companies. Lastly, portfolio companies exited through three sales or less, amounts to 89,70%. In a general sense, this shows that investors aim to sell shares in a smaller number of sales.

[13] Investors stay invested after the IPO (Fürth & Rauch, 2014; Cao, 2011)

We also find that exits at sale two and three are large sales, measuring up to 79% and 67% of the shareholdings. This means that when an investor divests by using more than one sale, the first sales are considerably smaller than the final sale.

By comparing Table V and Table VI, we clearly see that there is more detail to the sales patterns of investors than a decreasing equity stake over time, and that the investors do not exit their portfolio companies immediately after the lockup period. However, it might seem that the investors place greater emphasis on exiting through a lower number of sales, than selling shares early.

These results are in line with what we expected, namely that investors prefer a lower number of shares, or perhaps a block sale exit. Our expectations were based on the assumption that investors are well aware of the negative price reactions following a sale in a publicly enlisted portfolio company, which were found to be significant by Fürth and Rauch (2014). By exiting through a block sale sale, the negative market reaction is avoided entirely.

Looking at investors exiting through two or more sales however, we find that the last sales are bigger in percentage, meaning they start by selling smaller parts of the stakes.

This is opposite of our expectations, as we expected that these investors would start by selling one big equity stake, thus letting the following smaller sales be affected by the negative market reaction. Our expectation is based on research showing that the negative market reactions are significantly stronger after the first sale (Fürth & Rauch, 2014). We find the complete opposite in Table V by looking at investors exiting through two or more sales, where the last sales are the biggest, while the first two seem to be very small in terms of size. However Fürth and Rauch (2014) also add that investors do react intelligently, meaning that this type of earlier small sale might not trigger a big market reaction.

By using a t-test in Table X (a), we find the divestment period to be half the length for portfolio companies sold in block sales, than that of gradual sales. The divestment period for investors exiting by a block sale is 1,38 years, while non-block sale exits happen 2,92 years after the IPO. Continuing our focus on the block sales, we use a probit regression in Table IX and find three significant determinants. There we find that a higher ROA and price to book ratio increases the chances for a block sale. These findings were in line with our expectations, that a more profitable portfolio company might be more attractive for a block sale.

The only significant investor characteristic in Table IX is the equity stake. Appearently, the investor owning a smaller stake increases the probability for exiting through a block sale. This variable is also used in regression later, and will be further discussed.

Table IV shows the investor's behavior in different market conditions, we find that there are more IPOs during bull markets than that of the bear market periods. This is what we expected, and is in line with previous research (Lerner, 1994; Cao, 2011). We also find there to be significantly more sales during bull periods than bear periods, and that these sales are significantly a bit larger. This supports previous research made by Fürth and Rauch (2014). Furthermore, we observe that the investors generally execute more investments in bull markets than bear markets. This means that investments, IPOs and sales all happen to a larger degree in bull markets than bear markets. More investments in good market environments is not surprise, since good market conditions more likely provide more funding for the PE investors. More IPOs in good market conditions does not come as a surprise either, seeing as PE investors tend to chose IPO exits in good market environments, and private exits in worse markets, as found by Lerner (1994).

7.2 Regression

Table VIII shows the results from the OLS regression at the IPO. We see that the most prominent investor characteristic is the equity stake, which apparently is significantly correlated with all four exit indicators, the investment period, the divestment period, the divestment duration and the number of sales. These results connects our objective of investigating the sale patterns of the investors, first by investigating if they in fact do prefer fewer sales and block sales. Second, looking at what investor characteristics might be significantly correlated to exiting through fewer sales. The investor equity stake apparently plays a major role in all aspects.

It appears that if an investor owns a smaller stake in a portfolio company, there are five significant findings indicating that the exit will happen faster and with fewer sales. First, a smaller equity stake significantly shortens the divestment period. Second, the investor sells a bigger part of shareholdings earlier, as shown by the divestment duration. Third, the investor exits through a significantly less number of sales (Table VIII). Fourth, the investor has a higher probability of exiting through a block sale (Table IX), and lastly, the investors who exits

through a block sale significantly shortens the divestment period (Table X (a)). In other words, the equity stake seems to be significant across all models and shows consistent findings.

