PIPEs: Value Creation and Investor Identity

Alexander Däubener Theodora Alexe

Master Thesis

Department of Finance

Stockholm School of Economics

Abstract

Based on a sample of PIPE issuances by companies listed on major US exchanges between 2008 and 2013, this paper explores the connection between value creation and investor identity in PIPEs. In a novel study, the paper compares the target selection of hedge funds and private equity funds and monitors their subsequent effects on value, both at a shareholder and at a business level. We find that hedge funds target smaller, riskier firms, while private equity funds engage with more stable firms. These potentially different investment strategies do however not translate into significantly different deal announcement returns. Instead, we find evidence for the importance of issuer characteristics and monitoring and certification effects beyond investor classification. Since private equity investors focus on aligning the incentives of management and shareholders, engage in financial engineering and outperform hedge funds in terms of operational improvements in targets, they seem to emulate the traditional LBO investment model in PIPE transactions. In contrast, hedge funds appear to have a monitoring role, mitigating agency conflicts and saving severely distressed firms from collapsing. We conclude that, while both issuer characteristics as well as investment approach matter for value creation, a simple classification of investors into hedge and private equity funds has little explanatory value.

Keywords: PIPE, Value Creation, Announcement Returns, Hedge Funds, Private Equity

Tutor: Per Strömberg[1]

[1] We would like to thank Per for his advice and guidance throughout the thesis process.

List of Abbreviations

AR	Abnormal Return
bn	Billion
bps	Basepoint
CAR	Cumulative Abnormal Return
HF	Hedge Fund
LBO	Leveraged Buyout
LP	Limited Partner
OLS	Ordinary Least Squares
PE	Private Equity
PIPE	Private Investment in Public Equity
ROE	Return on Equity
SEO	Seasoned Equity Offering
SIC	Standard Industry Classification
US	United States (of America)
VC	Venture Capital
$	US Dollar

List of Tables

List of Graphs

1. Introduction

Private investments in public equity (PIPEs) have emerged as an important method of financing in the US, and more recently, also spread worldwide. The amounts raised through PIPEs per annum increased from $1.4bn in 1995 to $124bn in 2008 before the financial crisis triggered a liquidity crunch and shrank the PIPE market to under $40bn in 2009 (Särve, 2013). In 2016, transaction amounts totalled $44bn (PlacementTracker, 2017). PIPE financing is often described as a "follow-up financing after the IPO" (Särve, 2013) or as a follow-on round of venture capital for firms at an early stage of development (Schultz and Twite, 2016). Research commonly finds that PIPEs are last resort equity financings for small, risky and research and development intensive companies with poor operational performance (Hertzel et al, 2002; Dai, 2006; Chaplinsky and Haushalter, 2010; Gomes and Philips, 2012; Schultz and Twite, 2016). However, PIPEs are also described as confidential, flexible, and rather cost efficient, being an attractive option for growth financing (Anson, 2001; Gerhard, 2008; Steinberg and Obi, 2008). Subsequently, more mature firms have discovered PIPEs as an alternative form of financing as the market for PIPEs has grown (Gerhard, 2008). This paper aims to explore hedge funds and private equity firms as PIPE investors, building on the assertion of Cronqvist and Fahlenbrach (2008) that some investors in PIPEs are more adapt at influencing the target than others. We use a sample of PIPE transactions between 2008 and 2013 initiated by issuers listed on the major US exchanges to investigate differences in target selection, market reactions to PIPE announcements, and subsequent business level changes for the different investor groups.

PIPEs are commonly defined using the four features private, investment, equity, and public (Gerhard, 2008). According to this definition, they are private transactions (private) through which a direct investment is made (investment) in a publicly listed company (public) via newly issued securities, either equity or hybrid (equity). However, broader definitions are also used in which especially the need for a direct investment is excluded. Traditional PIPE contracts consist of either common stock or fixed price convertible debt issuances, usually at a discount to current stock prices. Structured PIPEs are characterised by more complex contractual arrangements, with one of the main goals being the risk reduction for the investor through price protection features.

While a wide range of investors is active in the PIPE market, such as corporations, mutual funds and institutional advisors, venture capital firms, and private equity firms, hedge funds (HFs) have emerged as the most dominant players (Brophy et al, 2009). On a US sample of PIPEs between

1995 and 2002, Brophy et al (2009) find that HFs account for 24.5% of the proceeds invested in the overall PIPE market, and for 72% of the investments in the structured PIPE market, while taking part in more than 50% of all private placements. The strong clientele effect suggests that HFs appreciate price protection features and might be skilled in dealing with complex, structured securities. This is commonly attributed to their low level of regulation, which, amongst others, results in the ability to use risk management methods which are not accessible to traditional investors like mutual or pension funds (e.g. Sjostrom, 2007; Brophy et al, 2009; Dai, 2009; Floros and Sapp, 2012). Their role in such investments is however debated. While some authors see them as providing niche financing and link their involvement to improvements in the issuer's stock and operational performance (Brav et al, 2008), hedge funds have also been alleged of taking advantage of firms' desperate financing needs (Sjostrom, 2007). The latter aspect is further underlined by investigations into PIPE investments by the security and exchange commission (SEC) (Bengtsson et al, 2014) and especially relevant for investments in structured PIPEs, with some contractual features being dubbed "death spirals" (Hillion and Vermaelen, 2004).

Private equity (PE) funds have shown an increasing interest in the PIPE market in recent years, even though they are traditionally known for majority investments in mature companies, often in the form of leveraged buyouts (LBO). Särve (2013) observes that worldwide PIPE deals by PE firms have grown in line with the overall development of the PIPE market, from under $1bn per annum in 1998 to $11bn in 2010. However, PIPE deals are still a niche phenomenon, amounting to 2% of total number of PE deals from 2008 to 2010. Puche and Lotz (2015) suggest that the aging of the PE industry, the increasing experience of the participants and growing amounts of capital committed by LPs led to the evolution of the PE minority investment model. They argue that since the investors do not own a majority stake, value creation sources are limited and on average exclude financial engineering. Yet, other authors suggest that the ability of PEs to create value as proven in their majority investments also translates into PIPE engagements (Chen et al, 2014; Mietzner and Schweizer, 2014; Hüther, 2017).

Our first hypothesis is that acquirers have different investment policies and target issuers with specific characteristics. We expect HF to focus on small, distressed firms, and to engage predominantly with repeat PIPE issuers. PEs, on the other hand, should target more stable and mature firms, focusing on the first few PIPE issuances by any given issuer. We test this by applying

t-tests and Wilcoxon rank-sum tests to issuer characteristics before the PIPE issuance. In a second step, market reactions to PIPE announcements are measured using standard event study methodology. Subsequently, regressions are run on cumulative abnormal returns to understand what drives the market reaction. We expect a generally positive announcement return, as documented for private placements in general (Wruck, 1989; Hertzel and Smith, 1993; Hertzel et al, 2002; Dahiya et al, 2013). Furthermore, we hypothesize that the return in case of HF and PE involvement should be higher due to their certification and monitoring role. Additionally, PEs should outperform HFs due to their long-term value creation investment approach compared to more short term, trading focused HFs. Lastly, we study how different investors influence the long-term business performance of targets by examining governance, financial and operational engineering changes as proposed by Kaplan and Strömberg (2009). We apply univariate tests, standard t-tests, and non-parametric tests to discern between the impact of different investor groups on value creation levels. We expect PE firms to adopt a minority investment model that covers only governance and operational improvements due to a lack of control over the target, and HFs to actively remedy free cash flow problems, save firms from the verge of collapsing and consequently bring performance improvements. Ultimately, we also run multivariable regressions on long-term operating performance changes to establish whether investor identity has a statistically significant effect on the observed improvements.

Limitations to our study originate from the fact that we are not able to source our transactions from the most comprehensive dataset of PIPE deals, Sagient Research's PlacementTracker, which is consistently used in prior literature. Using CapitalIQ and Preqin data does not allow us to differentiate between traditional and structured PIPEs, possibly blurring the distinction between active and passive PIPE investments. Furthermore, a news search has revealed that the quality of our announcement date data is questionable. At the same time, we were not able to correct for this without introducing a bias given that for many deals announcement dates could not be verified.

We contribute to the existing literature on the performance of PIPE deals with hedge fund and private equity investors by evaluating and comparing them in the US context. Furthermore, we add to the research on value creation by PE firms by investigating if the well-established methods of value creation in majority investments also apply to minority PIPE investments. Additionally, we compare the value creation methods of HFs and PE funds in PIPE deals to build on literature

examining the differences between these investor types. The paper proceeds as follows. Section two surveys the existing literature on value creation in PIPE deals by PE and HFs to develop our hypotheses. Section three describes the data we collected. Section four examines the market reaction to PIPEs. Section five investigates the value creation on a business level following PIPE transactions. Section six summarizes our findings and concludes the paper.

2. Literature Review and Hypotheses

2.1. PIPEs

A private investment in public equity consists of a privately negotiated sale of unregistered securities between the issuing company and a limited number of accredited investors, followed by a registration of the securities a few weeks later (Gerhard, 2008). The direct investment allows accredited investors such as private equity firms, venture capital firms, hedge funds, mutual funds or pension funds to acquire some degree of ownership in the company. The regulatory threshold of major US stock exchanges implies that equity issues exceeding 20% ownership stakes must pass a shareholder approval. Therefore, PIPEs often stay below this threshold. Moreover, selling large blocks of equity on the public market can cause severe share price drops for a young firm, and therefore a strategic buyer is often a better alternative. In the US, equity offerings following the PIPE definition are exempt from registering with the Securities Exchange Commission (SEC) prior to the transaction and can therefore be arranged faster than a SEO according to Section 4(2) or Regulation D under the Securities Act (Särve, 2013). However, as part of the deal contract, investors usually require the PIPE issuer to file for a resale registration statement (Form S-3) so that the shares can eventually be traded (Sjostrom, 2007). This selling mechanism results in lower transaction costs for the PIPE issuer compared to a typical SEO (Gerhard, 2008). To compensate for the temporary illiquidity (usually 90 to 120 days) from the moment of the investment to the moment of registration, PIPE deals are typically issued at a discount to market prices (Särve, 2013). PIPE issuers offer an average discount of 16.4% according to Chen et al (2010) who study the US PIPE market between 1996 and 2006, in line with the average discount of an older US sample of private equity placements from 1980 to 1996 covered by Hertzel et al (2002). Chaplinsky and Haushalter (2010) suggest that the median discount ranges from 15% to 30% depending on the PIPE deal characteristics. Another risk protection feature is contractual price protection. PIPE deals can be designed as plain vanilla common equity purchases or convertibles with a fixed conversion price, known as traditional PIPEs, or can take the form of convertibles with floating conversion prices and other option-like characteristics, generally known as structured PIPEs (Särve, 2013). Schultz and Twite (2016), using a sample of US PIPEs between 1991 and 2007, find that common stock PIPEs are the dominant structures accounting for 62.1% of all issues, while Dai (2009) finds plain vanilla common stock the top security used with 45% of the US PIPE market from 1996 to 2007.

PIPEs gained popularity in the US in the late 1990s. According to Dai (2011) and Särve (2013) PIPE deals in the US have seen a steep growth in amounts raised per annum from $1.4bn in 1995 to $124bn in 2008. Post-financial crisis, investments have stabilised at around $30bn annually. Most PIPE deals are sealed in the US, representing 50% of worldwide PIPE activity (Särve, 2013). Europe lags behind, particularly due to the difficult legal frameworks such as the pre-emptive rights of existing shareholders or mandatory takeover thresholds (Gerhard, 2008). Initially, PIPE deals have emerged as a niche financing alternative, especially for young internet and biotech companies who were prematurely listed on the public markets (Chaplinsky and Haushalter, 2010). Literature commonly describes PIPE issuers as small-cap firms at the earlier stage of development facing high growth opportunities, large R&D expenditures, and a poor operational performance (Hertzel et al, 2002; Dai, 2006, Chaplinsky and Haushalter, 2010; Gomes and Philips, 2012; Schultz and Twite, 2016). Brophy et al (2009) and Chen et al (2010) establish that PIPE offerings are a last resort equity financing for issuers which are financially constrained and have little bargaining power. Yet, PIPE issuances can also be selected because they are quick, confidential, flexible, and rather cost efficient, specifically to finance growth (Anson, 2001; Gerhard, 2008; Steinberg and Obi, 2008; Schultz and Twite, 2016). Furthermore, PIPEs can be used when the market environment is unfavourable for public offerings or if the share price is undervalued, resulting in positive announcement effects (Hertzel and Smith, 1993; Chen et al, 2010). Chaplinsky and Haushalter (2010) help explain these different views on PIPEs by linking issuer characteristics with contractual terms. Exploring the US PIPE market using 1,179 transactions between 1995 and 2000, they find that traditional, discount only PIPEs are mainly issued by low risk firms, but are rare amongst firms with a high risk of financial distress and unclear investment opportunities. Furthermore, issuers of structured PIPEs with contingent claim features are characterized by high cash burn rates, little tangible assets in place, high levels of intangible assets, poor stock performance prior to the issuance, and a higher likelihood of delisting. However, they find that investors earn a return in line with market benchmarks regardless of the issuing company, which indicates that investors can identify and manage risk.

The investor base for PIPE offerings has developed to encompass a wide range of institutional investors and wealthy private individuals. Dai (2009) emphasises that the main investors in the US PIPE market are institutional investors (70%) with HFs being preeminent (Meidan, 2006; Besley et al, 2007). Dresner and Lee (2009) report that the most active investors in PIPE deals are HFs

(45%), PE funds (12%) and financial institutions (7%) based on a sample covering 2005 to 2008. According to Brophy et al (2009) HFs account for 24.5% and PE LBO firms account for 11.6% of US PIPE issuances between 1995 and 2002. HFs account for 72% of investments in structured PIPEs while PE LBO firms show little interest in structured securities with 0.7% (Brophy et al, 2009). These so called structured PIPEs offer the investor risk protection, which might be a suitable from of financing for high risk firms (Hillion and Vermaelen, 2004) because they have the potential to mitigate adverse selection issues and cost of financial distress (Myers and Majluf, 1984; Brennan and Kraus, 1987). However, they are also being criticized for incentivizing the investor to short the targets stock to drive prices down, resulting in an increased profit on the convertible (Anson, 2001; Hillion and Vermaelen, 2004; Sjostrom, 2007). Hillion and Vermaelne (2004) report negative announcement returns for such PIPEs, and Brophy et al (2009) find that issuers of structured PIPEs perform poorly following the issuance while the investor is making a profit due to the risk protection. However, this is not conclusive evidence that a structured PIPE is good or bad news, since the average underperformance might be because the issuers are riskier and more prone to fail, thus constituting a selection bias. For traditional PIPEs the situation is different, 16% are invested in by HFs and 14% by PE LBO firms.

The influence of PIPE investors is widely discussed since the certification and monitoring they provide could be valuable to issuers which are suffering from a high degree of informational asymmetry (Wu, 2004; Wu et al, 2005; Gomes and Philips, 2012). Sophisticated investors might possess resources and managerial skills that could benefit their portfolio companies and mitigate agency conflicts between mangers and shareholders (Barber, 2006; Achleitner et al, 2010; Boyson and Mooradian, 2011; Bessler et al, 2015). These factors have been cited in the literature as reasons for the empirical observable, positive announcement effect of private placements (Wruck, 1989; Hertzel and Smith, 1993; Hertzel et al, 2002; Dahiya et al, 2013). However, this positive announcement effect is not uniform and contingent on additional factors. Wruck (1989) finds that the announcement return depends on the resulting change in ownership, while Wu (2004) and Barclay et al (2007) report that private placements are often made to passive investors and can also result in increased management entrenchment, thus exacerbating agency conflicts. Furthermore, Shleifer and Vishny (1986) show that the return on monitoring efforts, and therefore the likelihood of monitoring by an investor, depends on the size of the stake they take in the target. Similarly, Cronqvist and Fahlenbrach (2008) as well as Petry (2015) highlight the importance of not only

stake size, but also board representation for the ability to bring about change in the target. Additionally, announcement returns might result from investor over optimism (Hertzel et al, 2002; Dahiya et al, 2013), especially in case of small growth firms (Carpentier et al, 2011). Finally, Floros and Sapp (2012) provide evidence that informational content and the strength of the reaction to an announcement depends on if a PIPE is a consecutive deal.

The before mentioned considerations are often connected to investor identity (Krishnamurthy et al, 2005; Cronqvist and Fahlenbrach, 2008; Brophy et al, 2009; Mietzner and Schweizer, 2014). Pension funds, insurance companies etc. are highly regulated, possibly have connection to the target company on other levels than the PIPE investment, or other interests apart from investment returns (Black, 1997; Barber, 2006; Aggarwal et al, 2011). This might lead them to be passive investors or to follow agendas which are designed to further their overall (business) goals rather than maximise value on the investment. Alternative investment vehicles like HFs and PEs are less regulated and have a clear value maximisation target, which allows them to be more active in their portfolio companies (Brav et al, 2008; Brophy et al, 2009; Mietzner and Schweizer, 2014). Alternative investors are however not a homogenous group and have been found to differ in the selected targets, investment philosophies, as well as levers used to create value (Dai, 2006; Achleitner et al, 2010; Mietzner and Schweizer, 2014). In contrast, Meidan (2006) argues that, after controlling for offer characteristics, investor identity does not explain announcement returns of PIPEs. Notwithstanding, the connection between target performance and investor identity can still be made if different investor types target firms with certain characteristics, as research suggests (Brophy et al, 2009; Floros and Sapp, 2012; Mietzner and Schweizer, 2014).

2.2. Private Equity Investors

2.2.1 Value Creation by Private Equity Investors

Fuelled by the widely-recognised ability of LBO investment firms to create value, the PE industry has witnessed rapid growth of annual capital commitments in the last decades, from $0.2bilion in 1980 (Kaplan and Strömberg, 2009) in the US to $347bilion invested globally in 2016 (Preqin, 2017). Since the emergence of PE funds as “corporate raiders” in the 1980s and the findings of Jensen (1986, 1989), suggesting that the LBO is a superior organizational form which disciplines management and reduces agency costs of free cash flow, much research has been conducted on the efficiency and mechanisms through which PE firms transform target firms. The traditional LBO model implies acquiring a controlling stake in a mature, established firm and introducing a highly-

leveraged capital structure, with 60% to 90% debt financing. This structure is not compatible with the expectations and short term focus of public markets (Cornelli and Karakas, 2012). The investment model also entails aligning management interests towards value creation via equity compensation packages, and offering advisory services through a network of industry professionals. The median holding period of investments worldwide is six years (Kaplan and Strömberg, 2009) and target IRR returns for the industry are 25% and 2.5x money multiple (Higson and Stucke, 2012).

Recent studies demonstrate that PE firms reward LPs with sustained excess returns over the relevant market benchmarks, even after adjusting for fees. Brown et al (2015) conducts the most comprehensive global study on the investment performance of PE funds and finds that buyout funds have consistently outperformed public equities as measured by public market equivalents (PMEs) in all vintage years before 2006. The PME indicators used in the study follow Kaplan and Schoar methodology (2005) and compare net of fees invested capital in PE funds to an equivalently-timed investment in the relevant public market. Harris et al (2016), indicate that the global PE industry has outperformed S&P 500 by 3-4% annually net of fees until 2006. Higson and Stucke (2012) find that US buyout funds with vintage years from 1980 to 2008 have outperformed the market in net returns by 5% annually. Similarly, Ang et al (2013) report that private equity beats public index portfolios over the period from 1993 to 2010. Based on this favourable empirical evidence of consistent value generation, researchers have focused next on how PE firms achieve these results.

According to Kaplan and Strömberg (2009), PE firms manage to create value at the portfolio company level through financial, governance and operational engineering. While financial and corporate governance improvements have been documented since the 1980s through the work of Jensen (1989) and Kaplan (1989), operational engineering emerged more recently because of increased competitiveness and sophistication of PE firms. Gompers et al (2015) find through a survey of PE firms that the three levels of value creation documented by Kaplan and Strömberg (2009) are in line with the investment practices and action plans employed in targets. Financial engineering pertains to "optimising" the capital structure of the target firm and adopting leverage levels that exceed the average ratios dictated by industry competitors. The burden of debt increases the costs of financial distress and has the effect of disciplining management, eliminating corporate perks and correcting waste, overall fixing the agency costs of free cash flows. At the same time,

leverage triggers tax shields due to interest tax deductibility. Governance engineering implies that PE firms set the incentives of top management towards long term value creation, thereby aligning the interest of managers and shareholders. This is aided by the concentrated ownership, while in public companies the management has to consider the interests of a diverse shareholder base. Top managers are offered a substantial equity stake in the company and are also required to invest a part of their wealth to resolve agency conflicts (Kaplan, 1989; Kaplan and Strömberg, 2009; Acharya et al, 2012). Furthermore, boards of PE backed firms are often restructured to a smaller size and include members with professional expertise in the industry (Cornelli and Karakas, 2012; Gompers et al, 2015). This practice allows the PE investors to provide advisory services and accelerate the transformation of the target. In operational engineering, PE firms restructure the portfolio companies and implement strategic plans aimed at productivity improvements, cost cutting and growth. This approach has become more relevant as the PE landscape became more competitive and potential targets improved their governance and capital structure in a defensive response to takeover threats (Gompers et al, 2015). The PE firm usually replaces poorly performing managers with new personnel sourced from their network of industry professionals (Gompers et al, 2015). Covering US buyouts from 1980 to 2005, Davis et al (2014) report that they materially improve operating margins at target firms. Similarly, Cohn and Towery (2013) detect value creation through operational turnarounds in a sample of US private buyouts from 1995 to 2009. Acharya et al (2012) present evidence consistent with mature PE houses in Western Europe creating economic value for portfolio companies.

