ESSAYS ON CORPORATE OWNERSHIP

by

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Chapter 1

Introduction

Corporate ownership is one of the most important determinants of modern corporate behavior, affecting firm valuation and productivity. This thesis examines how share ownership influences, or is influenced by, important firm attributes. In the first two chapters, we examine how share ownership influences the mode of acquisition decisions (1st chapter) and firm valuation and productivity (2nd chapter.) In the third chapter, we examine how share ownership is in turn influenced by firm fundamentals, informational asymmetry, and financing constraints by focusing on hedge funds as a source of equity financing.

In chapter 2, the thesis examines acquisition decisions and target managerial incentives. With the acquisition of control, the acquirer can direct the target's resources to maximize the value of the combined firm; however, the concomitant delisting of the target's stock will dilute target managerial equity-based incentives, reducing the post-acquisition performance of the acquired unit. How acquirers trade-off these benefits and costs of control is reflected in the choice between a minority and majority acquisition. With minority acquisitions, target managerial incentives remain intact, but benefits to control are reduced.

I compare minority and majority acquisitions and find minority acquisitions are more frequent when the potential dilution to target managerial incentives is greater, or when the target is small relative to the combined firm. This relation does not hold when incentives based on public stock prices appear unimportant at the target, as evidenced by no managerial inside holdings, or at private targets with no public stock price to lose. Majority acquisitions are more frequent when control is important to enhance joint production efficiencies, increase market power, facilitate the termination of an underperforming management, or provide the acquirer with private benefits of control.

In chapter 3, the thesis examines firm performance effects of broad-based employee stock ownership. Employee share ownership plans (ESOPs) increase employee compensation and firm valuation, implying positive productivity gains. How the gains are divided depends on the size of ESOPs. When the plan has less than 5% of outstanding shares, compensation increases are small; when it is larger, compensation increases by a permanent 4.5%. The size has an opposite effect on shareholder value. Small ESOPs have substantially positive effects on firm valuation, whereas large plans show no valuation effects. This is robust to firm fixed effects and to controls for selection biases and time-varying firm characteristics. Financial leverage and unionization also influence the division of gains by affecting worker bargaining power. With higher financial leverage, employees gain less and stockholders gain more. The reverse is true with unionization rate.

In chapter 4, the thesis examines the role of hedge funds as investors of last resort in troubled firms. Hedge funds have become important investors in public companies raising equity privately. Hedge funds tend to finance companies that have poor

fundamentals and pronounced informational asymmetries. To compensate for these shortcomings, hedge funds protect themselves by requiring substantial discounts, negotiating repricing rights, and entering into short positions of the underlying stocks of the funded companies. We find that companies that obtain financing from hedge funds significantly underperform companies that obtain financing from other investors during the following two years. We argue that hedge funds are investors of last resort and provide funding for companies that are otherwise be constrained from raising equity capital.

Chapter 2

Control and Target Managerial Incentives in Acquisition Decisions

In this paper, I investigate whether firms weigh the benefits to control against costs associated with a potential dilution to target managerial incentives in acquisition decisions. I evaluate this trade-off by comparing the choice between minority and majority control acquisitions. While the current literature focuses on majority control acquisitions, one in eight acquisitions is for a minority stake involving less than 50% of the target. Existing theories on toeholds only speak to short-term holdings of minority stakes, yet most minority acquisitions are not temporary positions. Minority acquisitions are typically announced as part of a strategic alliance and generate value similar to majority acquisitions: the average three-day joint announcement return is 0.38% for minority versus 0.45% for majority acquisitions.

By attaining control, the acquirer can direct the target's resources to best maximize the value of the merged firm. However, agency conflicts at the target firm may intensify following a majority acquisition (Holmstrom and Tirole, 1993). After a controlling acquisition, the stock of a public target is typically delisted.[1] The stock price of the merged firm will be a diluted signal of target managerial performance, decreasing

[1] Less than 2% of the targets in the sample maintain a public stock price following a majority control merger.

the efficiency of equity-based incentives and potentially increasing agency conflicts at the target firm. Following a minority acquisition, there is no expectation of a delisting. Thus, if preserving existing managerial incentives is important, firms will be more likely to pursue a minority acquisition when the potential costs of diluting target managerial incentives are greater than the benefits to control.