All investors in our data set have a controlling stake of 20% or more at the time of the IPO. One could think that the higher the stake owned by the investor, the more control and influence. That could be an advantage in making the portfolio company attractive for a potential buyer. However, it seems that the higher the equity stake an investor owns of the portfolio company, the harder it might be to sell all shares in a block sale.

This might add information to the findings in Table V, where we concluded that investors exiting through two or more sales had smaller earlier sales and a big last sale. The finding was not what we expected. Literature finds that the negative market reactions are strongest after the first sale, but that the reactions are smaller in bull market periods. In addition, buyers seemed to react intelligently and take different positive and negative factors into account (Fürth & Rauch, 2014). It might be that the investors with a big equity stake realistically understand that they are not able to sell the entire stake in one sale, and that a bigger first sale perhaps will create an even bigger market reaction. Starting with small sales, keeping board seats and staying active investors may trigger smaller negative price reactions from sales. The strategy of starting with smaller sales first, and exiting in a big sale may turn out to be more profitable.

As previously explained, a part of our objective is to extend existing research by investigating if a higher pricing of the portfolio company might shorten the divestment period. That is why we included the price to book ratio as an explanatory variable in the regression. Table VIII shows that a portfolio company with a higher price to book ratio is significantly negatively correlated to the divestment period, meaning that a higher priced company is typically exited earlier. This significant finding confirms our expectation. The exit strategy of a PE investor is meticulously planned (Fürth & Rauch, 2014), and the investors are known for monitoring their portfolio companies carefully. If the portfolio company is valued at a high price, it seems natural that the investor will choose to exit rather than taking the risk involved by staying invested for a longer time.

Looking at the other investor characteristics, we observe significant correlations in the investment period, divestment period and the duration. An investor with a shorter investment

period is characterized as one that has raised more capital and participated in less trades. This characterization seems to describe a buyout investor, with bigger deals on average.

The same characteristics are significant in both the divestment period and divestment duration, although showing the opposite. An investor that exits earlier seems to mimic the characteristics of a VC investor with significantly less raised capital and participation in fewer deals. The same VC type investor seems to have smaller divestment duration, meaning that more of the shares are sold earlier in the divestment period. The investment period was included in the regression as an explanatory variable, and confirms that the characteristics leading to a shorter investment period, will lead to a longer divestment period.

As mentioned in section 5.5.1, we expected that these variables could work as indicators describing investor types. The fact that a buyout investor might have a shorter investment period is not a surprising result. VC investors typically invest in smaller portfolio companies in earlier stages, which may need longer time to grow to the size acceptable for an IPO. It seems reasonable that the process of BO investing, restructuring and managing a bigger and more established company, might take less time than the VC process.

Significant portfolio company characteristics seem to indicate that a bigger portfolio company has a shorter investment period. This supports that a buyout investor typically has a shorter investment period, matching the investor and portfolio company. The portfolio company with a shorter investment period also has a higher return on assets. Research on buyout investors found the opposite of this result, namely that a portfolio company with a high ROA seemed to have a longer investment period. It was attributed to the fact that a profitable company took a long time to restructure (Fürth & Rauch, 2014). However, an increase in profit is an important factor when making the portfolio company more attractive for buyers, or preparing the portfolio company for an IPO. With a sample data like ours, containing a variety of BO and VC backed companies, it seems that the most profitable ones have a significantly shorter investment period. This does not seem unreasonable. As mentioned earlier, investors have incentives for both maximizing profit and shortening time. From Table VII we also know that the investors time their IPOs in bull markets. The time and profit trade-off might strengthen the incentive to take a company public if the profitability is high, and the market will support a profitable exit through an IPO.