PE activity is influenced by the availability of credit and the industry has a cyclical character (Kaplan and Strömberg, 2009). Moreover, returns generated by funds with a post-2005 vintage year seem roughly in line with public markets, though the findings are not final given that most funds include unrealised investments. Harris et al (2016) explain this either through a decline in the illiquidity premium or through the attractive returns of the PE industry which lead competitive LPs to allocate funds in excess of the available investment opportunities. Gompers and Lerner (2000) coin the expression “money chasing deals” to explain how demand drives valuations up and depresses returns. Kaplan and Schoar (2005) also argue that the cyclical underperformance of PE returns is a result of capital flowing to underperforming funds in boom periods. Excess funds might also contribute to the search for new investment opportunities outside traditional majority investments, and the increasing interest in PIPEs (Majoros, 2001).

2.2.2. Private Equity Involvement in PIPEs

According to Lerner et al (2009), PIPE investments account for 7% of all PE backed transactions worldwide (CapitalIQ database covering 1990-2007), whereas they represent 10.5% of all PE transactions in North America. Not surprisingly, North American PIPE investments constitute 86% of the global PIPE investments (Lerner et al, 2009). While PE PIPE deals remain a niche issue in the overall PE market, amounting to only 2% of total number of PE deals from 2008 to 2010, their contribution to the PIPE market has grown to be significant (Särve, 2013). The rising interest of PE firms in PIPEs is documented in Majoros (2001), Christinat (2002), and Kuzneski and Landen (2006). Särve (2013) also observes that worldwide PIPE deals by PE firms have increased in line with the overall development of the PIPE financing market, from under $1bn per annum in 1998 to $11bn in 2010. Given the recency of this development, research on PEs as PIPE investors is sparse. PE funds are generally seen as long term investors who are adapt at creating value in target firms through a variety of measures (e.g. Davis et al, 2014; Gompers et al, 2015). Some papers claim that their traditional investment approach translates to their involvement in PIPEs, resulting in comparatively larger stakes held, longer investment horizon, and a value enhancing influence on the companies' governance and business (Chen et al, 2014; Mietzner and Schweizer, 2014; Hüther, 2017). Furthermore, PE funds do not usually engage in trading strategies like HFs, thus mitigating the shorting issue in floating rate convertibles (Christinat, 2002) and providing a more credible certification effect than HFs. Other authors argue that the acquired minority stakes do not allow to exert influence on the target and see the engagement of PEs in PIPEs as a result of excess funds (Majoros, 2001; Christinat, 2002; Kuzneski and Landen, 2006; Puche and Lotz, 2015). A connecting theme in the literature is however that PE targets tend to be more mature and stable firms than HF targets.

Hüther (2017) reports that while buyout funds do usually not seek a majority in their public investment, the holding period is the same as in their private engagements. Furthermore, the sample shows a run up in stock prices around the filing date of the investment, which he links to market expectations about investor activism. Dahiya et al (2013) confirm this announcement effect using a sample of 456 PIPEs and 1,910 SEOs issued in nine Asian countries between 2000 and 2009. They stress that it is stronger for PE than other investors, implying market expectations towards certification and monitoring, tough they cannot find subsequent improvements. Evidence for such improvements is however provided by Chen et al (2014). They explore the value creation in block

share acquisitions by PE firms using a sample of 1,132 acquisitions in the US between 1990 and 2006. Following the classification of value generating activities put forth by Kaplan and Strömberg (2009), they find that governance and operational engineering are important value creation channels, while financial engineering plays less of a role. Furthermore, they discover evidence for the PE funds' active involvement in their portfolio companies in form of larger stakes and an increased likelihood of board representation, specifically on governance related committees, when compared to other block acquirers. Additionally, the representatives PE firms place on the target's board are selected based on the needs of the target, thereby leveraging the PE's network to add value. Subsequently, the targets in PE acquisitions, especially when they have poor prior performance, high R&D intensity, or if they have a PE representative on the board, i.e. have more potential to profit from the additional expertise, show a better performance than targets with non-PE acquirers. They enjoy higher abnormal returns upon announcement and stronger improvements in post announcement operational performance.

2.3. Hedge Fund Activism

2.3.1. Value Creation by Hedge Funds

Shareholder activism in the US has a long history in which the most prominent investor groups have changed over time (Gillan and Starks, 2007). More recently, HFs have become important activist shareholders, typically acquiring a significant minority stake in target companies (Brav et al, 2008; Boyson and Mooradian, 2011). As described by Connor and Lasarte (2004), the HF category comprises a wide range of investment strategies, with the connecting features being weak regulation, an extremely performance based incentive structure for fund managers, and non-transparent investments. They categorize investment strategies into long/short, tactical trading, relative value, and event driven. Long short strategies simultaneously sell and buy securities to insulate certain return sources, while tactical trading sets out to exploit predicted market movements, relative value strategies attempt to take advantage of mispricing, and event driven strategies to make a gain from company events. Combinations of these strategies are common and activist investing as the attempt to influence portfolio companies can be done in the context of several of those strategies.

Despite allegations of having a short-term focus, the literature evaluates HF activism generally as beneficial for shareholders. While HF activism is often found to address cash related agency costs (e.g. Boyson and Mooradian, 2011), there is also evidence connecting it to operational

improvements (e.g. Brav et al, 2008). Aggarwal et al (2011) discuss the influence of activist shareholders on firm governance in 23 countries between 2003 and 2008. They find that governance changes are driven by institutional ownership, which also influence CEO turnover and is positively correlated to value creation in the target companies. Specifically, independent institutions like fund managers drive change, while institutions with possible business connections to the target companies like banks and insurance companies do not. Furthermore, investors based in a country with strong minority shareholder protection, like the US, play the most important role, regardless of if they are investing domestically or in a foreign country. In two studies from 2010 and 2016, Becht et al shed light on further factors which are important for successful shareholder activism. In the 2010 study, they use a sample of 362 activist shareholder interventions in Europe between 2000 and 2008 to confirm that focused activist funds, like certain HFs, are more profitable than other activists. Furthermore, public interventions outperform private ones, and hostile action proves more profitable than non-hostile interventions. Looking at differences between countries, they find no effect of different legal jurisdictions after controlling for the before mentioned factors. Becht et al (2016) use evidence on 1,740 activist engagements in 23 countries in Asia, Europe, and North America between 2000 and 2010 to stress the importance of ownership patterns. HFs need the support of other investors to succeed with their interventions. Subsequently, different ownership patterns across countries are an important determinant for the success of activist campaigns. Activism is most common where institutional ownership is wide spread, especially if those institutions are US based. Similarly, multi activist engagements in one target are common and outperform single activist engagements.

Bessler et al (2015) find positive short and long term effects on shareholder value by HF activism in Germany based on a sample of 231 activist actions between 2000 and 2006. Of those, 14 were PIPE investments. More aggressive HFs generate higher abnormal announcement returns, which revert later, and are outperformed by non-aggressive HFs in the long run. Looking at the PIPE subsample, they find that equity injections go to small growth companies with financing constraints. Investigating how activist HF generate value, Klein and Zur (2009) stress the effect of addressing cash related agency issues. In their sample of US activist investments by 101 HFs and 151 other private investors (including nine PE and five VC investors) between 1995 and 2005, they find that HFs target comparatively more profitable firms, with more cash on their balance sheets and a lower asset to debt ratio. Both investor types enjoy a high success rate for their interventions

and are likely to gain board representation. Furthermore, investments by both groups cause a positive market reaction for the target's stock, as well as significant, positive returns in the following year. The abnormal return following the announcement is higher for HFs than for other private investors, implying that the market believes in HFs' ability to create value.

Other authors confirm that HFs address cash related agency issues, but also find evidence on different value creation levels. Boyson and Mooradian (2011) investigate the outcomes of HF activism based on 418 pairs of HFs and targets between 1994 and 2005 in the US. They find that HFs are successful in causing governance changes and encouraging mergers. Thus, they improve the short and long term stock performance, as well as the long term operating performance of their targets. On a sample of 1,059 HF target pairs in the US between 2001 and 2006, Brav et al (2008) find that HFs propose a wide range of changes in their target and succeed in their attempts two thirds of the time. The stock market reacts to activism announcements with positive returns, which only reverse if the HF exits the investment without successful interventions. Most activist engagements are non-confrontational, however HFs engaging in hostile activism and with an established track record create better outcomes. Interventions address agency conflicts, e.g. by increasing pay-out ratios and book value leverage, as well as operational measures in form of the return on assets and operating profit margins, with operational changes taking a longer time to manifest. Furthermore, they find that targeting sales improvements or changes in business strategy is connected to the largest abnormal returns, while changes in the capital or governance structure creates positive, yet insignificant returns. In line with the importance and longer time until an effect is seen for operational improvements, the median holding period in the sample is found to be one year, with the author arguing that do to data collection issues, the true holding period should be closer to 20 months.

2.3.2. Hedge Fund Involvement in PIPEs

The existing literature on HFs as PIPE investors is limited, however the view on their involvement in PIPEs is largely negative. HFs are most commonly connected to structured PIPEs issued by financially constraint firms and a negative performance of their targets post issuance (Anson, 2001; Sjostrom, 2007; Floros and Sapp, 2012). A common theme is that the typical HF target is a growth firm, i.e. smaller, riskier and with weaker fundamentals (Brophy et al, 2009). Given that HFs are a heterogeneous investor group, PIPE investments could be part of different strategies as categorized by Connor and Lasarte (2004). If PIPE positions are entered into at a discount and

hedged through contractual risk protection and short selling to lock in the profit, they could be categorized as short-term, event driven investments. This would imply that there is little certification and monitoring by the investor. On the other hand, an activist involvement, e.g. as part of a tactical trading, long-only leveraged strategy, could lead to a focus on company value improvement with intensive monitoring.

Floros and Sapp (2012) investigate why firms issue PIPEs repeatedly using a sample of 14,958 US PIPE transactions between 1995 and 2008, of which 71% were repeat offerings. They find that issuers of multiple PIPEs are small, R&D intensive firms, hence firms with high informational asymmetry. Furthermore, these issuers exhaust their cash quickly without fulfilling the requirements for an SEO and have no other access to financing, which causes the repeat PIPE offerings to increase in frequency. On the investor side, they find that initial PIPEs attract a diverse investor group, while subsequent deals are the specialty of HFs. These later deals tend to include contractual terms which provide the investor with risk protection, which also lower the incentive to monitor the issuing company. Subsequently, the informational content of repeat PIPE offerings decreases, and the market is found to be unable to identify firms which will improve after the first PIPE issuances. Brophy et al (2009) investigate the role of HFs as PIPE investors using a sample of 4,330 US PIPE transactions between 1995 and 2002. They find that HFs invest in companies with weaker fundamentals and higher informational asymmetry. To compensate for this, they use risk mitigating contracts. That the issuers accept those implies that they have no access to other methods of finance. Furthermore, their research shows that companies in which HFs invest perform poorly post issuance.

2.4. Comparisons between PE and HF as PIPE Investors

Some studies also contrast HF and PE involvement in PIPEs and find generally positive evidence on the performance of PE investors, namely regarding business level improvements. Mietzner and Schweizer (2014) base their analysis of valuation effects of block acquisitions by HFs and PEs respectively in Germany on a sample of 159 PE and 67 HF block share acquisitions between 1993 and 2007. The authors argue that both investor types differ from others in their incentivisation and ability to address agency costs in targets. While they find a positive market reaction to transaction announcements for both investor classes, only PE funds can successfully address agency conflicts and improve operational performance. They connect this finding to the longer-term strategy of PE funds and their higher adaptability to the German, stakeholder oriented corporate governance

system. Furthermore, they find that PEs and HFs target different companies, with the typical HF target being smaller and more likely to already have another HF investor, which allows building shareholder majorities while maintaining a smaller stake. Mietzner et al (2011) report similar results using a sample of 78 HF and 171 PE investments in Germany between 1993 and 2009. They find positive abnormal announcement returns for both investor groups, with PEs outperforming HFs. HFs increase pay-out ratios while decreasing investment activity in their target firms, thus showing a more pronounced focus on shareholder value maximisation. On the other hand, PE funds are more successful in adapting to a stakeholder focused environment. Dai (2006) takes a slightly different angle by comparing the value creation of VCs and HFs based on 113 PIPEs placements with VCs and 397 PIPEs placed with HFs, which nevertheless paints a similar picture. She finds that VCs sit on the issuing company's board more often than HFs and are invested for a longer time. Additionally, holding length of the investment and the acquired stake as measures of commitment have a positive effect on value. Subsequently, while both investor types come with a positive announcement effect on the issuer's stock price, the effect is higher for VC investments. Additionally, the stock performance of VC invested companies improves post issuance, while the one of HF invested firms deteriorates. Despite this, the operating performance of the issuer tends to improve in the year following the PIPE issuance without a significant difference between investor types. She concludes that the positive valuation effect of a VC investment results from a certification effect, while monitoring related factors like board representation and the exchange of board members has no effect.

2.5. Hypotheses

2.5.1. Issuer Characteristics

Previous research shows that private placement issuers suffer from a high degree of informational asymmetry and are deemed poor quality firms (Wu, 2004). PIPE issuers are consistently characterised as small firms, with significant investment opportunities and a risky profile, often included in the high growth firm category (Gomes and Philips, 2012). In line with the findings of Steinberg and Obi (2008) we expect HF investors to associate with micro-cap issuers (companies with a market capitalization of under $250million), while PE firms should focus on larger firms as reported by Mietzner and Schweizer (2014). According to the same authors, HFs should also prefer targets with higher growth valuations and should invest lower stakes in companies than PEs.

Most authors agree that PIPE issuers are poor performers, face financing restrictions, invest heavily in R&D, and show a negative stock price performance in the year prior to the deal (Wu, 2004; Brophy et al, 2009; Steinberg and Obi, 2008; Chen et al, 2010; Chaplinsky and Haushalter, 2010). However, Schultz and Twite (2016) argue that not all PIPE issuers face a high likelihood of default, some being instead at an early stage of the business cycle. Therefore, we will seek to differentiate between distressed issuers and weak performers in our analysis. The emerging conclusion from recent papers is that PIPEs represent a "last resort" form of equity financing for small public companies (Brophy et al, 2009; Chen et al, 2010) and that HFs are the dominant sophisticated investor group, ready to extract wealth from firms in distress. Due to issuers' weak fundamentals, urgent need of financing, and inability to negotiate better contracts, HFs can lock in above market returns, usually by engaging in regulatory arbitrage (Sjostrom, 2007; Steinberg and Obi, 2008; Brophy et al, 2009). Finally, based on the work of Floros and Sapp (2012), we anticipate that repeat players in the PIPE market are loss making companies, in an acute need to finance R&D intensive projects and working capital needs. These firms rely predominantly on capital provided by HF investors. Comparatively, we anticipate that PE investors target the first PIPE deals of issuers.

2.5.2. Announcement Returns

Announcement returns could result from characteristics of the issuer as well as from investor characteristics. As described in the previous section, PIPE issuers are often firms with substantial issues, which gives raise to the capital injection hypothesis and distress signal hypothesis. The capital injection hypothesis regards PIPE deals as means of providing funds to financially constrained firms. Be it a financially distressed firm or an early growth firm, their existence would be threatened without the fresh capital, which implies a positive announcement effect. Under the distress signal hypothesis, a PIPE issuance reveals the adverse situation a company is in and should be followed by a negative market reaction. This is especially true for repeat issuances and is connected to floating rate convertibles and HF engagement.

The announcement returns to PIPE issuances are often linked to investor identity (Krishnamurthy et al, 2005; Cronqvist and Fahlenbrach, 2008; Brophy et al, 2009; Mietzner and Schweizer, 2014). Meidan (2006) argues that offer characteristics, not investor identity, explain the announcement returns of PIPEs. As research suggests, target performance and investor identity could however still be connected if target firm characteristics differ between investor types (Brophy et al, 2009; Floros and Sapp, 2012; Mietzner and Schweizer, 2014). Certification and monitoring hypothesis

capture investor related effects. Since investors in PIPEs are sophisticated, institutional investors with due diligence capabilities, the certification hypothesis states that their engagement attests the quality of a company. This would result in positive announcement returns, however this effect could be mitigated by conflicts of interest in the Other investor category and by risk protection features, which are especially connected to transactions involving HFs. Furthermore, PIPE investments represent a substantial investment, which justifies active monitoring by the investor under the monitoring hypothesis. The presence of a monitor reduces agency conflicts and results in operational improvements, causing a positive announcement effect. In the Other investor category, this effect may be mitigated by conflicts of interest arising from other business activities apart from investing. Monitoring by HFs might be reduced due to a short-term investment approach, including contracts with investor protection features. Collusion with management could cause entrenchment and reverse this effect. Both investor based effects are expected to diminish in repeat PIPE issuances by the same issuer.

We expect a positive announcement effect following a PIPE investment, which should be more pronounced for HFs and PEs compared to Other investors. Early evidence on positive announcement returns for private placements in the US is presented by Wruck (1989), who finds an average CAR [-20, 20] of 6.57% for 1979-1985. Hertzel and Smith (1993) report a similar CAR [-29, 10] of 8.78% between 1980 and 1987. Besley et al (2007), find a lower value of CAR [-1, 1] of 2.30%, covering 1985 to 2002, while Krishnamurthy et al (2005) and Floros and Sapp (2012) measure a CAR [-1, 1] of 1.36% between 1983 and 1992 and a CAR [-2, 2] of 1.93% between 1995 and 2008. Outside the US, Cronqvist and Nilsson (2005) report an average announcement effect of 7.27% (CAR [-1, 1]) for private placements in Sweden between 1986 and 1999. Mietzner and Schweizer (2014) find average announcement returns for PIPEs between 4.46% (CAR [-5, 5]) and 4.59% (CAR [-30, 30]) in Germany for the years from 1993 until 2007. Using deal data between 1989 and 1997 from Hong Kong, Wu et al (2005) report a CAR [-15, 15] of 8.35%.

The literature finds mixed evidence for the investor subgroups HF and PE. Mietzner and Schweizer (2014) split their sample into deals with HF and PE investors, and find that PEs outperform HFs with the CAR [-30, 30] being 5.23% and 3.31% respectively. Mietzner et al (2011) report comparable results on a geographically and time-wise similar sample. Qualitatively similar findings are reported by Dai (2006), where VC deals are found to have an average announcement

effect of 5.60%, while HFs cause a negative effect of (1.20%). Chen et al (2014) also presents favourable evidence for the announcement effect performance of PE invested deals. They report an average effect between 10.40% (CAR [-1, 1]) and 19.99% (CAR [-20, 20]) for deals with PE involvement versus 7.90% (CAR [-1, 1]) to 11.40% (CAR [-20, 20]) for deals without PE involvement using a US sample extending from 1990 to 2006. Dahiya et al (2013) report lower returns, with announcement effects between 3.41% (CAR [-1, 1]) and 5.43% (CAR [-10, 10]) on Asian data in a more recent time frame from 2000 to 2009. In the HF category, Bessler et al (2015) reports CARs reaching from 1.03% (CAR [-1, 1]) to 9.39% (CAR [-45, 45]). Those numbers are in line with our expectations towards generally positive announcement returns, while the difference between the categories seems to match our hypothesis of PE outperforming HFs and both alternative investors causing stronger announcement returns than Other investors.

In the ideal case, stock prices should be the best estimate of the present value of future cash flows to equity of a company and the market would incorporate business improvements into the stock price. This implies that announcement returns go hand in hand with subsequent improvements on a business level. The relationship might however be obscured if the market fails to evaluate an event correctly, and there is some evidence that this might be true in the case of PIPEs (Hertzel et al, 2002; Carpentier et al, 2011; Floros and Sapp, 2012). Furthermore, research indicates that markets are less informed about smaller, more risky firms (Sweeney et al, 1996). This means that the relationship between announcement returns and subsequent operational improvements might be less pronounced in PIPEs, especially for deals with HF involvement, since their average target is smaller than that of other investor groups. Despite those caveats, we expect announcement return and business development patterns to show a similar picture of value creation.

2.5.3. Value Creation through Business Improvements

Fund managers in the alternative investment class have performance-based compensation, value maximisation targets, and an active approach to creating value through their resources and expertise (Brav et al, 2008; Kaplan and Strömberg, 2009). Therefore, we expect PE firms and HFs to adopt a business model that adds value to PIPE issuers. However, we anticipate substantially different investment models for the two groups, as outlined by Achleitner et al (2010) and Mietzner and Schweizer (2014). For consistency, we will test the business improvements triggered by PE firms and HFs based on the same classification: governance, financial and operational engineering.

In PE investments, we expect the traditional LBO investment strategy to extend to the involvement in PIPEs, implying a longer investment horizon and larger stakes held compared to HF PIPE investors, as well as impactful changes in corporate governance and operations (Chen et al, 2014; Mietzner and Schweizer, 2014; Hüther, 2017). Nonetheless, the minority stake acquired in PIPEs should limit the investor's control over major corporate decisions, preventing the remodelling of the target and, in contrast to LBO investments, impeding the ability to unlock value through financial engineering (Chen et al, 2014; Puche and Lotz, 2015). Corporate governance improvements employed by PE firms should pertain to aligning the interests between managers and shareholders by introducing a performance-oriented managerial compensation. We expect agency costs to be diminished by increasing managerial ownership and appointing skilled board members and managers. Since PIPE issuers are high growth firms, PE investors providing capital should offer a monitoring role, scrutinising investment projects and reducing free cash flow problems (Achleitner et al, 2010). Thus, PE firms should also indirectly reduce informational asymmetry. Additionally, the industry expertise of PE investors should allow them to implement operational improvements (Chen et al, 2014; Puche and Lotz, 2015). Especially for poorly operating targets with good investment opportunities, the advisory services provided by professional investors should add significant value in the long term and result in a superior performance compared to non-PE targets (Chen et al, 2014).

