Norwegian School of Economics

Bergen, Fall 2018

The Effect of Post-IPO Private Equity Ownership

An empirical study of how post-IPO private equity ownership affects the stock market- and accounting performance of private equity-backed IPOs in the US

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Master thesis in Financial Economics

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Abstract

Private equity firms stay invested in their portfolio companies for up to several years after an initial public offering. Despite private equity firms having incentives and opportunities to continue influencing the companies, the effects of the retained ownership are uncertain. This study contributes to the understanding of how the long-run stock market- and accounting performance of portfolio companies is affected by private equity ownership post initial public offering. Panel data of publicly listed private equity-backed companies in the United States provides the basis for the analysis. Fixed effects, instrumental variable estimation, and simultaneous equations models are among the econometric methods used in this study, with a focus on dealing with the endogeneity of private equity ownership. We find that private equity ownership post initial public offering has a significant positive effect on the stock market return for the portfolio companies. We find no effect on return on assets or Tobin's Q. These findings contribute to broadening existing literature by investigating an, to our knowledge, previously unexplored relationship.

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1. Introduction

> *"We care about the performance of the portfolio companies after taking them public because we want to achieve a high return for our investors. Although it is more challenging to influence the companies after the IPO, we are often able to, and do so whenever beneficial."*
>
> - Managing director and global head of communications at a major PE firm[1]

Private equity (PE) plays a vital role in the economy, and private equity firms back a substantial part of initial public offerings (IPO) in the US. The role of these financial sponsors while companies are under their private ownership is thoroughly covered by academic literature. However, there is little knowledge about the extent to which PE investors affect the companies after bringing them to the stock market.

Exit strategy is vital for the life cycle of PE investments, and one of the most common exit routes is IPO (Kaplan & Stromberg, 2009). However, only a limited share of existing literature considers the fact that PE investors usually do not completely exit their investments at the IPO. Studies by Chao (2011), Visnjic (2013) and Fürth (2014) find that most PE firms use several years to exit the company entirely after an IPO, gradually disposing of their shares. The few studies that acknowledge this fact mainly focus on the reasons why PE firms stay invested for so long, and which factors determine their divestment strategy post flotation.

Several studies examine the long-run performance of PE-backed IPOs vs. non-backed IPOs, and find that PE-backed companies outperform non-backed companies on both stock market performance and accounting performance (Degeorge & Zeckhauser 1993; Cao & Lerner, 2009; Levis, 2011). These studies do not account for the fact that PE firms usually do not exit at the time of the IPO, but propose it as interesting for further research. They suggest that the continued involvement of the PE firms may be a factor leading to better performance (Levis, 2011), and that tracking buyout groups' involvement more carefully can enhance the understanding of the buyout process (Cao & Lerner, 2009).

This motivates our research question: *How does post-IPO private equity ownership affect the performance of portfolio companies?*

Because PE firms retain substantial holdings for a long time after the IPO, they still have incentives and opportunities to continue influencing the performance of the portfolio

[1] Source: Self-conducted telephone interview with a representative from a global private equity firm.

companies. As PE firms dispose of their shares, their incentives and opportunities are reduced because their control of the company and proportion of wealth gains decrease. We do not focus on why the PE firms stay invested post IPO, because their incentives and opportunities to improve performance exist regardless of the reason for retaining shares. The focus is on how stock market- and accounting performance changes as the PE ownership stakes decrease in the time following the IPO. There are reasons to suspect a significant relationship between PE ownership and performance, as PE firms in general are capable of converging interests of shareholders and managers, and add expertise to their portfolio companies through *shareholder activism*. Moreover, *signaling* suggests that investors may interpret PE firms' disposal of shares as negative information about the state of the portfolio companies.

Statements made by representatives from two global private equity firms further support the relevance of this study[2]. They state that one of the reasons PE firms stay invested after the IPO is that they try to time the market, in order to deliver a high return for their investors. This supports the fact that the PE firms indeed have incentives to affect the performance of the companies, as it has an impact on their ability to achieve the desired returns. Moreover, they both state that the PE firms still can influence the companies after the IPO, even though it requires more persuasion of the management due to decreased control of the company. One of the representatives says that this happens more informally than formally, compared to before the IPO. These statements support the fact that PE firms also have the opportunity to affect portfolio companies post IPO.

We estimate the effect that post-IPO PE ownership has on stock market return, return on assets, and Tobin's Q. We utilize panel data of 343 buyout-backed companies listed on the US stock market, with monthly data for PE ownership, performance and various control variables for 36 months following each IPO. By combining econometric techniques inspired by studies of ownership structure and performance, we build five different models using various methods to deal with the possible endogeneity of PE ownership. These methods are pooled OLS, fixed effects models, the use of lagged variables as proxies for possible endogenous variables, using lagged variables as instruments in IV estimation, and using simultaneous equations models.

We find evidence that post-IPO PE ownership affects stock market return for the portfolio company positively. That is, the companies perform worse as the PE firm gradually exits the company, ceteris paribus. We do not find a significant effect of PE ownership on return on assets or Tobin's Q. Possible reasons for the differing results are discussed later in the thesis,

[2] Source: Self-conducted telephone interviews with representatives from two global private equity firms.

and include the fact that stock market return is more informative than accounting measures and is observed more frequently. We also provide further evidence to the fact that the PE firms stay invested a long time after the IPO, on average reducing holdings from 50% to 19% during the 36 months following the IPO. We find that the PE firms, on average, do not sell more at the expiration of the lock-up agreement than in periods after the expiration, implying that the lockup agreement is not the sole reason for them to retain shares post IPO. Besides, we show that PE firms often conduct joint investments, where 52% of the IPOs in our sample are backed by more than one PE firm. Lastly, we find that PE ownership is negatively determined by company performance, in line with statements from the interviews.

This thesis contributes to expanding existing literature through studying a research question that, to our knowledge, has not previously been addressed. Although there are some limitations to the analysis, the findings improve the understanding of post-IPO performance for PE-backed companies. Moreover, we add knowledge to the research of performance and ownership structure in general, by examining the effect of a specific type of owner.

The thesis is structured in the following way. We start with an introduction of private equity and explain how an IPO is far from an immediate exit for the PE firm. We introduce two related fields of research that have implications for our thesis. Based on related research and theoretical predictions, we present the three main hypotheses of interest, before we discuss the sample and dataset used to address the hypotheses. Then, follows a detailed explanation of the methodology utilized in the thesis, with a particular focus on methods for dealing with the possible endogeneity of PE ownership. The results from the analysis are presented and explained before we discuss the robustness and limitations of the analysis. Finally, we present our conclusion, discuss implications of the results and make suggestions for further research.

2. Private Equity value creation and divestment

This chapter provides an introduction to private equity that the reader should have knowledge of before reading the remaining parts of the thesis. Furthermore, we discuss empirical evidence of value creation in private equity and explain how private equity firms retain substantial holdings post IPO, which is the basis of our research question.

2.1 Introduction to Private Equity

Private equity is a broad term used to describe capital investments in equity securities of unlisted companies. The majority of these investments are made by financial intermediaries referred to as private equity funds. These funds are usually limited partnerships with a finite lifetime, managed by private equity firms and funded by institutional investors.

There are different types of private equity investments, and a commonly used categorization is venture capital (VC) and buyout/leveraged buyout (BO/LBO). Venture capital funds usually invest in startups and early stage companies, often in high-growth sectors. Buyout funds invest in more mature, stable and bigger companies, usually seeking controlling stakes. These investments are often highly leveraged. The capital invested is typically used to buy shares, or "buy out" the old owners, rather than investing funds into the company. The venture capital investments typically include more risk than investments in established companies.

In this study, we solely focus on buyouts, due to several reasons. The business models of the two categories differ substantially. Whereas BO firms aim to control more than 50% of the portfolio company in order to get control, VC firms tend to diversify their investments more, resulting in smaller equity stakes. Given our interest in understanding how ownership affects long-run performance, it is of more interest to look at the investors with the highest possibility to make an impact. Moreover, buyouts dominate the market concerning funds raised and capital invested (Døskeland & Strömberg, 2018). In the following, we refer to buyout as private equity (PE).

Most PE funds are organized as limited partnerships, as depicted in Figure 1, where the fund managers are referred to as general partners (GP), and the investors are called limited partners (LP). The GP raise funds from LPs, which typically include institutional investors such as pension funds, insurance companies, and endowments. The GP has to invest a minimum of 1% of the committed capital in the fund in order to achieve the limited partnership status. The

owners of the GP are typically the partners and key employees of the PE firm that is hired by the GP to manage the investments of the fund. This set-up helps align the interests of the PE firm and the investors.

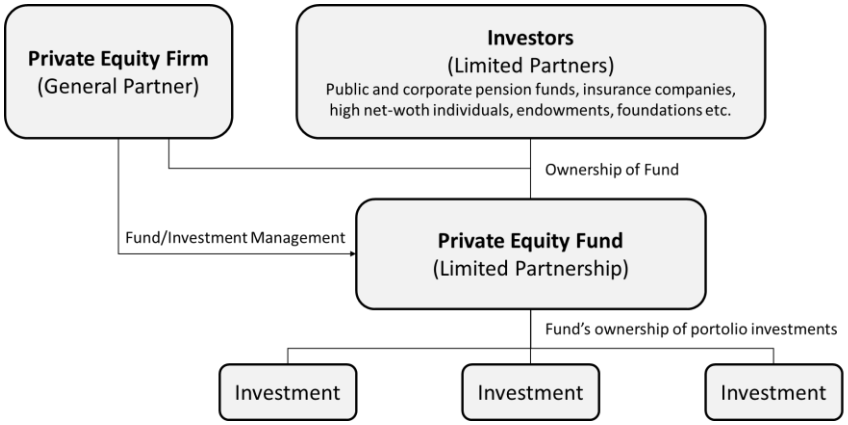

Figure 1 - Limited Partnership model
Inspired by Cendrowski et al. (2012)

The PE fund usually has a time horizon of around 10 years. The fund is typically dissolved after these ten years, although the fund occasionally is extended with a few years. At this point, all of the portfolio companies (companies invested in by the PE fund) should be exited. The first six years after the creation of the fund is often called the investment period, during which the GP calls on the LPs for committed capital to invest in new portfolio companies. No investments in new portfolio companies are made after this period. The PE firm proposes which companies that should be invested in, and makes the investments after approval from an investment committee and the GP board.

The GP is responsible for the daily management of the fund and is compensated with a management fee of 1-3% of committed capital, which covers the services of the PE firm. In addition to this, the GP earns carried interest of ~20% of the fund's profit. The carried interests are limited by a hurdle rate, which is a guaranteed rate of return that the LPs receive in addition to the amount they have invested in the fund. This hurdle rate is usually around 7-8% and is collected during the so-called harvesting phase, year ~6-10 of the fund's life.

The overall goal of the business model of a PE firm is to enhance the portfolio company through active ownership, typically during a 3-5 year horizon. The active ownership model enables the PE firm to make operational, organizational, financial and strategic improvements in the portfolio company. The PE investment cycle can be divided into four phases: fundraising, investment, value-adding and divestment, where the fundraising phase includes the establishment of the limited partnership described above. In the investment period, the PE firm

looks for potential investments in the market and conducts due diligence and valuations of possible targets. When a final target is decided and approved upon, the firm tries to acquire the target through competitive bidding. After the bidding rounds, investments are made, and the PE firm takes control of the portfolio company in the value-adding phase. During this period, the PE firm typically places representatives in the portfolio company's management and board and improves the company through active ownership and expertise. After the holding period, they choose an exit strategy based on the company characteristics and market conditions. One possible exit strategy is taking the portfolio company public in an IPO, which is the focus of this thesis.

2.2 Value creation

There is a lot of research and discussion on how, and to what extent, PE firms add value in the portfolio companies. Jensen (1989), Kaplan (1989) and Kaplan and Strömberg (2009) suggest three significant changes PE firms apply in their portfolio companies to add value; governance engineering, financial engineering, and operational engineering. Governance engineering involves designing the portfolio companies' corporate governance structure, which is possible due to the majority stake owned by the PE firm. PE firms typically require management to make a significant investment. Financial engineering is the implementation of the capital structure in the portfolio company and often involves the substantial leverage used to finance the acquisition. Operational engineering refers to the value added through the industry and operating expertise of the PE firm and is an essential differentiator for PE firms because it is difficult to copy. The professionals from PE firms typically possess unique knowledge and skills when it comes to increasing profits, and have extensive experience in taking advantage of market opportunities.

PE ownership is proved to improve profit margins (Smith, 1990), provide productivity gains (Davis, et al., 2014), increase sales growth (Acharya, Gottschalg, Hahn, & Kehoe, 2013) and reduce financial distress (Hotchkiss, Smith, & Strömberg, 2016). In sum, the majority of empirical studies support the fact that PE firms improve the performance of the portfolio companies during the holding period, before exit.

These studies have documented that PE firms improve the performance of PE-backed companies, but it is in general hard to identify and separate the main causes. For instance, it could be due to aligned interests through governance engineering or beneficial strategic

decisions through the professional expertise of the PE firms' professionals. Another component could be the PE firms' ability to select the most promising companies and buy them at a favorable price. The implication of this to our analysis is that we do not attempt to isolate the responsible factors, but rather determine whether post-IPO PE ownership affects performance.

2.3 IPO: Not an immediate exit

The exit is a crucial stage for the PE firm, as it partly determines the financial success of the investment (Metrick & Yasuda, 2011). There is a variety of possible exit routes, and the most common ones are sale to a strategic buyer, sale to another PE-fund and IPO (Kaplan & Stromberg, 2009). In a secondary sale, the portfolio is kept privately held. In an initial public offering, the company is offered to the public and the PE firm can sell their shares on the stock market.

An IPO is often described as the most favorable exit route because when the proper market conditions are available, this method is likely to enable the investors to realize the highest return on their investment. The return depends largely on the exit channel, with initial public offerings reported to deliver the highest returns on average (Schmidt, Steffen, & Szabó, 2009). Giot and Schwienbacher (2007) argue that there is a pecking order of exits, where investors prefer an IPO followed by a trade sale. Moreover, an IPO could be viewed as beneficial because it increases the liquidity of the shares. This allows PE firms to begin exiting their positions gradually instead of depending on a strategic buyer to acquire the entire equity stake. An additional benefit of IPO is the continuous market pricing, likely leading to fewer resources required to negotiate the terms of transactions.

During an IPO, shares are offered to the public, giving the PE firms the opportunity to realize their investment and exit the company. However, lock-up agreements restrict the PE firms' opportunity to sell their shares. A typical lock-up period in the US is 180 days but can vary between 60-360 days (Cendrowski, Petro, Martin, & Wadecki, 2012). During this period, the shareholders that the agreement concerns are not allowed to sell their shares unless they receive special permissions from the lead underwriter.[3]

Even though IPO is a common exit route, it is not as quick of an exit as it is often considered. Research documents that investors stay invested for a long time after the IPO (Chao,

[3] In some circumstances, the lead underwriter allows locked investors to sell some or all of their shares prior to the lockup expiration; this is referred to as an 'early sell' transaction (Hoque & Lasfer, 2013).

2011). Fürth and Rauch (2014) conclude that PE firms stay invested for several years post IPO, gradually reducing their stake in the portfolio company. This period also extends far beyond the restrictions of the lock-up period. Visnjic (2013) finds that the PE firm on average sells minor stakes of their holdings at the IPO. Even though their stake declines due to dilution effects, they hardly sell more than 1% of their shares at the IPO. He also finds that selling activity accelerates somewhat after the end lock-up period. After two years, PE firms have on average sold around 30% of their initial holdings, and selling activity softens thereafter. Five years after the IPO, PE firms have only sold roughly 40% of their shares (Visnjic, 2013). These aforementioned studies find that the divestment period after an IPO can be described as a stepwise decrease of equity ownership over a long period, as illustrated in Figure 2.

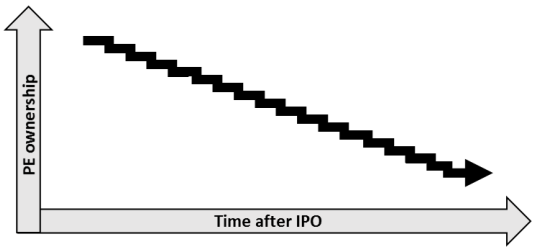

Figure 2 - PE firms' stepwise disposal of shares. Illustrative example: individual divestment patterns varies more and are less predictable

These findings are essential for the basis of this thesis, as there is, to our knowledge, no empirical explanation of how this divestment pattern affects the performance of portfolio companies. Because PE firms retain substantial holdings post IPO, the performance of their portfolio companies has significant wealth implications. As we argue in chapter 4, PE firms still have incentives and opportunities to influence their portfolio companies post IPO, despite the central part of their business model consists of doing so pre IPO. These incentives and opportunities will decrease as their equity stake gradually decreases.

3. Related research

To our knowledge, the relationship between post-IPO PE ownership and performance has never been studied, although Cao and Lerner (2009) and Levis (2011) have proposed it as interesting for further research. Two types of related research are of particular relevance to us. First, several studies have investigated the performance of PE-backed IPOs, but without considering retained PE ownership. Second, the relationship between ownership structure and performance has been thoroughly researched and is of interest to us because the findings are somewhat applicable to PE ownership and performance. Figure 3 illustrates how the present study is located in the interface between research focusing on the performance of PE-backed IPOs and research examining the relationship between ownership structure and performance. The following two sections discuss the findings of studies in the two categories.

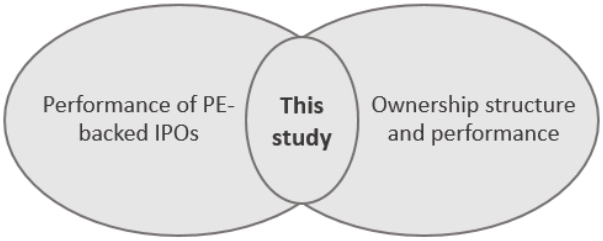

Figure 3: Location of this study related to existing research

3.1 Private Equity-backed IPOs and long-run performance

IPOs and long-run stock market performance has been a frequent topic in research papers for decades. Ritter (1991) documented the long-run underperformance of IPOs in the US in the late ’70s and early ’80s, which have been verified by Loughran (1993), Loughran and Ritter (1995), and Hoechle and Schmid (2008), among others. Initial studies focused on IPO performance in general, however, later studies have categorized the IPOs in order to examine potential variations.

Regarding PE-backed IPOs, several studies have focused on the differences in the long-run stock market performance between PE-backed, VC-backed, and non-backed IPOs, without considering post-IPO ownership. Gompers and Brav (1997) find that VC-backed IPOs outperform non-backed IPOs. Moreover, Bergström et al. (2006), Cao and Lerner (2009) and Levis (2011) are among studies to conclude that PE-backed IPOs outperform their non-backed peers concerning the long-run stock market performance.

It is important to consider underpricing when examining the long-run stock market performance. Underpricing is the listing of an IPO below market value, and is commonly measured by the first-day return. Ritter (2018) documents the presence of underpricing throughout the years, which has been between 10-20% for most years after the dot-com bubble. Whether underpricing is reduced in PE-backed IPOs is open for discussion, as Bergström et al. (2006) find no significant difference, whereas Hopkins and Ross (2013) finds significantly reduced underpricing for PE-backed IPOs. Being aware of underpricing is crucial due to our interest in long-run performance. We are interested in how the market evaluates the development of the value of the portfolio company. As underpricing is a result of the IPO being priced lower than the market value rather than value creation immediately after the IPO, we neglect the abnormal returns resulting from underpricing. We further discuss this decision when presenting our dataset in chapter 5.

There are also studies investigating the long-run accounting performance of PE-backed IPOs in the US, and IPOs in general. Bharat and Kini (1994) conclude that firms going public exhibit a substantial decline in performance post IPO, measured by ROA. Furthermore, Bharat and Kini (1995) find that the post-IPO accounting performance of VC-backed firms is superior to that of non-backed firms. Degeorge and Zeckhauser (1993) and Holthausen and Larcker (1996) find that PE-backed IPOs outperform non-backed IPOs, measured by ROA. However, like the studies examining stock market performance, these studies do not account for the development of PE ownership post IPO.