The relative size of the two firms proxies for the potential level of dilution to target managerial incentives. After a majority acquisition, equity-based incentives provided to the target's manager are now likely to be based upon the value of the merged firm, and the smaller the relative size of the target to merged firm, the greater the dilution to the incentives. As such, a target managerial incentives hypothesis predicts small targets, relative to the combined firm, will be more likely to engage in minority rather than majority acquisitions. Indeed, relatively small public firms are more likely to be targets of minority acquisitions, as estimated using 2,163 acquisitions by public acquirers between 1994 and 2006. Holding all other variables constant, and moving from the bottom quartile of relative size (estimated as the ratio of the target to combined firm) to the top quartile, decreases the probability of a minority acquisition by 47%.

This result is striking in light of traditional hypotheses suggesting the opposite relation between firm size and minority acquisitions. The presence of financing constraints at the acquirer would predict the relatively larger the target, the more likely a minority acquisition. An integration cost hypothesis, where larger targets are typically assumed to be more expensive to integrate, would lead to a similar prediction (Villalonga and McGahan, 2005).

In further support of a target managerial incentives hypothesis, relative size is a less significant predictor of the mode of acquisition when stock-based incentives are relatively unimportant in managing the target's assets, as inferred from target management's insignificant equity holdings prior to the acquisition announcement or a low industry-level correlation between stock performance and CEO pay. Relative size also is a less significant predictor of the mode of acquisition when accounting-based information is a better substitute for the information contained in the stock price regarding target managerial performance, such as when the firm has a high earnings response coefficient, low growth options, or when the target is private with no public stock price to lose.

Maintaining efficient incentives is one justification from agency theory for why firms may prefer to stay separate. Another reason is to avoid the inefficiencies of internal capital markets. According to the diversification discount literature, internal capital markets can be less efficient than external capital markets. Rajan, Servaes, and Zingales (2000) show value loss can occur in diversified firms when resources are over-allocated from high- to low-growth divisions. Likewise, Robinson (2007) finds an internal capital market can be inefficient when the manager of a risky project believes later stage funds may be reallocated to alternative uses within the firm. Using proxies for inefficient internal capital markets from both papers, I find costly internal capital markets predict minority acquisitions.

While target managerial incentives and internal capital markets are unchanged by a minority acquisition, benefits associated with control are less likely to be realized. When these benefits to control are important, firms are more likely to opt for majority

acquisitions. For example, a majority acquisition can generate value if the consolidation of control facilitates joint production maximization. Production efficiency gains are most likely to be realized when both the target and the acquirer operate in the same industry and can share valuable resources (Maksimovic and Phillips, 2001). As predicted, horizontal acquisitions are more likely to involve a majority stake.

A majority acquisition can also lead to benefits associated with increasing market power (Kim and Singal, 1993; Fee and Thomas, 2004; and, Shahrur, 2005). A minority acquisition is less likely to affect market power, an assumption consistent with recent decisions by the US anti-trust authority (Gilo, 2000). I assume benefits to control are more valuable in industries which are already concentrated, as estimated using the Herfindahl index. There is limited evidence that acquirers operating in concentrated industries are relatively more likely to make majority acquisitions.

Control also grants the acquirer greater say in hiring and firing managers at the target. The ability to terminate managers at the target will be most valuable when the existing management is underperforming (Martin and McConnell, l991). I use poor stock market returns as a proxy for managerial performance and find majority control acquisitions are more likely at target firms which are underperforming.

In some cases, benefits to control may accrue primarily to the acquirer's managers. Private benefits to control motivations are likely to be characterized by an acquiring firm with excess capital and minimal internal investment needs (Jensen, 1986). As predicted, firms with both high free cash flow and low growth options are more likely to make majority acquisitions, consistent with the existence of private benefits to control.