HFs are commonly associated with structured PIPEs and a short-term oriented, trading based investment model (Anson, 2001; Floros and Sapp, 2012: Gillan and Starks, 2007). Nevertheless, Brav et al (2008), Klein and Zur (2009), Boyson and Mooradian (2011), and Bessler et al (2015) lead us to expect HFs to be activist investors with substantial holding periods in their minority investments in PIPEs. We anticipate that the HF investment model has an overall positive effect on the target's business, generally implying an active monitoring role with the objective to mitigate agency conflicts. In terms of financial engineering, HFs should not aim to burden targets with additional debt and should not be able to turnaround the target's financial situation (Achleitner et al, 2010). However, we do expect HFs to create value through governance engineering, namely through resolving free cash flow problems. HF investors should push for cutting back inefficient R&D projects in risky targets with high informational asymmetry, thereby unlocking value and providing a useful monitoring function. This approach should also discipline management. Moreover, we expect to find evidence of operational improvements in HF PIPEs particularly since

investments are predominantly in targets with weak fundamentals which are often in distress, unable to survive without the capital injection (Brav et al, 2008; Boyson and Mooradian, 2011).

2.5.4. Summary of Hypotheses

We expect PIPE issuers to be small cap firms, with poor operational performance, high growth opportunities and an R&D intensive profile. Given these overall characteristics, HFs should invest in firms experiencing financial distress and PE firms should concentrate on more mature issuers, with promising business prospects and better financials. Lastly, repeat players in the PIPE market should predominantly rely on HF investors to provide capital for survival of the firm, while PE firms should focus on initial PIPE transactions.

The substantial investments represented by PIPEs justify active monitoring from investors which can mitigate agency conflicts and bring operational improvements. Hence, we expect the announcement of PIPE investments to trigger a positive market reaction, which should be more pronounced for HFs and PEs compared to Other investors. Given that stock prices should be the best estimate of the present value of future cash flows to equity, announcement returns and business development patterns should convey the same value creation potential in targets.

We expect PE firms and HFs to adopt a business model that adds value to PIPE issuers. PE investors should pursue a long-term value creation model, with longer median holding periods and larger stakes compared to HFs. Both investors should mitigate agency conflicts, with PE firms aligning the incentives of managers and shareholders, and HFs focusing on cash related agency issues. We do not anticipate investors to be able to significantly alter the capital structure of the target through financial engineering. While PE investors should have an important advisory role aimed at improving operations of the target, HFs are expected have an indirect influence through providing cash to otherwise financing constraint, distressed targets.

3. Data and Descriptive Statistics

3.1. Dataset

Our analysis focuses on PIPE issuances between 2008 and 2013 on major US stock exchanges (NYSE/AMEX and NASDAQ) by domestic or foreign issuers with primary or secondary common stock listings on those exchanges. We consider issuances on major stock exchanges only since their more stringent disclosure requirements help us to find the needed firm level financial data for our analysis. Similarly, we analyse the US PIPE market due to the better availability of data and its dominance in terms of PIPE market volume (Lerner et al, 2009; Särve, 2013). The time window was chosen to update the existing literature on PIPEs, which uses data up to the year 2009 (e.g. Mietzner et al, 2011; Dahiya et al, 2013). This is especially relevant since the PIPE market as well as the involvement of PEs in PIPE deals have seen a strong development in recent years (Särve, 2013). The observation period is ended in 2013 to allow us to track the performance of the issuing companies in the three years following the PIPE issuance.

We obtained data on PIPE deals from CapitalIQ (2,267 observations) and Preqin (155 observations). After correcting for overlapping deals, 2,382 PIPE unique deals were identified. 28 deals from the Preqin sample occurred outside the exchanges specified above and were therefore excluded, yielding 2,354 PIPEs. A list of HFs and LBO funds from CapitalIQ was used to identify and classify investors. We differentiate between HFs and PEs, all other investors are summarized under Other, while deals for which we lack investor information are labelled unknown. Table 3.1 shows a breakup of the observations based on investor types. The rest category summarizes deals in which multiple investors with different identities were involved. Note that this contains no precise information about the number of investors participating in each deal, i.e. a deal with a single HF investor would be labelled "HF" in the same way as a syndicated deal with several HF investors would.

Table 3.1
PIPE Deals Split by Investor Identity

Investor Type	No. of Deals	% of Deals
HF	134	5.69
PE	227	9.64
Other	754	32.03
Unknown	940	39.93
Rest	299	12.70
Total	2,354	100.00

With only 5.7% and 9.6% of deals being in the HF and PE category respectively, the proportion of alternative investors in the PIPE sample is notably lower than reported by previous studies (Brophy et al, 2009; Dresner and Lee, 2009). We could not obtain investor data for almost 40% of total deals, which might include a substantial number of alternative investors, given that their lower level of regulation gives them more leeway in deciding what to report publicly. This complicates the comparison of our sample to those of other authors. Since our aim is to identify the link between value generation and investor identity, we exclude deals for which we have no investor information (unknown) as well as syndicated deals with involvement of several investor categories (rest). This leaves us with a total of 1,115 deals in the HF (134), PE (227), and Other category (754). Another difference between our sample and the literature is that we have more PE than HF deals. This results from the observations we obtained from Preqin, which almost exclusively concentrates on PE investments and provides roughly half of the PE deals in our sample. This also implies that if we exclude Preqin deals, we have an almost equal number of observations for PEs and HFs. As highlighted by Dai (2009), this might be due to the financial crisis which changed the predominant investor profiles operating in the PIPEs market. While HF activities dropped, PE and other strategic investors picked up the surplus deals. In case this is not attributable to the effects of financial crisis and the increased importance of PE funds in the PIPE market (Särve, 2013), this might introduce a bias in our findings.

Table 3.2 depicts the deal distributions across years per investor type.

Table 3.2
PIPE Deals Split by Investor Type and Year

Investor	Year						
Type	2008	2009	2010	2011	2012	2013	Total
HF	24 (9%)	24 (10%)	23 (16%)	22 (12%)	15 (12%)	26 (16%)	134 (12%)
PE	36 (14%)	47 (20%)	39 (27%)	36 (20%)	24 (19%)	45 (27%)	227 (20%)
Other	203 (77%)	166 (70%)	84 (58%)	120 (67%)	87 (69%)	94 (57%)	754 (68%)
Total	263 (100%)	237 (100%)	146 (100%)	178 (100%)	126 (100%)	165 (100%)	1,115 (100%)

The number of overall deals in our sample has dropped following the financial crisis in 2008 and 2009. This might lend support to the hypothesis that PIPE deals are often entered into when no other financing methods are available or stock prices are depressed (Sjostrom, 2007; Brophy et al, 2009; Steinberg and Obi, 2008; Chen et al, 2010; Floros and Sapp, 2012; Särve, 2013). According to Dai (2009), the financial crisis gave way to mega-size PIPE offerings, disrupting the traditional

PIPE market. On the other hand, the deal volume development in our sample is not representative of the overall market due to the amount of deals we excluded because of unclear investor identity.

Floros and Sapp (2012) find that the informational content of PIPE deals diminishes in repeat offerings by the same firm. Furthermore, they report that the investor types engaged in PIPEs changes for repeat offerings by the same issuer, namely that HFs become more dominant. Table 3.3 shows which investors engage in follow on deals.

Table 3.3
Multiple Issuances by Investor Type

	Number of Issuance						
Investor Type	1	2	3	4	5	6	>6
HF	55 (9%)	28 (12%)	24 (19%)	12 (23%)	4 (15%)	5 (29%)	6 (13%)
PE	145 (23%)	40 (18%)	19 (15%)	9 (17%)	7 (26%)	2 (12%)	5 (11%)
Other	421 (68%)	158 (70%)	82 (66%)	32 (60%)	16 (59%)	10 (59%)	35 (76%)
Total	621 (100%)	226 (100%)	125 (100%)	53 (100%)	27 (100%)	17 (100%)	46 (100%)

44% of observations in our sample are repeat issuances, which is below what Floros and Sapp (2012) find for the period between 1995 and 2008. This result can be explained by our narrower sample window. Considering the history of all PIPE deals reported in CapitalIQ, over 75% of deals are repeat issuances. Therefore, we will consider the impact a possibly diminishing information effect in repeat issuances might have in our later analysis. Moreover, it is notable that PE firms show a stronger involvement in early deals, while HFs are more engaged in later deals. If repeat issuers are more distressed, this would be a hint on differences in target selection.

Table 3.4 shows how issuers and deals in our sample are distributed over the SIC major industries.

Table 3.4
Issuers and Deals by SIC Major Industries

SIC Major Industry	SIC Code	Issuers	Deals
Depository Institutions	60	197 (26%)	272 (24%)
Chemicals and Allied Products	28	143 (19%)	244 (22%)
Business Services	73	46 (6%)	64 (6%)
Metal Mining	10	35 (5%)	61 (5%)
Electronic, Electronical Equipment & Components […]	36	29 (4%)	44 (4%)
Holding and Other Investment Offices	67	28 (4%)	39 (3%)
Measuring, Analysing, and Controlling Instruments […]	38	27 (4%)	41 (4%)
Oil and Gas Extraction	13	20 (3%)	32 (3%)
Communications	48	18 (2%)	28 (3%)
Others		210 (28%)	290 (26%)
Total		753 (100%)	1,115 (100%)

Our sample is concentrated in certain high risk industries, namely with a high R&D intensity (pharmaceuticals, chemicals) and challenging market conditions or inherently risky business models (financials, natural resource exploration). This fits the characteristics of PIPE issuers as described for example by Dai (2009), Haggard and Zhang (2010), and Schultz and Twite (2016).

3.2. Descriptive Statistics

3.2.1. Issuer Characteristics by Investor Type

To better understand the profile of PIPE issuers in the US market, we gathered company specific financial data from Compustat from two years before up to three years after the PIPE deal, i.e. covering the period 2006 to 2016. Following standard practice, Dai (2006), Cronqvist and Fahlenbach (2008), Gomes and Phillips (2012), and Dahiya et al (2013) discard firms in the financial industry from their studies of PIPEs due to their unique operating model. Table 3.5 shows the split up of our sample in banking and non-banking issuers.

Table 3.5
Breakdown of Targets by Industry and Investor Types

	Banking		Non-Banking	
Investor Type	No. of Deals	% of Deals	No. of Deals	% of Deals
PE	37	13.21	190	22.75
HF	5	1.79	129	15.45
Other	238	85.00	516	61.80
Total	280	100.00	835	100.00

Although the majority of PIPE deals is concentrated in non-banking industries, we would miss 280 deals (25% of the sample) by excluding the banking industry. The liquidity crunch during the 2008 financial crisis might have led banks to tap the PIPE market, and the analysis of PIPE issuers in the banking sector would bring new insights about issuer characteristics to the existing literature. Consequently, we examine PIPE deals occurring in the banking industry separately from all other industries.

Table 3.6 and table 3.7 report the firm characteristics of PIPE issuers split by industries based on the accounting data of the fiscal year end that immediately precedes the PIPE deal. The definitions of variables are displayed in the appendix. To assess if differences between HF, PE and Other targets characteristics are statistically significant, we compute summary statistics. While we also perform adjusted t-tests for the samples which display heteroscedasticity, we consider the non-parametric Wilcoxon rank-sum tests to better capture the differences between our samples and to render valid results. This is because our samples violate a few main assumptions that underpin t-tests such as the assumption of having no significant outliers or of dealing with a normally distributed sample.

Consisting of a total of 835 PIPE deals, the non-banking sample is analysed in table 3.6.

Table 3.6
Descriptive Statistics for Targets by Investor Type, Non-Banking Industries

	PE Targets (A)		HF Targets (B)		Other Targets (C)	
Variables	Mean	Median	Mean	Median	Mean	Median
Assets	19,993.12	181.94	764.63	33.36	32,410.14	120.02
Sales	1,591.33	136.06	286.32	6.05	4,307.81	35.48
Market cap	923.73	141.53	273.04	59.78	3,668.89	122.20
Enterprise Value	915.95	197.62	535.03	93.28	7,534.88	148.83
Deal size	115.55	23.50	32.65	8.66	352.92	11.82
Deal size/ market cap (%)	40.84	18.98	37.06	13.94	26.02	10.04
Tobin's q	2.71	1.38	10.61	1.90	4.86	1.58
Leverage (%)	17.85	5.16	21.95	6.70	20.02	7.36
EBITDA	160.39	3.05	16.67	(3.67)	1,050.60	(3.57)
Operating performance (%)	(469.24)	5.02	(7,923.82)	(30.70)	(1,968.30)	(3.43)
Altman Z-Score	(0.49)	2.08	(23.45)	(1.24)	(3.19)	0.48
R&D intensity (%)	685.99	14.06	10,094.23	90.83	2,276.23	31.34
Insider ownership (%)	12.51	3.85	16.98	10.00	12.94	5.84
Prior stock return (%)	(0.08)	(0.04)	(0.09)	(0.05)	(0.09)	(0.06)

Variables	Test of Difference (A-B)		Test of Difference (A-C)		Test of Difference (B-C)	
	t-test	Wilcoxon Z test	t-test	Wilcoxon Z test	t-test	Wilcoxon Z test
Assets	0.14	0.00***	0.45	0.25	0.00***	0.00***
Sales	0.01**	0.00***	0.00***	0.00***	0.00***	0.00***
Market cap	0.01***	0.00***	0.02**	0.44	0.00***	0.00***
Enterprise Value	0.08*	0.00***	0.01**	0.63	0.01***	0.01**
Deal size	0.02**	0.00***	0.03**	0.00***	0.00***	0.04**
Deal size/ market cap	0.73	0.16	0.05*	0.00***	0.21	0.01***
Tobin's q	0.01***	0.00***	0.01**	0.04**	0.04**	0.10*
Leverage	0.23	0.36	0.39	0.64	0.52	0.53
EBITDA	0.07*	0.00***	0.03**	0.07*	0.01***	0.13
Operating performance	0.09*	0.00***	0.10	0.06*	0.18	0.00***
Altman Z-Score	0.00***	0.00***	0.41	0.00***	0.02**	0.03**
R&D intensity	0.10*	0.00***	0.17	0.01**	0.17	0.02**
Insider ownership	0.08*	0.01***	0.82	0.91	0.04**	0.00***
Prior stock return	0.95	0.64	0.72	0.91	0.84	0.52

Variables *Assets*, *Sales*, *Market cap*, *Enterprise value*, *Deal size*, *EBITDA*, are in USD millions.
Assets: N (PE) = 169, N (HF) = 112, N (Other) = 447, *Sales:* N (PE) = 165, N (HF) = 113, N (Other) = 443, *Market cap:* N (PE) = 148, N (HF) = 103, N (Other) = 377, *Enterprise value:* N (PE) = 144, N (HF) = 102, N (Other) = 369, *Deal size:* N (PE) = 161, N (HF) = 128, N (Other) = 494, *Deal size/ market cap:* N (PE) = 125, N (HF) = 102, N (Other) = 363, *Tobin's q:* N (PE) = 144, N (HF) = 102, N (Other) = 369, *Leverage:* N (PE) = 144, N (HF) = 102, N (Other) = 369, *EBITDA:* N (PE) = 167, N (HF) = 109, N (Other) = 431, *Operating performance:* N (PE) = 154, N (HF) = 90, N (Other) = 363, *Altman Z-Score:* N (PE) = 134, N (HF) = 97, N (Other) = 330, *R&D intensity:* N (PE) = 80, N (HF) = 57, N (Other) = 187, *Insider ownership (%):* N (PE) = 92, N (HF) = 106, N (Other) = 413, *Prior stock return:* N (PE) = 164, N (HF) = 106, N (Other) = 435

In line with our hypothesis regarding issuer size, we find that PE targets and Other targets are significantly larger than HF targets, with differences in median values for assets, sales, market capitalization and enterprise value statistically significant at the 1% level. Between Other targets and PE targets, only the difference in the level of median sales is statistically significant. Overall, PE investors seem to concentrate their investments in targets with the strongest sales. This finding is consistent with the LBO investment model which entails actively targeting portfolio companies with a solid, competitive market position, and stable or predictable revenue streams. With respect to invested amounts, PE investors allocate significantly larger funds in absolute terms compared to HFs and Other investors. HFs invest the smallest amounts in absolute values, as validated by statistically significant results. When measuring the median deal size relative to the market capitalization of the target, contrary to expectations, the difference between PE investors (19%) and HFs (14%) becomes insignificant, although both investor types allocate stakes that are statistically greater than the investments of Other investors (10%). The result supports the hypothesis that PE firms and HFs are strategic, active investors in PIPE deals, more likely to

appoint board members due to their higher ownership and presumably aiming to monitor and offer advisory services to the targets. Capturing growth opportunities, the median Tobin's q for HF targets is significantly higher compared to both PE targets and Other targets. This highlights HFs' appetite for high growth firms and validates our hypothesis. Indeed, HF investors also prefer to invest in targets with considerably higher R&D intensity than both PE and Other targets. The median level of R&D expenses to sales for HF targets is 91%, for Other targets 32%, and for PE targets 14%. Median leverage ratios are not statistically different between the three investor groups. This implies that PE firms investing in PIPEs do not actively seek underleveraged targets in which financial engineering can create value. Regarding operating performance, EBITDA values and EBITDA margins of PE targets are significantly greater than those of HF and Other targets. Economically, PE targets have positive median EBITDA margins of 5%, while Other targets show (4%) and HF targets have a weak operating performance of (31%). These outcomes are further supported by the Altman Z-Score. PE targets have the largest median score of 2.08, above the 1.81 threshold for financial distress, followed by Other targets at 0.48 and lastly by HF targets with (1.24). These statistically significant results outline that HFs prefer to invest in financially distressed firms, in accordance with the "investor of last resort" profile they are associated with. To gauge the market's perspective on the performance of targets, we analyse prior stock performance one year before the deal. The insignificant differences between stock returns suggest that the market does not penalise HF targets, the group closest to financial distress based on Altman Z-Score. This implies that the financial situation of HF targets did not change in the past year, and that their stock price is at its lowest level. Lastly, we find that HF targets display the highest degree of insider ownership before the PIPE deal. This is explained by the fact that HFs target R&D intensive firms which compensate employees and key management with stock and options to align their incentives towards long term value creation. Overall, our analysis supports the hypothesis that HF investors prefer smaller, higher growing firms with a negative operating performance, and a greater engagement in R&D activities compared to PE investors.

In table 3.7, targets belonging to the banking industry display a different profile for PIPE issuers.