3.2 Ownership structure and performance

Even though previous literature does not cover long-run performance dependent on PE ownership, several studies look at long-run performance dependent on other kinds of ownership structures. We primarily find the studies focusing on managerial ownership and performance interesting because the conclusions in these studies have implications for what we should expect in our analysis. Firms with a high degree of managerial ownership might perform better than others because there is an alignment of interest between managers and shareholders. Both have incentives to maximize shareholder value if the equity stake of managers is big enough. As we have touched upon and will elaborate on later, one of the consequences of PE ownership is aligned interests between managers and shareholders. Thus, the studies focusing on managerial

ownership can indicate whether the convergence of interests could be a source of superior performance.

However, previous studies differ in their conclusions about the relationship between managerial ownership and performance. Mørck et al. (1987) find a significant relationship that is positive between 0% and 5% of managerial holdings, negative between 5% and 25% and increasing beyond 25%. McConnel and Servaes (1990) find a quadratic relationship between managerial ownership and Tobin's Q using cross-sectional results. Other researchers have questioned the econometrical approach of these studies, and Loderer and Martin (1997) and Himmelberg et al. (1999) find no significant relationship with Tobin's Q using a fixed effects approach. Nevertheless, these studies are criticized as well. Zhou (2001) states that the within-firm variation in managerial ownership is too modest, arguing that the approach may lack the statistical power to document a significant effect, even if it exists.

These studies are interesting for two main reasons. First, they signify the econometric challenges in dealing with ownership and performance, primarily caused by endogeneity. Second, there is no definite answer to whether managerial ownership affects performance, as various econometric approaches produce various answers, and there could exist a relationship even if current research fails to conclude so. The quadratic relationships some studies find are explained by the entrenchment effect, stating that managers use their power to prioritize their vested interests rather than the interests of all shareholders. This is slightly less relevant in the case of PE ownership, as PE firms are repeated players in the IPO market, and will likely suffer from gaining such a reputation.

4. Predictions for post-IPO PE ownership and performance

Due to the lack of previous studies that are directly related, we are dependent on combining the findings from the studies discussed in the previous chapter with financial theories to make predictions for the relationship between post-IPO PE ownership and performance. Before we introduce our hypotheses in section 4.2, we present relevant theories and mechanisms with possible implication for our analysis.

4.1 Relevant theories and mechanisms

Section 2.2 introduced activities that PE firms typically perform to add value pre IPO. *Active ownership* is the common categorization for these activities, and in the following, we discuss their implication post IPO. Four additional mechanisms we consider relevant to explain the relationship between post-IPO PE ownership and performance are also presented. Some of the mechanisms are relevant for explaining both accounting and stock market performance, whereas some are only relevant for market performance.

4.1.1 Shareholder activism

Shareholder activism is when owners intentionally influence a company to undergo certain beneficial changes, and in the case of PE firms, it can be summed up in *governance-*, *financial-* and *operational engineering*. Even though the IPO is a part of the divestment phase, we argue that PE firms still have incentives to try to influence portfolio companies positively. They retain large equity stakes, implying that the performance of portfolio companies has a significant impact on their wealth.

Governance engineering involves how PE firms control the boards of their portfolio companies and are actively involved in governance. *Principal-agent theory* suggests that the separation of managers and shareholders leads to a conflict of interest (Meckling, 1976). When facing decisions, managers can experience that the optimal decision for them personally does not maximize shareholder value. In order to make managers maximize shareholder value, interests need to be aligned. PE firms often have representatives in the management and on the board of directors (Cao & Lerner, 2009), and Fürth and Rauch (2014) find that this also is valid post IPO, as PE firms retain their positions on the board and in the top management even longer

than their shares. This implies a convergence of interest between management and shareholders, as both parties have incentives to maximize shareholder value. Moreover, Kaplan and Stromberg (2009) find that management in PE-backed companies have a more substantial equity stake than management in other companies, which is a way PE firms aim to align their interests. It is reasonable to assume that this also holds post IPO, because PE firms still have incentives to align the interests of managers, and because management often is restricted by even longer lock-up periods than other beneficial shareholders (Ball & Gefter, 2016). A consequence of PE firms being actively involved on the board is that they can monitor other managers closely, which reduces asymmetric information and thus reduces the *Principal-agent problem*. Monitoring requires a substantial amount of effort and creates a *free-rider problem* among small shareholders. However, due to the PE firms' substantial holdings, they have incentives to take responsibility for monitoring the managers. When managers know they are being monitored, they are forced to act in the interest of shareholders in order to keep their position. This is especially true due to PE firms' reputation of being impatient regarding weak performing managers (Acharya, Franks, & Servaes, 2007).

Financial engineering is another way PE firms create value before IPO, and it primarily refers to how substantial leverage is used to finance the acquisition. As this happens years before the floatation, there is limited reason to believe that *financial engineering* is essential in explaining how important *shareholder activism* is post IPO. Thus, it will not be adressed further.

Operational engineering refers to how the industry and operational expertise PE firms are adding value to their portfolio companies. This is relevant also in the post-IPO period because PE firms still have incentives to contribute with their operational expertise. The PE professionals can contribute because they typically have extensive experience and knowledge required to improve the performance of the portfolio company.

Governance- and *operational engineering* are viewed as essential value creators in the period before floatation, and we argue that PE firms have incentives to continue with these efforts post IPO. Nonetheless, we also need to consider whether being publicly listed changes the possibility of a PE firm being able to influence their portfolio companies. There are obstacles to having control of how the portfolio company is managed when going public. Even as a majority shareholder, the minority has a say in how the company is managed. However, it still happens that PE firms behave actively post IPO. Anker and Stärk-Johansen (2015) interview private equity professionals stating that the degree of control they have and how

active they are following an IPO depends on the cooperation between the PE firm and other major owners. Moreover, they state that LPs occasionally view IPOs as a way to return some of their investment, while still being able to benefit from future growth potential, making active ownership post IPO likely. However, when PE firms reduce their holdings, performing active ownership is less likely due to reduced control.

In conclusion, we expect *activism* through *governance-* and *operational engineering* to positively affect both accounting and stock market performance post IPO. Findings from the interviews we have conducted also support the fact that PE firms both have incentives and opportunities to affect performance post IPO. As PE firms gradually dispose of their shares, the incentives and opportunities of PE firms to influence their portfolio companies are reduced, because the proportion of wealth gains they have to share with other shareholders increases and their control of the company decreases.

4.1.2 Signaling theory

Signaling theory is useful for describing behavior when two parties have different access to information (Connelly, Certo, Ireland, & Reutzel, 2011). PE firms have worked with their portfolio companies for years and know their shape well, making the presence of *asymmetric information* between PE firms and potential investors substantial. Thus, when PE firms dispose of shares, investors can view it as a signal that the PE firm believes the market overvalues the company. However, there may of course be other reasons for the PE firm to sell their shares. Still, PE firms are typically experienced professionals who have the prerequisites required to be able to time the market. Investors have reason to believe that the probability of the PE firms exiting is smaller if they view the portfolio company as undervalued. Hence, PE firms selling shares can be an indication of the shape of the portfolio company and might make investors value the company less than before, which leads to a weaker stock market return.[4]

4.1.3 Price pressure

Price pressure occurs when there is a change in the share price due to large quantities of the shares being traded (Harris & Gurel, 1986). PE firms aim to exit their position in the portfolio companies in the years post IPO, meaning that large number of shares will be sold. The price would typically experience a drop due to the large quantities offered on the sell side of the

[4] Note that since the portfolio companies are publicly listed, beneficial owners such as PE firms are obligated to file their transactions, so that other shareholders have access to this information.

order book, making it challenging for PE firms to exit at a satisfactory price. However, in the case of PE-backed IPOs, investors are aware of the planned exit of the PE firms at the time of the IPO, because the IPO is recognized as a way for PE firms to exit their investments.

Based on this, we argue that there could be an alternative *price pressure* effect. Since investors know that disposal of large quantities will cause a decrease in the share price, the effect PE firms' disposal of shares has on the share price could be reflected in the initial trading price. Thus, the initial price might be lower than it would be if the IPO were not PE-backed, i.e., there exists a discount. This discount will gradually decrease as the PE firms dispose of their shares, causing the price to increase, ceteris paribus. The discount is removed when the exit is complete. The alternative *price pressure* mechanism will positively affect the stock market return of periods with low PE ownership stakes, indicating poor performance when PE firms still hold a substantial number of shares as compared to when the PE firms have disposed of a considerable number of their shares.

Note that the discussion of the alternative *price pressure effect* is based on a hypothesis, and is to our knowledge not yet supported by empirical evidence. Thus, *price pressure* can affect the relationship in both the ordinary and the alternative way, and we consider it important to be aware of both possibilities.

4.1.4 Private benefits of control

Private benefits of control suggest that major shareholders may result in drawing out the company's resources at the expense of smaller shareholders (Barclay & Holderness, 1989). This can for instance happen by paying excessive salaries and bonuses to their own board members or transferring assets to other companies under their control. This leads to value destruction in the company, but controlling owners are still motivated to do so, as long as their private gains are greater than the loss of their equity stake. In the case of PE firms, they can achieve a greater IRR on their investments even though the performance of their portfolio companies weakens. Private benefits of control suggest that PE firms have incentives to not put as much effort into strengthening the stock market performance of their portfolio companies as they otherwise would, and the effect might even reduce company value. However, the private benefits of control effect might not be as strong for PE firms, as they are repeated players in the IPO market and will suffer if they get a reputation of suppressing minor shareholders.

4.1.5 Reputational concerns

Cao and Lerner (2009) state that there are reasons to believe reputation in the stock market is vital to PE firms. PE firms are repeated players in the IPO market, as they bring portfolio companies to the market regularly. If it becomes clear to investors that PE-backed IPOs only perform well while the PE firm is still invested, it might become less attractive to invest in PE-backed IPOs. This may lead to future IPOs pricing lower as the reputation depreciates. As a result, PE firms might see that future investments suffer from weaker exits, leading to weaker IRR on their investments.

Without considering corporate reputation, PE firms are incentivized to do quick fixes on portfolio companies in order to make it attractive to investors. These quick fixes might not actually add value, but if investors perceive it as value addition, PE firms can still benefit. However, when considering the future consequences of such actions, these incentives will weaken. The reputation of PE firms can discipline the PE firms, suggesting no considerable differences in performance depending on retained PE ownership.

4.2 Hypotheses

There is, to our knowledge, no existing research of the effect that post-IPO PE ownership has on performance. Given the unique ownership structure of PE-backed IPOs, we believe that addressing this may increase the understanding of post-IPO performance of portfolio companies. Our guiding empirical research question of the thesis is as follows:

How does post-IPO private equity ownership affect the performance of portfolio companies?

We develop three hypotheses as we measure performance in three ways; by the portfolio companies' stock market return, return on assets (ROA), and Tobin's Q. Bøhren and Ødegaard (2005) underline how the choice of performance measure in research of ownership and performance can be decisive. We use various measurements for three main reasons. First, it allows us to see an overall tendency and provides robustness to the discussion of our results. Second, the three measures explain different types of performance, and we aim to capture the full effect. Lastly, it facilitates for comparing our results with former and future studies.

We emphasize that we do not intend to draw any conclusions about which of the presented mechanisms that cause a significant relationship, as it would require a different type of study.

4.2.1 Hypothesis 1: Stock market performance

A significant part of the PE business model is to maximize their investors' return. PE firms have incentives to make improvements in their portfolio companies that the market recognizes, which leads to positive stock return, as pointed out by Cao (2009). PE firms do not only have the incentives for trying to influence stock market performance, we have suggested that they also have the opportunity, as *shareholder activism* depicts well. Together with *signaling,* these mechanisms underline the possibility of observing a positive effect of PE ownership on performance. *Private benefits of control* argue that the relationship could be negative, whereas *price pressure* and *reputational concerns* are ambiguous. However, the mechanisms arguing for a positive relationship are to a more considerable extent based on established financial theory and previous studies, which is why we expect the relationship to be positive.

Hypothesis 1: Post-IPO private equity ownership in portfolio companies positively affects their stock market return.

Given that PE firms primarily are interested in maximizing shareholder value, we view this as our primary and most important hypothesis. By testing this hypothesis, we aim to understand whether the performance of PE-backed IPOs is significantly affected by how PE firms dispose of shares post IPO.

4.2.2 Hypothesis 2: Accounting performance

By including an accounting performance measure, we aim to see if PE ownership improves the actual operations of the portfolio companies. We expect a stronger relationship between PE ownership and stock return than on accounting performance measures such as ROA, due to the nature of the PE business model. PE firms are mostly incentivized to improve the accounting performance of their portfolio companies if it results in a better return when they sell shares. Nonetheless, most ways of securing a satisfying price at exit involve improving the stock return through improving accounting performance. Thus, *shareholder activism* indicates that there might be a positive relationship also in the case of ROA. Another reason for expecting a slightly less significant relationship when considering accounting measures instead of market performance is that *signaling* is only relevant in the case of stock market performance.

However, previous studies have concluded that PE-backed IPOs outperformance of non-backed IPOs holds for both stock market return and accounting performance measures. This

outperformance is likely partly due to the continued ownership of PE firms post IPO. Therefore, we expect to see a positive relationship when considering accounting measures as well.

Hypothesis 2: Post-IPO private equity ownership in portfolio companies positively affects their return on assets.

ROA is a common measure for accounting performance and has been frequently used in former studies examining the accounting performance of PE-backed IPOs, e.g., in Bharat and Kini (1995), Degeorge and Zeckhauser (1993), and Holthausen and Larcker (1996). It shows how profitable a company is relative to its total assets, and indicates how efficient a company's management is at using its assets to generate earnings. We acknowledge the possible drawbacks of ROA as a way of measuring accounting performance, e.g., how it disregards intangible assets and borrowed capital, and how it can be biased by earnings management. However, the alternatives also have disadvantages. We use ROA because it is frequently used in existing literature and is the most accurate measurement for accounting performance in our dataset. To provide a fair picture of accounting performance, we address how our results would change if we used alternative accounting performance measures in section 7.4.1.

4.2.3 Hypothesis 3: General company performance

With the above hypotheses, we have covered both stock market performance and accounting performance. According to Loderer (1997), Tobin's Q is customarily interpreted as a proxy for general company performance. Although stock market return and ROA are frequently used in studies looking at the performance of PE-backed IPOs, studies regarding ownership structure and company performance tend to use Tobin's Q as their performance measure.

Whereas ROA is concerned with backward-looking accounting data, Tobin's Q is the market view of the company's future prospects and is the ratio of the market value of the company to the replacement cost of its assets. By using Tobin's Q as a performance measure, we facilitate for better comparison of results with other studies, and we can examine consistency in our results. Although other studies regarding ownership structure and performance find conflicting results, we argue that the reasons for expecting a significant positive relationship are stronger in the case of PE ownership, partly due to larger variation in PE ownership than in, e.g., managerial ownership. Moreover, the nominator in Tobin's Q is directly affected by the stock return of the firm. Thus, we also expect PE ownership to have a positive effect on Tobin's Q.

Hypothesis 3: Post-IPO private equity ownership in portfolio companies positively affects their Tobin's Q.

Although Tobin's Q is commonly used to measure company performance, there are disagreements among scholars whether it is an accurate proxy. Whited and Erickson (2000) point out how Tobin's Q likely contains a great deal of measurement error because of a conceptual gap between true investment opportunities and observable measures of Tobin's Q. They also argue that its popularity persists because of its intuitive appeal and simplicity, not because of its accuracy as a performance proxy. Following this, Kose and Litov (2010) argue how underinvestment increases the ratio rather than decreasing it, which is not a beneficial characteristic of a performance measure. We acknowledge the criticism towards Tobin's Q, but our analysis includes other performance measures as well, making it less exposed to the criticism. Moreover, when using Tobin's Q, we follow a large number of scholars, including Lindenberg and Ross (1981), Mørck, Schleifer and Vishny (1987), McConnell and Servaes (1990), and Hermalin and Weisbach (1991).

4.3 Contribution to existing research

This thesis attempts, in all modesty, to contribute to existing literature in two main ways. First, we provide empirical evidence of a relationship that has, to our knowledge, not been previously studied. The focus on PE-backed IPOs in existing literature proves the interest for the topic, and prior studies suggest that continued ownership post IPO may be an essential reason for the superior performance documented of PE-backed IPOs. Our thesis assists in understanding whether the outperformance of backed vs. non-backed IPOs is solely due to pre-IPO activities by the PE firms, or whether continued ownership may have an effect.

Second, the relationship between ownership structure and performance has been thoroughly examined in previous studies. We add to this literature by examining the relationship between ownership structure and performance of a specific group of companies, namely PE-backed, and a specific type of owner, PE firms.

Moreover, by contributing to research into a field with limited empirical attention, we do so with (i) a comprehensive dataset with extensive use of sources, (ii) various use of performance measures to capture the full effect, (iii) use of several econometric approaches, making results more robust.

5. Data

In order to answer the research question, we have constructed a dataset in the form of a balanced panel. This was done through extensive and time-consuming data gathering and processing, combining data from multiple sources. The use of multiple databases allowed for constructing and quality assuring a unique combination of different variables. In the following sections, we present the sample and the procedures used to construct it, define variables and present descriptive statistics.

5.1 Sample

The sample consists of PE-backed IPOs floated on the US stock market between 01.01.2000 and 01.10.2015. The end date is chosen to have performance data 36 months after the IPO, to be able to study long-run performance. For each listed company, we have monthly data for 36 months following the IPO. The sample consists of 343 companies, after trimmings according to Table 1. The complete sample of portfolio companies and PE firms is presented Appendix A.5.

Table 1 - Sample construction

Description	Reduction	Sample Size
PE-backed IPOs in the relevant period	-	586
Companies delisted within three years after IPO	73	513
No available ownership data	132	381
Poor quality of ownership and performance data	38	343
Final sample	-	343

The final sample of 343 PE-backed IPOs with 36 monthly observations, gives us a total of 12 348 unique observations. The original 586 IPOs were identified using SDC platinum's buyout flag. We choose to exclude the companies that are listed for less than three years, to obtain a balanced panel of a sample with an equal basis for comparison among the companies.

Figure 4 shows the distribution of IPOs across the years in our sample. The IPO activity is lower around the recessions, especially during the financial crisis of 2008. The reason why 2015 is relatively low is that the last months are not included, due to the abovementioned cut. In Figure 5 we see the aggregated distribution of the sectors that the companies in our sample operate in, which shows that the sample is spread over a wide variety of different sectors. The dominating sector is manufacturing, which represents ~30% of the companies in our sample.