Apart from having a higher price to book ratio, the portfolio companies that significantly shorten the divestment period also seem to have a lower leverage. A higher debt ratio has been proven to significantly increase the divestment period (Fürth & Rauch, 2014). The result matches our expectations, as a future lower leverage ratio might lead to value creation followed by a higher price. This will be further discussed in section 7.3, where we look at change in characteristics from the IPO to the first sale, analyzing what variables trigger the selling process.

7.3 Triggers initiating the sale process

The investors have incentives for maximizing profit, shortening time, and possibly seeking a block sale or fewer sales, like discussed earlier. Literature shows that the investors carefully plan the divestment process (Lerner, 1994), and yet they choose to stay invested after the IPO[14]. Literature also seems to ignore the post IPO aspects of the investment, and focus on information known at the IPO. Just from the fact that the investors stay invested, we believe that the post IPO changes do play an important role in the divestment strategy and the timing of sales. We aim to extend on earlier findings by investigating why the investors stay invested. We do this by looking at what potential determinants might trigger the sale, using parametric statistical test.

Displayed in Table X (a) and X (b), are the variables having a significant change from the IPO to the selling process starts. First, we see that a positive development of the portfolio company's return on assets is significant at a 99,9% significance level. The change per portfolio company equals to 18,65%. Second, that there is a significant increase in net income of a high 65,24% from the IPO to the first sale. Third, the variable showing the value of the investor's equity stake also shows a significant increase.

Our expectations were that the change in variables from the IPO to the first sale would represent a form of value creation. Spesifically we expected that the investor would focus on increasing the income and profitability to make the portfolio company more attractive for one or more buyers. The significant findings confirm our expectations.

[14] Investors stay invested after the IPO. (Fürth & rauch, 2014; Cao, 2011)

The significant finding that investors stay invested in their portfolio companies post IPO to continue value creation and exit with a higher profit is not very surprising. However as far as we know, this has not been researched until now, and that our significant findings provide important information.

Our findings significantly show that the investors strategically stay invested after the IPO, and await their exit until the portfolio company has obtained a higher income and profitability. It seems like the post IPO divestment process is a continuation of the pre IPO investment process, in the sense that the objective for the investor is value creation. As previously mentioned, the IPO is a costly process, and the PE investor's ownership is diluted through the IPO (Cendrowski et al., 2011). At the same time, the portfolio company raises capital that is used for further value creation. One could expect that future growth and value creation would be incorporated in the IPO share price. However, the underpricing of IPOs is well documented[15], and might play a small role to the fact that the investor does not sell early. Regardless if the offering price is underpriced or not seemingly has an expectation of reaching a higher future profit, and that this is the PE investor divestment strategy.

In the regression in Table VIII we observed that a portfolio company with a higher leverage was significantly correlated to a longer divestment period. This was in line with previous research (Fürth & Rauch, 2014), wich suggested that a lowering of debt would lead to a higher price, and a profitable exit. The results we find in the parametric test add new information in this regard. Change in the total liabilities from the IPO to the first sale is actually positive, however not significant. It seems that increased earnings and profitability are of a high importance, while reducing the debt is seemingly not.

Metrick and Yasuda, (2011, p.179) explain that the definition of a good venture capital exit is not obvious, since investments are different and that there are a lot of variables to take into account. Our research on the PE divestment strategy confirms that there are a lot of variables

[15] Pukthuanthong, Shi, & Walker (2013): Studied underpricing of 6025 IPOs listed between 1995 and 2002 in 34 different countries. Loughran & Ritter (2004): Studied underpricing of of 6391 IPOs listed between 1980 and 2003 on the US market.

to navigate through. The definition of a good exit might not be obvious, but our research sheds light on what the definition of a good exit strategy might be.

8. Conclusion

The objective of this thesis was to answer the following research question: what determines the post IPO exit process of private equity investors. There is not much existing literature on the subject, leaving areas of the post IPO exit period for PE investors to be explored.

We have used a dataset of 466 private equity backed portfolio companies, which have been exited after taken public. The data set contains a variety of PE investors listed through an initial public offering between 1996 and 2005, providing a different starting point than literature focusing on either VC or BO investors.