Finally, as most acquisitions during this time period were friendly, it is also important to consider the target firms' motivations. Targets may solicit a minority acquisition to meet external financing needs. Fee, Hadlock and Thomas (2006) find that financial constraints at a supplier firm increase the likelihood of observing an equity stake by a customer firm in this supplier firm, relative to no equity stake between the two trading partners. I find complimentary evidence indicating minority, relative to majority, acquisitions are more likely when the target is financially constrained.

To compare the economic magnitude of these various influences on the mode of acquisition decision, I start with a multivariate regression and analyze the change in predictions given a change in any one variable. After controlling for benefits to control, the relative size ratio remains influential on the mode of acquisition indicating preserving target managerial incentives is an important consideration in determining the boundaries of the firm. Changing the value of the relative size ratio, from the bottom to the top quartile, for non-financially constrained firms with low earnings response coefficients, reduces the probability of a minority acquisition by 71%.

The other key drivers of the acquisition decision are production efficiency gains, private benefits to control, and financial constraints at the target. Changing from a diversifying to a horizontal acquisition decreases the probability of a minority acquisition by 57%. When the acquiring firm changes from having high to low growth options and from low to high free cash flow, the probability of a minority acquisition decreases by 60%. Changing from a financially constrained target to a non-financially constrained target decreases the probability of a minority acquisition by 42%.

To ensure the robustness of the results in support of the target managerial incentives hypothesis, I propose, then exclude, alternative explanations of the relative size finding. For example, can real options explain these results? While firms may prefer majority acquisitions when anticipating large benefits to control, if these benefits are uncertain, a minority acquisition may, instead, be preferred. A minority acquisition will allow the acquirer to learn more about potential synergies with the target before committing to the full acquisition price. This real option approach to majority acquisitions will predict relatively more minority acquisitions of those targets with the most uncertain synergies.

Target firms may be associated with uncertain merger synergies due to unknown future growth options, such as at small high-technology firms, or limited public information, such as at private firms. Therefore, the real option hypothesis will share a prediction with the target managerial incentives hypothesis: small target firms with high growth options will be more likely to be targets of minority acquisitions. However, the real option hypothesis cannot explain the finding that small private target firms are less likely to be targets of minority acquisitions. I use a similar approach to test alternative explanations based on corporate culture and product market considerations. Results are not consistent with these alternative explanations.

Related arguments have been made in the literature. Holmstrom and Tirole (1993) show that information contained in the stock price pertaining to managerial performance is not replicated in accounting information, thus suggesting a cost to stock delistings. Allen and Phillips (2000), Fee, Hadlock, and Thomas (2006) and Mathews (2006) raise the possibility that concerns for target managerial incentives may limit majority

acquisitions. Aron (1991); Slovin, Sushka, and Ferraro (1995); and Seward and Walsh (1996) suggest improved managerial incentives as a rationale for spin-offs. In addition, Gupta (2005) shows that the addition of a new stock price and the ability to write incentive contracts thereon can lead to value gains following partial privatizations.

The paper proceeds as follows. Section 2.1 surveys the literature and develops the main hypotheses. Section 2.2 describes the sample. Section 2.3 presents empirical results. Section 2.4 considers several robustness tests and Section 2.5 concludes.

2.1. Predictions

2.1.1. Costs to diluting target managerial incentives

A firm consists of agents with divergent interests (Jensen and Meckling, 1976). Managerial effort is valuable to shareholders, but managers are reluctant to provide costly effort unless they are compensated for it. One way to align managerial interests with those of shareholders is to provide managers with equity stakes in the firm. However, equity-based incentives become less efficient once a firm is acquired and its stock is delisted, because an important source of information on managerial performance is lost. This lost signal is costly regardless of whether the same target managers continue to work at the merged firm. As long as the merged firm enlists agents with imperfectly observable behavior to manage the target's assets, a signal of managerial performance will have value. If the target management is given new equity stakes in the combined firm, the signal value will be diluted, and the dilution will be greater the smaller the relative value of the target to the merged firm.