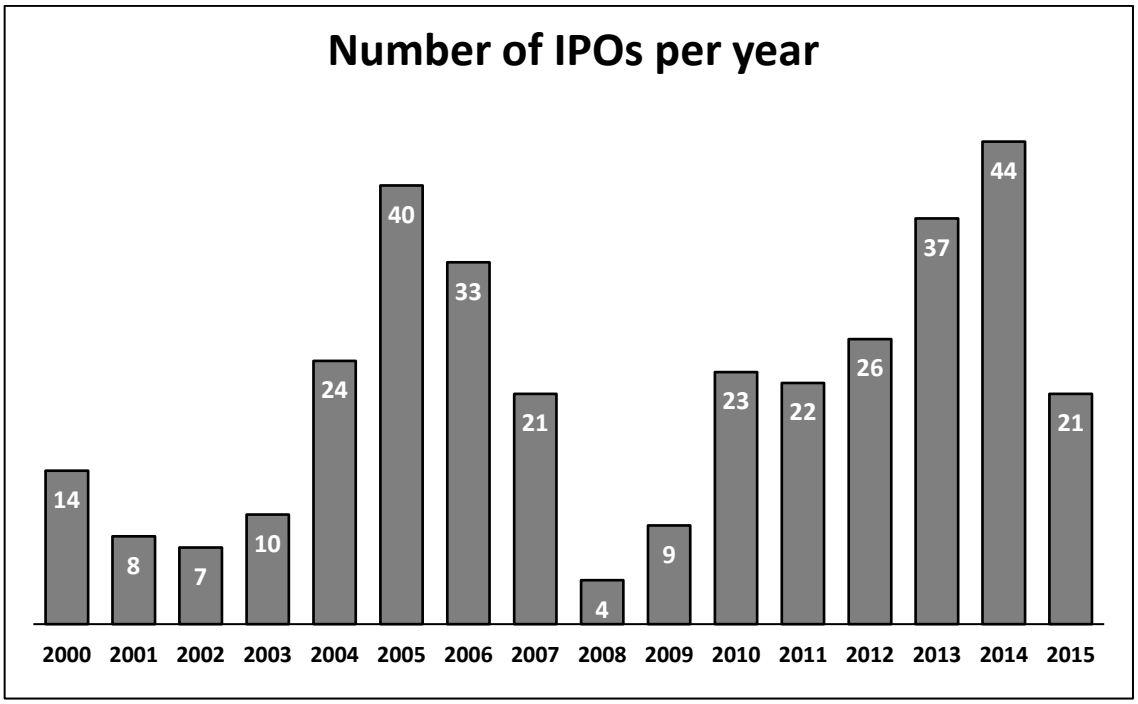

Figure 4 - Distribution of IPOs across years

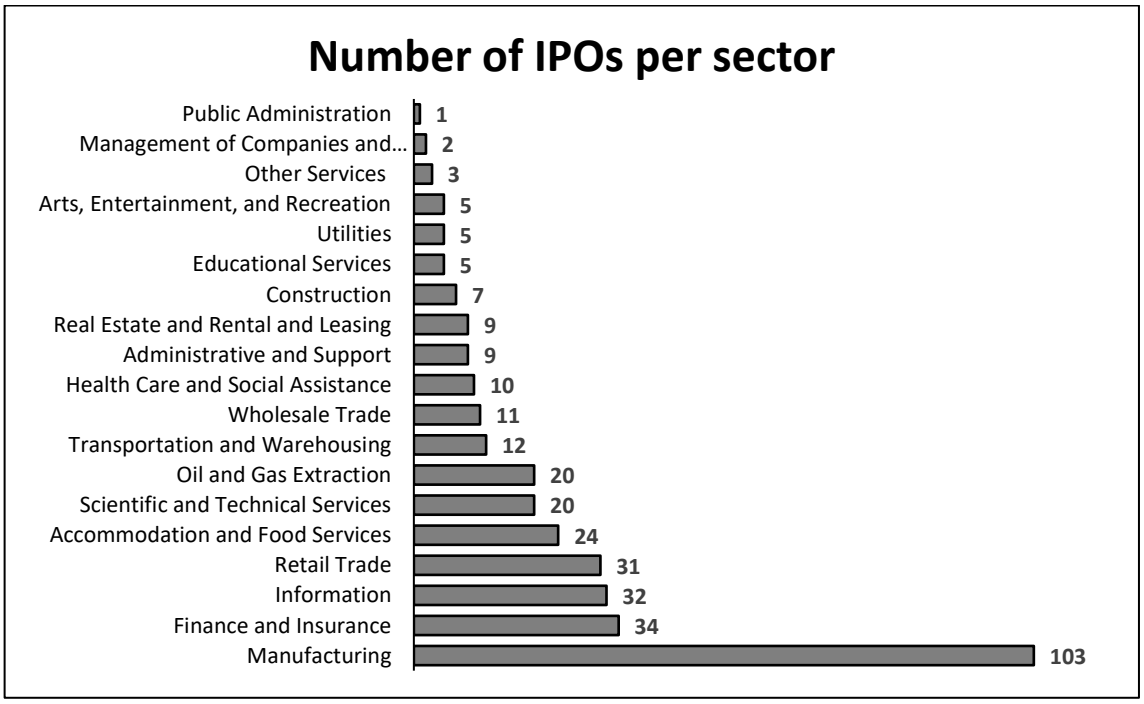

Figure 5 - Distribution of IPOs across sectors

5.2 Collection and processing

The process of collecting and processing the data was challenging. After using the SDC database to identify the PE-backed IPOs in the relevant period, we gathered monthly stock prices and indices from Datastream. We exclude the effects of underpricing by using the observation at the start of the month following the IPO as the first observation. The reason for this is that our interest is whether PE ownership affects the long-run performance through active ownership and other mechanisms. Periods of underpricing and abnormal returns directly after the IPO, when the PE ownership usually is at its highest, would distort the analysis.

Company characteristics and financial data were collected from several different sources, including Datastream, SDC platinum, Bloomberg, Compustat, and financial statements. The use of different data sources allowed for quality checking the data across the different databases, utilizing the sources with the most reliable data. By manually looking at a sample of financial statements, we concluded which source was most accurate for the various variables. It also enabled for filling gaps and complimenting the data, to obtain as few missing values as possible. We believe this to have significantly increased the data quality in our dataset. However, the different databases use different names and identifiers for the same companies, so we were required to use combinations of name, ticker, isin, cuisip, and listing date, as well as manual crosschecking to match the data from the different sources.

Historical ownership data is complicated to access, with limited providers. We use FactSet to gather ownership data, which has available historical monthly ownership data for listed companies. After identifying the correct companies and manually retrieving ownership data for each company in our sample, we possessed a collection of ownership stakes for each stockholder in each company, at the start of every month. We used this data both to calculate ownership concentration and to construct a variable for PE ownership. Because the stockholder names are based on different filings, it was a challenge to identify the PE firms amongst all of the other stockholders. From FactSet, we managed to retrieve a list of all PE deals in the relevant period, giving us an overview of which PE firms backed the different companies. Using this as a starting point, we were able to identify most of the PE firms in the ownership data. However, the names used for the PE firms varies for the different companies, making the matching process demanding. Also, directors of the PE firms, or a different holding firm, are occasionally listed as stockholders in the ownership data instead of the PE firm, making the identifying process even more challenging. We solved this by manually browsing through the “principal

stockholders" sections in the IPO prospectuses, where there often is a footnote clarifying the ultimate owner.

After constructing the dataset, it required more processing. The ownership data have cases where the ownership stake of a PE firm suddenly drops to zero for up to three consecutive months and then bounces back up to its original level. Because PE firms usually reduce their holdings gradually, and do not conduct heavy trading, the missing values should not be interpreted as zero ownership, but rather a consequence of missing data. We filled these gaps using two approaches. When possible, we filled the gaps with data from the ownership section of company reports. When not possible, we filled the gaps with the ownership stake reported immediately after the gaps. We also used IPO prospectuses to ensure that our first ownership observation was roughly the same as the post-IPO ownership stake listed in the "principal stockholders" section, to increase the data quality.

5.3 Variable definitions

Table 2 provides a brief definition of the variables included in our analysis, as well as the source and frequency of the observations. The table also explains how the variables are calculated.

To calculate stock market return, market return and GDP growth, we use a logarithmic approach. Logarithmic return is often referred to as continuously compounded return and has several advantages over simple return. It is often assumed to be normally distributed, which is a requirement for most econometric models. Logarithmic returns also enable additivity, as two-period log return is identical to the sum of each period's log return, and is mathematically more convenient. By using this method, we are following Sias et al. (2006).

Table 2 - Variable definitions and calculations

Variable	Definition	Frequency	Source
Dependent			
StockReturn	Monthly stock market return calculated as $\ln(RI_t) - \ln(RI_{t-1})$, where RI is the total return index. RI shows theoretical value growth, assuming re-invested dividends and adjustments for stock splits.	M	1
ROA	Return on assets calculated as net income divided by opening balance of total assets.	Q	3, 4, 5
TobinsQ	Calculated as the equity and liabilities market value, divided by the equity and liabilities book value, under the assumption that liabilities market value is equal to its book value.	Q	3, 4, 5
Independent[5]			
PE_Ownership	The percentage share of equity ownership held by PE firms backing the IPO at the start of every month. In the case of syndicates, the shares of the PE firms are added together.	M	2, 6
Concentration	The ownership concentration is measured by the Herfindahl-Hirschman Index, calculated as the sum of the squared equity positions above 1%.	M	2
Concentration_sq	Squared Herfindahl-Hirschman Index.	M	2
DebtRatio	Debt divided by opening balance total assets.	Q	3, 4, 5
AssetTurnover	Asset turnover, given by revenue divided by the opening balance of total assets.	Q	3, 4, 5
TotalAssets	Opening balance of total assets.	Q	3, 4, 5
Volatility	A measure of the risk of price moves, given as the annualized standard deviation of the relative price change of the closing price for the 30 last trading days.	M	3
MB	Market to book ratio, market capitalization divided by common shareholders' equity.	Q	3, 4, 5
Liquidity	Share turnover given by the average daily trading volume of the stock for the past month divided by outstanding shares.	M	1
MKT_Return	Monthly return for the S&P 500 index[6], calculated as $\ln(S\&P_t) - \ln(S\&P_{t-1})$. S&P 500 consists of the 500 largest corporations in the US, and is a commonly used index for stock market performance.	M	1
GDP	The monthly increase in US GDP, calculated by $\ln(GDP_t) - \ln(GDP_{t-1})$.	M	1
CashRatio	Cash divided by total liabilities.[7]	M	3, 4, 5
DividendPR	Dividend Payout Ratio, dividends divided by net income.	Q	3
Revenue	Total sales.	Q	3, 4, 5
ROS	Return on sales, net profit divided by revenue.	Q	3, 4, 5
ROE	Return on equity, net income divided by shareholders' equity.	Q	3, 4, 5
Period	Number of months after IPO for each company.	-	-
Month	Dummy variable for month.	-	-
Year	Dummy variable for year.	-	-

Where 1 = Datastream, 2 = FactSet, 3 = Bloomberg, 4 = Compustat, 5 = Financial statements, 6 = IPO prospectuses, M = Monthly, Q = Quarterly

[5] *PE_Ownership* and *Concentration* are dependent variables when performing simultaneous equations methods.
[6] We have tested also tried using Wilshire 5000 as an alternative index, but the differences are negligible.
[7] We would prefer to include readily convertible investments as well, but are unable to do so due to data limitations.

5.4 Descriptive statistics

Table 3 presents summary statistics for the variables in our analysis.

Table 3 - Descriptive statistics

Variables	Mean	Median	SD	Min	Max	Count
StockReturn	0.002	0.007	0.135	-0.409	0.301	12348
ROA	0.016	0.014	0.068	-0.252	0.211	4116
TobinsQ	1.986	1.640	1.177	0.763	6.619	4116
PE_Ownership	0.330	0.328	0.239	0.000	0.986	12348
Concentration	0.180	0.121	0.162	0.000	0.980	12348
DebtRatio	0.353	0.359	0.256	0.000	1.053	4116
AssetTurnover	0.250	0.208	0.192	0.011	0.850	4116
TotalAssets	2122	831.2	3142	94.72	15715	4116
Volatility	0.457	0.383	0.269	0.160	1.499	12348
MB	2.912	2.611	6.615	-24.54	24.32	4116
CashRatio	0.206	0.067	0.370	0.000	1.923	4116
Liquidity	0.009	0.006	0.009	0.001	0.045	12348
MKT_Return	0.004	0.009	0.039	-0.100	0.090	12348
GDP	0.005	0.005	0.005	-0.011	0.013	12348
DividendPR	0.251	0.000	0.634	0.000	0.650	4116
Revenue	346.9	147.6	488.9	14.69	2431	4116
ROS	0.036	0.047	0.185	-0.769	0.481	4116
ROE	0.024	0.027	0.133	-0.484	0.501	4116

This table provides summary statistics for all variables used in the analysis. *ROS* and *ROE* are not included in our main analysis but are used in robustness discussion in section 7.4.1. The variables are winsorized at the 1st to 99th percentile. Some accounting variables are observed quarterly. How this is handled and possible effects are discussed in section 7.5.2. Ratios, indices and return variables are displayed in decimal fractions, and monetary values are displayed in million USD.

The average PE ownership stake of all 36 months for all companies is 33%, with a maximum of 99% and a minimum of 0%. The mean of *Concentration*, calculated as the Herfindahl index, is 0.18. Average monthly logarithmic stock market return for the companies in our sample is 0.2% while the average for the market is 0.4%. However, using simple return, the sample return is 0.9%, and the market return is 0.5%. These differ partly because logarithmic return handles extreme values differently. Return on assets and Tobin's Q has averages of 0.016 and 1.986, respectively.

It is interesting to know more about the development of *PE_ownership* because it is our variable of interest. Figure 6 depicts how average PE ownership develops over the 36 months post IPO. On average, PE ownership starts at 50% right after the IPO and decreases gradually towards 19% after 36 months. This indicates that PE firms stay invested in the portfolio with relatively large positions for more than three years, supporting that IPO is not an immediate exit for the PE firm.

Another interesting observation is that there does not seem to be any major reductions in PE ownership on the expiration of the lock-up agreement, usually after six months. There is a minor increase in the number of shares sold around month six compared to the previous months, but this stays about the same thereafter. We have conducted a t-test comparing the mean reduction in ownership in the 6th month post IPO to the following months. The test results are presented in A.3 and display a high p-value. We fail to reject the null hypothesis of the means being equal, suggesting that the PE firms stay invested for other reasons than the lock-up agreement. The graph is falling slightly also before the six months mark because some IPOs has a shorter lock-up period, and sometimes the PE firm is permitted by the lead underwriter to sell shares before the lock-up period has expired.[8]

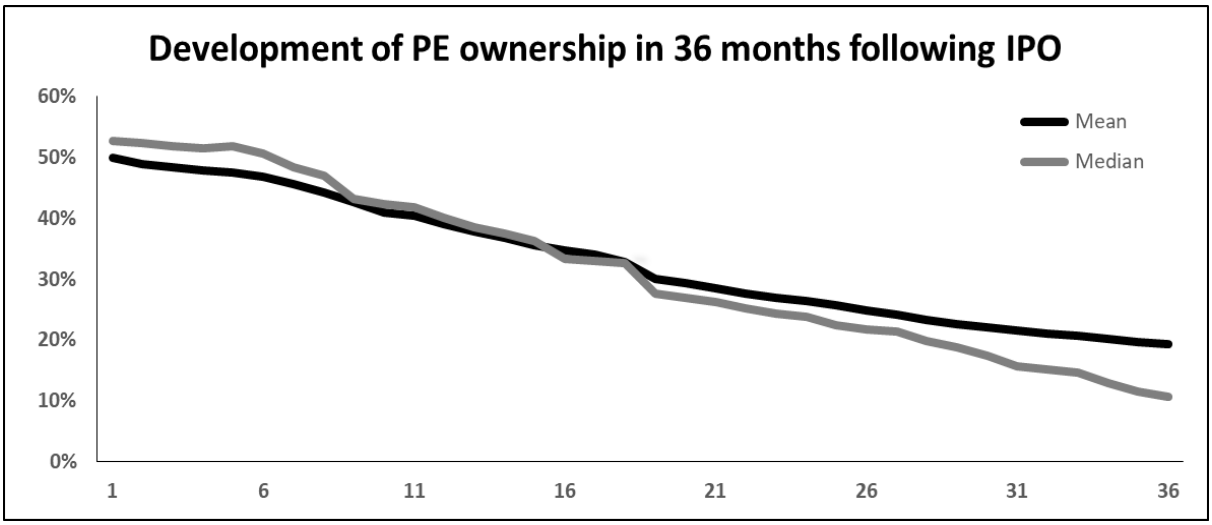

Figure 6 - PE firms' divestment development

[8] In some circumstances, the lead underwriter allows locked investors to sell some or all of their shares prior to the lockup expiration; this is referred to as an 'early sell' transaction (Hoque & Lasfer, 2013).

As defined in section 5.3, *PE_Ownership* is calculated by adding the positions of different PE firms in the cases where several PE firms back the same IPO[9]. How often this happens is an interesting finding in itself. In our sample, 52% of the IPOs are backed by more than one single PE firm. This implies that PE firms often form syndicates to carry out joint investments, sharing both risks and potential gains. Figure 7 illustrates that 48% of IPOs are backed by a single PE firm. There is a downward trend, ending with 5% of IPOs being backed by more than four PE firms.

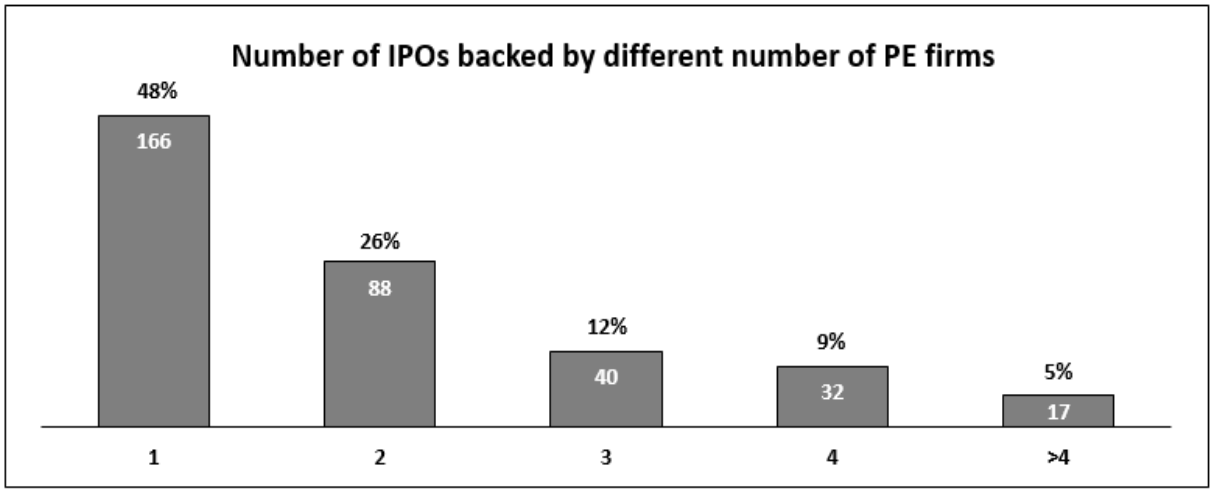

Figure 7 - IPOs backed by different number of PE firms

[9] Possible limitations of this are discussed in section 7.5.2.

6. Methodology

This chapter introduces the methodology used in the analysis. An important consideration for the choice of methodology is the possible endogeneity between PE ownership and company performance. We start by presenting this issue and the techniques used to handle it. After a detailed explanation of these techniques, we specify the equations used to answer the research question and discuss the reasons for including the different variables and our expectations for their effect.

6.1 Endogeneity and causation of ownership and performance

The relationship between ownership structure and performance causes discrepancies between earlier studies. The different methodologies used in existing research are based on the views summarized in Table 4.

Table 4 - Mechanisms and causation of ownership and performance

	One-way causation	**Two-way causation**
Exogenous mechanisms	Category 1	*Infeasible*
Endogenous mechanisms	Category 2	Category 3

Most prior research belong in the first category, where one-way causation runs from ownership to performance, and the mechanisms are assumed to be externally given. Studies by, i.e., McConnel and Servaes (1990) and Mørck et al. (1987) belong in this category. The second category also assumes one-way causation but consider ownership to be endogenous. Demsetz and Himmelberg belong in this category, and the initial argument was made by Demsetz (1983), who argued that ownership structure is an endogenous outcome of decisions that should be influenced by the profit-maximizing interests of shareholders. This implies that the optimal level of ownership likely varies with firm characteristics, which also affects performance. Himmelberg et al. (1999) also find that a large share of cross-sectional variation in ownership can be explained by unobserved time-invariant firm heterogeneity, i.e., company characteristics. The third category views ownership and performance as a system of simultaneous equations, where the causality runs both ways. This creates endogeneity in the

form of simultaneity bias. Researchers in this category includes Agrawal and Knoeber (1996), Cho (1998), Bøhren and Ødegaard (2005) and Demsetz and Villalonga (2001).

6.1.1 In the case of PE ownership

The abovementioned methodologies are based on ownership structure and performance but not specifically on PE ownership. Although no assumptions have been made about the relationship between PE ownership and performance, we believe endogeneity may also be present with PE ownership. Fürth and Rauch (2014) conclude that PE ownership to an extent is determined by both fund-specific factors and company-specific factors such as size and profitability. It is likely that these factors also could affect the performance of the portfolio companies.

PE firms also have incentives to change their holdings based on performance in order to deliver a fair return on LPs capital. They may also adapt to the expectation of future performance, and might continue to hold their stakes in expectations of future performance improvements in order to meet requirements.