The most prominent determinant influencing the exit indicators in our findings is the PE investor's equity stake. The investor with a smaller stake has a higher probability for a block sale, a shorter divestment period, sells more of its shareholdings earlier in the divestment period, and exits through fewer share sales.

Looking closer at post IPO sales patterns of the PE investors, we see that a large part of the sample data prefers to exit through fewer sales, and very likely through a block sale. That way they can avoid, or perhaps handle the negative market effects in a good way. Surprisingly, we find that if the PE investor sells through more than one sale, they start with smaller sales and sell a big equity stake last. From the regression, we find that a portfolio company with less debt is typically exited through less sales.

The market equity to book ratio we added to investigate if a higher pricing would ease the sale, showed significant findings. We found that a portfolio company with a higher pricing increased the chances of a block sale. It also had a shorter divestment period, and exited through fewer sales. These findings were in line with what we expected.

Finally, we determine why the investor chooses to stay invested and exit the portfolio company at a later time. The t-test shows that the strategy is directed towards value creation, through substantially increasing the net earnings and the return on assets. Another variable showing why the investor starts selling at that point in time is the investors increased equity stake value.

Summed up, we find that the PE investor seem to have meticulously planned exit strategy, which includes staying invested in the portfolio company after the IPO, with the objective of substantially increasing earnings and profitability. Further, exiting when the price has risen as

an effect of the improvements. In addition, many investors seem to be able to exit through block sales, and by that, drastically shortening the divestment period at the same time as the investor avoids negative market reactions.

References

Bain & Company (2016). *Global Private Equity Report 2016*. Retrieved April 9, 2016, From Bain website, http://www.bain.com/bainweb/publications/global_private_equity_report.asp

Barry, C. B., Muscarella, C. J., Peavy J. W. III., Vetsuypens, M. R. (1990). The Role of Venture Capital in the Creation of Public Companies: Evidence from the Going-Public Process. *Journal of Financial Economics, 27*(2), pp. 447-472.

Cao, J. (2011). IPO Timing, Buyout Sponsors' Exit Strategies, and Firm Performance of RLBOs. *Journal of Financial and Quantitative Analysis 46*(4), pp. 1001-1024.

Cendrowski, H., Petro, L. W., Martin, J. P., & Wadecki, A. A. (2012). *Private equity: History, governance, and operations* (2nd ed.). Hoboken, New Jersey: John Wiley & Sons, Inc.

Chen, S.C. (2009). Predicting the bear stock market: Macroeconomic variables as leading indicators. *Journal of Banking & Finance 33*(2), pp. 211-223.

Fürth, S., Rauch, C. (2014) Fare Thee well? An analysis of Buyout funds' Exit Strategies. *Financial Management 44*(4), pp 811-489. doi: 10.1111/fima.12070

Gill, A., Walz, U. (2016). Are VC-backed IPOs delayed trade sales?. *Journal of Corporate Finance 37*(April, 2016), pp. 356-374. doi: 10.1016/j.jcorpfin.2016.01.007

Gompers, P. (1996). Grandstanding in the Venture Capital Industry. *Journal of Financial Economics 42*(1), pp. 133-156. doi: 10.1016/0304-405X(96)00874-4

Gompers, P., Lerner J. (1998). Venture Capital Distributions: Short Run and Long –Run Reactions. *The Journal of Finance 53*(6), pp. 2161-2183. doi: 10.1111/0022-1082.00086

Lerner, J. (1994). Venture Capitalists and the Decision to Go Public. *Journal of Financial Economics 35*(3), pp. 293-316.

doi: 10.1016/0304-405X(94)90035-3

Lin, T. H., Smith, R. L. (1998) Insider Reputation and Selling Decisions: The Unwinding of Venture Capital Investments during Equity IPOs. *Journal of Corporate Finance 4*(3), pp. 241- 263.

Metrick, A., & Yasuda, A. (2011). *Venture Capital & the Finance of Innovation* (2nd ed.). New York: John Wiley & Sons, Inc.