I assume there is no cost effective contract with which the acquirer can fully offset this dilution to incentives due to costs associated with transferring risk to the target's managers. I also assume a tracking stock or a minority share flotation will not adequately replace the lost information. Holmstrom and Tirole (1993) show that the presence of a majority stakeholder decreases the information in the stock price pertaining to managerial performance. Thus, even if the target's stock remains listed following a majority acquisition, valuable information will still be lost. Furthermore, firms have found that tracking stocks cannot fully replace information previously contained in the delisted target stock. For example, when General Motors (GM) acquired EDS, it was concerned that changes in the value of EDS would not be observable in the merged stock, dominated by the much larger GM. This was important as many EDS employees received equity-based incentives, leading to the issuance of the EDS tracking stock in October of 1984. However, the EDS tracking stock was eventually considered unsatisfactory. Disagreements over transfer prices between EDS and the remainder of GM highlighted the potential for GM to manipulate the value of the EDS shares and caused the EDS tracking stock to reflect factors other than the performance of the EDS division.[2]

As such, the target manager's incentives will be diluted following the delisting of the target's stock after a majority acquisition, reducing his incentives to put forth costly effort. Because dilution is greater for relatively smaller targets, I predict minority acquisitions will be more common for relatively smaller targets to avoid the delisting of their stocks.

[2] See Holmstrom and Tirole (1989) for more detail. D'Souza and Jacob (2000) make a similar point by showing a 30% correlation in returns between a tracking stock and its parent. This correlation with the parent firm is three times the magnitude found when using similar, but independent firms.

2.1.2. Benefits to control

I consider the benefits to control over assets and employees from the perspective of the acquirer's shareholders. I also consider benefits to control which accrue primarily to the acquiring manager.

Control over assets may be necessary to realize acquisition synergies. When two firms merge, they cease to act as separate units, allowing for the maximization of a joint production function. Maximizing a joint function can lead to an increase in production efficiency or an increase in market power. When joint maximization is most valuable, I predict majority acquisitions will be more common. Production efficiency will increase following a horizontal merger with economies of scale or when more efficient firms acquire less efficient assets in the same industry and share technology or specialized resources, as in Maksimovic and Phillips (2001). I proxy for benefits to control associated with increasing production efficiency with an indicator variable as to whether the target and acquirer share an industry.

A merger can also increase market power over customers, as shown in Kim and Singal (1993), or suppliers, as shown in Fee and Thomas (2004) and Shahrur (2005). I assume a majority acquisition will have a greater effect on market power. While it is conceivable that equivalent benefits associated with increased market concentration could be realized following either minority or majority acquisitions, the potential for either party to deviate in the minority acquisition setting will reduce the potential value from increased market concentration. The US government appears to agree. Gilo (2000) finds

that regulators have been less inclined to challenge minority stakes on anti-trust grounds, instead viewing these investments as passive and lower threats to fair competition. I proxy for the benefits to control associated with market power with the existing acquirer industry Herfindahl index, estimated prior to the acquisition announcement.

Further benefits to control may derive from the ability to replace underperforming managers at target firms. Martin and McConnell (l991) show target management turnover following majority acquisitions is common and more likely when the target has been under-performing. Thus, I predict majority acquisitions will be more likely when the target management is underperforming.

Finally, private benefits to control may be important. When shareholder and managerial incentives are misaligned, the CEO may pursue an acquisition for personal gains. Beginning with the empire-building argument in Jensen (1986), multiple justifications suggest a preference by managers for majority control acquisitions. For example, managers may prefer majority control acquisitions if firm size is correlated with their compensation (Murphy, 1985, and Gabaix and Landier, 2007). Thus, I argue agency motivations will predict majority control acquisitions. Following the approach of Lang, Stulz, and Walkling (1991), I proxy for agency motivated acquisitions by identifying firms with both low growth options and high free cash flow.