6.2 Dealing with the endogeneity of PE ownership

The models we present in this thesis use methodology from both the first, second and third category. We acknowledge that there might be endogeneity issues caused by both unobservable company characteristics and possible reverse-causality/simultaneity.

The first source of endogeneity is that unobservable individual heterogeneity among the companies disturbs the relationship between PE ownership and performance. A way to solve this problem is to use a fixed effects model, as applied by Himmelberg (1999), in which within-groups transformation eliminates the time-invariant company-specific characteristics. Pinadado and De La Torre (2004) also argued that the use of panel data allows controlling for heterogeneity through the individual effects, in which the common determinants for ownership and performance will be included. Therefore, we utilize panel data and fixed effects models in our analysis.

The second source of endogeneity is the possibility that performance also determines PE ownership, creating a simultaneity bias. There are two typical ways of dealing with this. The first and simplest way is to utilize lagged values of the suspected endogenous variable, either as a proxy for the endogenous variable or as an instrument in instrumental variable estimation. Vergara (2010) argues that including lagged variables avoids possible simultaneity problems.

Clemens et al. (2012) also address potential bias by using lagged variables and argue that it is beneficial because they avoid using poor quality instrumental variables. Other studies that utilize this technique include Aschhoff and Schmidt (2008) and MacKay and Phillips (2005). We use lagged variables by replacing and instrumenting our endogenous variables PE ownership, ownership concentration and the different performance measurements with their lagged values.

The other way of dealing with the simultaneity problem is to use simultaneous equations models. This method is frequently used in research that is more cited, and Becht et al. (2003) refer to this method as vastly improved econometrics because it differs markedly from the single equation methods. Farooque et al. (2005) argue that this approach is the most appropriate methodology to control for the potential endogenous relationship between ownership and performance. Examples of other researchers who have used this method are Demsetz and Villalonga (2001) and Bøhren and Ødegaard (2005). A simultaneous equations model assuming PE ownership, concentration and the different performance measurements as endogenous interdependent variables allows for separation of their effects and can reduce the endogeneity issue. In our analysis, we estimate simultaneous equations models using two-stage least squares (2SLS) on systems of three structural equations. We combine this with controlling for fixed effects.

Table 5 depicts the five models that we estimate in our analysis, based on combinations of methods to deal with endogeneity. Each of these methods will be explained in detail in the next sections before we specify the regression equations in section 6.3. In section 7.2, the equations will be estimated using the five models.

Table 5 - Five models combining methods for dealing with endogeneity

Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Pooled OLS	Fixed effects	Fixed effects with lags as proxies	FEIV with lags as instruments	Simultaneous equations with fixed effects
Category 1	Category 2	Category 3	Category 3	Category 3

6.2.1 Panel data and fixed effects

Because our dataset is a balanced panel, we can use panel data methods in our analysis. In panel data, we measure the same companies (N=343) over multiple periods (T=36). This has several advantages, including increased sample size, reduction of multicollinearity problems, and to control for unobserved effects. Panel data methods allow us to control for unobservables, which can be correlated with the regressors and are time-invariant and individual-specific (Wooldridge J. M., 2016). Based on econometric tests, presented in Appendix A.2, and the arguments in the previous section regarding endogeneity, we use the fixed effects method in our analysis.

The general form of panel data can be explained by the following simple example, inspired by Wooldridge (2016):

$$y_{it} = \beta_1 x_{it} + a_i + u_{it}, t = 1,2 \dots T$$

In this equation, $y_{it}$is the dependent variable, x_{it} is the explanatory variable, u_{it} is the idiosyncratic error term, and a_i is the unobserved individual-specific effect. If the unobserved individual-specific effects are correlated with the explanatory variables, OLS estimations will be biased and inconsistent.

Fixed effects transformation solves this problem and allows for a correlation between a_i and x_{it}. The fixed effects method assumes that the individual-specific effects are constant over time, and the average of the above equation yields:

$$\overline{y}_i = \beta_1 \overline{x}_i + a_i + \overline{u}_i$$

If we subtract this equation from the first one, we get:

$$\ddot{y}_{it} = \beta_1 \ddot{x}_{it} + \ddot{u}_{it}, t = 1,2 \dots T$$

Where $\ddot{y}_{it} = y_{it} - \overline{y}_i$ is the time-demeaned data on y_{it}. Because we assume a_i is constant over time, it is removed from the regression equation, and can no longer create problems in the estimation. Thus, we can estimate the within group transformed equation by OLS. As argued in the previous section, the fixed effects transformation will remove the problem of endogeneity in line with the views of category 2. We use this method in our analysis, and include time dummies, making it a two-way effect model.

We should also mention some possible drawbacks with the fixed effects method. One drawback is that variables that are constant for all periods will not be estimated. For example, it would be interesting for us to include some investor-specific variables, but since these do not vary over the period, we are unable to estimate them. Besides, if there is not sufficient variation, the quality of the estimates might decrease.

6.2.2 Lagged variables

A common practice for dealing with endogeneity is to use lagged explanatory variables instead of the endogenous variables, as either a proxy or an instrument. The idea is that the simultaneous relationship depicted in Figure 8 will create biased estimates. To overcome this, X_{t-1} can be used as in place of X_t. Assuming no unobservables, we have that if Y_t causes X_t, then Y_{t-1} also causes X_{t-1}. The argument is that X_{t-1}will have an effect on Y_t through its effect on X_t, but Y_t will not affect X_{t-1}. This implies that $Cov(x_t, u_t) \neq 0$ but $Cov(x_{t-1}, u_t) = 0$. It makes sense that performance today does not affect PE ownership in earlier periods, especially if PE ownership is lagged by several periods. However, in order for this method to solve the whole problem, the identification assumption is that there is no relationship between Y_t and Y_{t-1}.

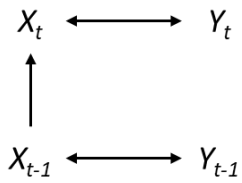

Figure 8 - Simultaneous relationship assuming no unobservables

Despite being widely used, these methods have received criticism as well. This is especially true for the method using lagged variable as a proxy. Reed (2015), for instance, argues that using lagged variable as a proxy does not avoid the inconsistency problems associated with simultaneity. He also states that using lagged values of endogenous variable as an instrument can provide an effective estimation strategy, but it requires that (i) the lagged values do not themselves belong in the corresponding estimating equation, and (ii) they are sufficiently correlated with the simultaneously determined explanatory variable.

6.2.3 Simultaneous equations models

Simultaneous equations models (SEM) are often used to deal with endogeneity caused by simultaneity. The usual way to estimate these models is through using an instrumental variable approach, usually with two-stage least squares (2SLS) estimation. This method estimates a system of structural equations, where the endogenous explanatory variables typically, but not always, are the dependent variables from other equations in the system:

$$X = Y + Z + exogenous\ variables + u$$
$$Y = X + Z + exogenous\ variables + u$$
$$Z = Y + X + exogenous\ variables + u$$

A structural equation is identified as one of the equations in the system. All left-hand-side variables are explicitly taken to be endogenous to the system and are treated as correlated with the disturbances in the system's equations. The other variables are treated as exogenous to the system. These exogenous variables are used as instruments for the endogenous variables.

The 2SLS estimation can be thought of as producing estimates from a 2-step process. The first step involves developing instrumented values for all endogenous variables by regressing the endogenous variables on the exogenous variables in the system. In the second step, the instrumented values are then used in place of the actual endogenous variables in an OLS regression. This is done for each of the structural equations.

Even though this method, in theory, may be the best way to deal with the simultaneity problem, there are several drawbacks to this method as well. It is difficult to find suitable instruments, which will be discussed in detail in section 7.4.3 specifically to our situation. Moreover, most relationships are sensitive to the choice of instruments and simultaneous estimation models are not necessarily better than the single equation models (Bøhren & Ødegaard, 2005).

6.3 Model specification

In the following, we present each of the three regression equations used to answer the hypotheses. These equations are determined parsimoniously, based on both theory and existing research. As depicted in Table 5, we use five different models in our analysis. Each of the three regression equations introduced in this section will be estimated using all five models. We first specify the equations that will be solved with single equations models, before we specify a system that will be estimated using simultaneous equation models (SEM). Definitions of all included variables are found in section 5.3, and the rationale behind their inclusion is in section 6.4.

6.3.1 Single equations models

Using single equations models, we specify one regression equation for stock market return, one for return on assets and one for Tobin's Q. Each of these equations will be estimated with pooled OLS and the panel data method fixed effects (model 1 and 2). Also, the same equations will be estimated using lagged suspected endogenous variables, both as proxies in the fixed effects model (model 3), and as instruments in an instrumental variable estimation (model 4).

We estimate equations that include the variable of interest, *PE_Ownership*, and the other ownership structure variable, *Concentration*. Besides, several time-variant company-specific control variables are included, as well as some time variables.

6.3.1.1 Stock market return

The first hypothesis and the primary objective of this study is to determine whether PE ownership matters for company stock market performance. To investigate this, we define the following regression equation:

$$\begin{aligned} \boldsymbol{StockReturn_{it}} = {} & \beta_0 + \beta_1 PE\_Ownership_{it} + \beta_2 Concentration_{it} + \beta_3 Concentration\_sq_{it} \\ & + \beta_4 DebtRatio_{it} + \beta_5 AssetTurnover_{it} + \beta_6 LN\_TotalAssets_{it} + \beta_7 Volatility_{it} \\ & + \beta_8 MB_{it} + \beta_9 Liquidity_{it} + \beta_{10} MKT\_Return_t + \beta_{11} Period_{it} + D_1 Year_t \\ & + D_2 Month_t + u_{it} \end{aligned} \quad \textbf{(1)}$$

When specifying this equation, we rely on financial theory and previous research. We use a firm-characteristics approach, which allows for a larger number of risk factors/firm characteristics that impact stock returns than a standard portfolio approach. This approach, and the included control variables, are inspired by, e.g., Eugster and Isakov (2018), Lilienfied-Toal and Ruenzi (2013) and Brennan et al. (1998), who report several individual firm characteristics that can drive returns and whose influence is not captured by the factor models building on work by, i.a., Fama and French (1993). Although we do not calculate abnormal return, some of the right-hand side variables proxy the usual Fama-French factors, like the size and value of the company. By using panel data and normal return as dependent variable, we are following researchers like El-Masry (2017) and Eugster and Isakov (2018).

6.3.1.2 Return on assets

The second hypothesis is that PE ownership positively affects return on assets, indicating an effect on accounting performance. We specify the following equation:

$$\begin{aligned} \boldsymbol{ROA_{it}} = {} & \beta_0 + \beta_1 PE\_Ownership_{it} + \beta_2 Concentration_{it} + \beta_3 Concentration\_sq_{it} + \beta_4 DebtRatio_{it} \\ & + \beta_5 AssetTurnover_{it} + \beta_6 LN\_TotalAssets_{it} + \beta_7 GDP_t + \beta_8 CashRatio_{it} \\ & + \beta_9 Period_{it} + D_1 Year_t + D_2 Month_t + u_{it} \end{aligned} \quad \textbf{(2)}$$

6.3.1.3 Tobin's Q

To test the third hypothesis, we estimate an equation with Tobin's Q as the dependent variable. The equation is specified as:

$$\begin{aligned} \boldsymbol{TobinsQ_{it}} = \beta_0 &+ \beta_1 PE\_Ownership_{it} + \beta_2 Concentration_{it} + \beta_3 Concentration\_sq_{it} \\ &+ \beta_4 DebtRatio_{it} + \beta_5 AssetTurnover_{it} + \beta_6 LN\_TotalAssets_{it} + \beta_7 Volatility_{it} \\ &+ \beta_8 MB_{it} + \beta_9 Liquidity_{it} + \beta_{10} Period + D_1 Year_t + D_2 Month_t + u_{it} \end{aligned} \quad \textbf{(3)}$$

6.3.1.4 Lagged variables as proxies and instruments

Because we suspect that some of the variables in the equations specified above might be endogenous, we estimate them again using the lagged values of these variables. In model 3, we simply replace the variables with their lagged values as proxies in the fixed effects model. Then, using model 4, we estimate the equations using instrumental variable estimation and 2SLS. The equations are specified exactly as in (1), (2) and (3), except that the possible endogenous variables, *PE_Ownership*, *Concentration*, and *Concentration_sq* are instrumented using lagged values of the variables. We use three months lagged values as proxies and instruments, trying to balance a trade-off between relevance and exogeneity.[10]

6.3.2 Simultaneous equations models

Because there might be simultaneity between PE ownership, concentration, and the different performance measurements, we specify systems of three structural equations to be able to separate the effects (model 5). We do this by using 2SLS estimation with fixed effects, where the assumed exogenous variables are used as instruments for the endogenous ones. The dependent variable in each equation also represents the endogenous variables. Following Bøhren and Ødegaard (2005) we choose only to endogenize three variables, as we cannot hope to validly restrict a system of equations including all possible endogenous variables from the equations specified in the previous section.

The systems consist of the following three structural equations:

[10] Three months are chosen based on relevance and endogeneity tests for the instruments, using varying number of lagged periods.

I. *Equation* **(1)**, **(2)** *or* **(3)**

II. $$\boldsymbol{PE\_Ownership_{it}} = \beta_0 + \beta_1 Performance_{it} + \beta_2 Concentration_{it} + \beta_3 LN\_TotalAssets_t + \beta_4 Liquidity_{it} + \beta_5 DebtRatio_{it} + \beta_6 Volatility_{it} + \beta_7 Revenue_{it} + \beta_8 DividendPR_{it} + \beta_9 Period_{it} + D_1 Year_t + D_2 Month_t + u_{it} \quad \textbf{(4)}$$

III. $$\boldsymbol{Concentration_{it}} = \beta_0 + \beta_1 Performance_{it} + \beta_2 PE\_Ownership_{it} + \beta_3 LN\_TotalAssets_t + \beta_4 Liquidity_{it} + \beta_5 DebtRatio_{it} + \beta_6 Volatility_{it} + \beta_7 Revenue_{it} + \beta_8 DividendPR_{it} + \beta_9 Period_{it} + D_1 Year_t + D_2 Month_t + u_{it} \quad \textbf{(5)}$$

Where the first equation is either equation (1), (2) or (3), specified in the previous section, except that C*oncentration_sq* is excluded to limit the number of endogenous variables. The variable *Performance* in the second and third equation of the system is either *StockReturn*, *ROA* or *TobinsQ*, from the first equation. The dependent variables of each structural equation are also included as explanatory variables in the other equations. We believe that *Performance*, *PE_ownership*, and *Concentration* might all affect each other, and be determined simultaneously. This is the reason why simultaneous equations models (SEM) are required. All of the structural equations are identified, passing the order and rank conditions, which is discussed in more detail in section 7.4.3.

6.4 Rationale for variable inclusion and expectations

In this section, we attempt to justify the included control variables in the performance equations (1-3) and the ownership equations (4-5). We also explain our expectation for the sign of the coefficients. The majority of the control variables are included regardless of the chosen performance measure. However, certain variables are included for a specific measure. Some of the variables that affect stock market return specifically are also included in the Tobin's Q equation since the numerator in Tobin's Q is directly affected by the stock return.

In addition to our interest variable, *PE_Ownership*, we include a set of control variables that might be correlated with both *PE_Ownership* and *Performance*, aiming to prevent omitted variable bias. Thus, we provide models including several of the most critical determinants of performance. This methodology is following the motivation by Heracleous (2001) who urges scholars to develop methodologies that account for multiple and multi-directional influences on

performance, rather than using models that attempt to utilize only one element, like *PE_Ownership*.

6.4.1 Performance equations

Our variable of interest, *PE_Ownership*, is included in order to examine the effect it has on performance. We believe there are two main reasons to expect *PE_Ownership* to affect performance positively. First, the more ownership PE firms have retained in the portfolio companies, the stronger are their incentives to influence the performance positively. Second, financial theories and mechanisms suggest that PE firms are able to affect performance positively, as discussed in section 4.1.

Concentration is included for two reasons. The first is that several governance theories argue that ownership concentration can influence the company and its performance. The second reason, and in our case more important, is to be able to separate the effect of ownership *Concentration* and *PE_Ownership*. The concentration of ownership may have some effect regardless of whether it is caused by a large PE firm or other large shareholders, but we want to see if PE ownership has an effect beyond this. If *Concentration* were excluded from the regression, it would end up in the error term, and part of its effect would be picked up by PE ownership. We have also included the squared version of this variable, as previous studies have suggested that a quadratic relationship might exist. Thomsen and Pedersen (2000) and Demsetz and Villalong (2001) are among studies to investigate the relationship between concentration and performance. As their results are conflicting, we have no clear expectations for the coefficient of *Concentration*.

DebtRatio indicates how much of the assets that are financed by debt. By using it to explain variation in company performance, we follow i.a. Lee (1992) and Chen (2006). Based on their findings and that it might mitigate the *free cash flow problem* described by Jensen (1986), we expect it to have a positive coefficient. In certain countries, like the US, leverage could also potentially increase company value due to tax deductibility of interest. On the other hand, it can increase the probability of costly financial distress.

AssetTurnover controls for firm efficiency and productivity, and improvement of this is expected to affect performance positively. Other researchers who have included *AssetTurnover* when explaining the performance of PE-backed IPOs include Levis (2011) and Meles et al. (2014).

We want to control for company size due to the possibility of it affecting return, and we want to allow for a non-linear relationship. We use *LN_TotalAssets* as a proxy for size, following, among others, Belghitar et al. (2011) and Dushnitsky and Lenox (2006). To ensure robustness, we have also tried other proxies for size, which gave concurring results[11]. Previous research has suggested small companies to outperform large companies for both stock market return (F.Fama & R.French, 1993) and accounting performance (Dushnitsky & Lenox, 2006), which is why we expect a negative coefficient.

Volatility is our risk measure, and it is given as the standard deviation of the stock. We use this risk measure because we want to control for total risk. While beta is a common risk measure for portfolios, many consider standard deviation of a security's return a good predictor for its risk premium, and regards standard deviation as the best measure of risk for individual securities.[12] Financial theory and asset pricing models suggest that investors should be compensated for increased volatility. However, it is a common finding that there is a negative relationship between volatility and stock market return when looking at single stocks. One theory for this is that if expected risk premiums are positively related to expected volatility, then an unexpected positive change in volatility increases future expected risk premiums and lowers current stock prices (French, Schwert, & Stambaugh, 1987). Therefore, we expect a negative relationship.

MB is commonly used to predict stock market performance, as research has demonstrated that value stocks (low MB) tend to outperform growth stocks (high MB) in the long run (F.Fama & R.French, 1993). Thus, we expect the coefficient for *MB* to be negative.

Liquidity is included as a proxy for the liquidity of the stock, and it indicates to what degree the stock can be bought or sold in the market without affecting the price. A high level of trading activity characterizes a liquid stock, whereas low activity may lead to changes in the price when the stock is traded. By including it as a variable to determine stock return, we are following Gompers and Metrick (1997) and Bøhren and Ødegaard (2005). Although we expect a significant coefficient, the direction is not clear.

MKT_Return is included as logarithmic returns. Most stocks covariate with the market, making it a useful explanatory variable for stock market return. Because few stocks are defensive (counter-cyclical), we expect *MKT_Return* to affect stock market return positively.

[11] Alternative proxies for size: logarithm of revenue, market capitalization and the sum of market value of equity and book value of debt.

[12] See for example Hirschleifer (1958) or Gordon (1962).

Like Meles et al. (2014), we include *GDP* to take into account the effect a general change of the American economy has on accounting performance. As *GDP* increases, the economy improves, which we believe to have a positive impact on the accounting performance of the companies in our sample.

CashRatio is included in order to have a proxy for a firm's capacity to meet its short-term financial obligations. In general, the higher the level of liquidity the better. Therefore, we expect a positive effect on return on assets.

Period is included to account for a potential difference in performance across the years following the IPO. IPO underperformance is a well-known phenomenon. Hoechle and Schmid (2008) find that the underperformance is more pronounced the first year post IPO. Therefore, we have included Period as a dummy variable to account for this effect, and expect period to affect performance positively, at least for stock market performance.