Table 3.7
Descriptive Statistics for Targets by Investor Type, Banking Industry

Variables	PE Targets (A)		HF Targets (B)		Other Targets (C)	
	Mean	Median	Mean	Median	Mean	Median
Assets	76,286.17	2,454.93	2,092.80	1,999.12	120,912.78	2,149.84
Sales	2,510.42	152.94	132.05	137.41	7,256.78	141.96
Market cap	334.56	141.28	158.96	99.33	5,578.75	179.66
Enterprise Value	1,295.76	349.72	512.60	351.85	22,384.36	453.88
Deal size	446.84	33.85	19.88	20.00	1,248.78	38.24
Deal size/ market cap (%)	78.04	14.58	23.90	15.10	47.56	22.97
Tobin's q	0.24	0.20	0.21	0.15	0.27	0.25
Leverage (%)	59.15	56.68	65.02	70.00	59.39	61.76
Net income	247.05	6.00	(0.01)	10.13	234.46	8.15
ROE (%)	(26.61)	4.09	(5.30)	6.15	3.13	7.20
Net profit margin (%)	(4.89)	6.49	0.99	7.60	6.62	10.32
Coverage ratio (%)	6.65	6.95	5.99	6.00	8.27	8.71
Insider ownership (%)	10.89	10.21	10.30	11.40	12.55	9.64
Prior stock return (%)	(0.16)	(0.04)	(0.08)	(0.11)	(0.14)	(0.13)

Variables	Test of Difference (A-B)		Test of Difference (A-C)		Test of Difference (B-C)	
	t-test	Wilcoxon Z test	t-test	Wilcoxon Z test	t-test	Wilcoxon Z test
Assets	0.31	0.45	0.62	0.34	0.00***	0.80
Sales	0.29	0.64	0.10*	0.79	0.00***	0.64
Market cap	0.05*	0.59	0.00***	0.75	0.00***	0.54
Enterprise Value	0.05*	0.62	0.00***	0.96	0.00***	0.63
Deal size	0.20	0.28	0.08*	0.70	0.00***	0.12
Deal size/ market cap	0.15	0.96	0.39	0.06*	0.16	0.19
Tobin's q	0.69	0.96	0.45	0.02**	0.33	0.23
Leverage	0.57	0.53	0.95	0.72	0.51	0.41
Net income	0.39	0.35	0.97	0.01**	0.27	0.61
ROE (%)	0.49	0.84	0.30	0.03**	0.53	0.31
Net profit margin (%)	0.68	0.42	0.04**	0.00***	0.39	0.50
Coverage ratio (%)	0.82	0.69	0.19	0.20	0.23	0.11
Insider ownership	0.90	0.84	0.50	0.74	0.70	0.95
Prior stock return	0.56	0.58	0.75	0.65	0.50	0.54

Variables *Assets*, *Sales*, *Market cap*, *Enterprise value*, *Deal size*, *Net income* are in USD millions.
Assets: N (PE) = 34, N (HF) = 5, N (Other) = 227, *Sales:* N (PE) = 34, N (HF) = 5, N (Other) = 227, *Market cap:* N (PE) = 32, N (HF) = 5, N (Other) = 215, *Enterprise value:* N (PE) = 32, N (HF) = 5, N (Other) = 215, *Deal size:* N (PE) = 33, N (HF) = 5, N (Other) = 237, *Deal size/ market cap:* N (PE) = 28, N (HF) = 5, N (Other) = 215, *Tobin's q:* N (PE) = 32, N (HF) = 5, N (Other) = 215, *Leverage:* N (PE) = 32, N (HF) = 5, N (Other) = 215, *Net income:* N (PE) = 31, N (HF) = 5, N (Other) = 212, *ROE:* N (PE) = 18, N (HF) = 3, N (Other) = 79, *Net profit margin:* N (PE) = 31, N (HF) = 5, N (Other) = 212, *Coverage ratio:* N (PE) = 18, N (HF) = 3, N (Other) = 77, *Insider ownership (%):* N (PE) = 24, N (HF) = 4, N (Other) = 224, *Prior stock return:* N (PE) = 36, N (HF) = 5, N (Other) = 234

From an economic point of view, their size is significantly larger than that of the small cap targets belonging to other industries. As Dai (2009) points out, firms with a market capitalisation exceeding $1bn issued PIPEs during the recent financial crisis, changing the structure of the market. Based on Wilcoxon Z tests, all investor groups employ their funds in similarly sized financial firms, with median asset sizes of around $2bn. The amounts invested by different investor types are not statistically significant different, and the median stake acquired by PE firms and HFs is indistinguishable. We notice lower Tobin's q values than in the non-banking sample, in line with the profile of well established, mature financial firms. While leverage ratios are economically larger than in non-banking industries, we do not observe any investor selection bias for underleveraged targets. PE firms and HFs invest in targets with a similar performance, as suggested by ROE and net profit margins, while Other investors prefer firms with a stronger profitability than PE firms. While a coverage ratio below 1% indicates financial distress, all investors in our sample target similar firms with median values of 7%, slightly lower than the 8%-12% range displayed by healthy firms. Lastly, we remark that all investors target firms with uniform prior stock performances and insider ownership stakes. Consequently, we argue that financial PIPE issuers have a different profile and do not completely fit the profile of PIPE issuers presented in previous academic research.

To better understand the selection mechanism employed by the three investor groups we breakdown the sample based on whether the targets are in distress or not. Our indicator for non-banking firms is based on the Altman Z-Score, with values below 1.81 signalling distress. However, when the necessary accounting metrics to compute Altman Z-Score could not be sourced from Compustat, we use negative prior stock returns one year before the PIPE deal as a proxy for distress. For financial firms, we use a coverage ratio below 1% to signal distress, and a negative prior stock return when necessary financial metrics are not available. While falling stock prices are also used as a distress metric in PIPE transactions by Chaplinsky and Haushalter (2010) and Schultz and Twite (2016), they could also capture market reactions to various other factors. For instance, the financial crisis might have caused stock prices to decline uniformly for PIPE issuers following general "flight to quality" by investors. Nonetheless, a poor stock performance could also reflect restructuring efforts or, for early stage firms, an uncertain product marketability. Table 3.8 shows a break up of our sample based on financial distress.

Table 3.8
Breakdown of Targets by Financial Condition and Investor Types

Investor Type	Distressed Issuers		Non-Distressed Issuers	
	No. of Deals	% of Deals	No. of Deals	% of Deals
PE	101	16.48	108	26.02
HF	79	12.89	41	9.88
Other	433	70.64	266	64.10
Total	613	100.00	415	100.00

For 87 deals, the financial distress condition of targets could not be determined due to a lack data

Evidently, HF investors have a stronger preference for fragile PIPE issuers compared to PEs, possibly introducing a selection bias when measuring post transaction performance.

3.4.2. Issuer Characteristics in Repeat Issuances

Since several issuers are repeat players in the PIPE market during our sample period (2008-2013), we analyse firm characteristics of early and late PIPE issuers separately. Early deals are the first two PIPEs by the same firm, whereas subsequent issuances are defined as late deals. While Floros and Sapp (2012) find diminishing informational content of repeat PIPE issuances after the fourth deal, we use this stricter definition to mitigate the effect of PIPEs predating our rather narrow sample window. Table 3.9 shows the investor type distribution in early and late deals.

Table 3.9
Breakdown of Targets by Number of Deals and Investor Types

Panel A: Non-Banking Industries

Investor Type	Early Deals		Late Deals	
	No. of Deals	% of Deals	No. of Deals	% of Deals
PE	162	26.91	28	12.02
HF	81	13.46	48	20.60
Other	359	59.63	157	67.38
Total	602	100.00	233	100.00

Panel B: Banking Industry

Investor Type	Early Deals		Late Deals	
	No. of Deals	% of Deals	No. of Deals	% of Deals
PE	23	9.39	14	40.00
HF	2	0.82	3	8.57
Other	220	89.80	18	51.43
Total	245	100.00	35	100.00

N (early) = 847, N (late) = 268

PE investors are more present in early deals than HFs across non-banking industries, validating our hypothesis. In the banking industry, PE firms dominate both early and late deals compared to HF investors, indicating that PE firms are more likely to engage in financial industry PIPEs than HFs. Looking at the 824 deals between 2008 and 2011 to determine the proportion of PIPEs followed by another offering by the same issuer up to two years after the deal, we find that 32% of all and Other invested PIPEs, 27% of PE invested PIPEs, and 45% of HF invested PIPEs are followed by another transaction. This confirms that PE investments are less likely to be followed by another PIPE. Given that we find in chapter 3.2.1 that the typical PE target is healthier than its HF counterpart, PE targets seem to be more likely to either reach a stage where they can access other sources of financing following the PIPE, or use PIPEs despite access to other forms of financing. On the other hand, HF targets need several PIPE rounds, either because they are further away from a mature stage despite an improving situation, or because they suffer from a deteriorating performance following the transaction.

Differences between the characteristics of issuers of early and late PIPEs can be found in table 3.10.

Table 3.10
Descriptive Statistics for Targets by Timing of PIPE Deal, Non-Banking Industries

Variables	Late Deals (A)		Early Deals (B)		Test of Difference (A-B)		
	Mean	Median	Mean	Median	t-test	Median test	Wilcoxon test
Assets	12,553.69	21.64	29,212.90	196.24	0.16	0.00***	0.00***
Sales	525.30	4.08	4,020.59	96.50	0.00***	0.00***	0.00***
Market cap	268.26	48.83	3,396.47	148.23	0.00***	0.00***	0.00***
Enterprise Value	403.82	50.06	6,725.89	212.65	0.01***	0.00***	0.00***
Deal size	154.91	5.49	292.29	19.19	0.36	0.00***	0.00***
Deal size/ market cap (%)	27.85	8.82	32.54	13.53	0.43	0.00***	0.00***
Tobin's q	10.07	2.62	3.26	1.24	0.00***	0.00***	0.00***
Leverage (%)	11.59	1.59	23.38	9.30	0.00***	0.00***	0.00***
EBITDA	(330.97)	(5.19)	1,077.31	0.56	0.00***	0.00***	0.00***
Operating performance (%)	(3,660.89)	(92.01)	(2,083.90)	4.43	0.41	0.00***	0.00***
Altman Z-Score	(13.99)	(0.50)	(2.29)	1.08	0.06*	0.00***	0.00***
R&D intensity (%)	3,633.32	69.20	3,119.38	17.76	0.82	0.00***	0.00***
Insider ownership (%)	17.29	9.86	11.79	4.74	0.00***	0.00***	0.00***
Prior stock return (%)	(0.05)	(0.03)	(0.11)	(0.07)	0.05**	0.35	0.07*

Variables *Assets*, *Sales*, *Market cap*, *Enterprise value*, *Deal size*, *EBITDA* are in USD millions.

Assets: N (A) = 199, N (B) = 529, *Sales:* N (A) = 199, N (B) = 522, *Market cap:* N (A) = 187, N (B) = 441, *Enterprise value:* N (A) = 185, N (B) = 430, *Deal size:* N (A) = 231, N (B) = 552, *Deal size/ market cap:* N (A) = 185, N (B) = 405, *Tobin's q:* N (A) = 185, N (B) = 430, *Leverage:* N (A) = 185, N (B) = 430, *EBITDA:* N (A) = 199, N (B) = 508, *Operating performance:* N (A) = 149, N (B) = 458, *Altman Z-Score:* N (A) = 180, N (B) = 381, *R&D intensity:* N (A) = 88, N (B) = 236, *Insider ownership (%):* N (A) = 198, N (B) = 413, *Prior stock return:* N (A) = 213, N (B) = 492

It is evident that early PIPE issuers in non-banking industries have significantly higher values for median assets, sales, market capitalization, and enterprise value. Significant at the 1% level, these results show that repeat issuers are small enterprises, less developed, and probably with unproven markets. The absolute and relative deal size is statistically larger for issuers who tap the PIPE market the first or second time. We expect this to reflect the fact that more mature PIPE issuers manage to access other sources of financing after the PIPE. Smaller issuers need several rounds of financing to reach that stage, provided their performance improves after the initial transactions. In terms of growth opportunities, median Tobin's q is significantly higher for late issuers, supporting the argument that these firms are at an early stage of development and face numerous expansion possibilities. The capital structure of early issuers is more levered than that of multiple issuers, presumably because they are more mature and stable, with a larger asset pool to act as collateral. Early issuers are also less reliant on risky R&D investments, as shown by their significantly lower R&D intensity. This supports the hypothesis that late issuers use PIPEs to finance working capital needs or investments required to grow their business. The traditional credit market is presumably not available for them as banks are risk averse financial institutions. As expected, the operating performance of late issuers is negative and significantly below the positive median operating performance of early issuers. The Altman Z-Score, calculated using the latest financials before the transaction, is significantly lower for multiple issuers, further emphasizing their fragile financial condition. Prior stock return differences are significant at the 10% level, with early issuers facing a slightly more negative market sentiment in the year before the issuance. This indicates that the market expects poor performers to tap the PIPE market, whereas for early issuers a PIPE deal conveys additional information about their condition. Finally, late issuers have significantly higher insider ownership, as expected due to their high R&D intensity.

In table 3.11 we analyse the same metrics for the PIPE deals occurring within banking.

Table 3.11
Descriptive Statistics for Targets by Timing of PIPE Deal, Banking Industry

Variables	Late Deals (A)		Early Deals (B)		Test of Difference (A-B)		
	Mean	Median	Mean	Median	t-test	Median test	Wilcoxon test
Assets	133,849.45	1,890.97	109,916.01	2,292.11	0.79	0.71	0.38
Sales	8,680.90	109.22	6,198.94	154.59	0.69	0.15	0.10*
Market cap	4,249.89	104.90	4,888.98	195.98	0.86	0.09*	0.04**
Enterprise Value	27,653.80	302.86	18,009.54	476.92	0.73	0.04**	0.07*
Deal size	802.98	20.00	1,174.82	39.50	0.65	0.04**	0.04**
Deal size/ market cap (%)	58.91	24.10	49.28	22.02	0.67	0.70	0.89
Tobin's q	0.21	0.16	0.28	0.25	0.02**	0.00***	0.00***
Leverage (%)	57.48	55.74	59.77	61.76	0.52	0.61	0.36
Net income	(91.37)	3.66	279.11	9.87	0.10*	0.00***	0.00***
ROE (%)	0.45	4.09	(3.62)	8.13	0.74	0.00***	0.00***
Net profit margin (%)	(0.76)	6.77	5.93	10.32	0.14	0.02**	0.00***
Coverage ratio (%)	7.58	8.77	8.04	8.50	0.57	1.00	0.54
Insider ownership (%)	13.91	12.87	12.19	9.59	0.48	0.20	0.43
Prior stock return (%)	(0.06)	(0.00)	(0.15)	(0.14)	0.07*	0.00***	0.00***

Variables *Assets*, *Sales*, *Market cap*, *Enterprise value*, *Deal size*, *Net income* are in USD millions.
Assets: N (A) = 34, N (B) = 232, *Sales:* N (A) = 34, N (B) = 232, *Market cap:* N (A) = 33, N (B) = 219, *Enterprise value:* N (A) = 33, N (B) = 219, *Deal size:* N (A) = 33, N (B) = 242, *Deal size/ market cap:* N (A) = 32, N (B) = 216, *Tobin's q:* N (A) = 33, N (B) = 219, *Leverage:* N (A) = 33, N (B) = 219, *Net income:* N (A) = 32, N (B) = 216, *ROE:* N (A) = 28, N (B) = 72, *Net profit margin:* N (A) = 32, N (B) = 216, *Coverage ratio:* N (A) = 28, N (B) = 70, *Insider ownership (%):* N (A) = 24, N (B) = 228, *Prior stock return:* N (A) = 34, N (B) = 241

Overall, we find the same differences between the characteristics of early and late issuers in the banking sample, however with a lower statistical significance. Specific to the banking sample, the median stake invested appears similar for late and early deals, and early issuers have slightly higher growth opportunities. Although early issuers are more profitable than late issuers, it is noteworthy that median profitability metrics for late issuers are also positive, in contrast to the situation of non-banking firms. This finding is further supported by indistinguishable coverage ratios for the two groups, both numbers implying that early and late issuers can be identified as healthy institutions. Thus, although early financial firms tapping the PIPE market are larger and more profitable than repeat issuers, all firms in the sample are mature, well established and with a very low likelihood of financial distress.

4. Market Reactions to PIPE Announcements and Shareholder Value

4.1. Methodology

4.1.1. Calculations

We employ standard event study methodology to investigate short horizon announcement returns on PIPE issuances. As a predicted return model, the Fama French three factor model plus momentum factor is used (Fama and French, 1992; Carhart, 1997), which leads to an expected return specification as shown in equation 4.1.

$$r_{i,t} = \alpha_{i,t} + \beta_{i,t}^{Mkt} (Mkt - Rf)_t + \beta_{i,t}^{SMB} SMB_t + \beta_{i,t}^{HML} HML_t + \beta_{i,t}^{MOM} MOM_t + \varepsilon_{i,t} \quad (4.1)$$

A regression on daily stock returns in excess of the risk-free rate $r_{i,t}$ during a 200-day window before the event was used to estimate alpha and betas for each event i. Furthermore, the robust sample standard errors (Huber, 1964) of the abnormal return σ_i^{AR} were saved for hypothesis testing. Subsequently, these estimates were used to calculate predicted returns during the event window. The daily excess return was then calculated by subtracting the predicted return $R_{i,t}$ from the realized return $r_{i,t}$ during the event window, yielding the abnormal return $AR_{i,t}$ as shown in equation 4.2.

$$AR_{i,t} = r_{i,t} - R_{i,t} \quad (4.2)$$

Cumulative abnormal returns $CAR_{i,t}$ are obtained by summing up abnormal returns over the event window.

$$CAR_i (t_1, t_2) = \sum_{t_1}^{t_2} AR_{i,t} \quad (4.3)$$

To test if CARs are statistically different from zero, we run regressions of the form presented in equation 4.4. The intercept a is the average CAR and the results from testing if the average CAR is different from 0 are indicated by displaying an increasing number of stars to denote significance on a 10%, 5%, or 1% level.

$$CAR_i (t_1, t_2) = a + \varepsilon_i \quad (4.4)$$

To understand CARs better, we proceed to run regressions with CAR as the dependent variable with J independent variables describing target, deal, and investor characteristics, as well industry and time fixed effects. Equation 4.5 shows the regression set-up, where c represents the different characteristics and dummy variables, while b denotes the respective coefficients. Results for testing

differences from zero are again indicated by displaying an increasing number of stars to denote significance on a 10%, 5%, or 1% level.

$$CAR_i\,(t_1, t_2) = \; a + \sum_{j=1}^{J} b_{i,j}\, c_{i,j} \; + \; \varepsilon_i \qquad (4.5)$$

4.1.2. Specifications

Previous event studies on the announcement effects of PIPEs and private placements use a wide range of event windows (e.g. Brav et al, 2008; Klein and Zur, 2009; Chen et al, 2014; Mietzner and Schweizer, 2014) to calculate CARs. These choices are usually motivated by doubts about the precision of announcement dates, which is also a concern in our dataset. To ensure the robustness of our findings, we utilize several event windows between three [-1, 1] to 61 days [-30, 30] around the event date.

In determining the length of the estimation window, we follow the existing literature which uses estimation windows between 90 (Dai, 2006) and 250 days (Gomes and Philips, 2012), with values around 200 days being most common (e.g. Cronqvist and Nilsson, 2005; Krishnamurthy et al, 2005; Kang and Kim, 2008; Mietzner and Schweizer, 2014). The end of the estimation window has been set 31 days before the event to allow for wide event windows, however running the event study with an estimation window ending 11 days before the event does not change our results. Despite the average time between PIPE deals by the same issuer being 379 days in our 1,115-deal sample (see chapter 3.1.), we note that the estimation window includes the effect of preceding PIPEs for 206 deals (18% of the sample). However, we expect this to have little effect on predicted returns and a randomized check of some effected deals supports this view.

As a predicted return model, we chose the Fama French three factor model plus momentum factor due to its wide acceptance and predictive superiority when compared to the market model (Fama and French, 1992; Carhart, 1997). However, we acknowledge that the choice of the predicted return model has little bearing on results given that we conduct a short-term event study (Brown and Warner, 1980, 1985).

4.2. Analysis

4.2.1. Data

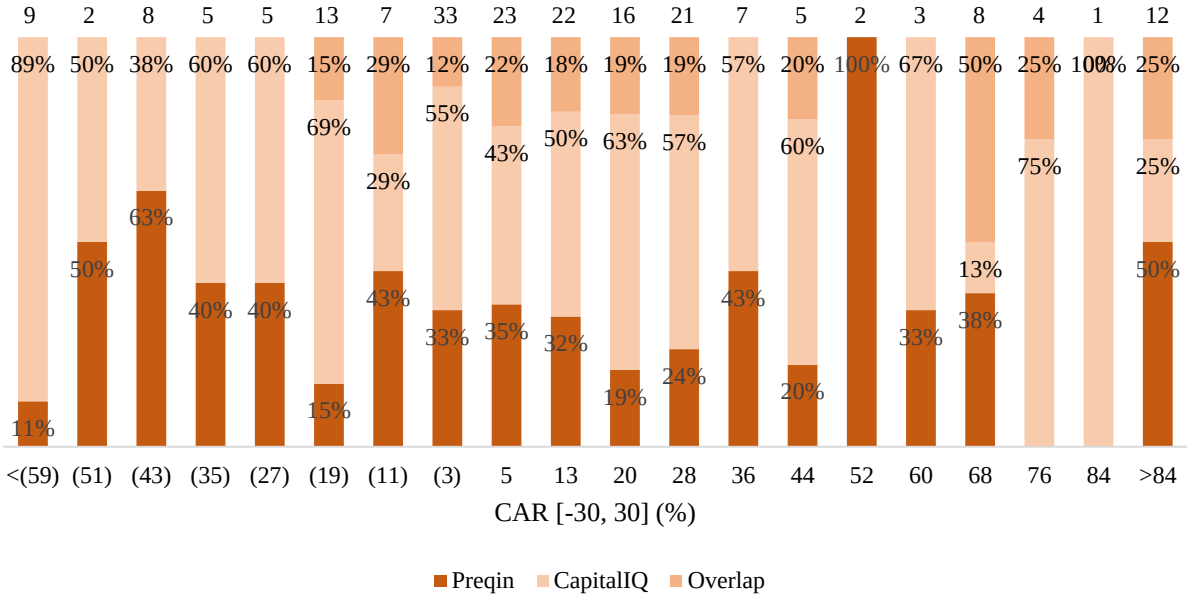
Our event study builds on the data described in chapter 3. Issuer stock prices were obtained from Datastream and, due to the complete unavailability of stock data, one deal in the Other investor category was dropped. Further deals were excluded where sufficient data to cover the event and

estimation was not available. Additional deals were excluded in the CAR regression in case of incomplete target data. Factor data for the regression presented in equation 4.1 was downloaded from Kenneth French's website (French, 2017).

Given that event studies critically depend on the event date, we scrutinized the obtained data by conducting a news search, which revealed that the obtained dates are often imprecise. At the same time, we were not able to verify the announcement dates for a large proportion of the deals in our sample. To avoid reducing our data set by this substantial amount of observations and as to not risk the introduction of a bias by correcting only parts of the observations, we chose to keep the announcement dates as stated in the original data. Furthermore, since there is neither factor data nor movements in stock prices during weekends and holidays, thus leading the event study code to exclude deals with announcement dates falling on such dates, the announcement dates of the 54 concerned deals were moved to the next business day.

CapitalIQ and Preqin use different definitions for PIPEs. After running the event study, a pronounced difference between the CARs of the two subsamples became apparent. Graph 4.1 shows a CAR histogram of deals with PE involvement split by data provider. The total number of deals per bin is shown over the columns.