Ownership Reports and Trading by Officers, Directors and Principal Security Holders (2002). Retrieved April 20, 2016, From U.S. Securities and Exchange Commission website, https://www.sec.gov/rules/final/34-46421.htmPreqin (2016). *2016*

Prequin Global Private Equity & Venture Capital Report. Retrieved April 9, 2016, from Preqin website, https://www.preqin.com/docs/samples/2016-Preqin-Global-Private-Equity-and-Venture-Capital-Report-Sample_Pages.pdf

Ritter J. R. (2016, March 8). *Initial Public Offerings: Updated Statistics*. Retrieved from https://site.warrington.ufl.edu/ritter/files/2016/03/Initial-Public-Offerings-Updated-Statistics-2016-03-08.pdf

Ruxton, G. D. (2006). The unequal variance t-test is an underused alternative to Student's t-test and the Mann–Whitney U test. *Behaviour Ecology, 17*(4)*,* pp 688-690. doi: 10.1093/beheco/ark016

Schmidt, D., S. Steffen, and F. Szabó. (2010). Exit Strategies of Buyout Investments: An Empirical Analysis. *Journal of Alternative Investments 12*(4), pp. 58-84. doi: 10.3905/JAI.2010.12.4.058

Sokal R. R., Rohlf, F. J. (1987). *Introduction to biostatistics* (2nd ed.). New York: Freeman

Statista (2016). *Fundraising of global private equity companies from 2003 to 2015*. Retrieved March 9, 2016, from Statista website, http://www.statista.com/statistics/280221/global-private-equity-fundraising-of-investment-companies/

Strömberg, P. (2007). The New Demography of Private Equity. *The Journal of economic perspectives 23*(1), pp. 121-146

Visnjic, N. (2013). *The Real Exit: Selling Strategies subsequent to Private Equity-backed IPOs*. Unpublished working paper

U.S. Securities and Exchange Commission. (2015, April 27th). CUSIP Number. Retrieved from https://www.sec.gov/answers/cusip.htm

Welch, B. (1938). The Significance of the Difference Between Two Means when the Population Variances are Unequal. *Biometrika, 29*(3/4), pp 350-362. doi: 10.2307/2332010

Whitley, E., & Ball, J. (2002). Statistics review 6: Nonparametric methods. *Critical Care*, *6*(6), pp 509–513. doi: 10.1186/cc1820

9. Apendix

9.1 Tables

9.1.1 Table XI – Correlation of exit indicators

The following table display the results of a correlation analysis of the different exit indicators used in this thesis.

	Investment Period	Divestment Period	Divestment Duration	Number of Sales
Investment Period	1,0000			
Divestment Period	-0,0728	1,0000		
Investment Duration	-0,0840	0,9257	1,0000	
Number of Sales	0,0330	0,5949	0,4450	1,0000

9.2 Assumptions for Cross-Sectional Ordinary Least Squared (OLS) Multiple Regression Model

Ordinary least squares (OLS) is a method for estimating the unknown parameters in a linear regression model, given that the following assumptions are met:

1) The relationship between the independent and dependent variables needs to be linear.The population of the model can be stated as follows:

$$y_i = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k + \varepsilon$$

where y represent the dependent variable
x_1 and $x_2$represent the independent variables
ε is an unobserved random error term.

2) The linear regression analysis requires all variables to be normal (Multivariate normality): We have a random sample of size $n, \{(x_{i1}, \dots, x_{ik}, y_i): i = 1, \dots, n\}$

3) There is no or little multicollinearity in the data: None of the independent variables in the sample are constant, and there is no exact linear relationship among the independent variables.