Year dummies are included to account for potential unobserved year-specific factors that influence performance. During our sample period, the economy has experienced vast fluctuations, especially due to the Dot-com bubble and the 2008 financial crisis. As shown in Figure 4, IPO activity is very low in recessions, implying that our data is modestly affected by this. Nonetheless, it might be that the sample of firms going public in the recessions is skewed; only managers knowing their firm is superior would list the firm knowing the access to capital is limited. Because company performance may be affected by the economy in general and the economic downturns in particular, it makes sense to include *Year* as a dummy variable.

Month dummies are included with the same rationale, to control for possible month-specific factors affecting performance, caused by, e.g., the January effect. Although we include *Year* and *Month*, we need to acknowledge that these dummies are unlikely to account for all unobserved time-specific factors that influence performance. In addition to economic recessions, our sample period covers the introduction of the Sarbanes-Oxley Act, and variation in PE funding might be substantial, for instance, due to varying opportunity cost of investing. This might indicate that time-specific factors to some extent affect our analysis, but we believe that time dummies account for this in a adequate manner.

6.4.2 Ownership equations

Since the ownership equations are not our primary interest, and we only specify them to be able to run simultaneous equations models, we will only briefly discuss these equations. Given that previous chapters have discussed a potential reverse causality between performance and PE ownership, we include the performance measurements *StockReturn*, *ROA* and *TobinsQ* in the equation with *PE_Ownership* as the dependent variable. We expect there to be a negative relationship between the different performance measures and *PE_Ownership*, as the PE firm will sell their shares in periods with high performance, in order to achieve a return on their investments. This effect is probably strongest with stock market return, but it is generally familiar that stock market return is higher when accounting performance is strong. In addition to these variables of interest, different control variables are included, based on studies from Fürth & Rauch (2014), Chao (2011), and Visnjic (2013). Because PE firms exit gradually post IPO, *Period* is an essential explanatory variable and should have a negative relationship with *PE_Ownership*.

The *Concentration* equation is almost identical to the one of *PE_Ownership*, as many of the same variables are relevant. Because there might exist reverse causation also from *Performance* to *Concentration*, the different performance measurements are included as explanatory variables. Although we expect a significant relationship, the direction is unclear. Large owners may want to increase their holdings further when the return is high and the company is doing well, but they also have incentives to cash out on their investments for a high return. This is in line with the findings of previous studies, who find varying results (Bøhren & Ødegaard, 2005). We also include several control variables to explain variation in *Concentration*, inspired by, among others, Pedersen and Thomsen (2000), Demsetz and Villalonga (2001), Richter and Weiss (2013) and Shyu (2013).

7. Analysis

In this chapter, we present the findings of our analysis. First, we discuss which of the five regression models are expected to be the most reliable, before we present and discuss the regression results. We then summarize and explain the findings and deliberate on the robustness and limitations of the analysis.

7.1 Model preferences

Before showing and interpreting the results from our analysis, we find it useful first to discuss how we will weigh the different models in the interpretation of the results. As specified in section 6.2, we use the five models in Table 6 for each of the three specified equations of interest.

Table 6 – Five models used in analysis

Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Pooled OLS	Fixed effects	Fixed effects with lags as proxies	FEIV with lags as instruments	Simultaneous equations with fixed effects

The first model ignores both the possible two-way causation and endogeneity of PE ownership. Model 1 is included mostly for comparison and will not be emphasized in conclusions. The second model takes care of the unobserved company-specific heterogeneity, making it more reliable than the first. Many researchers studying ownership structure and performance use this approach and assumes that it provides the correct picture of reality because much of the cross-company variation in ownership can be explained by unobserved company-specific characteristics (Himmelberg, Palia, & Hubbard, 1999). However, there are some reasons to believe that there might be two-way causation between PE ownership and performance. If that is the case, model 3-5 will provide better estimates for the true relationships, because they try to deal with the possible simultaneity/reverse causation in addition to utilizing fixed effects transformations. Model 3 and 4 use lagged endogenous variables as proxies and instruments, respectively. These methods are widely used, but they also receive criticism for not necessarily solving the endogeneity problem. Nonetheless, they are likely improvements from model 2. Finally, model 5 is estimated using simultaneous equations models, and is in theory probably best model to solve the simultaneity bias, if it exists.

It is, however, difficult to know if we have found the best possible instruments and specified the system correctly, as the estimates are sensitive to the choice of instruments.

Because there is no agreement among scholars as to what kind of endogeneity mechanisms are present in the case of PE ownership and performance, as well as the fact that there are no perfectly correct econometric models to solve the accompanying problems, our interpretations and conclusions will primarily be based on the full range of models. That is, we will emphasize whether or not the different models show similar results regarding the direction and magnitude of the coefficients, and not base our conclusions on a single model. We believe this will provide us with a solid basis for interpreting the relationships.

7.2 Results

In this section, we present and discuss the results concerning our three hypotheses introduced in section 4.2. The main focus in these discussions is on the variable of interest, *PE_ownership*, rather than on the remaining control variables.

7.2.1 Stock market return

The primary objective and hypothesis in this thesis were to determine whether post-IPO PE ownership affects the stock market return for the PE-backed companies. Using the five models previously discussed provides the regression results presented in Table 7.

Table 7 - Regression results for StockReturn

StockReturn	Model 1	Model 2	Model 3	Model 4	Model 5
	Pooled OLS	Fixed effects	FE with lags	FEIV	SEM
PE_Ownership	-0.011	0.063***		0.093***	0.067***
L3.PE_Ownership			0.047***		
Concentration	0.052**	0.064		0.005	-0.051
L3.Concentration			0.078		
Concentration_sq	-0.055**	-0.094		-0.050	
L3.Concentration_sq			-0.109*		
DebtRatio	-0.012**	0.006	0.006	0.004	0.013***
AssetTurnover	0.018***	0.081***	0.080***	0.079***	0.094**
LN_TotalAssets	0.156	-1.693**	-1.865***	-1.771**	-0.940*
Volatility	-0.069***	-0.039***	-0.039***	-0.040***	0.105***
MB	0.000	0.000	-0.000	0.000	-0.001
Liquidity	-0.482**	-2.321***	-2.524***	-2.290***	-2.818***
MKT_Return	1.299***	1.249***	1.254***	1.251***	1.361***
Period	-0.000**	-0.002***	-0.001**	0.001***	-0.008***
Years	Yes	Yes	Yes	Yes	Yes
Months	Yes	Yes	Yes	Yes	Yes
_cons	-0.048*	-0.723***	-0.728***	-0.502***	0.144***
N	12348	12348	11319	11319	12348
R^2	0.212	0.230	0.233		
adj. R^2	0.209	0.227	0.230		

This table displays regression results for equation (1) with *StockReturn* as the dependent variable. *PE_Ownership* is the variable of interest, and the rest are included as control variables. Significance levels of 1%, 5%, and 10% are denoted as ***, **, and *, respectively. Models are estimated with robust standard errors and clustered on company level. The regressions use monthly observations. The variables are winsorized at the 1st to 99th percentile. Because there are both advantages and disadvantages to this method, we provide regression outputs with non-winsorized data in the robustness section 7.4.2. R^2 is not reported for model 4 and 5 as it is not helpful.[13]

[13] R^2 from IV estimation is not useful for comparison and does not have natural interpretation. (Wooldridge J. M., 2016). It is also excluded from all following models.

Starting with the most important variable, we see that *PE_Ownership* is statistically significantly positive in model 2-5. Even if none of the models are perfect, the fact that they all show similar results provides strong indications that the true relationship is in fact positive. The estimated coefficients lie between 0.047 and 0.0932. This implies that if the PE firm increases its equity ownership share by one percentage point, the stock market return will increase by ~0.048-0.098 percentage points, ceteris paribus. This will be the opposite way in practice, because the PE firm rarely increases holdings post IPO, but instead decreases ownership share over time. This decrease will according to the results reduce stock market return for the PE-backed company. These results confirm our first hypothesis, providing evidence for the fact that post-IPO PE ownership positively affects the portfolio companies long-run stock market performance.

Concentration is positively significant in model 1 but insignificant in all the other models. The coefficient for *Concentration_sq* is negative in all models, implying a possible inflection point after a certain level. Nonetheless, due to the lack of significant results, we cannot conclude that concentration affects stock market return.

MKT_Return significantly affects stock market return, which is highly expected. The coefficients are positive and above 1. This implies that on average, one percentage point increase in the stock market index leads to, all else equal, ~1.3 percentage points increase in stock market return for the company.

LN_TotalAssets is included as a proxy for size and is expected to be negative. In the present case, the coefficients are significant and negative in most models, implying that an increase in the size of the company will lead to a reduction in its stock market return, ceteris paribus.

AssetTurnover is positive and significant in all models. This is also in line with expectations, as productivity can be a driver for stock market performance. *MB* is, however, not significant in any of the models and does not seem to affect stock market return. *DebtRatio* is also inconclusive, while *Liquidity* is negative and significant in most models, implying that higher daily trading volume decreases return. *Volatility* also has a negative effect on stock market return in most models, which is a common finding, as previously discussed.

7.2.2 Return on assets

Table 8 shows the regression results for the return on assets equation, to determine whether PE ownership also affects accounting performance.

Table 8 - Regression results for ROA

ROA	Model 1	Model 2	Model 3	Model 4	Model 5
	Pooled OLS	Fixed effects	FE with lags	FEIV	SEM
PE_Ownership	-0.052***	-0.049		-0.040	-0.030
L3.PE_Ownership			-0.033		
Concentration	0.027	0.052		0.028	0.047
L3.Concentration			0.034		
Concentration_sq	0.001	-0.031		-0.016	-0.0346
L3.Concentration_sq			-0.029		
DebtRatio	-0.036***	-0.049***	-0.054***	-0.052***	-0.006
AssetTurnover	0.083***	0.111***	0.111***	0.110***	0.076***
LN_TotalAssets	0.004*	0.016*	0.020**	0.019**	0.006***
GDP	0.279	0.213	0.205	0.215	0.337
CashRatio	-0.004	-0.006	-0.003	-0.004	-0.001
Period	-0.001***	-0.001**	-0.001**	-0.001***	-0.002***
Years	Yes	Yes	Yes	Yes	Yes
Months	Yes	Yes	Yes	Yes	Yes
_cons	0.003	-0.026	-0.026	-0.058	0.018
N	4116	4116	3087	3087	4116
R^2	0.129	0.063	0.063		
adj. R^2	0.123	0.056	0.056		

This table displays regression results for equation (2) with *ROA* as the dependent variable. *PE_Ownership* is the variable of interest, and the rest are included as control variables. Significance levels of 1%, 5%, and 10% are denoted as ***, **, and *, respectively. Models are estimated with robust standard errors and clustered on company level. The regressions use quarterly observations. How this is handled and possible effects are discussed in section 7.5.2. The variables are winsorized at the 1st to 99th percentile. Because there are both advantages and disadvantages to this method, we provide regression outputs with non-winsorized data in the robustness section 7.4.2. Regressions using alternative accounting measures instead of ROA are presented in section 7.4.1.

PE_Ownership is to our surprise not significant in any of the models we emphasize, which disproves our second hypothesis. In fact, the coefficient is negative in all models, although none of these are significant, and should not be emphasized. Based on these results, we are unable to conclude that PE ownership has a significant effect on return on assets.

Concentration has positive coefficients in most models with a possible inflection point but does not seem to have a significant effect on ROA, which is no surprise given the conflicting results from previous studies.

GDP was expected to positively affect ROA, as GDP growth is an indicator of how well the overall economy is doing. The lack of significance may be a result of the inclusion of dummies for years and months, which may remove some of these effects. *AssetTurnover* is

positive and significant, in line with expectations, while *DebtRatio* is significantly negative. Size seems to have a positive effect on return on assets, as *LN_TotalAssets* is significant in most models. *CashRatio* is not significant in any model, and we cannot conclude on its effect.

7.2.3 Tobin's Q

To test the third hypothesis, we estimate the five models with Tobin's Q as the dependent variable. This provides the output in Table 9.

Table 9 - Regression results for Tobin's Q

TobinsQ	Model 1	Model 2	Model 3	Model 4	Model 5
	Pooled OLS	Fixed effects	FE with lags	FEIV	SEM
PE_Ownership	-0.296	0.289		0.457*	0.238***
L3.PE_Ownership			0.342*		
Concentration	0.612	-1.087*		-1.529**	-2.482
L3.Concentration			-0.927		
Concentration_sq	-1.445	0.792		1.141**	1.825*
L3.Concentration_sq			0.581		
DebtRatio	-0.811***	0.693***	0.625***	0.628***	1.078***
AssetTurnover	1.787***	2.354***	2.222***	2.209***	2.956**
LN_TotalAssets	-0.485***	-0.847***	-0.893***	-0.893***	-0.812***
Volatility	0.265**	0.201***	0.207***	0.211***	0.249***
MB	0.021*	0.010***	0.011***	0.011***	-0.223**
Liquidity	22.521***	-5.107***	-8.333***	-8.913***	-7.609***
Period	-0.016***	-0.014***	-0.012***	-0.010***	-0.072***
Years	Yes	Yes	Yes	Yes	Yes
Months	Yes	Yes	Yes	Yes	Yes
_cons	0.295	-4.492***	-4.538***	-4.182***	4.439**
N	4116	4116	3087	3087	4116
R^2	0.274	0.503	0.499		
adj. R^2	0.272	0.502	0.497		

This table displays regression results for equation (3) with *TobinsQ* as the dependent variable. *PE_Ownership* is the variable of interest, and the rest are included as control variables. Significance levels of 1%, 5%, and 10% are denoted as ***, **, and *, respectively. Models are estimated with robust standard errors and clustered on company level. The regressions use quarterly observations. How this is handled and possible effects are discussed in section 7.5.2. The variables are winsorized at the 1st to 99th percentile. Because there are both advantages and disadvantages to this method, we provide regression outputs with non-winsorized data in the robustness section 7.4.2

PE_Ownership has positive coefficients in model 2-5 but is only significant at the 5% level in model 5, and the 10% level in model 3 and 4. This gives indications that the true relationship between PE ownership and Tobin's Q is positive. However, we cannot comfortably affirm our third hypothesis stating that PE ownership positively affects Tobin's Q.

Concentration seems to have a negative effect on Tobin's Q, reducing performance as concentration increases. Despite that, these coefficients are not significant, and we cannot

conclude on the effect. Furthermore, *AssetTurnover, DebtRatio,* and *Volatility* positively affect Tobin's Q, while *Liquidity* and *LN_MarketCap* has a negative effect and *MB* is somewhat inconclusive.

7.3 Discussion of results

Seeing as the analysis above has investigated several different relationships, we now try to provide a clarifying discussion of the results. We first summarize the findings and the direction of the effects. Then follows a detailed argumentation of possible reasons for the results, linked to theoretical and empirical expectations.

7.3.1 Relationships and causation

Based on the results from the analysis, we obtain a good foundation for understanding the true effect that PE ownership has on performance. Higher PE ownership is associated with a significantly higher stock market return, possibly a higher Tobin's Q, but not a higher ROA. We are able to confirm our first hypothesis but are unable to confirm the second and third hypotheses.

This thesis has discussed endogeneity several times and emphasizes the fact that there may be simultaneity between several variables, especially between PE ownership and the different performance measurements. To see if our concerns are justified, it is interesting to show the results from regressions with PE ownership as the dependent variable, to see if there, in fact, exists a reverse causality.

Table 10 - Regression results for PE ownership

PE_Ownership	Model 3	Model 4	Model 5
StockReturn		-0.040**	-0.008**
L3.StockReturn	-0.009**		
ROA		-0.120***	-0.081**
L3.ROA	-0.030*		
TobinsQ		-1.105***	-0.047*
L3.TobinsQ	-1.506***		

This table displays regression results of equation (4) with *PE_Ownership* as the dependent variable. We only display the variables of interest, and only use model 3-5 as these deal with simultaneity. Significance levels of 1%, 5%, and 10% are denoted as ***, **, and *, respectively. Models are estimated with robust standard errors and clustered on company level. The regressions use monthly observations. The variables are winsorized at the 1st to 99th percentile.

In Table 10, we see extracts from regressions with *PE_Ownership* as the response variable, using the three regression models used throughout the analysis to deal with simultaneity. Both *StockReturn*, *ROA*, and *TobinsQ* have significant coefficients, indicating that they might affect the level of PE ownership. The fact that the estimated coefficients are negative is in line with the expectations explained in section 6.4.2, implying that PE firms liquidate their shares in periods of high performance, presumably to maximize return on the investments of the fund. This provide indications of possible causation going both from performance to PE ownership and vice versa, supporting the choice to utilize several methods in the analysis. This is further supported by the interviews we have conducted, where the PE firms' representatives state that PE firms are highly aware of the companies' return and try to time the market to maximize return.

7.3.2 Explanations of results

We have stated how PE ownership affects three performance measures, and we now intend to explain possible reasons for our findings. Before doing so, we emphasize that the goal of this study has not been to isolate the effects of, i.a., *activism* and *signaling*, but instead analyze the total effect of retained PE ownership. Thus, we are not concluding about which mechanisms that are underlying for the relationship, but we still aim to discuss how these mechanisms might explain our results.

In general, we can conclude with a positive relationship between PE ownership and stock market performance because the mechanisms that predict this, dominate the mechanisms indicating a negative relationship or no relationship at all. *Shareholder activism* and *signaling theory* suggested a positive relationship, whereas *price pressure, private benefits of control* and *reputational concerns* were ambiguous.

Shareholder activism can improve performance through *governance* and *operational engineering.* The fact that we observe a positive relationship between PE ownership and performance indicates that *shareholder activism* is also important in the period post IPO, but that it is of less importance as time goes by and PE firms dispose of their shares. This is in line with our expectation that when PE firms dispose of their shares, their incentives and opportunities to influence the portfolio companies are reduced.

Signaling might affect the stock market performance in periods with high PE ownership relative to periods with low PE ownership. *Signaling* predicts a positive relationship between

PE ownership and stock market performance, but with limited effect on accounting performance. Thus, it is reasonable to view *signaling* as a likely reason for our findings.

Note that we are not stating that *price pressure*, *private benefits of control* and *reputational concerns* do not have any effect. For instance, it might be that the positive effect of PE ownership on stock market performance would be even stronger if the firms neglected their need of keeping a favorable reputation among investors in the long run.

Furthermore, it is interesting that we can conclude that PE ownership affects stock market performance significantly but are unable to draw similar conclusions for accounting performance. We present four alternative explanations for this to occur.

First, stock market performance is based on expectations of future performance, ROA is backward looking, and Tobin's Q is somewhere in between. A reduction in PE ownership might have an immediate effect on stock market performance since the market adjusts its belief immediately. However, for accounting measures, the effect will not necessarily show immediately. Imagine that a reduction of PE firms' involvement was to weaken accounting performance. It is unreasonable to think that all of this effect would happen immediately because the portfolio company would operate as before even without the expertise of PE firms. After a while, the lack of assistance from PE professionals could start to show, and managers could start acting in their vested interest as they are less closely monitored. When these effects are spread over some time, it likely becomes harder to capture a potentially significant effect. These explanations are in line with the fact that Tobin's Q is showing results in between stock market performance and ROA because Tobin's Q is a measure that combines future expectations and backward-looking accounting measures.

Second, PE ownership might affect the accounting performance of the company in ways that are not picked up by the chosen proxy for accounting performance. However, in the robustness assessment in section 7.4.1, we discuss the choice of ROA as a measurement for accounting performance, reducing the possibility of this being a problem.

Third, our accounting figures are reported quarterly, whereas the stock return is reported monthly. This makes it easier to draw an inference regarding the stock market return, as there is more variation in our observations. This applies to both ROA and Tobin's Q.

The fourth possible explanation is that PE ownership only affects stock market performance. This could be a consequence of PE firms affecting stock market return in ways that do not improve the operations of the company, e.g., they could be able to create a buzz about the stock. It could also be that the significant positive relationship is only due to

mechanisms that solely influence market performance. If the positive relationship between PE ownership and stock market performance were entirely a consequence of investors interpreting a reduction in PE ownership as a *signal* of the shape of the portfolio company, we would only observe an effect on stock market performance.