Graph 4.1
Proportion of Data Sources for PE Deals, 1% Winsorized



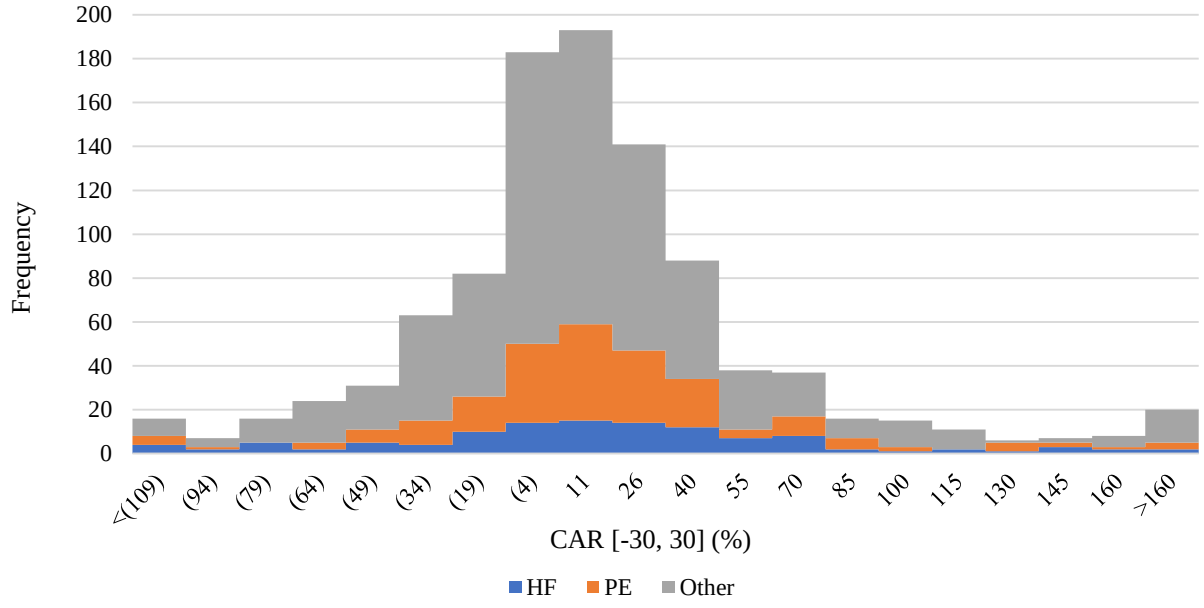
N (all) = 206, N (Preqin) = 66, N (CapitalIQ) = 107, N (consolidated) = 33

The histogram shows the tendency of Preqin deals to have higher CARs. The average CAR in the Preqin subsample is 12.40% with a standard deviation of 0.49, while the average CAR in the CapitalIQ subsample is only 1.4% with a similar standard deviation of 0.48. The overlapping deals, with an average CAR of 29.04% and a standard deviation of 0.54, outperform. We attribute the difference between the two data sources to the different PIPE definitions. While CapitalIQ requires new equity to be issued to consider a transaction as a PIPE, Preqin counts any investment by a private investment vehicle into public equity, i.e. including secondary market transactions. Since the deals in the Preqin sample are almost exclusively in the PE investor category and make up roughly half of our total observations in this category, the average CAR of the PE sample might be (upwardly) biased when compared to the other investor categories in which all deals fulfil the stricter definition of PIPEs used by CapitalIQ.

4.2.2. Announcement Returns

Our analysis reveals a wide range of CARs. Graph 4.2 presents the distribution of CARs for the [-30, 30] event window using 1% winsorized data.

Graph 4.2
Histogram of CAR [-30, 30], 1% Winsorized



N (all) = 1,002, N (HF) = 115, N (PE) = 206, N (Other) = 681

The width of the CAR distribution increases gradually with the event window, however even the CAR [-1, 1] distribution ranges from (35%) to 65% (see appendix, graph X.4.1). While the dispersion of deals with involvement of PE or Other investors mostly changes quantitatively, deals with HF involvement show a different pattern. Even though they exhibit considerable dispersion in the wider CAR windows, their deviation is lower compared to PE and Other deals up to the [-3, 3] window.

Table 4.1 shows the average announcement returns, broken down by investor identity. To ensure the robustness of the results we also ran tests using 3% and 5% winsorized data. However, these results resembled those of the 1% winsorized data and are therefore reported in the appendix, table X.4.1.

Table 4.1
Average Announcement Returns, Complete Sample

CAR	Unaltered Data				1% Winsorized			
	All	HF	PE	Other	All	HF	PE	Other
[-1, 1]	3.48***	0.79	6.38*	3.06***	2.53***	1.09	3.40***	2.51***
[-3, 3]	5.10***	5.96**	7.32*	4.28***	3.91***	5.82***	4.22***	3.49***
[-5, 5]	24.50	170.4	6.98*	5.14***	4.66***	7.60***	4.02***	4.35***
[-10, 10]	24.30	171.2	8.45**	4.28***	4.76***	9.42***	5.64***	3.71***
[-20, 20]	25.50	168.7	10.00**	5.94***	5.17***	7.40	7.22**	4.17**
[-30, 30]	26.60	170.8	11.60**	6.77***	6.78***	9.87	9.35***	5.48***

CAR [-10, 10], [-20, 20], [-30, 30]: N (all) = 1,002, N (HF) = 115, N (PE) = 206, N (Other) = 681
CAR [-1, 1], [-3, 3], [-5, 5]: N (all) = 1,001, N (HF) = 115, N (PE) = 206, N (Other) = 680

The results based on unaltered data, namely in the HF category, show the significant impact outliers have on average values. A comparison between the unaltered and winsorized data also shows that statistical significance, especially in the HF and PE categories with their lower number of observations, is reduced when using unaltered data. Therefore, we will focus on winsorized data in the following discussion.

Generally, we find positive announcement returns which increase with the length of the event window. If announcement dates were precise, this could be interpreted in terms of a slow reaction

of the market to the PIPE announcement. Since there are considerable doubts about the precision of the announcement dates in our data (see chapter 4.2.1.) it is likely that more narrow windows exclude some of the announcement reaction and even announcement reactions to some deals whatsoever. However, the phenomenon of CARs increasing in the length of the event window can also be found in previous research (e.g. Wruck, 1989; Mietzner et al, 2011; Dahiya et al, 2013; Chen et al, 2014; Mietzner and Schweizer, 2014; Bessler et al, 2015). In our sample, this effect is most notable in the PE subsample, in which it is driven by post event abnormal returns. Therefore, leakage due to a longer due diligence process in PEs doesn't seem to offer an explanation.

The magnitude of announcement returns for all deals is broadly in the range previous research has found. In our sample, HFs outperform PEs by some margin in the narrower event windows, while PEs and Others display similar values. In wider event windows, PE and HF announcement returns diverge. This indicates over all that the market believes HFs to add more value in PIPEs than PEs. Therefore, our results seem to contrast with our hypothesis and some of the research findings mentioned in chapter 2.5.2. Only Bessler et al (2015) and Dahiya et al (2013) find similar numbers as we do for the HF and PE category respectively, yet they do not benchmark them to other investor groups.

Since the mentioned papers use the same PIPE definition as CapitalIQ, we report the announcement returns for the CapitalIQ subsample in table 4.2 to generate more comparable numbers.

Table 4.2
Average Announcement Returns, CapitalIQ Subsample

CAR	Unaltered Data				1% Winsorized			
	All	HF	PE	Other	All	HF	PE	Other
[-1, 1]	3.47***	0.82	7.61	3.06***	2.42***	1.13	3.01**	2.51***
[-3, 3]	5.07***	6.06**	8.10	4.28***	3.77***	5.92***	3.37**	3.49***
[-5, 5]	25.90	173.40	7.78	5.14***	4.62***	7.72***	3.42*	4.35***
[-10, 10]	25.50	174.30	8.59	4.28***	4.53***	9.59***	4.46*	3.71***
[-20, 20]	26.60	171.50	9.88	5.94***	4.79***	7.37	5.73	4.17**
[-30, 30]	27.60	173.50	11.20*	6.77***	6.36***	9.74	7.92*	5.48***

CAR [-10, 10], [-20, 20], [-30, 30]: N (all) = 934, N (HF) = 113, N (PE) = 140, N (Other) = 681
CAR [-1, 1], [-3, 3], [-5, 5]: N (all) = 933, N (HF) = 113, N (PE) = 140, N (Other) = 680

Given that the now excluded Preqin subsample almost exclusively consists of PE deals, we see a change only in the PE category. As we reported earlier, the Preqin sample reports higher CARs, which explains why average announcement returns for PE invested deals are now lower. Statistical significance has also gone down, which might partially be attributable to the reduction in sample size. For the narrower event windows up to [-5, 5], deals with PE and Other involvement are no longer distinguishable, and PE deals do not catch up with HF deals in the wider event windows. Overall, the more stringent PIPE definition makes our previous result of HFs outperforming PEs clearer.

Table 4.3 presents the average CARs for deals with PE investors for the Preqin subsample for the unaltered data and different levels of winsorization.

Table 4.3
Average Announcement Returns of PE Deals in the Preqin Subsample

CAR	PE Preqin				PE Preqin (without overlap)			
	Unaltered	Win 1%	Win 3%	Win 5%	Unaltered	Win 1%	Win 3%	Win 5%
[-1, 1]	12.20*	5.99***	5.26***	4.71***	3.76*	4.22**	4.26***	4.17***
[-3, 3]	14.00*	7.90***	7.05***	6.43***	5.68**	6.02***	6.16***	5.83***
[-5, 5]	14.50*	8.31***	7.46***	6.92***	5.29***	5.29***	5.18***	4.99***
[-10, 10]	17.10**	11.50***	10.60***	9.71***	8.15***	8.15***	7.83***	7.13***
[-20, 20]	20.70***	15.90***	14.30***	12.60***	10.40**	10.40**	9.39**	8.06**
[-30, 30]	21.70***	17.90***	16.30***	14.40***	12.40**	12.40**	11.60**	9.80*

N (PE Preqin) = 99, N (PE Preqin without overlap) = 66

As mentioned in the data section (chapter 4.3.1.), the Preqin subsample yields higher PE announcement returns. PE returns in this subsample also exceed the announcement effects in the HF category. The CapitalIQ subsample differs from the Preqin subsample through using a wider definition of PIPEs which does not require a capital injection. This implies that issuer based effects are not present in the announcement returns, since there was neither a capital injection to rescue the company, nor were new shares issued which would contain new information about the company's situation. The remaining announcement effect should then be investor driven. With the Preqin only CARs being substantially higher than the CapitalIQ PE deals, the results indicate

positive monitoring and certification effects and a negative signal from issuing a PIPE for PE invested deals.

This might help to reconcile our previous finding with our hypothesis of PEs creating more value than HFs. In chapter 3, we find that HFs tend to invest in distressed, smaller, and risky firms, while PE targets are more stable. Therefore, the capital injection hypothesis might be more and the distress signalling hypothesis less relevant for HF targets, since it is known that they are in a difficult situation and face serious financing constraints. The opposite might then be true for PE targets, leading to positive issuer related effects for HF deals and negative issuer related effects for PE deals. Subsequently, the positive monitoring and certification effect of PE involvement would be reduced by the negative signal about the target, while the higher announcement returns for HFs might be partially explained by issuer characteristics and not fully reflect value added by the investor.

The results of the event study reveal HF invested targets to outperform PE invested targets in terms of announcement effects. However, we also find positive evidence on the monitoring and certification ability of PEs and acknowledge that issuer related effects potentially obscure the impact different investor groups have (Meidan, 2006). Additionally, some caution is warranted in interpreting the results in general since we find in untabulated t-tests that the difference between announcement returns is not significant.

4.2.3. CAR Regression

In this section, we regress CARs on a range of variables capturing time and industry related fixed effects and company characteristics. Furthermore, we include further explanatory factors brought forth in previous research. Regressions were run using unaltered as well as winsorized dependent and independent variables on all event windows. Since results based on unaltered and winsorized data show little difference, just as different event windows, we only report the results of the OLS regression on unaltered data for CARs [-10, 10] and [-30, 30]. The complete results are tabulated in the appendix, table X.4.3 to X.4.5. Given the different business models, banking and non-banking firm need to be described using different metrics, which is why we split our sample along this industry classification. Table 4.4 reports the regression results for non-banking PIPE issuers.

Table 4.4
OLS Regressions on CAR for Non-Banking PIPE Issuers

Variables	CAR [-10, 10]			CAR [-30, 30]		
	All	PE	HF	All	PE	HF
Constant	(0.223)	(0.912)	(0.128)	(0.346)	(1.055)	(0.391)
Market cap	6.13e-07	7.78e-06	(0.000116)**	4.21e-07	(1.78e-06)	(0.000177)*
EBITDA margin	3.52e-05	(0.00705)	0.000147*	8.15e-05	0.00458	0.000189
Leverage	(0.103)	0.145	0.146	(0.122)	(0.0496)	0.407
Tobin's q	(0.00143)	0.00765	(0.00334)	(0.00270)	0.0214	(0.00231)
Prior stock return	(29.48)***	(23.82)	(14.29)*	(71.93)***	(91.97)***	(11.49)
Stake	0.293***	0.682***	0.0241	0.301***	0.564***	0.0656
HF (indicator)	0.00270	no	no	(0.0473)	no	no
PE (indicator)	(0.0143)	no	no	(0.0123)	no	no
Early deal (indicator)	0.126***	0.452**	0.0951	0.147**	0.522**	0.241
Z distress (indicator)	0.0259	0.0476	(0.115)	(0.00569)	0.0560	(0.235)
Year dummies	yes	yes	yes	yes	yes	yes
Industry dummies	yes	yes	yes	yes	yes	yes
Observations	437	101	76	437	101	76
R^2	0.267	0.654	0.432	0.302	0.566	0.353

In the overall sample, we find that neither company metrics nor the investor identity dummies are significant. Furthermore, both investor dummies have a negative sign in most regressions. Overall, this indicates that a classification of investors into HFs and PEs does not provide information and is not seen as value enhancing by the market. Prior stock returns are highly significant (1% level) and negative, meaning that companies with a negative pre-event stock performance experience a 0.7% higher CAR per bps of negative, prior stock return in the CAR [-30, 30] regression, while firms with a positive stock performance have their CAR reduced by the same amount. Given that prior stock returns range from roughly (1.8%) to 2.7%, the impact of prior stock returns on CAR are economically meaningful. This observation provides evidence for the importance of target

characteristics, which should be captured in the stock price development. The finding is consistent with the signalling hypothesis, in which well performing companies with positive stock developments are seen as revealing negative information by issuing a PIPE. On the other hand, it can also be interpreted in favour of the capital injection, certification, and monitoring hypothesis, under which a badly performing firm is either saved through the new capital, receives a vote of confidence through the involvement of an investor, or is expected to reap the benefits of increased monitoring. The positive, significant stake variable (1% level) for the overall and PE sample provides further credibility for the certification and monitoring hypothesis. For the [-30, 30] event window, a 1% increase in the acquired stake is associated with a 0.3% higher CAR in the overall sample and a 0.6% increase in the PE subsample, while the coefficient is not significant in the HF subsample and only implies a 0.1% CAR increase. This indicates that monitoring and certification plays a large role in PE deals, while it seems to have little effect in HF deals. Finally, we find the early deal indicator to be significant and positive for the overall and PE sample, on a 1% and 5% for the [-10, 10] and [-30, 30] event window respectively. In the latter window, this means that early deals enjoy a 14.7% higher CAR in the overall sample, and a 52.2% higher CAR in the PE subsample. While the effect in the HF subsample would be 24.1%, the coefficient is not statistically significant. The significance of the early deal indicator again shifts the focus to issuer characteristics rather than investor identity. However, in case there is a bias towards early or late deals in certain investor groups, this might contribute to explaining the different CARs between the investor groups. Given that we found PE firms to be more engaged in early deals (see chapter 3.1., table 3.3), this effect should work in their favour. Indeed, the early deal coefficient has a much higher value in the PE subsample regression.

Table 4.5 presents the regression results for banking PIPE issuers. A lack of observations does not allow us to present results for HF deals in the banking sample.

Table 4.5
OLS Regressions on CAR for Banking PIPE Issuers

Variables	CAR [-10, 10]		CAR [-30, 30]	
	All	PE	All	PE
Constant	0.000259	(0.229)	0.0540	0.0747
Market cap	3.23e-07	9.80e-05	1.30e-06	9.58e-05
Net profit margin	0.246***	0.147	0.352**	0.270
Leverage	(0.109)	0.427	(0.111)	(0.183)
Prior stock return	(48.47)***	(54.09)**	(105.2)***	(130.5)***
Stake	0.0134	(0.0118)	0.00182	0.150
HF (indicator)	0.0300	no	0.0105	no
PE (indicator)	0.0485	no	0.121	no
Early deal (indicator)	0.0598	0.180	0.0656	0.272
Coverage distress (indicator)	0.365**	0.303	0.499*	(0.902)
Year dummies	yes	yes	yes	yes
Observations	237	26	237	26
R^2	0.321	0.742	0.357	0.778

The banking sample again shows no significance for the investor type dummies, however they are both positive now. Furthermore, the early deal and stake indicators are no longer significant. This is all evidence against investor dependent announcement returns. Prior stock returns continue to be significant (mostly on a 1% level) and negative. With a CAR [-30, 30] change of (1.1) and (1.31) per bps increase in the prior stock return in the overall and PE sample respectively, the effect is even stronger than in non-banking industries. Additionally, net profit margin and coverage distress are significant. While the effect of a change in the net profit margin is economically low, a distressed firm has a 49.9% higher CAR [-30, 30] than a stable firm. All three variables stress the importance of firm characteristics for announcement effects. The strong effect of the coverage distress coefficient is in line with the capital injection hypothesis. However, this result must be treated with caution since only three observations are marked as distressed.

Overall, the CAR regressions indicate that a classification into HF and PE investors has no explanatory power for CARs. Especially in the banking sample the evidence for the importance of issuer instead of investor characteristics is strong. The non-banking sample does however provide some evidence for the importance of monitoring and certification effects, albeit not necessarily connected to certain investor types.

5. Value Creation on the Business Level

5.1. Univariate Tests

5.1.1. Governance Engineering

To investigate how different investor types apply governance engineering to their targets, we focus on post-investment changes in insider ownership. An increase would signal an active involvement of the investor to align the interests of agents and outside shareholders. Using the CapitalIQ database, we monitor insider ownership stakes of PIPE issuers from one year before deal announcement up to three years post-acquisition. Subsequently, we test for differences within investor categories and across investor identities. Whenever CapitalIQ did not provide ownership details of targets, these companies were dropped from the analysis. Table 5.1 reports our results, with panel A covering financially distressed issuers and panel B stable firms.

Table 5.1
Post-Acquisition Changes in Insider Ownership Relative to the Deal Announcement Year

Panel A: Targets in Financial Distress

Insider ownership change (%)	PE Targets (A)		HF Targets (B)		Other Targets (C)	
	Mean	Median	Mean	Median	Mean	Median
Year-1 to Year+1	(4.60)***	(0.88)***	(2.17)**	(1.38)***	(2.53)***	(0.45)***
Year-1 to Year+2	(4.10)***	(0.93)**	(3.65)**	(1.27)***	(3.66)***	(0.80)***
Year-1 to Year+3	(4.18)***	(0.72)**	(4.98)***	(1.26)***	(4.51)***	(1.40)***

Years	Test of Difference A-B			Test of Difference A-C			Test of Difference B-C		
	t-test	Median test	Wilcoxon test	t-test	Median test	Wilcoxon test	t-test	Median test	Wilcoxon test
Y-1 to Y+1	0.14	0.25	0.84	0.15	0.10*	0.15	0.79	0.09*	0.32
Y-1 to Y+2	0.83	0.25	0.61	0.77	0.80	0.80	0.99	0.36	0.77
Y-1 to Y+3	0.72	0.43	0.78	0.84	0.40	0.38	0.77	0.88	0.65

Year-1 to Year+1: N (PE) = 60, N (HF) = 69, N (Other) = 386
Year-1 to Year+2: N (PE) = 60, N (HF) = 69, N (Other) = 383
Year-1 to Year+3: N (PE) = 60, N (HF) = 69, N (Other) = 382

Panel B: Targets in a Stable Financial Condition

Insider ownership change (%)	PE Targets (A)		HF Targets (B)		Other Targets (C)	
	Mean	Median	Mean	Median	Mean	Median
Year-1 to Year+1	(1.41)	(0.47)**	(8.08)**	(3.83)***	(1.98)***	(0.36)***
Year-1 to Year+2	(2.45)	(1.29)***	(7.61)**	(3.60)**	(3.20)***	(0.47)***
Year-1 to Year+3	(3.10)*	(0.81)**	(6.57)*	(4.31)**	(3.17)***	(0.59)***

Years	Test of Difference A-B			Test of Difference A-C			Test of Difference B-C		
	t-test	Median test	Wilcoxon test	t-test	Median test	Wilcoxon test	t-test	Median test	Wilcoxon test
-1 to +1	0.05*	0.09*	0.14	0.68	0.66	0.84	0.06*	0.14	0.08*
-1 to +2	0.16	0.15	0.30	0.62	0.37	0.59	0.19	0.10*	0.19
-1 to +3	0.38	0.13	0.40	0.97	0.68	0.88	0.14	0.20	0.31

Year-1 to Year+1: N (PE) = 57, N (HF) = 32, N (Other) = 229
Year-1 to Year+2: N (PE) = 56, N (HF) = 33, N (Other) = 228
Year-1 to Year+3: N (PE) = 57, N (HF) = 33, N (Other) = 226

Given that sophisticated investors with an active investment mandate usually implement changes in their targets immediately following a restructuring plan carried out within the first 100 days, the post-acquisition shifts in insider ownership during the first year should be the most impactful. A statistically significant decrease in median insider ownership stakes during the first year is documented for all investors in the distressed sample. Median ownership change in the time frame -1 to +1 is (0.9%) for PE targets, (1.4%) for HF targets and (0.5%) for Other targets. The negative values reflect the dilution of insiders as a result of the increased institutional ownership because of the PIPE deal. However, if investors replace management members with representatives from their team and incentivise them with equity, we would expect the dilution effect to be somewhat offset. Although the differences between investor groups are not statistically significant, we find that PE investors have a smaller negative effect than HFs from an economic point of view. Given that median stakes acquired by PE and HF investors are indistinguishable, we can conclude that PE firms are more concerned with corporate governance issues than HFs. The results imply that HFs do not usually appoint members in the target's management team, confirming the hypothesis that HFs tend to resolve agency and free cash flow problems simply by influencing capital allocation decisions. Other investors have the least negative impact on this measure, in line with the finding that they also invest the lowest stakes in targets compared to both PE and HFs. We also report significant drops in insider ownership within industry class for the long-term time frame, year-1 to year+3: (0.7%) for PE targets, (1.3%) for HF targets, and (1.4%) for Other targets. The differences in ownership changes between investor classes are however not statistically significant. From an economic point of view, these results suggest that PE investors disrupt insider ownership to the least degree, choosing to collaborate with companies and probably appoint new management members incentivised with stock. On the other hand, HF investors dilute insider ownership to a higher degree, also in the longer term.