4) Little or no auto-correlation in the data (Strict exogeneity, Zero Conditional Mean): $E(u|x_1, x_2 \dots, x_k) = 0$

5) Homoscedasticity: Constant variance at every value of x: $Var(u|x_1, x_2 \dots, x_k) = \sigma^2$

9.3 Statistical hypothesis tests

Welch's t-test: Total Assets

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
assets_sale	466	384,7429	38,2265	825,1967	309,6249	459,861
assets_IPO	466	320,3992	34,74896	750,1269	252,1148	388,6836
combined	932	352,5711	25,83764	788,7891	301,8643	403,2778
diff		64,34374	51,66		-37,03993	165,7274

diff = mean(assets_sale) - mean(assets_IPO) t = 1,2455
Ho: diff = 0 Welch's degrees of freedom = 923,63

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr (T < t) = 0,8934 Pr (|T| > |t|) = 0,2133 Pr (T > t) = 0,1066

Welch's t-test: Leverage

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
leverage_sale	466	42,1429	1,791135	38,66529	38,62318	45,66263
leverage_IPO	466	39,67633	1,640865	35,42141	36,4519	42,90076
combined	932	40,90962	1,214578	37,07946	38,52599	43,29325
diff		2,466575	2,429116		-2,300643	7,233793

diff = mean(leverage_sale) - mean(leverage_IPO) t = 1,0154
Ho: diff = 0 Welch's degrees of freedom = 924,919

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr (T < t) = 0,8449 Pr (|T| > |t|) = 0,3102 Pr (T > t) = 0,1551

Welch's t-test: Total Liabilities

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
liabilities_sale	466	218,7743	30,71379	663,0195	158,4193	279,1293
liabilities_IPO	466	190,8939	29,71599	641,48	132,4996	249,2881
combined	932	204,8341	21,36147	652,1374	162,9119	246,7563
diff		27,88045	42,73613		-55,98985	111,7508

diff = mean(liabilities_sale) - mean(liabilities_IPO) t = 0,6524
Ho: diff = 0 Welch's degrees of freedom = 930,983

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr (T < t) = 0,7428 Pr (|T| > |t|) = 0,5143 Pr (T > t) = 0,2572

Welch's t-test: Market equity to book ratio

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
eqt_book_sale	466	5,09245	0,4474935	9,660058	4,21309	5,97181
eqt_book_IPO	466	8,165476	0,7192633	15,52676	6,752067	9,578885
combined	932	6,628963	0,4263106	13,0147	5,792322	7,465604
diff		-3,073026	0,8471069		-4,735907	-1,410144

diff = mean(eqt_book_sale) - mean(eqt_book_IPO) t = -3,6277
Ho: diff = 0 Welch's degrees of freedom = 779,421

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr (T < t) = 0,0002 Pr (|T| > |t|) = 0,0003 Pr (T > t) = 0,9998

Welch's t-test: Net Income

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
net_income_sale	466	37,61757	7,144041	154,2187	23,57897	51,65618
net_income_IPO	466	18,03104	3,136894	67,71622	11,8668	24,19528
combined	932	27,82431	3,912292	119,4371	20,14637	35,50224
diff		19,58653	7,802399		4,265074	34,90799

diff = mean(net_income_sale) - mean(net_income_IPO) t = 2,5103
Ho: diff = 0 Welch's degrees of freedom = 638,623

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr (T < t) = 0,9938 Pr (|T| > |t|) = 0,0123 Pr (T > t) = 0,0062

Welch's t-test: Return on Assets

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
roa_sale	466	34,35572	4,608226	99,47792	25,30019	43,41124
roa_IPO	466	15,70393	1,380179	29,79398	12,99177	18,4161
combined	932	25,02983	2,423296	73,98002	20,27407	29,78558
diff		18,65178	4,810472		9,202566	28,101

diff = mean(roa_sale) - mean(roa_IPO) t = 3,8773
Ho: diff = 0 Welch's degrees of freedom = 548,113

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr (T < t) = 0,9999 Pr (|T| > |t|) = 0,0001 Pr (T > t) = 0,0001

Welch's t-test: Market Capitalization

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
market_cap_sale	466	777600,6	65523,62	1414461	648841,5	906359,7
market_cap_IPO	466	830867,5	65432,59	1412495	702287,3	959447,7
combined	932	804234	46283,38	1412970	713402,2	895065,9
diff		-53266,87	92600,05		-234995,6	128461,9

diff = mean(market_cap_sale) - mean(market_cap_IPO) t = -0,5752
Ho: diff = 0 Welch's degrees of freedom = 931,998