When comparing our results to previous studies, we find it particularly relevant to discuss studies focusing on the performance PE-backed IPOs. Although these studies lack corporate governance mechanisms, they have some suggestions for how the relationship between PE ownership and performance could be. Bergström et al. (2006), Cao and Lerner (2009) and Levis (2011) are among several researchers to conclude that PE-backed IPOs outperform non-backed IPOs. These studies tend to suggest that a reason for the outperformance could be that PE-backed IPOs receives the benefits of being backed by a large, professional shareholder also in the time post IPO. These benefits diminish as PE firms reduce their holdings, and the studies imply that PE ownership is positive for performance. Thus, we can state that our results are in line with these researchers' discussions.

7.4 Robustness assessment

This section considers the robustness of our results. The focus is on the choice of ROA as a measure of accounting performance, the use of winsorized variables and the choice of instruments for model 4 and 5. More straightforward econometric assumptions are discussed in Appendix A.1.

7.4.1 ROA as a measure of accounting performance

Our initial argument for why we measured accounting performance was that we aimed to capture the full effect of PE ownership on performance. We selected ROA as a proxy, and our results and conclusions depend on the chosen measure. As there is no clear answer to which measure one should use, we believe that a comparison with other dependent variables strengthens our discussions and the robustness of our results. Table 11 shows the regression results when comparing the results of ROA with return on equity (ROE) and return on sales (ROS).

Table 11 – Regression results with alternative accounting measures

ROA	Model 1	Model 2	Model 3	Model 4	Model 5
PE_Ownership	-0.052***	-0.049		-0.040	-0.030
L3.PE_Ownership			-0.033		
N	4116	4116	3087	3087	4116
adj. R^2	0.123	0.056	0.056		
ROE					
PE_Ownership	-0.039*	-0.054		0.004	-0.061
L3.PE_Ownership			-0.031		
N	4116	4116	3087	3087	4116
adj. R^2	0.023	0.006	0.007		
ROS					
PE_Ownership	-0.132***	-0.111		-0.109	-0.095
L3.PE_Ownership			-0.060		
N	4116	4116	3087	3087	4116
adj. R^2	0.075	0.034	0.041		

This table displays the regression results for equation (2). The equation is specified in the same way as before, but we replace *ROA* with *ROE* and *ROS*, respectively. Only variables of interest are displayed. Significance levels of 1%, 5%, and 10% are denoted as ***, **, and *, respectively. The models used are the same as in the main analysis. Models are estimated with robust standard errors and clustered on company level. The regressions use quarterly observations. The variables are winsorized at the 1st to 99th percentile.

The effect of *PE_Ownership* on accounting performance is not significant, regardless of whether the measure for performance is *ROA*, *ROE* or *ROS*. The fact that our results are relatively consistent have implications for our results discussion. It becomes less likely that *ROA* as the chosen proxy is the reason why we did not observe a significant effect of PE ownership on accounting performance. Nonetheless, we do not state the relationship is non-existent. There are still explanations for why we did not find a significant relationship other than assuming there is none.

7.4.2 Winsorizing

In our main analysis, we use winsorized data. Whether it is preferable to winsorize or not is dubious, and the conclusion of this paper should not rely on such a decision. Table 12 shows the results for our interest variable, *PE_Ownership*, when using unprocessed data. The coefficients differ modestly, but the decision of winsorizing or not does not affect the significance of the relationships, nor our conclusions.

Table 12 – Non-winsorized regression results

StockReturn	Model 1	Model 2	Model 3	Model 4	Model 5
PE_Ownership	-0.014	0.078**		0.097**	0.048***
L3.PE_Ownership			0.059*		
N	12384	12384	11319	11319	12384
adj. R^2	0.123	0.056	0.056		
ROA					
PE_Ownership	-0.086***	-0.113		-0.107	-0.087
L3.PE_Ownership			-0.109		
N	4116	4116	3087	3087	4116
adj. R^2	0.023	0.006	0.007		
TobinsQ					
PE_Ownership	-0.829	0.395**		0.374*	0.230**
L3.PE_Ownership			0.291*		
N	4116	4116	3087	3087	4116
adj. R^2	0.075	0.034	0.041		

This table displays the regression results for equation (1), (2) and (3), but only display the variables of interest. The variables in this regression are not winsorized, as opposed to the other regressions. Significance levels of 1%, 5%, and 10% are denoted as ***, **, and *, respectively. The models used are the same as in the main analysis. Models are estimated with robust standard errors and clustered on company level. The regression for *StockReturn* uses monthly observations, while *ROA* and *TobinsQ* use quarterly.

7.4.3 Robustness of instruments

An essential condition for both the instrumental variable regression and simultaneous equations models is to have good instruments. That is, they have to be both correlated with the endogenous variable, and uncorrelated with the dependent variable. Poor instruments may cause even worse results than OLS in the presence of endogeneity (Wooldridge J. M., 2016). For simultaneous equations models, the identification problem is also important to consider.

7.4.3.1 Instrumental variable estimation

In model 4, we use three months lagged values of the suspected endogenous variables as instruments for the contemporary values. The variables are *PE_Ownership, Concentration*, and *Concentration_sq*. In order for these to be good instruments, they have to be both relevant and exogenous. The relevance condition can be tested, and the results are showed in the appendix A.4, where we see that the F-statistic from the first stage in the 2SLS is far above 10, which is a rule of thumb. This is also quite intuitive. As previously discussed, PE firms sell their shares in a gradual downward sloping fashion. They almost never increase their holdings of shares, causing today's holding of shares to be quite dependent on the shares they held three months ago. This is also true for concentration, although it probably is not as dependent on past values as PE ownership. Nevertheless, it is reasonable to believe that there will not be too large changes

in concentration throughout three months. The reason for using three months lagged values is to allow enough time to achieve the second condition, exogeneity. The intention is to eliminate the reverse causation from performance to PE ownership and concentration. The further we go back in time, the harder it is for the large shareholders, and PE firms, to predict the performance of the companies and decide their holding of shares based on this. There is a trade-off when choosing how many periods to lag, between relevance and exogeneity.

There are reasons to believe that the simultaneity issue does not entirely disappear with these instruments. To some degree, the PE firms will still be able to predict performance and adjust their equity share based on the predictions. In addition, if performance is also determined to some degree by its own lagged values, then the instrument could still be correlated with the error term. This may not be a major problem with the stock market return, as suggested by the random walk hypothesis (Malkiel, 1973), but might be a more significant problem for accounting performance. The use of lagged variables as instruments have been criticized in existing research, and they are likely not perfect instruments (Reed, 2015).

7.4.3.2 Simultaneous equations models

In the simultaneous equations models (model 5), all variables except the dependent variables are used as instruments in the estimation. Therefore, the relevance discussion is to a large degree based on whether we have been able to specify the correct structural equations and the connection between them. We have specified the system based on financial theory and existing research. There is, however, little theory of the relationship between PE ownership, concentration and performance, and corporate governance theory does not rank alternative instruments. This can lead to imperfect instruments, although the F-statistics from the first stage regressions are well above the requirements for relevance (Appendix A.4).

Another possible problem is that some of the assumed exogenous explanatory variables may also be endogenous, and thereby failing the exogeneity condition. An example is the variable *Liquidity*, which we believe to affect PE ownership, as it is difficult for PE firms to sell their large positions in periods with low stock liquidity. However, the effect might also go the other way, where sales from the PE firm increases the liquidity of the stock. Despite that, it would be both difficult and highly impractical to specify equations for all possible endogenous variables, and we believe that our specified systems of three structural equations still can provide helpful insight.

An assumption to be able to estimate the structural equations in a simultaneous equations model is that they have to be identified. The critical element is to have sufficient IV's to estimate the equations. Two conditions are required for the identification of a structural equation, the order condition, and the rank condition. The order condition is necessary for the rank condition, and a structural equation in an SEM system satisfies the order condition if the number of excluded exogenous variables from the equation is at least as large as the number of right-hand side endogenous variables. Assuming that the only endogenous variables in our system specified in section 6.2.3 are *PE_Ownership, Concentration* and the various *Performance* measurements, all three structural equations meet the requirements of the order condition. There are two endogenous right-hand side variables in each equation, and 12, 12 and 11 variables that are exogenous to the system when using *StockReturn, ROA,* and *TobinsQ* as the performance equation, respectively. At least two of these are excluded from each equation, fulfilling the order condition for identification.

The rank condition requires more because it depends on the values of the parameters in the other equations, which we can never know for sure. In most applications, one assumes that unless there is obvious failure of identification, an equation is identified as long as it passes the order condition (Wooldridge J. M., 2016).

7.5 Limitations of analysis

7.5.1 Econometric limitations

Analyzing the relationship between general ownership structure and performance is challenging, as no perfect econometric approaches or theory describes the relationships. Existing research use different methodologies, based on different views on the relationship. The disagreement between scholars proves how challenging this task can be. When our thesis examines the relationship between performance and PE ownership, it is even more demanding. There is no previous directly related literature or theories to lean on, which makes it difficult to choose the correct methodology. Our analysis has utilized several different methods, combining views from different papers studying ownership structure and performance. Thus, we believe that we have presented valuable results considering the current knowledge and theory available. However, there are drawbacks to the methodology used, especially regarding the choice of instruments, and the analysis is not entirely without limitations.

7.5.2 Data and sample limitations

Another potential limitation to our analysis is the fact that we may experience some *selection bias*. There are several sources for this. The first, and in our case the most important one, is the fact that we only analyze companies that have been listed on the stock market for at least 36 months. By excluding the ones that are delisted within three years, we might exclude companies with other characteristics than the ones we include. A possible reason for this is if the majority of delisted companies are inferior to the ones that stay listed. Another source of selection bias is that the companies that are taken public may be better performing than the ones that are not. That is, by only studying publicly listed companies, we may have a skewed sample. A third source is that PE firms only invest in companies with good prospects, while inferior companies do not receive backing from PE firms. The final possible source is the fact that we have excluded several companies for which we could not find satisfactory ownership data. If there are common features among these companies compared to the remaining sample, it will skew the sample. Thus, there may be multiple selection bias in our analysis, which means that the results may not apply to the whole population. Nonetheless, our interest is understanding the effect of PE ownership for backed companies while they are publicly traded, and not the effect that PE ownership maybe would have had on poor performing companies that would not receive PE-backing or be listed in the first place. Therefore, we do not believe that the selection bias distorts the analysis to a large extent.

Our dataset consists of monthly data, preventing us from studying the immediate effect of changes in PE ownership. However, to study more frequent ownership data would require programming and extensive manual work by registering every single filing of every trade in the Edgar database, which is not possible in this thesis. Also, we only have quarterly accounting data. This makes it even harder to see the direct effects of changes in PE ownership. There is, however, no way to obtain more frequent accounting data because it is usually only reported quarterly.

The fact that we have quarterly data for accounting variables and monthly data for the remaining variables may create some limitations. We have solved this by estimating with monthly data when we have *StockReturn* as the dependent variable. The alternative solution is to use quarterly data for all variables. This would reduce observations and observed variation. Because the variable of interest is *PE_Ownership,* for which we have monthly data, and accounting variables are included as control variables, we choose to use monthly data when

possible. While this may reduce the quality of estimates for the accounting variables, the estimates for the most important variables are not affected. In the regression with *ROA* and *TobinsQ* as the dependent variable, we use quarterly data for all variables. This reduces observations and variation, and the estimates will not be as robust as when using monthly data. Reduced variation particularly affects fixed effects estimations, as discussed in section 6.2.1. We use opening balance figures for accounting data, which is matched with the level of PE ownership on the first day of the corresponding quarter.

The variable for PE ownership is calculated as the sum of all positions held by PE firms when there are more than one PE firm backing a company. The basis for this is that we believe the mechanisms discussed in section 4.1 still applies when there are several PE firms as owners, and the incentives and opportunities to affect performance still will be present. Some of the effects may be weaker when there are several owners rather than one major owner, and this is a possible limitation in our analysis. We are also not able to investigate the effect of different funds being involved and possibly exiting at different times.

It could be interesting to include fund-specific control variables in our analysis, to see how different PE-funds may affect performance differently. Nevertheless, because these characteristics are constant over the period for each company, we are not able to estimate these when using fixed effects. This is one of the drawbacks of using fixed effects models, as discussed in section 6.2.1. There is a trade-off between estimating these time-invariant characteristics and using models to deal with endogeneity.

We only consider one type of PE types, i.e., buyout, and only the American market. This prevents us from assessing whether our results are applicable for venture capital investors or other PE types, and other markets. It is possible that countries to some degree differ in institutional frameworks, the level of PE ownership and various level of activism for corporate control.

7.5.3 Limitations due to PE firms' disposal of shares

There are two aspects of how PE firms exit their positions that might have consequences for our analysis. First, PE firms occasionally exit through block trades outside of the open market. Our analysis is based on the assumption that PE firms have incentives to improve performance, making it crucial that trade prices are affected by performance. Barclay and Holderness (1989) and Dyck & Zingales (2004) find that block transactions trade at a premium of the market price. Given that the market price is the basis for the block trade, it is reasonable to believe that PE

firms still have some incentives to try to affect stock market performance, regardless of whether they dispose of their shares in the open market or not. Although it might affect the incentives moderately, we do not view this as a significant concern.

Second, we should be aware of the consequences of Seasoned Equity Offerings (SEO). An SEO is an issue of additional securities of an already publicly listed firm, which dilutes the holdings of existing shareholders (Wadhwa, Reddy, & Goyal, 2016). Our dataset consists of percentage holdings, which makes it difficult to separate the effects of dilution and share sales in the event of SEOs. In the situations where a change of PE ownership is caused by an dillution rather than an actual sale by the PE firm, the consequences might be different. However, we argue that both the incentives and opportunities to improve the company are not only dependent on the absolute size of the position, but also by the percent of shares that the PE firm holds. Thus, it is reasonable to believe that the presence of SEOs might disturb our analysis modestly, but not critically.

8. Conclusion

The objective of this paper has been to contribute to a better understanding of the consequences of retained PE ownership post IPO. Because previous studies find that PE firms use up to several years to entirely exit the portfolio companies, it is interesting to understand the implications of this long and gradual divestment period. This interest is supported by statements retrieved from the interviews we have conducted, where PE representatives state that they both have incentives and opportunities to affect performance post IPO. We attempted to answer the research question "*How does post-IPO private equity ownership affect the performance of portfolio companies?"*

With panel data of 343 PE-backed IPOs floated in the US market between 2000 and 2015, we observe performance and PE ownership for the first 36 months after the IPO. By using various econometric approaches and considering that PE ownership might be endogenous in explaining performance, we estimate models using pooled OLS, fixed effects, IV estimation, as well as simultaneous equations models. We find evidence that PE ownership positively affects stock market return. However, we are unable to draw the same conclusions for accounting performance (measured by ROA) or general company performance (measured by Tobin's Q), although there is some indication of a positive effect on the latter. We accept our first hypothesis but are unable to accept the second and third hypotheses.

The purpose of this study was not to isolate the effects causing our results, but we still aimed to discuss it. We suggest that *shareholder activism* and *signaling* dominate other mechanisms in the case of stock market performance, in which *shareholder activism* primarily refers to how PE firms converge interests of managers and shareholders and add expertise to their portfolio companies. We suggest four explanations for why we do find a significant relationship for accounting performance. First, the inference is dependent on how informative the measurement is, and stock market return can be viewed as the most informative. Second, the proxies for accounting performance could be weak, although the results do not differ when using alternative accounting measures. Third, less frequent observations reduce variation in the measurement, and inference becomes less likely. Lastly, it could be that the mechanisms only affecting stock market performance are solely explaining the relationship. Even though we do not find a significant relationship for other performance measures than stock market return, there are plausible arguments for why it still may exist.

This study also supports previous findings of the fact that PE firms stay invested in the portfolio companies for a long time after the IPO, showing that our sample on average reduces

holdings from 50% to 19% during the 36 months following an IPO. A test of the reduction of PE ownership in this period shows that the PE firms do not only stay invested because of the lock-up agreement, as the pace of ownership reduction is not different on the expiration of the agreement than in the following months. We also provide insight into how often IPOs are backed by more than one PE firm, finding that this is the case for 52% of the IPOs in our sample. Finally, we conclude that PE ownership is negatively determined by company performance, in line with statements from self-conducted interviews and previous research.

There are several limitations to our results, the most important being the econometric challenges in analyzing the effect of ownership on performance. The lack of proper methodologies and disagreement among scholars make it challenging to estimate causal relationships. Despite using multiple different econometric techniques, there are still drawbacks to all the estimated models, including the difficulty of choosing good instruments when no existing theory provides answers.

Our study has combined insights from separate research fields, utilized a comprehensive dataset, used several econometric techniques to deal with possible endogeneity, analyzed multiple performance measurements, and used self-conducted interviews. Despite the limitations and weaknesses of the analysis, we believe to have presented conclusions that can contribute to existing and future research.

8.1 Implication of results and further research

Although our study differs from previous studies focusing on the stock market performance of PE-backed IPOs as we account for post-IPO PE ownership, we believe that it has implications for previous studies. Bergström et al. (2006), Cao and Lerner (2009) and Levis (2011) are among several researchers to conclude PE-backed IPOs to outperform non-backed IPOs, and these studies tend to suggest that benefits of being backed by a large, professional shareholder can be an explanation for the outperformance. This implies that PE-backed IPOs should perform better when PE firms still hold large stakes as opposed to when they have already sold a considerable number of shares, ceteris paribus, which is precisely the conclusion of our study.

Our results also contribute to research investigating the relationship between ownership structure and performance. We add to this literature by examining the relationship between performance and a new type of owners, PE firms, as well as focusing on a specific group of companies, PE-backed companies.

Given that our study does not identify the exact reasons for the relationships, it would be interesting for further research to try to separate the effects. However, there are significant challenges in isolating the effects.

In addition to the models used in our analysis, a supplementary way to estimate a causal effect of PE ownership is to use a diff-in-diff estimation, by exploiting an external shock as a natural experiment. The Sarbanes–Oxley Act of 2002 is a possible shock for such an analysis. Even though we could not conduct this analysis ourselves due to limited sample in the relevant period, we encourage others to consider this approach.

Future research should further examine this relationship, and we suggest utilizing even more performance measures and examining other types of private equity funds, e.g., VC, other countries and markets, as well as using more frequent data. It may also be interesting to take the remaining owner types into account, and the owners that take over the PE firms' positions. Studying more than three years will also enable examination of the complete divestment period, which is often longer than three years. Including more information about the PE fund can also uncover exciting results.

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10. Appendix

A.1 Econometric assumptions

Normal distribution is perhaps the most common econometric assumption and is essential for most estimation methods. After inspecting and testing our variables, we conclude that they are normally distributed. We use logarithmic returns in order to fulfill this criterion better.

Heteroscedasticity occurs when the variance of the error term is not constant conditional on the explanatory variable, making the usual standard errors and test statistics are invalid (Wooldridge J. M., 2016). We use a modified Wald test for groupwise heteroscedasticity to test this, which is a test for panel data and fixed effects. Table 13 shows that there is heteroscedasticity in our dataset. *Serial correlation* is the relationship between a given variable and a lagged version of itself over various time intervals, and its presence can bias the standard errors and causes the results to be less efficient. In Table 13 is a test for serial correlation in the idiosyncratic errors of a linear panel-data model developed by Wooldridge (2002). The test shows no rejection of the null hypothesis, indicating that serial correlation is not a problem our dataset. It is common practice in the econometric field to use robust standard errors and clustering to deal with both heteroscedasticity and serial correlation. Following Bertrand et al. (2004), we use cluster-robust standard errors at company level to allow for *heteroscedasticity* across firms and within-firm *serial correlation* of error terms. This solves the potential issues from heteroscedasticity.