Results in panel B show that although all insider stakes are decreasing, investors act differently in firms with a stable financial condition. One year after the PIPE transaction, the median change within the PE investor group is (0.5%), significant at the 5% level, within the HF group (4%) and within the Other group (0.4%), both significant at the 1% level. Thus, HFs seem to dilute the stakes of insiders in healthy firms stronger than in distressed firms. Three years post-acquisition, the negative changes within investor groups are even more pronounced, therefore refuting the hypothesis that investors increase insiders' ownership to create value in targets.

5.1.2. Financial Engineering

To determine whether different investor types bring financial engineering changes to their target companies we focus on post-acquisition changes in book value leverage ratios measured as debt to total assets, from one year before up to three years after deal announcement, as shown in table 5.2. Using the Shapiro – Wilk test for normality, we find that the distributions of our samples are not normal, which leads us to employ median tests.

Table 5.2
Post-Acquisition Changes in Debt Ratio Relative to the Deal Announcement Year

Panel A: Targets in Financial Distress

Daebt ratio change (%)	PE Targets (A)		HF Targets (B)		Other Targets (C)	
	Mean	Median	Mean	Median	Mean	Median
Year-1 to Year+1	(3.52)	(1.32)*	30.67	0.00	(0.43)	(0.87)***
Year-1 to Year+2	(2.17)	(0.45)	13.26	0.00	(6.28)	(1.78)***
Year-1 to Year+3	(7.62)**	(2.14)**	(75.82)**	(0.05)**	(7.34)**	(2.26)***

Years	Test of Difference A-B			Test of Difference A-C			Test of Difference B-C		
	t-test	Median test	Wilcoxon test	t-test	Median test	Wilcoxon test	t-test	Median test	Wilcoxon test
-1 to +1	0.47	0.47	0.72	0.68	0.73	0.86	0.51	0.07*	0.82
-1 to +2	0.75	0.74	0.79	0.41	0.33	0.55	0.68	0.04**	0.72
-1 to +3	0.07*	0.66	0.67	0.95	0.86	0.91	0.07*	0.16	0.66

Year-1 to Year+1: N (PE) = 81, N (HF) = 72, N (Other) = 398
Year-1 to Year+2: N (PE) = 80, N (HF) = 72, N (Other) = 398
Year-1 to Year+3: N (PE) = 65, N (HF) = 62, N (Other) = 367

Panel B: Targets in a Stable Financial Condition

Debt ratio change (%)	PE Targets (A)		HF Targets (B)		Other Targets (C)	
	Mean	Median	Mean	Median	Mean	Median
Year-1 to Year+1	5.25***	0.00	(2.43)	0.00	5.19	(0.21)**
Year-1 to Year+2	7.57***	0.26***	(3.77)	0.00	0.84	(0.16)**
Year-1 to Year+3	10.65***	2.67***	5.36*	0.00	(0.33)	(0.74)***

Years	Test of Difference A-B			Test of Difference A-C			Test of Difference B-C		
	t-test	Median test	Wilcox on test	t-test	Median test	Wilcoxon test	t-test	Median test	Wilcox on test
-1 to +1	0.08*	0.25	0.19	0.99	0.01***	0.00***	0.16	0.27	0.63
-1 to +2	0.03**	0.42	0.13	0.00***	0.01**	0.00***	0.36	0.38	0.67
-1 to +3	0.21	0.15	0.23	0.00***	0.00***	0.00***	0.05*	0.03**	0.06*

Year-1 to Year+1: N (PE) = 95, N (HF) = 36, N (Other) = 237
Year-1 to Year+2: N (PE) = 92, N (HF) = 37, N (Other) = 235
Year-1 to Year+3: N (PE) = 82, N (HF) = 29, N (Other) = 215

Panel A focuses on firms in financial distress and shows that within each investor category, the long-term changes in leverage are the most statistically significant. Three years after the PIPE transaction, PE targets experience a significant decline in median debt ratios of (2.1%), HF targets of (0.05%) and Other targets of (2.3%). Since the differences between investor groups are not statistically significant, we conclude that all investors equally improve the debt ratio of distressed targets in the long run.

A different conclusion is reached by studying the financially sound PIPE issuers presented in panel B. Within investor classes, we note that statistically significant leverage changes occur only after PE-led and Other-led deals. This implies that HFs might not gain sufficient control to influence the capital structure of targets in a significant manner. Three years after the transaction, PE targets increase their median debt ratios by 2.7%. Other targets experience a significant decrease in leverage of (0.7%). Although the differences between PE targets and HF targets are not statistically significant, we find significant differences between PE and Other groups. Therefore, contrary to expectations, PE investors can be credited with employing financial engineering in targets that benefit from a stable financial condition. At the same time, this study supports the hypothesis that HFs do not change the capital structure of targets.

5.1.3. Operational Engineering

In this section, we compare the operating performance of targets to the respective industry average two years before and three years after the PIPE transaction. Although PE investors recognise sales growth as the key value driver for a target's business, operational improvements rank immediately behind in terms of importance (Gompers et al, 2015). Following Brav et al (2008) and Chen et al (2014), we use EBITDA/total sales as our key operating performance metric for non-financial firms, while we utilize net profit margins for the financial industry. Positive changes in industry-adjusted performance values post-acquisition would imply that investors create value in targets.

We obtained median industry level financial ratios from Compustat, which uses Fama and French industry classifications, based on 4-digit SIC codes. Industry-adjusted values are calculated by subtracting the median Fama and French 48 industry performance from each PIPE issuer's performance. Given that Compustat does not provide financial ratios on an industry level after 31/12/2015, PIPE deals that occurred in 2013 were dropped from Year-1 to Year+3 analyses. Grouping our sample by investor type and applying normality tests such as the Shapiro – Wilk test, we once more found distributions that violate the normality assumption. Thus, table 5.3 focuses on the non-financial industries and displays results from median statistical tests of differences within each investor category and between investor categories.

Table 5.3
Industry Adjusted Median Changes in Operating Performance Relative to the Deal Announcement Year, Non-Banking Industries

Panel A: Targets in Financial Distress

Years	Performance Change (%)			Test of Difference A-B		Test of Difference A-C		Test of Difference B-C	
	PE (A)	HF (B)	Other (C)	Median test	Wilcox on test	Median test	Wilcox on test	Median test	Wilcox on test
-2 to -1	(3.60)	2.51	(1.54)	0.17	0.06*	0.59	0.38	0.29	0.15
-1 to +1	3.64	(0.14)	2.47**	0.27	0.46	0.55	0.83	0.39	0.19
-1 to +2	3.25*	2.89	2.77**	0.57	0.76	0.86	0.92	0.91	0.46
-1 to +3	8.66***	4.03*	2.20	0.34	0.78	0.17	0.38	0.62	0.95

Year-2 to Year-1: N (PE) = 64, N (HF) = 55, N (Other) = 223
Year-1 to Year+1: N (PE) = 64, N (HF) = 56, N (Other) = 227
Year-1 to Year+2: N (PE) = 57, N (HF) = 57, N (Other) = 224
Year-1 to Year+3: N (PE) = 44, N (HF) = 45, N (Other) = 187

Panel B: Targets in a Stable Financial Condition

Years	Performance Change (%)			Test of Difference A-B		Test of Difference A-C		Test of Difference B-C	
	PE (A)	HF (B)	Other (C)	Median test	Wilcox on test	Median test	Wilcox on test	Median test	Wilcox on test
-2 to -1	0.49	0.49	(1.11)*	0.95	0.75	0.04**	0.08*	0.36	0.77
-1 to +1	(0.94)*	(2.63)	(0.83)	0.36	0.81	0.93	0.64	0.35	0.93
-1 to +2	0.57	(1.74)	(0.20)	0.32	0.66	0.75	0.89	0.35	0.81
-1 to +3	(0.03)	0.15	(1.11)	1.00	0.51	0.43	0.83	0.96	0.58

Year-2 to Year-1: N (PE) = 75, N (HF) = 24, N (Other) = 96
Year-1 to Year+1: N (PE) = 71, N (HF) = 22, N (Other) = 106
Year-1 to Year+2: N (PE) = 66, N (HF) = 22, N (Other) = 98
Year-1 to Year+3: N (PE) = 50, N (HF) = 18, N (Other) = 79

For firms in financial distress, we find that PE targets have statistically significant median changes in industry-adjusted operating performance from Year-1 to Year+2 of 3.3% (10% level), and from Year-1 to Year+3 of 8.7% (5% level). This supports the hypothesis that PE firms are improving the operational performance of firms in acute need of advisory services and strategic guidance. HF targets display significant median changes (10% level) of 4% only from Year-1 to Year+3. These improvements are in line with the hypothesis that HF investors add value by saving issuers from bankruptcy through PIPE investments of last resort. Finally, Other investors also improve operating performance by 2.5% and 2.8% one year and two years after the transaction. However, differences between investor groups are not significant, and do therefore not support the hypothesis that any investor group adds superior value in PIPE deals. Shifting the attention to firms in a stable financial condition, we find that investors are not associated with positive or significant industry-adjusted changes in targets post-acquisition. Tests between investor groups certify that there is no sign of a differentiated value creation pattern. Results for the banking industry are shown in table 5.4.

Table 5.4
Operational Engineering: Industry Adjusted Median Changes in Performance Relative to the Deal Announcement Year, Banking Industry

Panel A: Targets in Financial Distress

Years	Performance Change (%)			Test of Difference A-B		Test of Difference A-C		Test of Difference B-C	
	PE (A)	HF (B)	Other (C)	Median test	Wilcox on test	Median test	Wilcoxo n test	Median test	Wilcox on test
-2 to -1	(8.22)*	0.45	0.02	0.92	0.50	0.77	0.07*	0.99	0.80
-1 to +1	10.36	(18.85)	0.10	0.16	0.13	0.14	0.02**	0.16	0.35
-1 to +2	5.59**	(1.63)	1.36	0.16	0.13	0.04**	0.02**	0.15	0.54
-1 to +3	16.91**	1.77	0.68	0.16	0.40	0.04**	0.01***	1.00	0.85

Year-2 to Year-1: N (PE) = 13, N (HF) = 2, N (Other) = 117
Year-1 to Year+1: N (PE) = 13, N (HF) = 2, N (Other) = 118
Year-1 to Year+2: N (PE) = 13, N (HF) = 2, N (Other) = 118
Year-1 to Year+3: N (PE) = 13, N (HF) = 2, N (Other) = 118

Panel B: Targets in a Stable Financial Condition

Years	Performance Change (%)			Test of Difference A-B		Test of Difference A-C		Test of Difference B-C	
	PE (A)	HF (B)	Other (C)	Median test	Wilcoxon test	Median test	Wilcoxon test	Median test	Wilcoxon test
-2 to -1	(2.23)	(2.27)	1.04*	0.59	0.55	0.32	0.60	0.56	0.47
-1 to +1	(0.37)	0.57	(2.00)	0.48	0.69	0.28	0.86	0.56	0.28
-1 to +2	2.81*	2.51	(0.40)	0.72	0.92	0.04**	0.47	0.56	0.41
-1 to +3	4.06	18.82	(0.40)	0.91	0.84	0.34	0.28	0.99	0.41

Year-2 to Year-1: N (PE) = 18, N (HF) = 3, N (Other) = 89
Year-1 to Year+1: N (PE) = 18, N (HF) = 3, N (Other) = 93
Year-1 to Year+2: N (PE) = 18, N (HF) = 3, N (Other) = 93
Year-1 to Year+3: N (PE) = 11, N (HF) = 2, N (Other) = 91

For distressed banks, we note that PE investors are the most skilled at enhancing performance, with statistically significant improvements of 5.6% and 16.9% two and three years post-transaction. In banking firms in a stable condition, only PE targets are associated with a statistically significant increase of 2.8% in terms of industry-adjusted net profit margins from Year-1 to Year+2. Therefore, results indicate that PE firms are better at understanding the banking industry and improving the competitive position of PIPE issuers in that industry than other investors.

To gain a better understanding of the importance of insider ownership stakes for issuer performance, we classify PE and HF targets according to the sample median change in insider ownership in table 5.5.

Table 5.5
Industry Adjusted Median Changes in Post-Acquisition Operating Performance of Targets

Panel A: By Change in Insider Ownership

Change in Insider Ownership (%)	PE Targets			HF Targets		
	Y-1 to Y+1	Y-1 to Y+2	Y-1 to Y+3	Y-1 to Y+1	Y-1 to Y+2	Y-1 to Y+3
Above sample median	0.918	2.389	0.446	(0.124)	3.713	4.951*
No. of obs	44	41	40	27	35	30
Below sample median	0.602	1.793	2.157	(1.439)	(0.693)	3.207
No. of obs	54	52	34	49	41	28

Panel B: By Change in Leverage Ratio

Change in Leverage Ratio (%)	PE Targets			HF Targets		
	Y-1 to Y+1	Y-1 to Y+2	Y-1 to Y+3	Y-1 to Y+1	Y-1 to Y+2	Y-1 to Y+3
Above sample median	0.678	2.807**	1.169**	(1.706)	(1.356)	4.908*
No. of obs	86	84	67	44	41	36
Below sample median	0.338**	1.386	1.094	(0.124)*	(0.566)	1.273
No. of obs	81	72	50	39	43	31

Panel A shows that the effect of insider ownership stakes on target performance appears to be statistically insignificant, except for the 5% change from Year-1 to Year+3 that HF targets with above median stakes experience. This suggests that HFs are responsible for improving governance practices and diminishing agency problems within firms. Panel B tests whether low or high changes in industry-adjusted leverage ratios influence the median industry-adjusted performance. For PE targets, we find that firms with above sample median leverage changes experience a positive median industry-adjusted performance of 2.8% from Year-1 to Year+2 and of 1.2% from Year-1 to Year+3, statistically significant at the 5% level. Similarly, HF targets with above median leverage changes experience a positive change of 4.9% in the third year post-transaction. These results reject our hypothesis regarding financial engineering, but nonetheless support the view that PE investors remain faithful to the LBO investment model with higher leverage playing a significant role in improving operational performance. For HF investors, it implies that leverage can serve as a disciplinary tool to resolve cash flow and agency problems and improve efficiency.

5.2. Multivariable Regressions

To better understand the drivers of operating performance changes, we run multiple regressions on the industry-adjusted performance change between Year-1 to Year +3 as the dependent variable. As explanatory variables, we use indicators for PE and HF investor identity, as well as target financial characteristics covering size, prior stock return, operating performance, leverage, Tobin's q and distress status. We also control for the deal characteristics such as stake acquired and early transaction, as well as year and industry effects. All variables are winsorized in order to eliminate the impact of outliers. The OLS regressions winsorized at the 10% level for non-financial industries are reported in table 5.6.

Table 5.6
OLS Regression on Industry-Adjusted Operating Performance Change, 10% Winsorized, Non-Banking Industries

Variables	(1)	(2)	(3)	(4)	(5)
PE (indicator)	(0.0833)	(0.0893)	0.100	(0.186)	0.247
HF (indicator)	0.0733	0.0634	(0.0746)	(0.273)	(0.446)
Operating income/ total assets is in the bottom 25% of the sample (indicator)		0.768***	0.806**		
R&D expenses/ sales is in the top 25% of the sample (indicator)				0.675*	0.899**
PE (indicator) x Operating income/ total assets is in the bottom 25% of the sample (indicator)			(0.685)		
HF (indicator) x Operating income/ total assets is in the bottom 25% of the sample (indicator)			0.415		
PE (indicator) x R&D expenses/ sales is in the top 25% of the sample (indicator)					(1.757)**
HF (indicator) x R&D expenses/ sales is in the top 25% of the sample (indicator)					0.586
Size of investment/ Market cap	(0.399)	(0.366)	(0.391)	(0.202)	(0.422)
Prior stock return	42.42	37.27	29.40	50.49	50.42
Operating income / total assets	(1.219)***			(0.482)	(0.475)
Log of book value of total assets	0.119	0.0533	0.0361	0.0566	0.00148
Leverage	(0.214)	(0.300)	(0.343)	(0.107)	(0.210)
Tobin's q	(0.0842)	(0.0608)	(0.0718)	(0.0872)	(0.105)
Financial distress (indicator)	0.0374	0.116	0.132	0.312	0.411
Early deal (indicator)	0.111	0.0676	0.0423	(0.0937)	(0.106)
Constant	(0.344)	(0.265)	(0.195)	0.150	0.550
Observations	285	285	285	200	200
R^2	0.079	0.078	0.088	0.100	0.142
Industry (indicators)	yes	Yes	yes	yes	yes
Year (indicators)	yes	Yes	yes	yes	yes

The dependent variable is the change in industry-adjusted operating performance (EBITDA/Sales) for targets from Year-1 to Year+3, relative to the acquisition announcement year of the PIPE deal. The industry-adjusted operating performance is computed by subtracting the median industry operating performance from each firm's operating performance.

In the first regression, we include only investor indicators, firm characteristics and time and industry controls. The coefficient estimates for investor indicators are not statistically significant, but from an economic viewpoint they suggest that PE targets realise a negative value of (8%), while HFs targets achieve a 7% increase compared to non-HF investors. In the second regression, we include an indicator for operating income to total assets which equals one if target is in the bottom 25% of the sample. The results show that targets with a poor operating performance realise a significantly higher industry-adjusted change in operating performance which is approximately 80% higher than for better-performing targets. In regression three we add the corresponding interaction terms with the investor dummy variables. However, the coefficient estimates of the interaction terms are not significant for either of the two investor groups. In the following two regressions, we test whether investor identity is important in targets with high R&D intensity profiles, since these firms are expected to benefit from advisory services and business planning strategies. The dummy included equals one if target has R&D expenditures divided by sales in the top 25% of the sample. We find that targets with high R&D expenses benefit from PIPE deals to a larger degree, outperforming the rest of the sample by a statistically significant 70% higher change in operating performance. When adding interaction terms in regression five, we remark that PE investors create significantly less value than non-PE investors in targets with high R&D expenses, as suggested by the sum of the interaction coefficient and PE indicator coefficient. Thus, it cannot be concluded that PE firms provide valuable, industry-specific advisory services for targets, rejecting our hypothesis.

A separate set of regressions are run for financial firms, table 5.7 displaying the OLS method with variables winsorized at the 1% level.

Table 5.7
OLS Regression on Industry-Adjusted Profitability Change, 1% Winsorized, Banking Industry

Variables	(1)	(2)	(3)
PE (indicator)	(0.0588)	0.0849	(0.0293)
HF (indicator)	(0.00370)	0.0972	0.0290
Net profit margin is in the bottom 25% of the sample (indicator)		0.192***	0.147***
PE investor (indicator) x Net profit margin is in the bottom 25% of the sample (indicator)			0.360***
HF investor (indicator) x Net profit margin is in the bottom 25% of the sample (indicator)			0.239
Size of investment/ Market cap	0.0174	0.108**	0.145***
Prior stock return	(1.827)	(19.94)	(26.99)**
Net profit margin	(0.876)***		
Log of book value of total assets	(0.00563)	0.000800	0.00192
Leverage	(0.392)	(0.696)*	(0.772)*
Tobin's q	0.158	0.242	0.340
Financial distress (indicator)	0.0212	(0.113)	(0.392)
Early deal (indicator)	(0.00619)	(0.0408)	(0.0110)
Constant	0.172*	(0.113)	(0.0680)
Observations	85	85	85
R^2	0.848	0.629	0.677
Year (indicators)	yes	yes	yes

The dependent variable is the change in industry-adjusted net profit margin for targets from Year-1 to Year+3, relative to the acquisition announcement year of the PIPE deal. The industry-adjusted net profit margin is computed by subtracting the median industry net profit margin from each firm's net profit margin.