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr (T < t) = 0,2826 Pr (|T| > |t|) = 0,5653 Pr (T > t) = 0,7174

Welch's t-test: Holdings

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
holdings_sale	466	282891,6	18424,28	397725,5	246686,5	319096,8
holdings_IPO	466	349173,2	25255,64	545194,3	299543,9	398802,5
combined	932	316032,4	15660,22	478085,9	285299	346765,8
diff		-66281,56	31261,82		-127640,7	-4922,389

diff = mean(holdings_sale) - mean(holdings_IPO) t = -2,1202
Ho: diff = 0 Welch's degrees of freedom = 852,355

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr (T < t) = 0,0171 Pr (|T| > |t|) = 0,0343 Pr (T > t) = 0,9829

Welch's t-test: Block Sales

Variable	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
regular_exit	288	2,92364	0,1103011	1,871872	2,706538	3,140741
takeover_exit	178	1,383362	0,0685965	0,9151918	1,247989	1,518734
combined	466	2,335293	0,0808049	1,744338	2,176505	2,494081
diff		1,540278	0,1298916		1,285002	1,795554

diff = mean(market_cap_sale) - mean(market_cap_IPO) t = 11,8582
Ho: diff = 0 Welch's degrees of freedom = 445,664

Ha: diff < 0 Ha: diff != 0 Ha: diff > 0
Pr (T < t) = 1,0000 Pr (|T| > |t|) = 0,0000 Pr (T > t) = 0,0000

9.4 Variable Description

The following table displays explanations and measurements units for variables used in this thesis.

Variable Name	Unit	Description	Source
Exit Strategy Indicators			
Investment Period	Months	Length between the initial investment made by a PE investor in a portfolio company and the IPO date. Calculated as: $\frac{\text{IPO date} - \text{date of first investment}}{365} * 12$	Compustat, EDGAR
Divestment Period	Months	Length between the IPO date and the final exit. Calculated as: $\frac{\text{Date of final exit} - \text{IPO date}}{365} * 12$	Compustat, EDGAR
Divestment Duration	Months	Value weighted length of the divestment period. Calculated as: $\frac{\sum \text{Time} * \text{Transaction Value}}{\sum \text{Transaction Values}}$	Calculation
Number of Sales	Number	The number of share sales a PE investor during the divestment period of a portfolio company	Sale dentifiers
PE investor Variables			
Investor stake	%	The percentage of shares held by the investor in the portfolip company. Calculated as $Shares\ held * Share\ price$	Compustat, EDGAR
Historic Capital Raising	Mill USD	The total amount raised during the PE investors Existence. *Based on snapshot from 2011*	Core data

Fund Vintage Age	Years	The vintage age of the investor. Calculated as the difference in years between the fund's vintage year and the portfolio company's IPO year	Core data, Compustat
Historic Number of Trades	Number	The number of trades done by the portfolio company. *Based on snapshot from 2011*	Core data

Portfolio Company Variables

Return on Assets at IPO	%	Return on assets, calculated as net income over total assets	Compustat
Total Assets at IPO	Mill USD	Total assets of the portfolio company	Compustat
Leverage	%	Leverage of the portfolio company, calculated as liabilities over market equity	Compustat
Equity to Book	%	Equity to book, calculated as common equity to shares outstanding	Compustat
Block Sale	Dummy	Indicator to show if a PE investor sell all of the held shares in one sale, indicating a Mergers and acquisitions. (1 = Yes, 0 = No)	Sale identifiers
Market Cap	Mill USD	Share price multiplied by the total number of shares outstanding	Compustat

Market Conditions

Bear Market Investment	Dummy	Indicator to show if the initial investment made by the PE investor was made furing the time of a bear stock market	

Bull Market IPO	Dummy	Indicator to show if the IPO of the portfolio company took place during a bull stock market