Table 13 - Test for heteroscedasticity and autocorrelation[14]

Test	Property	Null hypothesis	Significance	Test value	Rejection of H_0
Modified Wald	Heteroscedasticity	$H_0: \sigma(i)^2 = \sigma^2 \; for \; all \; i$	$Prob > \chi^2 = 0.000$	$\chi^2(343) = 1450.25$	Yes
Wooldridge	Autocorrelation	$H_0: no \; autocorrelation$	$Prob > F = 0.059$	$F(1,342) = 3.60$	No

One advantage of using panel data is reduced issues with *multicollinearity*. Nevertheless, we should be aware of possible collinearity issues between *PE_Ownership* and *Concentration*, as the shareholdings of the PE firm partly determine the concentration among owners of portfolio companies. There is no universal agreement to how high VIF values need to be in order to cause issues. However, researchers tend to suggest that one need to be concerned with

[14] This test shows results using specifications from equation (1) but results are concurring for all equations.

VIF values of 5-10 and higher (Menard, 1995; Neter, 1989). From Table 14, we conclude that this is not a serious issue in our analysis.

Table 14 - VIF test[15]

Variable	VIF
PE_Ownership	2.60
Concentration	2.14
LN_TotalAssets	1.36
Volatility	1.32
Liquidity	1.29
Period	1.22
DebtRatio	1.11
AssetTurnover	1.07
MB	1.07
MKT_Return	1,02
Mean VIF	1.42

Stationarity refers to situations in which the statistical properties of a variable are constant over time. Our variable of interest, PE_*Ownership*, has a stepwise form, resulting in the mean changing over time. This could indicate that the variable is non-stationary, which might lead to spurious regression. There are panel unit root tests we could conduct, but as Professor Øivind A. Nilsen at NHH points out,[16] there is a general understanding in the field that these tests have very low power, and stationarity is viewed as unproblematic in panel data with a large *N* and a small *T* (Baltagi, 2013; Pesaran, 2015). Given our *N=343* and *T=36*, we disregard stationarity issues in our data.

A.2 Tests for fixed effects, random effects, and pooled OLS

We have previously argued how the use of fixed effects can assist in reducing the endogeneity issues in our estimations. Nonetheless, we have still conducted a formal test in order to choose between fixed effects and random effects. The null hypothesis of the Hausman test is that random effects are the preferred estimation method, i.e., that there is no correlation between explanatory variables and the unobserved effects (Wooldridge J. M., 2016), which we argue is unlikely. The Hausman test does not permit the presence of cluster-robust standard errors, making the alternative approach of Mundlak is more appropriate in our case, which has the same null hypothesis. Table 15 shows that fixed effects are appropriate in our analysis.

[15] This test shows results using specifications from equation (1) but results are concurring for all equations.

[16] Information received from meeting with Øivind Anti Nilsen, professor at Norwegian School of Economics with econometric expertise.

Table 15 – Hausman test for fixed effects vs. random effects[17]

Test	Property	Null hypothesis	Significance	Test value	Rejection of H_0
Hausman (Mundlak)	RE or FE	$H_0: E(\eta_i \mid X) = 0$	$Prob > \chi^2 = 0.000$	$\chi^2(38) = 305.07$	Yes

We also used an F-test to ensure that fixed effects are preferred over pooled OLS. The null hypothesis is that observed and unobserved fixed effects u_i are equal to zero, i.e., they are equal across all units. The rejection of H_0 in Table 16 confirms that the sample contains fixed effects.

Table 16 - F-test for fixed effects vs. pooled OLS[17]

Test	Property	Null hypothesis	Significance	Test value	Rejection of H_0
F-test	FE or POLS	$H_0: all\ u_i = 0$	$Prob > F = 0.000$	$F(342,11968) = 210.85$	Yes

A.3 T-test of lock-up period expiration

To test whether the reduction in PE ownership at the end of the lock-up date is different from the months after the expiration of the agreement, we use a two-sided t-test to determine if the population means are equal. In Table 17, we fail to reject the null hypothesis, and cannot state that the reduction at the expiration of the lock-up agreement is different from the later months.

Table 17 - Two-sample t-test for equal means

Test	Property	Null hypothesis	Significance	Test value	Rejection of H_0
Two-sample t-test	Equal means	$H_0: \mu_1 = \mu_2$	$Prob(\lvert T \rvert > \lvert t \rvert = 0.653$	$t = -0.4495$	No

A.4 Relevance of instruments

The relevance of instruments is tested from the first stage in the 2SLS regressions. As a rule of thumb, the F-statistic of a joint test of whether all excluded instruments are significantly different from zero should be larger than 10. Table 18 shows the results for the models using lagged variables as instruments (model 4), and the rows represent the different regression equations for *StockReturn, ROA* and *TobinsQ*, respectively. All instruments pass the relevance test. Table 19 displays the same test for the simultaneous equations models (model 5), with *StockReturn, ROA* and *TobinsQ* as the dependent variable, respectively. These instruments are

[17] This test shows results using specifications from equation (1) but results are concurring for all equations.

also relevant. We do not show tests for equation (4) and (5), as these are not of interest to our research question.

Table 18 - F-test for the relevance of instruments in model 4

Test	Property	Null hypothesis	Significance	Test value	Rejection of H_0
F-test	Relevance	$H_0: all\ \beta_i = 0$	$Prob > F = 0.000$	$F = 231.74$	Yes
F-test	Relevance	$H_0: all\ \beta_i = 0$	$Prob > F = 0.000$	$F = 232.22$	Yes
F-test	Relevance	$H_0: all\ \beta_i = 0$	$Prob > F = 0.000$	$F = 237.93$	Yes

Table 19 - F-test for the relevance of instruments in model 5

Test	Property	Null hypothesis	Significance	Test value	Rejection of H_0
F-test	Relevance	$H_0: all\ \beta_i = 0$	$Prob > F = 0.000$	$F = 84.22$	Yes
F-test	Relevance	$H_0: all\ \beta_i = 0$	$Prob > F = 0.000$	$F = 50.59$	Yes
F-test	Relevance	$H_0: all\ \beta_i = 0$	$Prob > F = 0.000$	$F = 771.29$	Yes

A.5 Portfolio companies and PE firms in the sample

Table 20 - Total sample of PE firms and backed companies

Portfolio company	Backing private equity firm	IPO date
Packaging Corp of America	Madison Dearborn Partners LLC	27.01.2000
Therma-Wave Inc	Sutter Hill Ventures LLC, Bain Capital Private Equity LP	03.02.2000
Fargo Electronics Inc	TA Associates Management LP, Split Rock Partners LLC	10.02.2000
Digitas Inc	Hellman & Friedman LLC	13.03.2000
Manufacturers Services Ltd	Portfolio Advisors LLC	22.06.2000
Charles River Labs Intl Inc	aPriori Capital Partners LP	23.06.2000
California Pizza Kitchen Inc	Bruckmann, Rosser, Sherrill & Co., Inc.	02.08.2000
Entravision Commun Corp	TSG Capital Group LLC	02.08.2000
ChipPAC Inc	Bain Capital Private Equity LP, Court Square Capital Partners	08.08.2000
American Med Sys Holdings Inc	Warburg Pincus LLC	10.08.2000
Viasource Communications Inc	BancBoston Capital, Inc., Crest Communications Holdings LLC, PNC Equity Management Corp.	18.08.2000
TTM Technologies Inc	HCI Equity Partners LLC, Brockway Moran & Partners, Inc., Crescent Capital Group	20.09.2000
Wilson Greatbatch Tech Inc	aPriori Capital Partners LP	29.09.2000
W-H Energy Services Inc	aPriori Capital Partners LP	10.10.2000
Resources Connection Inc	Evercore Capital Partners	14.12.2000
AFC Enterprises Inc	Freeman Spogli Management Co. LP, Pennington Partners & Co.	01.03.2001
Select Medical Corp	Welsh, Carson, Anderson & Stowe, GTCR LLC	04.04.2001
Alliance Data Systems Corp	Welsh, Carson, Anderson & Stowe	07.06.2001
Galyan's Trading Co Inc	Freeman Spogli Management Co. LP, Benchmark Capital Management Co. LLC	26.06.2001
MedCath Corp	Kohlberg Kravis Roberts & Co. LP, Welsh, Carson, Anderson & Stowe	23.07.2001
Cross Country Inc	Charterhouse Group, Inc., Metalmark Capital LLC	24.10.2001
AMN Healthcare Services Inc	Haas Wheat & Partners LP	12.11.2001

Asbury Automotive Group Inc	Freeman Spogli Management Co. LP	13.03.2002
JetBlue Airways Corp	Weston Presidio Service Co. LLC, BancBoston Ventures, Inc., CCMP Capital Advisors LP	11.04.2002
Premcor Inc	Blackstone Corporate Private Equity	29.04.2002
Regal Entertainment Group	Oaktree Capital Management	08.05.2002
Kirkland's Inc	Advent International Corp., Capital Resource Partners, SSM Partners, Robinson Humphrey Ventures	10.07.2002
Red Robin Gourmet Burgers Inc	Quad-C Management, Inc.	18.07.2002
Safety Insurance Group Inc	The Jordan Co. LP, Crescent Capital Group	21.11.2002
Seagate Technology LLC	Silver Lake Management Co. LLC	10.12.2002
Accredited Home Lenders Hldg	Crosspoint Venture Partners, Enterprise Partners Venture Capital	14.02.2003
Citadel Broadcasting Corp	Forstmann Little & Co.	31.07.2003
CapitalSource Inc	Rosewood Capital LLC, Pamlico Capital Management LP, FFL Partners LLC, Madison Dearborn Partners LLC, OZ Management LP, Farallon Capital Management	06.08.2003
AMIS Holdings Inc	Francisco Partners Management LP	23.09.2003
Carter's Inc	Berkshire Partners LLC	23.10.2003
Quality Distribution Inc	Apollo Global Management LLC	06.11.2003
LECG Corp	GTCR LLC	13.11.2003
Nexstar Broadcasting Group Inc	ABRY Partners LLC	24.11.2003
SIRVA Inc	Clayton Dubilier & Rice LLC	24.11.2003
United National Group Ltd	Fox Paine & Co. LLC	15.12.2003
Universal Technical Institute	Charlesbank Capital Partners LLC, The Jordan Co. LP	16.12.2003
Tempur-Pedic International Inc	TA Associates Management LP, FFL Partners LLC	17.12.2003
TRW Automotive Holdings Corp	Blackstone Corporate Private Equity	02.02.2004
Asset Acceptance Capital Corp	Quad-C Management, Inc.	04.02.2004
Bristol West Holdings Inc	Kohlberg Kravis Roberts & Co. LP	11.02.2004
Cherokee International Corp	G3W Ventures LLC, Oaktree Capital Management, RIT Capital Partners Plc	19.02.2004
Kinetic Concepts Inc	Calera Capital Advisors LP, aPriori Capital Partners LP	23.02.2004
Ultra Clean Holdings Inc	Francisco Partners Management LP	24.03.2004
Hornbeck Offshore Services Inc	Rock Creek Capital Group, Inc., SCF Partners LLC	25.03.2004
Intersections Inc	Loeb Holding Corp., CCP Equity Partners	29.04.2004
InfraSource Services Inc	Oaktree Capital Management	06.05.2004
Wellcare Group Inc	TowerBrook Capital Partners LP	30.06.2004
Domino's Pizza Inc	J.P. Morgan Partners LLC, Bain Capital Private Equity LP	12.07.2004
Greenfield Online Inc	MSD Capital LP, Insight Venture Management LLC, UBS Capital Americas LLC	15.07.2004
Blackbaud Inc	JMI Management, Inc., Hellman & Friedman LLC	21.07.2004
Bucyrus International Inc	AIP LLC	22.07.2004
StoneMor Partners LP	McCown De Leeuw & Co., Inc.	14.09.2004
Beacon Roofing Supply Inc	CHS Capital LLC	22.09.2004
New York & Co Inc	Irving Place Capital Management LP	06.10.2004
B&G Foods Holdings Corp	Bruckmann, Rosser, Sherrill & Co., Inc.	07.10.2004
Copano Energy LLC	EnCap Investments LP, aPriori Capital Partners LP	09.11.2004
Nalco Holding Co	Blackstone Corporate Private Equity, Goldman Sachs Capital Partners	10.11.2004
PRA International	Genstar Capital LLC	17.11.2004
Foundation Coal Holdings Inc	First Reserve Management LP, Blackstone Corporate Private Equity	08.12.2004
Symmetry Medical Inc	Olympus Advisors LLC, Windjammer Capital Investors LLC	08.12.2004

Knoll Inc	Warburg Pincus LLC	13.12.2004
Interline Brands Inc	Sterling Investment Partners Advisers LLC, J.P. Morgan Partners LLC, Parthenon Capital Inc	15.12.2004
SeaBright Insurance Hldgs Inc	Summit Partners LP	20.01.2005
GFI Group Inc	Advent International Corp., Venturion Capital LLC, CMS Cos.	25.01.2005
optionsXpress Holdings Inc	Summit Partners LP	26.01.2005
Dollar Financial Corp	Leonard Green & Partners LP, Goldman Sachs Capital Partners, Ares Private Equity Group	27.01.2005
W&T Offshore Inc	Jefferies Capital Partners, Jefferies Capital Partners	27.01.2005
American Reprographics Co	CHS Capital LLC	03.02.2005
FTD Group Inc	Leonard Green & Partners LP	08.02.2005
Valor Communications Group Inc	Vestar Capital Partners, Inc., Welsh, Carson, Anderson & Stowe, Advent-Morro Equity Partners, Inc., Citigroup Private Equity LP	08.02.2005
Prestige Brands Holdings Inc	GTCR LLC, Crescent Capital Group	09.02.2005
Syniverse Holdings Inc	GTCR LLC	09.02.2005
Alpha Natural Resources Inc	First Reserve Management LP	14.02.2005
FreightCar America Inc	Trimaran Capital Partners LLC, Hancock Capital Management LLC	05.04.2005
Accuride Corp	Albion Investors LLC, Kohlberg Kravis Roberts & Co. LP, RSTW Partners, Trimaran Capital Partners LLC	25.04.2005
VeriFone Holdings Inc	GTCR LLC, Crescent Capital Group	29.04.2005
Zumiez Inc	Brentwood Associates	05.05.2005
Warner Music Group Corp	Thomas H. Lee Partners LP, Bain Capital Private Equity LP, Providence Equity Partners LLC	10.05.2005
Xerium Technologies Inc	Apax Partners Ltd.	16.05.2005
Citi Trends Inc	Hampshire Equity Partners	17.05.2005
Rackable Systems Inc	Parthenon Capital Inc, PTI Ventures LLC	09.06.2005
ev3 Inc	Warburg Pincus LLC, The Vertical Group LP	16.06.2005
Builders FirstSource Inc	JLL Partners, Inc.	22.06.2005
Eagle Bulk Shipping Inc	Kelso & Co. LP	22.06.2005
Lincoln Educational Services	Stonington Partners, Inc.	22.06.2005
Kenexa Corp	Parthenon Capital Inc, Wafra Partners LLC, Westbury Partners	24.06.2005
NeuStar Inc	Warburg Pincus LLC, ABS Capital Partners, Inc., MidOcean US Advisor LP	28.06.2005
Consolidated Commun Hldg Inc	Spectrum Equity Management LP, Providence Equity Partners LLC	21.07.2005
Maidenform Brands Inc	PineBridge Private Equity Group, Ares Private Equity Group	22.07.2005
Pike Electric Corp	Lindsay Goldberg & Co. LLC	26.07.2005
Ruths Chris Steak House Inc	Madison Dearborn Partners LLC	08.08.2005
Reddy Ice Holdings Inc	Trimaran Capital Partners LLC, Irving Place Capital Management LP	09.08.2005
Rockwood Holdings Inc	Kohlberg Kravis Roberts & Co. LP, aPriori Capital Partners LP	16.08.2005
Global Cash Access Hldg Inc	Summit Partners LP, HarbourVest Partners LLC, Tudor Growth Equity	22.09.2005
TAL International Group Inc	The Jordan Co. LP, Edgewater Services LLC	11.10.2005
AMERISAFE Inc	Welsh, Carson, Anderson & Stowe, Abbott Capital Management LLC	17.11.2005
Brookdale Senior Living Inc	FIG LLC	21.11.2005
Union Drilling Inc	Metalmark Capital LLC	21.11.2005
Directed Electronics Inc	Trivest Partners LP	15.12.2005
LINN Energy LLC	Quantum Energy Partners LLC	12.01.2006
H&E Equipment Services Inc	Bruckmann, Rosser, Sherrill & Co., Inc.	30.01.2006
Koppers Holdings Inc	Saratoga Management Co. LLC	31.01.2006

Smart Modular Technologies	Shah Management LLC, Francisco Partners Management LP	02.02.2006
EXCO Resources Inc	GCP Capital Partners LLC, Ares Private Equity Group	08.02.2006
Morton's Restaurant Group Inc	Castle Harlan, Inc., Laurel Crown Capital LLC	08.02.2006
TransDigm Group Inc	Warburg Pincus LLC, Portfolio Advisors LLC, Banc of America Capital Investors	14.03.2006
Sealy Corp	BancBoston Capital, Inc., Kohlberg Kravis Roberts & Co. LP, J.P. Morgan Partners LLC, Bain Capital Private Equity LP	06.04.2006
Complete Production Svcs Inc	SCF Partners LLC	20.04.2006
CPI International Inc	The Cypress Group LLC	24.04.2006
DynCorp International LLC	Veritas Capital Fund Management LLC	03.05.2006
Burger King Holdings Inc	TPG Capital LLC, Bain Capital Private Equity LP, Goldman Sachs Capital Partners	17.05.2006
Town Sports Int Holdings Inc	Bruckmann, Rosser, Sherrill & Co., Inc., Crescent Capital Group, Farallon Capital Management	01.06.2006
Alphatec Holdings Inc	HealthpointCapital LLC	02.06.2006
Golfsmith Intl Hldg Inc	First Atlantic Capital Ltd.	14.06.2006
Houston Wire & Cable Co	CHS Capital LLC	14.06.2006
PGT Inc	JLL Partners, Inc.	27.06.2006
J Crew Group Inc	TPG Capital LLC	27.06.2006
Chart Industries Inc	First Reserve Management LP	25.07.2006
Geomet Inc	Yorktown Partners LLC	27.07.2006
Aircastle Ltd	FIG LLC	07.08.2006
ICF International Inc	CM Equity Partners	27.09.2006
First Mercury Financial Corp	Glencoe Capital LLC	17.10.2006
Susser Holdings Corp	Wellspring Capital Management LLC	18.10.2006
ExlService Holdings Inc	Oak Hill Capital Management LLC, Financial Technology Ventures Management Co. LLC	19.10.2006
Eagle Rock Energy Partners LP	Natural Gas Partners LLC	24.10.2006
GateHouse Media Inc	FIG LLC	24.10.2006
Globalstar Inc	Thermo Capital Partners LLC, QUALCOMM Ventures, Columbia Ventures Corp.	01.11.2006
Innophos Holdings Inc	Bain Capital Private Equity LP	02.11.2006
Physicians Formula Holdings	Summit Partners LP	08.11.2006
Hertz Global Holdings Inc	The Carlyle Group LP, Clayton Dubilier & Rice LLC	15.11.2006
Spirit AeroSystems Holdings	Onex Partners	20.11.2006
Altra Holdings Inc	Genstar Capital LLC, CDP Capital Private Equity	14.12.2006
Carrols Restaurant Group Inc	Madison Dearborn Partners LLC	14.12.2006
Opnext Inc	Clarity Partners	14.02.2007
Clearwire Corp	Motorola Solutions Venture Capital	07.03.2007
Veraz Networks Inc	Levensohn Venture Partners LLC, Battery Ventures, Argonaut Partners LLC, Norwest Venture Partners	04.04.2007
Cinemark Holdings Inc	Madison Dearborn Partners LLC	23.04.2007
Solera Holdings Inc	GTCR LLC	10.05.2007
TriMas Corp	The Heartland Industrial Group LLC, Masco Capital Corp.	17.05.2007
Jazz Pharmaceuticals Inc	Kohlberg Kravis Roberts & Co. LP, Thoma Cressey Bravo, Inc., Adams Street Partners LLC, Beecken Petty O'Keefe & Co. LP, Prospect Venture Partners, Versant Venture Management LLC	31.05.2007
Bway Holding Co	Kelso & Co. LP	12.06.2007
Polypore International Inc	Warburg Pincus LLC	27.06.2007
Dice Holdings Inc	General Atlantic LLC	17.07.2007
hhgregg Inc	Freeman Spogli Management Co. LP	19.07.2007