Similarly, we first test industry-adjusted net profit margin changes on investor identity, having as control variables firm and transaction characteristics. Regression one signals that investor identity is not statistically significant and, all else equal, neither PE investors nor HFs realize higher industry-adjusted returns in PIPE deals. In the second regression, we find that targets in the bottom 25% of the sample with respect to profitability experience stronger performance changes,

outperforming better performing firms by 19% (significant at the 1% level). After adding investor interaction terms in regression three, we conclude that PE investors are responsible for 33% higher industry-adjusted changes in targets with a poor performance compared to non-PE investors (significant at the 1% level). In contrast, the HF interaction term is not statistically significant. Since poorly operating firms are often in need of guidance to resolve agency problems and restructure their business, the benefits they can reap from advisory services offered by a sophisticated investor are important for their development. Thus, our hypothesis is confirmed for the banking sample, PE investments are connected to significantly better results.

6. Conclusion

Our investigation yields a differentiated picture of the connection between investor identity and value creation in PIPEs issued between 2008 and 2013 in the US. The profile of PIPE issuers in our sample is consistent with previous findings in that the issuing firms tend to be small growth firms with substantial risk and financing restrictions (Hertzel et al, 2002; Dai, 2006; Chaplinsky and Haushalter, 2010; Gomes and Philips, 2012; Schultz and Twite, 2016). Given these overall characteristics, PEs target more stable, larger firms, while HFs focus on small, distressed issuers. Furthermore, we report evidence in line with Floros and Sapp (2012) by finding that HFs are present in repeat issuances by the same issuer, while PEs tend to invest in first PIPE deals. Repeat issuers of PIPEs tend to be more distressed (Floros and Sapp, 2012). These findings can be interpreted as evidence for different investment approaches. HFs invest in distressed, repeat issuers and make a return by possibly employing risk mitigating contract designs (structured PIPEs). PE funds on the other hand could have an investment approach focused on company value creation. Their strategy would then be to select companies which will be able to reach a stage where other means of financing than PIPEs become available under their guidance.

We generally find positive announcement returns to PIPEs in line with previous research (Wruck, 1989; Besley et al, 2007), but differences based on investor identities are difficult to determine. While there is some evidence for positive effects of monitoring and certification by PE investors, the HF investments seems to yield a stronger announcement return than PE investments, with Other investors lagging not too far behind. Moreover, the announcement returns are not statistically significant from each other. This contrasts with previous research by Dai (2006) and Mietzner and Schweizer (2014), where PEs outperform based on announcement returns. Regressing CARs on different explanatory variables also yields no significance for investor type dummies, but highlights the importance of issuer characteristics. Furthermore, there is evidence on the importance of the stake investors take in the PIPE, implying certification and monitoring effects.

Studying business level changes post-transaction, we find diverse evidence on investor and target interactions. Based on changes in insider ownership stakes, governance engineering does not seem to play a large role in PIPE investments. However, we report evidence that PE investors are more concerned with aligning the incentives between management and shareholders than HFs (Achleitner et al, 2010), since they dilute insider ownership the least despite investing the largest stakes. Furthermore, HF targets with above median insider ownership changes have a better

operational performance, consistent with previous research outlining that HFs mitigate agency conflicts to bring about increased efficiency (Boyson and Mooradian, 2011). Financial engineering activity differs between distressed and stable firms. In distressed firms, leverage is reduced post-transaction regardless of investor identity. In stable firms, we find that PE firms consistently engage in financial engineering through increasing leverage, contrary to findings in previous research (Chen et al, 2014; Puche and Lotz, 2015). Conversely, our analysis does not yield substantial proof that HF targets engage in financial engineering. In line with Achleitner et al (2010), we find that targets with above median leverage changes in the third year after the deal benefit from better returns, potentially due to a more disciplined and efficient management team. Operational engineering plays different roles across our subsamples. In the non-banking sample, PE and HF investments are associated with significant long-term improvements in industry adjusted operating margins in distressed firms, while there is little impact on stable companies. Furthermore, PE targets seem to outperform HF targets. The conclusion that HFs are associated with long-term operational improvements in targets is consistent with Brav et al (2008) and Boyson and Mooradian (2011). Additionally, the results support the hypothesis that PE firms provide strategic advisory services and actively involve their network of professionals to add value in targets, similar as in the traditional LBO investment model (Chen et al, 2014; Puche and Lotz, 2015). In the banking sample, we find that only PE firms significantly improve the industry-adjusted profitability of targets. Despite those differences between investor groups, our multivariable regressions on operating performance show that investor identity has no significance. This finding confirms the study of Meidan (2006), who reports that investor identity has no additional explanatory power in the long-term performance of PIPE issuers. At the same time, it contradicts the reported importance of investor identity in the work of Brophy et al (2009) and Mietzner and Schweizer (2014).

Overall, we cannot detect a direct connection between the classification of an investor as HF or PE and value creation. Notwithstanding, we find that PIPE issuer characteristics predict their subsequent performance and thus that the different investment and selection models of PE and HFs matter. An interesting topic for future research could be to consider in more detail which investor characteristics beyond a simple classification as HF or PE are connected to value creation. Moreover, comparing PE and HF methods of value creation using a sample of observations covering only traditional common-stock PIPEs sourced from a comprehensive database of PIPE deals such as PlacementTracker could be of interest. It would be useful to note whether the same

conclusion as in our sample can be drawn from transactions in which both investors are known to have an active engagement in targets. Finally, we find evidence that sizeable PIPE deals occurred within the banking sector during the financial crisis. Investigating the role PIPE financing played in the recovery of financial institutions would be another interesting research topic.

References

Acharya, V.V., Gottschalg, O., Hahn, M., Kehoe, C., 2012, Corporate Governance and Value Creation: Evidence from Private Equity, The Review of Financial Studies 26 (2), 368-402

Achleitner, A.-K., Betzer, A., Gider, J., 2010, Do Corporate Governance Motives Drive Hedge Fund and Private Equity Fund Activities?, European Financial Management 16 (5), 805-828

Aggarwal, R., Erel, I., Ferreira, M., Matos, P., 2011, Does governance travel around the world? Evidence from institutional investors, Journal of Financial Economics 100, 154-181

Ang, A., Chen, B., Goetzmann, W.N., Phalippou, L., 2013, Estimating Private Equity Returns from Limited Partner Cash Flows, Columbia Business School Research Paper No. 13-83

Anson, M., 2001, Playing the PIPEs: The Benefits and Risks of Private Investments in Public Entities, The Journal of Private Equity 5 (1), 66-73

Barber, B., M., 2006, Monitoring the Monitor: Evaluating CalPERS' Shareholder Activism, working paper, [Online] Available from: https://ssrn.com/abstract=890321

Barclay, M., J., Holderness, C., G., Sheehan, D., P., 2007, Private placements and managerial entrenchment, Journal of Corporate Finance 13, 461-484

Becht, M., Franks, J., Grant, J., 2010, Hedge Fund Activism in Europe, European Corporate Governance Institute Finance Working Paper 283

Becht, M., Franks, J., Grant, J., Wagner, H., F., 2016, The Returns to Hedge Fund Activism: An International Study, Forthcoming at Review of Financial Studies, European Corporate Governance Institute – Finance Working Paper 402/2014, [Online] Available from: https://ssrn.com/abstract=2376271

Besley, S., Kohers, N., Steigner, T., 2007, Private placements of common equity and the industry rival response, Applied Financial Economics 17, 559-568

Bessler, W., Drobetz, W., Holler, J., 2015, The Returns to Hedge Fund Activism in Germany, European Financial Management 21 (1), 106-147

Bengtsson, O., Dai, N., Henson, C., 2014, SEC Enforcement in the PIPE Market: Actions and Consequences, working paper, Journal of Banking and Finance 42, 213-231

Black, B., S., 1997, Shareholder Activism and Corporate Governance in the United States, in Newman, P., ed.: The New Palgrave Dictionary of Economics and the Law, Volume 3, 459-465

Boyson, N., M., Mooradian, R., M., 2011, Corporate Governance and Hedge Fund Activism, Review of Derivative Research 14, 169-204

Brav, A., Jiang, W., Partnoy, F., Thomas, R., 2008, Hedge Fund Activism, Corporate Governance, and Firm Performance, The Journal of Finance 63 (4), 1729-1775

Brennan, M., Kraus, A., 1987, Efficient Financing Under Asymmetric Information, The Journal of Finance 42 (5), 1225-1243

Brophy, D., J., Ouimet, P., P., Sialm, C., 2009, Hedge Funds as Investors of Last Resort?, Review of Financial Studies 22 (2), 541-574

Brown, G., W., Harris, R., S., Jenkinson, T., Kaplan, S., N., Robinson, D., 2015, What Do Different Commercial Data Sets Tell Us About Private Equity Performance?, Charles A. Dice Center Working Paper 2015-10, Fisher College of Business Working Paper 2015-03-10, [Online] Available from: https://ssrn.com/abstract=2627312

Brown, S., J., Warner, J., B., 1980, Measuring Security Price Performance, Journal of Financial Economics 8, 205-258

Brown, S., J., Warner, J., B., 1985, Using Daily Stock Returns The Case of Event Studies, Journal of Financial Economics 14, 3-31

Carhart, M., M., 1997, On Persistence in Mutual Fund Performance, The Journal of Finance, 52 (1), 57-82

Carpentier, C., L'Her, J.-F., Suret, J.-M., 2011, The return on private investment in small public entities, Small Business Economics 41 (1), 149-168

Chaplinsky, S., Haushalter, D., 2010, Financing under Extreme Risk: Contract Terms and Returns to Private Investments in Public Equity, The Review of Financial Studies 23 (7), 2789-2820

Chen, H.-C., Dai, N., Schatzberg, J., D., 2010, The choice of equity selling mechanisms: PIPEs vs SEOs, Journal of Corporate Finance 16, 104-119

Chen, G., Kang, J.-K., Kim, J.-M., Na, H., S., 2014, Sources of Value Gains in Minority Equity Investments by Private Equity Funds: Evidence from Block Share Acquisitions, Journal of Corporate Finance 29, 449-474

Christinat, J., 2002, PIPEs Flowing Despite LP Concerns. Thomson Financial, PE Week, 31-05-2002, [Online] Available from: http://www.placementtracker.com/News/PR%2005.31.02%20-%20PrivateEquityWeek1.html

Cohn, J., B., Towery, E., M., 2013, The Determinants and Consequences of Private Equity Buyouts of Private Firms: Evidence from U.S. Corporate Tax Returns, Unpublished working paper, University of Texas

Connor, G., Lasarte, T., 2004, And Introduction to Hedge Fund Strategies: Introductory Guide, International Asset Management and London School of Economics and Political Science

Cornelli, F., Karakas, O., 2012, Corporate Governance of LBOs: The Role of Boards, Working paper

Cronqvist, H., Nilsson, M., 2005, The choice between rights offerings and private equity placements, Journal of Financial Economics 78, 375-407

Cronqvist, H., Fahlenbrach, R., 2008, Large Shareholders and Corporate Policies, The Review of Financial Studies 22 (10), 3941-3976

Dahiya, S., Klapper, L., Parthasarathy, H., Singer, D., 2013, The Role of Private Equity Investments in Public Firms, Policy Research Working Paper 6484, The World Bank

Dai, N., 2006, Does Investor Identity Matter? An Empirical Examination of Investments by Venture Capital Funds and Hedge Funds in PIPEs, Journal of Corporate Finance 13, 538-563

Dai, N., 2009, The Rise of the PIPE Market, in Cumming, D., J., ed.: Companion to Private Equity (Wiley)

Dai, N., 2011, Monitoring via staging: Evidence from private investments in public equity, Journal of Banking and Finance 35, 3417-3431

Davis, S.J., Haltiwanger, J., Handley, K., Jarmin, R., Lerner, J., Miranda, J., 2014, Private Equity, Jobs and Productivity, American Economic Review 104(12), 3956-3990

Dresner, S., Lee, D., D., 2009, The Issuer's Guide to Pipes: New Markets, Deal Structures, and Global Opportunities for Private Investments in Public Equity, John Wiley & Sons

Fama, E., F., French, K., R., 1992, The Cross-Section of Expected Stock Returns, The Journal of Finance 47 (2), 427-465

Floros, I., V., Sapp, T., R., A., 2012, Why do firms issue private equity repeatedly? On the motives and information content of multiple PIPE offerings, Journal of Banking & Finance 36 (12), 3469-3481

French, K. R., 2017, Data Library [Online] Available from: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html

Gerhard, F., 2008, Private Investments in Public Equity (PIPEs) – A Closer Look at PIPE Transactions in Switzerland, European Company and Financial Law Review 5 (3), 305-352

Gillan, S., L., Starks, L., T., 2007, The Evolution of Shareholder Activism in the United States, Journal of Applied Corporate Finance 19 (1), 55-73

Gomes, A., Phillips, G., 2012, Why do public firms issue private and public securities?, Journal of Financial Intermediation 21 (4), 619-658

Gompers, P., Lerner, J., 2000, Money chasing deals? The impact of fund inflows on private equity valuations, Journal of Financial Economics 55, 281-325

Gompers, P., Kaplan, S.N., Mukharlyamov, V., 2015, What Do Private Equity Firms Say They Do?, Working paper 15-081, Harvard Business School

Haggard, K., S., Zhang, Y., J., 2010, Foreign issuers in the U.S. PIPE market, Journal of Multinational Financial Management 20 (2-3), 144-157

Harris, R.S., Jenkinson, T., Kaplan, S.N., 2016, How Do Private Equity Investments Perform Compared to Public Equity?, Journal of Investment Management 14 (3), 1-24

Hertzel, M., Smith, R., L., 1993, Market Discounts and Shareholder Gains for Placing Equity Privately, The Journal of Finance 48 (2), 459-485

Hertzel, M., Lemmon, M., Linck, J.S., Rees, L., 2002, Long-run performance following private placements of equity, The Journal of Finance vol. LVII, no. 6

Higson, C., Stucke, R., 2012, The Performance of Private Equity, Unpublished working paper, London Business School

Hillion, P., Vermaelen, T., 2004, Death spiral convertibles, Journal of Financial Economics 71, 381-415

Huber, P., J. 1964, Robust Estimation of a Location Parameter, The Annals of Mathematical Statistics 35 (1), 73-101

Hüther, N., 2017, Raising Funds on Performance: Are Private Equity Returns Too Good to Be True?, Working Paper

Jensen, M., 1986, Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers, American Economic Review 76, 323-329

Jensen, M., 1989, Eclipse of the Public Corporation, Harvard Business Review 67, 61-74

Kang, J.-K., Kim, J.-M., 2008, The Geography of Block Acquisitions, The Journal of Finance 63 (6), 2817-2857

Kaplan, S., N., 1989, The effects of management buyouts on operating performance and value, Journal of Financial Economics 24, 217-254

Kaplan, S., N., Schoar, A., 2005, Private Equity Performance: Returns, Persistence, and Capital Flows, The Journal of Finance 60 (4), 1791-1823

Kaplan, S., N., Strömberg, P., 2009, Leveraged Buyouts and Private Equity, Journal of Economic Perspective 23 (1), 121-146

Klein, A., Zur, E., 2009, Entrepreneurial Shareholder Activism: Hedge Funds and Other Private Investors, The Journal of Finance 64 (1), 187-229

Krishnamurthy, S., Spindt, P., Subramaniam, V., Woidtke, T., 2005, Does investor identity matter in equity issues? Evidence from private placements, Journal of Financial Intermediation 14, 210-238

Kuzneski, J., Landen, R., 2006, Looking through the PIPE – opportunities for private equity investors, Private Equity Alert, May 2006, Weil, Gotshal & Manges LLP

Lerner, J., Sørensen, M., Strömberg, P., 2009, Globalization of Alternative Investments - The Global Economic Impact of Private Equity Report 2009, World Economic Forum Working Papers 2

Majoros, G., L., 2001, Comment: The Development of "PIPEs" in Today's Private Equity Market. Case Western Reserve Law Review 51 (493)

Meidan, D., 2006, The Informativeness of Offer Characteristics versus Investor Identity in PIPE Transactions, working paper

Metrick, A., Yasuda, A., 2010, The economics of private equity funds, The Review of Financial Studies 23 (6), 2303-2341

Mietzner, M., Schweizer, D., Tyrell, M., 2011, Intra-Industry Effects of Shareholder Activism in Germany – Is There a Difference between Hedge Fund and Private Equity Investments?, Schmalenbach Business Review 63 (2), 151-185

Mietzner, M., Schweizer, D., 2014, Hedge funds versus private equity funds as shareholder activists in Germany – differences in value creation, Journal of Economics and Finance 38, 181-208

Myers, S., C., Majluf, N., S., 1984, Corporate Financing and Investment Decisions When Firms Have Information That Investors Do Not Have, NBER Working Paper Series no. 1396

Petry, S., 2015, Private Equity Monitoring in Public Firms, FIRN Research Paper 261388, [Online] Available from: https://ssrn.com/abstract=2613448

Placementtracker, 2017, [Online] Available from: http://www.placementtracker.com/GStats.cfm?Type=6

Preqin, 2017, Preqin Global Private Equity & Venture Capital Report, [Online] Available from: https://www.preqin.com/item/2017-Preqin-Global-Private-Equity-and-Venture-Capital-Report/1/16504

Puche and Lotz, 2015, Private Equity Minority Investments, The Journal of Private Equity 18 (4), 46-55

Robinson, D.T., Sensoy, B.A., 2013, Do Private Equity Fund Managers Earn Their Fees? Compensation, Ownership, and Cash Flow Performance, The Review of Financial Studies 26 (11), 2760-2797

Särve, B., 2013, PIPE Investments of Private Equity Funds: The temptation of public equity investments to private equity firms, Reihe Alternative Investments Bd. 3

Schultz, E., Twite, G., 2016, Are PIPEs a bet on growth options?, working paper, [Online] Available from: https://ssrn.com/abstract=2023220

Shleifer, A., Vishny, R., W., 1986, Large Shareholders and Corporate Control, Journal of Political Economy 94 (3), 461-488

Sjostrom, W., K., 2007, PIPEs, Entrepreneurial Business Law Journal 2 (1), 381-413

Steinberg, M., I., Obi, E., U., 2008, Examining The Pipeline: A Contemporary Assessment of Private Investments in Public Equity ("PIPEs"), University of Pennsylvania Journal of Business Law 11, 1-54

Sweeney, R., J., Scherer, R., F., Goulet, J., Goulet, W., M., 1996, Investment Behavior and the Small Firm Effect, Entrepeneurial and Samll Business Finance 5 (3), 251-269

Wruck, K. H., 1989, Equity Ownership Concentration and Firm Value: Evidence from Private Equity Financings, Journal of Financial Economics 23, 3-28

Wu, Y., 2004, The choice of equity-selling mechanisms, Journal of Financial Economics 74, 93-119

Wu, X., Wang, Z., Yao, J., 2005, Understanding the Positive Announcement Effects of Private Equity Placements: New Insights from Hong Kong Data, Review of Finance 9, 385-414

Appendix

I. Definitions of Variables

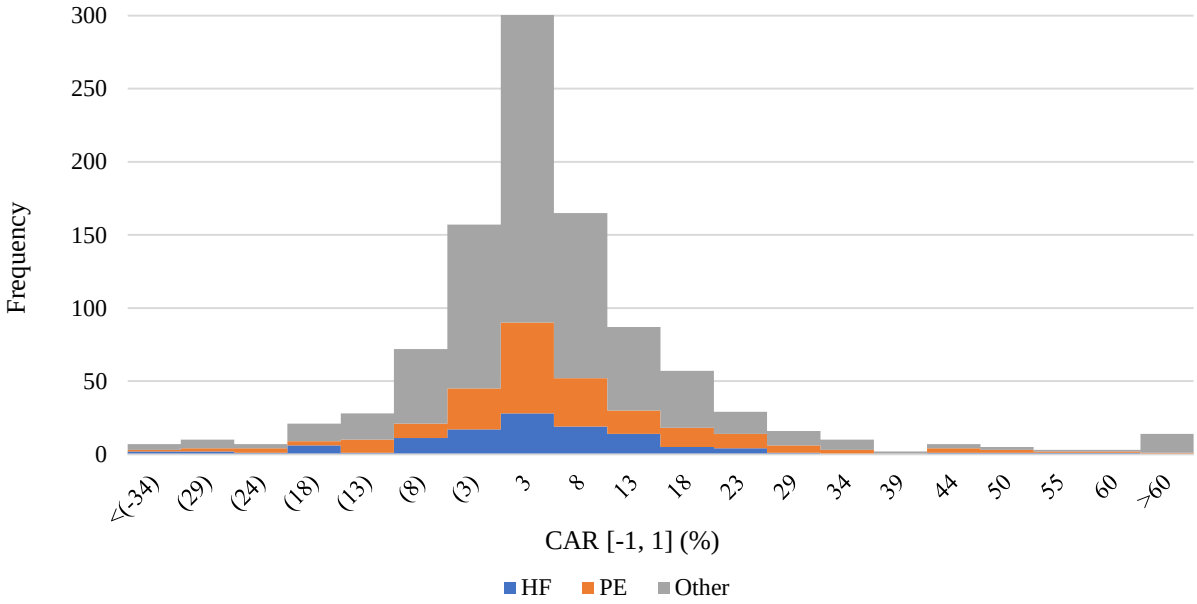
This section details the definitions and construction of all variables used in the tables of the paper.