Monotype Imaging Holdings Inc	TA Associates Management LP	24.07.2007
Genpact Ltd	General Atlantic LLC	01.08.2007
Concho Resources Inc	Yorktown Partners LLC	02.08.2007
Deltek Inc	New Mountain Capital LLC	01.11.2007
SandRidge Energy Inc	Ares Private Equity Group	05.11.2007
Approach Resources Inc	Yorktown Partners LLC	07.11.2007
Lumber Liquidators Inc	TA Associates Management LP	08.11.2007
EnergySolutions Inc	Lindsay Goldberg & Co. LLC	14.11.2007
Cardtronics Inc	TA Associates Management LP, The CapStreet Group LLC	10.12.2007
MedAssets Inc	Parthenon Capital Inc, Grotech Ventures, Galen Collaborative Capital	12.12.2007
Heritage-Crystal Clean Inc	Bruckmann, Rosser, Sherrill & Co., Inc.	11.03.2008
Grand Canyon Education Inc	DVSM LLC	19.11.2008
Rosetta Stone Inc	ABS Capital Partners, Inc., Norwest Equity Partners	15.04.2009
Avago Technologies Ltd	Kohlberg Kravis Roberts & Co. LP, Silver Lake Management Co. LLC	05.08.2009
Education Management Corp	Leeds Equity Partners LLC, AlpInvest Partners BV, Providence Equity Partners LLC, Goldman Sachs Capital Partners	01.10.2009
Mistras Group Inc	Altus Capital Partners, Inc., HCI Equity Partners LLC	07.10.2009
Addus HomeCare Corp	Eos Management LLC	27.10.2009
Vitamin Shoppe Inc	CCMP Capital Advisors LP, Irving Place Capital Management LP	27.10.2009
Ancestry.com Inc	Spectrum Equity Management LP, Adams Street Partners LLC, Sorenson Capital, W Capital Management LLC, Crosslink Capital, Inc., Industry Ventures LLC, Hercules Capital	04.11.2009
STR Holdings Inc	aPriori Capital Partners LP	06.11.2009
Dollar General Corp	Kohlberg Kravis Roberts & Co. LP	12.11.2009
KAR Auction Services Inc	Kelso & Co. LP, Parthenon Capital Inc, Goldman Sachs Capital Partners	10.12.2009
Cobalt Intl Energy Inc	First Reserve Management LP, ACM Ltd., Riverstone Investment Group LLC	15.12.2009
TeamHealth Inc	Blackstone Corporate Private Equity	15.12.2009
Kraton Performance Polymers	TPG Capital LLC	16.12.2009
Symetra Financial Corp	Vestar Capital Partners, Inc., aPriori Capital Partners LP, Rho Ventures, OZ Management LP	21.01.2010
Generac Holdings Inc	CCMP Capital Advisors LP, Unitas Capital Pte Ltd.	10.02.2010
SS&C Technologies Hold	The Carlyle Group LP	30.03.2010
Douglas Dynamics Inc	Aurora Capital Group LP	04.05.2010
Express Inc	Golden Gate Private Equity, Inc.	12.05.2010
Roadrunner Transp Sys Inc	HCI Equity Partners LLC, Bain Capital Credit, Eos Management LLC	12.05.2010
Noranda Aluminum Holding Corp	Apollo Global Management LLC	13.05.2010
Higher One Holdings Inc	North Hill Ventures, Lightyear Capital LLC	16.06.2010
Oasis Petroleum Inc	EnCap Investments LP	16.06.2010
RealD Inc	Shamrock Capital Advisors LLC	15.07.2010
Chesapeake Midstream Partners	Global Infrastructure Management LLC	28.07.2010
Gordmans Stores Inc	Sun Capital Partners, Inc.	04.08.2010
IntraLinks Holdings Inc	TA Associates Management LP, Rho Ventures	05.08.2010
NXP Semiconductors NV	Apax Partners Ltd., Kohlberg Kravis Roberts & Co. LP, Bain Capital Private Equity LP, AlpInvest Partners BV, Silver Lake Management Co. LLC	05.08.2010
Tower International Inc	Cerberus Capital Management LP	14.10.2010
Bravo Brio Restaurant Grp Inc	Castle Harlan, Inc., Bruckmann, Rosser, Sherrill & Co., Inc.	21.10.2010
Booz Allen Hamilton Hldg Corp	The Carlyle Group LP	16.11.2010

LPL Investment Holdings Inc	TPG Capital LLC, Hellman & Friedman LLC	17.11.2010
Aeroflex Holding Corp	Golden Gate Private Equity, Inc., Veritas Capital Fund Management LLC, Goldman Sachs Capital Partners	18.11.2010
Targa Resources Corp	Warburg Pincus LLC	06.12.2010
First Republic Bank,California	General Atlantic LLC, Colony Capital LLC	08.12.2010
RigNet Inc	Altira Group LLC, Cubera Private Equity AS, Houston Ventures	14.12.2010
Fortegra Financial Corp	Summit Partners LP	16.12.2010
Demand Media Inc	Spectrum Equity Management LP, St. Cloud Capital LLC, Oak Investment Partners, Generation Partners Management LLC, W Capital Management LLC	25.01.2011
Nielsen Holdings NV	Thomas H. Lee Partners LP, Blackstone Corporate Private Equity, The Carlyle Group LP, Kohlberg Kravis Roberts & Co. LP, Hellman & Friedman LLC, AlpInvest Partners BV, Centerview Partners Holdings LLC	26.01.2011
BankUnited Inc	W.L. Ross & Co. LLC, Blackstone Corporate Private Equity, The Carlyle Group LP, Centerbridge Partners LP	27.01.2011
Kinder Morgan Inc	Highstar Capital LP	10.02.2011
HCA Holdings Inc	Kohlberg Kravis Roberts & Co. LP, Bain Capital Private Equity LP	09.03.2011
GNC Holdings Inc	Ares Private Equity Group	31.03.2011
Air Lease Corp	W.L. Ross & Co. LLC, Leonard Green & Partners LP, Ares Private Equity Group	18.04.2011
Thermon Group Holdings Inc	CHS Capital LLC, Thompson Street Capital Managers LLC	04.05.2011
Spirit Airlines Inc	Indigo Partners LLC, Oaktree Capital Management	25.05.2011
Bankrate Inc	Apax Partners	16.06.2011
HomeAway Inc	Institutional Venture Partners, Redpoint Ventures, TCMI, Inc., Austin Ventures	28.06.2011
Skullcandy Inc	Battery Ventures, Goode Partners LLC, Mercato Partners	19.07.2011
Francesca's Holdings Corp	CCMP Capital Advisors LP	21.07.2011
Dunkin Brands Group Inc	Thomas H. Lee Partners LP, The Carlyle Group LP, Bain Capital Private Equity LP	26.07.2011
Wesco Aircraft Holdings Inc	The Carlyle Group LP	27.07.2011
C&J Energy Services Inc	Citigroup Private Equity LP, StepStone Group LP, Energy Spectrum Capital	28.07.2011
Mattress Firm Holding Corp	J.W. Childs Associates LP	17.11.2011
Digital Domain Media Group Inc	Palm Beach Capital Partners LLC	18.11.2011
Laredo Petroleum Holdings Inc	Warburg Pincus LLC	14.12.2011
US Silica Holdings Inc	Golden Gate Private Equity, Inc.	31.01.2012
EPAM Systems Inc	Russia Partners Management LLC, VTB Capital, Da Vinci Capital Llc	07.02.2012
Roundy's Inc	AlpInvest Partners BV, Willis Stein & Partners, Norwest Equity Partners	07.02.2012
Yelp Inc	Benchmark Capital Management Co. LLC, Deer Management Co. LLC, Elevation Management LLC	01.03.2012
Nationstar Mortgage Hldg Inc	FIG LLC	07.03.2012
Allison Transmission Hldg Inc	The Carlyle Group LP, Onex Partners	14.03.2012
M/A-COM Technology Hldg	Summit Partners LP	14.03.2012
Regional Management Corp	Palladium Equity Partners Advisor LLC, Parallel Investment Partners	27.03.2012
Rexnord Corp	Apollo Global Management LLC	28.03.2012
Erickson Air-Crane Inc	Q&U Investments LLC	10.04.2012
Forum Energy Technologies Inc	SCF Partners LLC, B-29 Investments LP	11.04.2012
MRC Global Inc	Goldman Sachs Capital Partners	11.04.2012
Tumi Holdings Inc	DH Private Equity Partners LLP	18.04.2012
Ignite Restaurant Group Inc	J. H. Whitney Capital Partners LLC	10.05.2012
Five Below Inc	Advent International Corp., LLR Partners, Inc., blue 9 capital LLC	18.07.2012
Chuy's Holdings Inc	Goode Partners LLC	23.07.2012
Northern Tier Energy LP	TPG Capital LLC	25.07.2012

Del Frisco's Restaurant Grp LL	Lone Star Americas Acquisitions LLC	26.07.2012
Bloomin' Brands Inc	Catterton Management Co. LLC, Bain Capital Private Equity LP	07.08.2012
Performant Financial Corp	Parthenon Capital Inc, Madison Capital Funding LLC, Ares Capital Management LLC	09.08.2012
Berry Plastics Group Inc	Graham Partners, Inc., Apollo Global Management LLC	03.10.2012
Realogy Holdings Corp	Apollo Global Management LLC	10.10.2012
Shutterstock Inc	Insight Venture Management LLC	10.10.2012
Diamondback Energy Inc	Wexford Capital Private Equity	11.10.2012
Restoration Hardware Hldg Inc	Catterton Management Co. LLC, Tower Three Partners LLC	01.11.2012
USA Compression Partners LP	Riverstone Investment Group LLC	14.01.2013
Norwegian Cruise Line Hldg Ltd	TPG Capital LLC, Apollo Global Management LLC	17.01.2013
Bright Horizons Family	Bain Capital Private Equity LP	24.01.2013
TRI Pointe Homes Inc	Starwood Capital Group Global LLC	30.01.2013
Boise Cascade Co	Madison Dearborn Partners LLC	05.02.2013
Pinnacle Foods Inc	Blackstone Corporate Private Equity	27.03.2013
Fairway Group Holdings Corp	Sterling Investment Partners Advisers LLC	16.04.2013
Hannon Armstrong	MissionPoint Capital Partners LLC	17.04.2013
SeaWorld Entertainment Inc	Blackstone Corporate Private Equity, Goldman Sachs Capital Partners	18.04.2013
Emerge Energy Services LP	KA Fund Advisors LLC, Insight Equity Holdings LLC, LBC Credit Partners	08.05.2013
Quintiles Transnational	Aisling Capital LLC, TPG Capital LLC, Bain Capital Private Equity LP, 3i Private Equity	08.05.2013
TriState Capital Holdings Inc	Lovell Minnick Partners LLC, BankCap Partners	08.05.2013
First NBC Bank Holding Co	Castle Creek Capital LLC, Blue Pine Partners LLC	09.05.2013
Global Brass & Copper Holdings	KPS Capital Partners LP	22.05.2013
Ply Gem Holdings Inc	CI Capital Partners LLC	22.05.2013
Coty Inc	Berkshire Partners LLC, Rhône Capital LLC	12.06.2013
CDW Corp	Providence Equity Partners LLC, Madison Dearborn Partners LLC	26.06.2013
HD Supply Holdings Inc	The Carlyle Group LP, Clayton Dubilier & Rice LLC, Bain Capital Private Equity LP	26.06.2013
Noodles & Co	Catterton Management Co. LLC	27.06.2013
Fox Factory Holding Corp	Compass Group Management LLC, Madison Capital Funding LLC	07.08.2013
Stock Building Supply Holdings	The Gores Group LLC	08.08.2013
Envision Healthcare Holdings	Clayton Dubilier & Rice LLC	13.08.2013
Benefitfocus Inc	Oak Investment Partners, Goldman Sachs Capital Partners	17.09.2013
ClubCorp Holdings Inc	KSL Advisors LLC	19.09.2013
Burlington Stores Inc	Bain Capital Private Equity LP	01.10.2013
QTS Realty Trust Inc	General Atlantic LLC	08.10.2013
Antero Resources Corp	Warburg Pincus LLC	09.10.2013
Stonegate Mortgage Corp	Long Ridge Equity Partners LLC, Second Curve Partners LLC	09.10.2013
Springleaf Holdings Inc	FIG LLC	15.10.2013
CommScope Holding Co Inc	The Carlyle Group LP	24.10.2013
Endurance Intl Grp Hldg Inc	Warburg Pincus LLC, Goldman Sachs Capital Partners, Tregaron Capital Co. LLC	24.10.2013
Surgical Care Affiliates Inc	TPG Capital LLC, Oaktree Capital Management	29.10.2013
The Container Store Group Inc	Leonard Green & Partners LP	31.10.2013
Barracuda Networks Inc	Sequoia Capital, Francisco Partners Management LP	05.11.2013
Extended Stay America Inc	Blackstone Corporate Private Equity, Centerbridge Partners LP	12.11.2013
Houghton Mifflin Harcourt Co	ABRY Partners LLC, Apollo Capital Management LP, Avenue Capital Management LLC, Anchorage Capital Group	13.11.2013

Vince Holding Corp	Sun Capital Partners, Inc.	21.11.2013
ARAMARK Holdings Corp	Thomas H. Lee Partners LP, Warburg Pincus LLC, Goldman Sachs Capital Partners, CCMP Capital Advisors LP	11.12.2013
Hilton Worldwide Holdings Inc	Blackstone Corporate Private Equity, GIC Real Estate Pte Ltd.	11.12.2013
EP Energy Corp	Access Industries, Inc., Apollo Global Management LLC, Riverstone Investment Group LLC	16.01.2014
RSP Permian Inc	Natural Gas Partners LLC	16.01.2014
Rice Energy	Natural Gas Partners LLC	23.01.2014
Malibu Boats Inc	Black Canyon Capital LLC	30.01.2014
Continental Building Products	Lone Star Americas Acquisitions LLC	04.02.2014
Ladder Capital Corp	GI Manager LP, OMERS Private Equity, Inc., TowerBrook Capital Partners LP, Alberta Investment Management Corp.	05.02.2014
Installed Building Products	Littlejohn & Co. LLC	12.02.2014
TriNet Group Inc	General Atlantic LLC	26.03.2014
Enable Midstream Partners LP	ArcLight Capital Holdings LLC	10.04.2014
Zoe's Kitchen Inc	Jemison Investment Co., Inc., Brentwood Associates	10.04.2014
Paycom Software Inc	Welsh, Carson, Anderson & Stowe	14.04.2014
Sabre Corp	TPG Capital LLC, Silver Lake Management Co. LLC	16.04.2014
Sportsman's Warehouse Hldg Inc	The Seidler Co. LLC	16.04.2014
Papa Murphy's Holdings Inc	Access Industries, Inc., Ares Capital Management LLC, Lee Equity Partners LLC, Arrowhead Mezzanine LLC	01.05.2014
K2M Group Holdings Inc	Ferrer Freeman & Co. LLC, Welsh, Carson, Anderson & Stowe	07.05.2014
Parsley Energy Inc	Natural Gas Partners LLC	22.05.2014
Trinseo SA	Bain Capital Private Equity LP	11.06.2014
Adeptus Health Inc	Sterling Fund Management LLC	24.06.2014
Servicemaster Global Holdings	Clayton Dubilier & Rice LLC, StepStone Group LP, Ridgemont Partners Management LLC	26.06.2014
The Michaels Companies Inc	Blackstone Corporate Private Equity, Bain Capital Private Equity LP	26.06.2014
Minerva Neurosciences Inc	Johnson & Johnson Innovation JJDC, Inc., Care Capital LLC, Medicxi Ventures Ltd.	30.06.2014
Advanced Drainage Systems Inc	American Securities LLC	24.07.2014
El Pollo Loco Holdings Inc	Trimaran Capital Partners LLC	24.07.2014
Catalent Inc	Genstar Capital LLC, Aisling Capital LLC, Blackstone Corporate Private Equity	30.07.2014
Green Bancorp Inc	Harvest Partners LP, FFL Partners LLC, Pine Brook Road Partners LLC	07.08.2014
Independence Contract Drilling	Lime Rock Management LP, 4D Global Energy Advisors SAS, Northwestern Mutual Capital LLC	07.08.2014
Ryerson Holding Corp	Platinum Equity LLC	08.08.2014
Civitas Solutions Inc	Vestar Capital Partners, Inc.	16.09.2014
Smart & Final Stores Inc	Ares Private Equity Group	23.09.2014
Vivint Solar Inc	Blackstone Corporate Private Equity	30.09.2014
VWR Corp	Madison Dearborn Partners LLC	01.10.2014
FMSA Holdings Inc	American Securities LLC	02.10.2014
Veritex Holdings Inc	SunTx Capital Partners LP	08.10.2014
Dave & Buster's Ent Inc	Oak Hill Capital Management LLC	09.10.2014
Zayo Group Holdings Inc	HarbourVest Partners LLC, Charlesbank Capital Partners LLC, Columbia Capital LLC, Oak Investment Partners, GTCR LLC, Battery Ventures, TAC Partners, Inc., AlpInvest Partners BV, Centennial Ventures, Inc.	16.10.2014
Boot Barn Holdings Inc	Freeman Spogli Management Co. LP, CapitalSouth Corp., Brookside Capital Partners Management LLC, Hartford Mezzanine & Private Equity Group	29.10.2014
Upland Software Inc	Austin Ventures, ESW Capital LLC, Activant Capital Group LLC	05.11.2014

Freshpet Inc	MidOcean US Advisor LP	06.11.2014
INC Research Holdings Inc	Avista Capital Holdings LP	06.11.2014
Axalta Coating Systems Ltd	The Carlyle Group LP, Franklin Square Holdings LP	11.11.2014
PRA Health Sciences Inc	Kohlberg Kravis Roberts & Co. LP	12.11.2014
The Habit Restaurants Inc	KarpReilly LLC, BlackRock Private Equity Partners	19.11.2014
Connecture Inc	Live Oak Equity Partners LLC, SSM Partners, Chrysalis Ventures, Inc., Great Point Partners Private Equity	11.12.2014
Metaldyne Performance Group	American Securities LLC	11.12.2014
Bellerophon Therapeutics LLC	Venrock Associates, ARCH Venture Partners LLC, New Mountain Capital LLC	13.02.2015
GoDaddy Inc	Kohlberg Kravis Roberts & Co. LP, TCMI, Inc., Silver Lake Management Co. LLC	31.03.2015
Party City Holdco Inc	Advent International Corp., Thomas H. Lee Partners LP	15.04.2015
Virtu Financial Inc	Silver Lake Management Co. LLC	15.04.2015
Enviva Partners LP	Riverstone Investment Group LLC	28.04.2015
Tallgrass Energy GP LP	EMG Fund II Management LP	06.05.2015
Bojangles' Inc	Advent International Corp., Brooke Private Equity Associates	07.05.2015
Black Knight Financial Svcs	Thomas H. Lee Partners LP	19.05.2015
Wingstop Inc	Roark Capital Group, Inc., Arrowhead Mezzanine LLC	11.06.2015
Univar Inc	Clayton Dubilier & Rice LLC, CVC Advisers Ltd., Goldman Sachs Capital Partners, Apollo Capital Management LP	17.06.2015
Gener8 Maritime Inc	Aurora Capital Group LP, Oaktree Capital Management, BlueMountain Capital Management	24.06.2015
Lantheus Holdings Inc	Avista Capital Holdings LP	24.06.2015
Milacron Holdings Corp	CCMP Capital Advisors LP, Alberta Investment Management Corp.	24.06.2015
TransUnion	Advent International Corp., Goldman Sachs Capital Partners	24.06.2015
Alarm.com Holdings Inc	ABS Capital Partners, Inc., TCMI, Inc.	25.06.2015
Unique Fabricating Inc	Peninsula Capital Partners LLC, Taglich Private Equity LLC, Taglich Private Equity LLC	30.06.2015
Ollie's Bargain Outlet Hldg	CCMP Capital Advisors LP	15.07.2015
Planet Fitness Inc	TSG Consumer Partners LLC	05.08.2015
Conifer Holdings Inc	Strength Capital Partners LLC	12.08.2015