Variable name	Definition
Altman Z-Score	Edward I. Altman's model of predicting financial distress for corporations. The discriminant function used is: Z = 1.2 × working capital/total assets + 1.4 × retained earnings/ total assets + 3.3 × earnings before interest and taxes/total assets + 0.6 × market value of equity/book value of total liabilities + 1.0 × sales/total assets. When firms have scores below 1.81, they are marked as firms in distress
Assets	Book Value of Total Assets in $ millions
Coverage ratio	As proposed by B. Gonzalez-Hermosillo (1999, "Determinants of Ex-Ante Banking System Distress: A Macro-Micro Empirical Exploration of Some Recent Episodes", IMF), the coverage ratio is defined as the ratio of capital equity and loan reserves minus nonperforming loans to total assets. A coverage ratio below 1% signals a fragile financial institution, likely to be in distress, while a coverage ratio between 8%-12% is a signal for safe firms
Coverage distress (indicator)	One if the coverage ratio is below 1%, 0 otherwise
Deal size	Total amount of money invested through the PIPE deal in $ millions
Deal size/ market cap (%)	Total amount of money invested through the PIPE deal / market value of equity of the target
EBITDA	Operating income before depreciation and amortization in $ millions.
EBITDA margin	EBITDA / Sales
Enterprise value	Total book value of debt plus market value of equity at fiscal year-end in $ millions
Early deal	Categorical variable determining if a deal is the first or the second deal in the sample by the issuer. 1=True 0=False
Financial distress (indicator)	For non-financial companies: one if Altman Z-Score is below 1.81, zero otherwise. For financial companies: one if coverage ratios is below 1%, zero otherwise
HF (indicator)	Categorical variable determining whether the investor is a HF (variable=1) or non-HF (variable=0)
Industry (indicators)	One if the PIPE issuer operates in one of the main SIC divisions, zero otherwise
Insider ownership (%)	Stake owned by officers and directors as well as non-officer/director 'people' (which may include former directors or wealthy private individuals who do not have an investment vehicle)
Leverage (%)	Total book value of debt / total book value of debt plus market value of equity
Log of book value of total assets	Log (total assets)

Market cap	Market value of equity at fiscal year-end in $ millions
Net income	Net profit in $ millions
Net profit margin (%)	Net income as a fraction of sales
Net profit margin is in the bottom 25% of the sample (indicator)	One if the target company belonging to the financial industry has net profit margin in the bottom 25% of the sample, zero otherwise
Operating income/ total assets is in the bottom 25% of the sample (indicator)	One if the target company has operating income/ total assets in the bottom 25% of the sample, zero otherwise
Operating margin is in the bottom 25% of the sample (indicator)	One if the target company has EBITDA/Sales in the bottom 25% of the sample, zero otherwise
Operating performance (%)	EBITDA / total revenue
PE (indicator)	Categorical variable determining whether the investor is a PE firm (variable=1) or non-PE (variable=0)
Prior stock return	Geometric returns of target stock prices one year ([-280, -31]) before the PIPE deal announcement
ROE (%)	Net income as a fraction of book equity value
R&D expenses/ sales is in the top 25% of the sample (indicator)	One if the target company has R&D expenses/sales in the top 25% of the sample, zero otherwise
R&D intensity (%)	Research and development expenses /total revenue
Sales	Total revenue in $ millions.
Stake	Size of deal / market cap to approximate the bought stake
Tobin's q	Market value of equity plus book value of total debt / book value of total assets.
Year (indicators)	One if the PIPE deal occurs in a specific year (2008-2013), zero otherwise
Z distress (indicator)	One if the issuer has an Altman Z score of smaller than 1.81 before the issuance

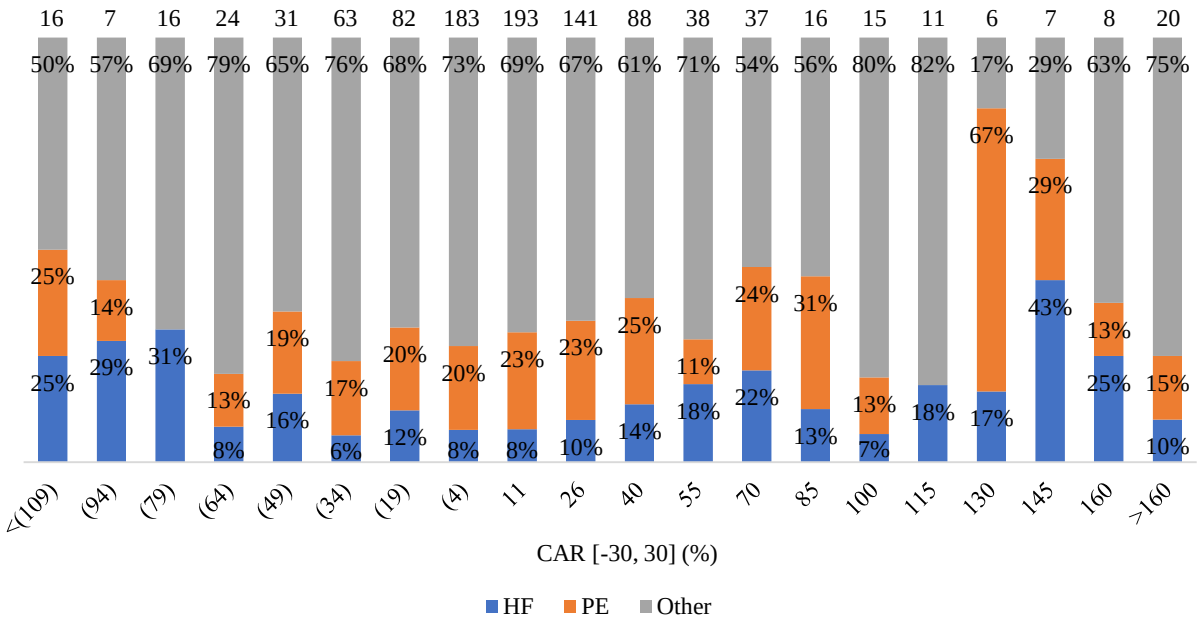
II. Market Reactions to PIPE Announcements and Shareholder Value

Graph X.4.1
Histogram of CAR [-1, 1], 1% Winsorized



N (all) = 1,001, N (HF) = 115, N (PE) = 206, N (Other) = 680

Graph X.4.2
Proportion of Investor Types, CAR [-30, 30], 1% Winsorized



N (all) =1,002, N (HF) = 115, N (PE) = 206, N (Other) = 681

Table X.4.1
Average Announcement Returns, Complete Sample, 3% and 5% Winsorized

CAR	3% Winsorized				5% Winsorized			
	All	HF	PE	Other	All	HF	PE	Other
[-1, 1]	2.11***	0.975	3.05***	2.01***	1.90***	0.974	2.78***	1.79***
[-3, 3]	3.22***	4.73***	3.63***	2.84***	2.91***	4.19***	3.40***	2.55***
[-5, 5]	3.89***	6.68***	3.29**	3.61***	3.60***	5.93***	3.14***	3.34***
[-10, 10]	4.08***	8.29***	5.11***	3.06***	3.61***	7.61***	4.75***	2.59***
[-20, 20]	3.82***	5.55	6.51**	2.72**	3.33***	5.18	6.09***	2.18*
[-30, 30]	5.36***	8.20	8.43***	3.96**	4.83***	7.68	7.84***	3.44**

CAR [-10, 10], [-20, 20], [-30, 30]: N (all) = 1,002, N (HF) = 115, N (PE) = 206, N (Other) = 681
CAR [-1, 1], [-3, 3], [-5, 5]: N (all) = 1,001, N (HF) = 115, N (PE) = 206, N (Other) = 680

Table X.4.2
Average Announcement Returns, CapitalIQ Subsample, 3% and 5% Winsorized

CAR	3% Winsorized				5% Winsorized			
	All	HF	PE	Other	All	HF	PE	Other
[-1, 1]	1.96***	1.01	2.48**	2.01***	1.75***	1.01	2.12**	1.79***
[-3, 3]	3.02***	4.80***	2.44*	2.84***	2.71***	4.25***	2.26*	2.55***
[-5, 5]	3.81***	6.78***	2.40	3.61***	3.51***	6.02***	2.27	3.34***
[-10, 10]	3.83***	8.45***	3.82*	3.06***	3.37***	7.75***	3.63*	2.59***
[-20, 20]	3.42***	5.49	5.15*	2.72**	2.98***	5.11	5.17*	2.18*
[-30, 30]	4.90***	8.05	6.93*	3.96**	4.46***	7.51	6.92**	3.44**

CAR [-10, 10], [-20, 20], [-30, 30]: N (all) = 934, N (HF) = 113, N (PE) = 140, N (Other) = 681
CAR [-1, 1], [-3, 3], [-5, 5]: N (all) = 933, N (HF) = 113, N (PE) = 140, N (Other) = 680

Table X.4.3
Regressions on CAR, All Investors

Panel A: Non-Banking PIPE Issuers

Variables	CAR [-1, 1]		CAR [-3, 3]		CAR [-5, 5]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	(0.00641)	0.108	(0.0574)	0.0611	(0.0495)	0.0545
Market cap	2.56e-07	(2.02e-07)	2.40e-07	(4.61e-07)	3.03e-07	(3.46e-07)
EBITDA margin	4.12e-06	0.00419**	3.39e-05	0.00148	2.26e-05	0.000590
Leverage	(0.0976)	(0.0452)	(0.149)*	(0.0820)*	(0.152)*	(0.0799)
Tobin's q	0.000182	(0.000276)	0.000442	(0.00169)	(0.000331)	(0.00179)
Prior stock return	(9.621)*	(8.762)***	(15.62)***	(14.57)***	(20.17)***	(19.03)***
Stake	0.295***	0.0491***	0.290***	0.0485***	0.298***	0.0649***
HF (indicator)	(0.0654)	(0.0374)*	(0.00986)	0.0116	(0.00368)	0.0159
PE (indicator)	0.00285	(0.00780)	(0.00709)	(0.0199)	(0.0424)	(0.0506)*
Early deal (indicator)	0.0841**	0.0355**	0.121***	0.0697***	0.119***	0.0746***
Z distress (indicator)	0.0232	0.0260	0.0473	0.0444**	0.0213	0.0186
Year (indicators)	yes	yes	yes	yes	yes	yes
Industry (indicators)	yes	yes	yes	yes	yes	yes
Observations	437	437	437	437	437	437
R^2	0.297	0.168	0.268	0.168	0.273	0.175

Variables	CAR [-10, 10]		CAR [-20, 20]		CAR [-30, 30]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	(0.223)	(0.125)	(0.315)	(0.206)	(0.346)	(0.261)
Market cap	6.13e-07	7.58e-07	9.17e-07	2.04e-06	4.21e-07	6.26e-07
EBITDA margin	3.52e-05	(0.00255)	0.000123	0.00334	8.15e-05	0.0106*
Leverage	(0.103)	(0.0357)	(0.156)	(0.108)	(0.122)	(0.121)
Tobin's q	(0.00143)	(0.00397)	(0.00321)	(0.00533)	(0.00270)	(0.00206)
Prior stock return	(29.48)***	(28.40)***	(50.97)***	(48.93)***	(71.93)***	(72.61)***
Stake	0.293***	0.0822***	0.318***	0.141***	0.301***	0.165***
HF (indicator)	0.00270	0.0149	(0.0545)	(0.0433)	(0.0473)	(0.0373)
PE (indicator)	(0.0143)	(0.0245)	(0.0295)	(0.0480)	(0.0123)	(0.0360)
Early deal (indicator)	0.126***	0.0881**	0.165***	0.119**	0.147**	0.111*
Z distress (indicator)	0.0259	0.0203	0.0338	0.0228	(0.00569)	(0.000124)
Year (indicators)	yes	yes	yes	yes	yes	yes
Industry (indicators)	yes	yes	yes	yes	yes	yes
Observations	437	437	437	437	437	437
R^2	0.267	0.191	0.296	0.253	0.302	0.283

Panel B: Banking PIPE Issuers

Variables	CAR [-1, 1]		CAR [-3, 3]		CAR [-5, 5]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	0.0280	(0.00464)	(0.00378)	0.00565	(0.00925)	(0.0132)
Market cap	(8.62e-09)	1.28e-07	2.36e-07	2.80e-07	2.06e-07	2.76e-07
Net profit margin	(0.110)**	(0.0911)	(0.109)*	(0.130)*	0.0379	0.0609
Leverage	(0.0735)*	(0.114)***	(0.0638)	(0.0601)	(0.0408)	(0.0379)
Stake	(0.00415)	0.0479***	0.00896	(0.000815)	0.00272	0.00280
Prior stock return	(13.68)***	(8.145)*	(16.45)***	(18.13)***	(28.04)***	(28.88)***
HF (indicator)	(0.0430)	(0.0191)	(0.00507)	(0.00969)	(0.00899)	(0.00869)
PE (indicator)	0.00755	0.0224	0.0105	0.00851	0.00508	0.00463
Early deal (indicator)	(0.00251)	0.00770	0.0370	0.0355	0.0382	0.0380
Coverage distress (indicator)	0.0395	(0.296)**	0.184	0.306**	0.314**	0.323**
Year (indicators)	yes	yes	yes	yes	yes	yes
Observations	237	237	237	237	237	237
R^2	0.141	0.176	0.257	0.250	0.250	0.251

Variables	CAR [-10, 10]		CAR [-20, 20]		CAR [-30, 30]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	0.000259	(0.00107)	0.0494	0.00121	0.0540	(0.0108)
Market cap	3.23e-07	3.79e-07	1.54e-06*	2.24e-06**	1.30e-06	1.87e-06
Net profit margin	0.246***	0.296***	0.313**	0.410***	0.352**	0.463***
Leverage	(0.109)	(0.0936)	(0.149)	(0.174)	(0.111)	(0.160)
Stake	0.0134	0.00575	(0.0205)	0.0331	0.00182	0.0903**
Prior stock return	(48.47)***	(51.91)***	(87.18)***	(81.18)***	(105.2)***	(98.33)***
HF (indicator)	0.0300	0.0271	0.0226	0.0486	0.0105	0.0522
PE (indicator)	0.0485	0.0390	0.116*	0.128**	0.121	0.132*
Early deal (indicator)	0.0598	0.0608	0.0183	0.0286	0.0656	0.0878
Coverage distress (indicator)	0.365**	0.434**	0.627**	0.137	0.499*	(0.129)
Year (indicators)	yes	yes	yes	yes	yes	yes
Observations	237	237	237	237	237	237
R^2	0.321	0.321	0.319	0.316	0.357	0.368

Table X.4.4
Regressions on CAR, PE Investors

Panel A: Non-Banking PIPE Issuers

Variables	CAR [-1, 1]		CAR [-3, 3]		CAR [-5, 5]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	(0.894)*	(0.0102)	(1.123)**	(0.303)	(1.008)*	(0.358)
Market cap	3.77e-05	4.67e-06	2.19e-05	(5.46e-06)	1.77e-05	(6.71e-06)
EBITDA margin	0.00287	0.0144***	(0.000513)	(0.00373)	(0.00104)	(0.0147)**
Leverage	0.0928	(0.160)**	0.144	(0.0498)	0.139	(0.0254)
Tobin's q	0.0160	(0.00351)	0109	(0.0111)	0.0116	(0.0132)
Prior stock return	(5.508)	(7.124)	(12.80)	(13.24)*	(16.54)	(14.32)*
Stake	0.721***	0.0712***	0.701***	0.0722***	0.706***	0.0953***
Early deal (indicator)	0.243*	(0.0141)	0.416**	0.170***	0.407**	0.205***
Z distress (indicator)	0.0836	0.00177	0.109	0.00995	0.0493	(0.0458)
Year (indicators)	yes	yes	yes	yes	yes	yes
Industry (indicators)	yes	yes	yes	yes	yes	yes
Observations	101	101	101	101	101	101
R^2	0.739	0.425	0.690	0.379	0.689	0.378

Variables	CAR [-10, 10]		CAR [-20, 20]		CAR [-30, 30]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	(0.912)	(0.404)	(1.192)*	(0.716)	(1.055)	(0.718)
Market cap	7.78e-06	(9.24e-06)	6.48e-06	(1.51e-05)	(1.78e-06)	(1.98e-05)
EBITDA margin	(0.00705)	(0.0305)***	(0.00285)	(0.00760)	0.00458	0.00278
Leverage	0.145	0.0393	(0.0906)	(0.132)	(0.0496)	(0.0909)
Tobin's q	0.00765	(0.0192)*	0.000336	(0.0183)	0.0214	0.00845
Prior stock return	(23.82)	(19.90)*	(66.34)***	(59.18)***	(91.97)***	(84.80)***
Stake	0.682***	0.134***	0.631***	0.157***	0.564***	0.194***
Early deal (indicator)	0.452**	0.277***	0.550**	0.376**	0.522**	0.399**
Z distress (indicator)	0.0476	(0.0466)	0.143	0.0374	0.0560	(0.0135)
Year (indicators)	yes	yes	yes	yes	yes	yes
Industry (indicators)	yes	yes	yes	yes	yes	yes
Observations	101	101	101	101	101	101
R^2	0.654	0.426	0.593	0.455	0.566	0.472

Panel B: Banking PIPE Issuers

Variables	CAR [-1, 1]		CAR [-3, 3]		CAR [-5, 5]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	(0.0991)	(0.215)	(0.176)	(0.416)**	(0.173)	(0.348)
Market cap	0.000144	0.000146	0.000180*	0.000189*	(2.17e-05)	(1.04e-05)
Net profit margin	(0.0348)	(0.0294)	0.0184	0.0797	0.0280	0.110
Leverage	0.152	0.151	0.367**	0.381**	0.351*	0.369*
Stake	0.0472	0.0478	(0.0228)	(0.0234)	(0.0449)	(0.0457)
Prior stock return	(7.898)	(7.799)	(14.34)	(15.25)	(44.23)**	(45.46)**
Early deal (indicator)	0.0464	0.0466	0.0918	0.0899	0.138	0.136
Coverage distress (indicator)	0.0479	0.0587	0.662**	0.693**	0.639*	0.679*
Year (indicators)	yes	yes	yes	yes	yes	yes
Observations	26	26	26	26	26	26
R^2	0.845	0.843	0.847	0.850	0.827	0.831

Variables	CAR [-10, 10]		CAR [-20, 20]		CAR [-30, 30]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	(0.229)	(0.541)	(0.173)	(0.559)	0.0747	(0.514)
Market cap	9.80e-05	0.000122	(3.24e-06)	2.36e-05	9.58e-05	0.000142
Net profit margin	0.147	0.348	0.0601	0.253	0.270	0.652
Leverage	0.427	0.476	0.441	0.484	(0.183)	(0.0894)
Stake	(0.0118)	(0.0152)	0.0561	0.0542	0.150	0.143
Prior stock return	(54.09)**	(57.50)**	(99.53)***	(102.4)***	(130.5)***	(137.0)***
Early deal (indicator)	0.180	0.172	0.170	0.164	0.272	0.259
Coverage distress (indicator)	0.303	0.385	(0.753)	(0.656)	(0.902)	(0.743)
Year (indicators)	yes	yes	yes	yes	yes	yes
Observations	26	26	26	26	26	26
R^2	0.742	0.759	0.827	0.835	0.778	0.799

Table X.4.5
Regressions on CAR, HF Investors, Non-Banking Industries

Variables	CAR [-1, 1]		CAR [-3, 3]		CAR [-5, 5]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	(0.0216)	(0.0728)	0.130	0.153	0.00471	0.0696
Market cap	(6.88e-05)***	(5.40e-05)**	(6.82e-05)*	(7.09e-05)*	(5.77e-05)	(6.31e-05)
EBITDA margin	(1.76e-05)	0.00311	1.54e-05	0.00281	6.38e-05	0.00474
Leverage	(0.0210)	(0.0114)	(0.147)	(0.160)	(0.0718)	(0.104)
Tobin's q	(0.000631)	0.00143	(0.00103)	(0.00269)	(0.00222)	(0.00583)
Prior stock return	2.673	1.172	(9.148)	(9.912)	(11.59)*	(12.67)**
Stake	0.00841	0.00774	0.00673	0.00612	0.0335	0.0336
Early deal (indicator)	0.0676*	0.0719**	0.0401	0.0352	0.0711	0.0590
Z distress (indicator)	(0.00181)	0.00121	(0.0122)	(0.0107)	(0.00977)	(0.00977)
Year (indicators)	yes	yes	yes	yes	yes	yes
Industry (indicators)	yes	yes	yes	yes	yes	yes
Observations	76	76	76	76	76	76
R^2	0.336	0.309	0.297	0.301	0.394	0.390

Variables	CAR [-10, 10]		CAR [-20, 20]		CAR [-30, 30]	
	Unaltered	Winsorized	Unaltered	Winsorized	Unaltered	Winsorized
Constant	(0.128)	(0.0319)	(0.442)	(0.322)	(0.391)	(0.222)
Market cap	(0.000116)**	(0.000126)**	(0.000135)*	(0.000152)*	(0.000177)*	(0.000192)*
EBITDA margin	0.000147*	0.00966	0.000208*	0.0186*	0.000189	0.0143
Leverage	0.146	0.101	0.331	0.271	0.407	0.322
Tobin's q	(0.00334)	(0.00487)	(0.00303)	(0.000818)	(0.00231)	(0.00658)
Prior stock return	(14.29)*	(17.06)*	(4.214)	(10.13)	(11.49)	(15.17)
Stake	0.0241	0.0253	0.0439	0.0444	0.0656	0.0667
Early deal (indicator)	0.0951	0.0789	0.172	0.149	0.241	0.206
Z distress (indicator)	(0.115)	(0.121)	(0.247)*	(0.253)*	(0.235)	(0.232)
Year (indicators)	yes	yes	yes	yes	yes	yes
Industry (indicators)	yes	yes	yes	yes	yes	yes
Observations	76	76	76	76	76	76
R^2	0.432	0.400	0.416	0.410	0.353	0.352