2.2. Data and sample selection

2.2.1. Identifying minority and majority acquisitions

The sample covers acquisitions involving US public acquirers and targets announced between 1994 and 2006. Thompson's Security Database Clearinghouse (SDC) identifies 3,285 mergers and acquisitions over this period which can be matched to the Compustat and CRSP databases.[3] Deals are classified based on whether or not the percent of the target firm acquired is less than (minority) or greater than or equal to 50% (majority). A realized minority stake may represent a failed majority bid. Thus, deals which involve a realized stake of less than 50%, but an intended stake of greater than 50%, are coded as majority acquisitions. After dropping 218 observations due to inadequate information to determine if the deal was for a minority or majority stake or because the acquirer already had a majority stake, I identify 2,697 majority and 370 minority acquisitions.[4]

The sample is further restricted by the following screens. First, observations are dropped if multiple firms acquire the same target on the same day (involving 4 majority and 9 minority acquisitions). Often, the acquiring firms are related through cross-holdings, making it difficult to identify if control was attained. Second, firms may take multiple days to complete an acquisition. To avoid double counting these staged acquisitions, I include only the later acquisition (with the final equity stake) if two deals

[3] Withdrawn deals are included to avoid a possible sample selection bias.
[4] Observations are dropped where the acquirer already had a majority stake as, for these deals, a minority stake is the only feasible option.

involving the same target and acquirer occur within 20 trading days (dropping 6 majority and 7 minority acquisitions). Finally, I follow the literature and exclude acquirers whose acquisitions are highly regulated, dropping 792 majority and 86 minority acquisitions by financial firms (SIC codes 6000-6999) and utilities (SIC codes 4911-4931). This yields a final sample of 1,895 majority and 268 minority acquisitions. There are 1,126 unique acquires in the majority acquisition sample and 175 unique acquirers in the minority acquisition sample.

CEO pay sensitivity is estimated using data from Execucomp. Change in total compensation at the CEO level is estimated as the percent change relative to the previous year and winsorized at the 5% level. For each CEO-firm combination, total compensation change is regressed on the operating performance and stock price performance, at that firm, over that period. This regression is run multiple times using data which pre-dates the 1994 sample observations, data which pre-dates the 1995 sample observations, and so on. The mean coefficient on stock price performance is estimated for each 3-digit SIC code and set of year restrictions and matched to each observation so that all data used in the estimate predates the acquisition announcement.

Earnings response coefficients (ERCs) are estimated using the approach used in Foster (1977) and adapted in Easton and Zmijewski (1989). Earnings announcements are identified as the latest mean quarterly EPS analyst estimate which still strictly pre-dates the actual earnings announcement. Observations are discarded when the latest mean quarterly analyst estimate occurs more than 45 days before the actual EPS is announced. Unexpected earnings are estimated as the actual EPS minus the mean estimate normalized by the firm's stock price.

Earnings announcement returns are estimated using a market-model and a 2-day observation window including the day of and the day after the earnings are announced. Stock price performance between the date of the mean analyst estimate and the day before the earnings announcement is also estimated using a market model. When available, this procedure is repeated using the last 3 quarterly earnings at the target firm which pre-date the acquisition announcement. ERC is then estimated as the coefficient on unexpected earnings observed when regressing earnings announcement returns on unexpected earnings and stock price performance between the date of the analysts' predictions up to the earnings announcement. The stock price performance between the date of the analysts' predictions up to the earnings announcement is meant to capture new information about expected earnings which may have been released after the last analyst report. This regression is estimated on a firm-by-firm basis.

2.2.2. Characteristics of minority and majority acquisitions

Table 2.1 presents summary statistics of both minority and majority acquisitions with averages reported and medians in parentheses.[5] Minority acquisitions tend to involve the transfer of a sizable portion of the target firm, with a mean purchase of 12.42%. Firms which make minority acquisitions are larger, on average, than those which make majority acquisitions. The average market capitalizations (in 2006 $) of minority and majority acquirers are $52.7B and $15.2B, respectively. Both types of acquirers tend to be profitable the year before the acquisition announcement. Targets of minority acquisitions

[5] All accounting data (summarized in this table or used in later tests) are from the most recent annual report which strictly predates the event announcement.

are larger, on average, than targets of majority acquisitions, although this difference is not statistically significant. Targets of minority acquisitions also tend to have higher research and development expenses and lower earnings than targets of majority acquisitions. Relative size is estimated as the ratio of the target market capitalization to combined market capitalizations, evaluated 28 calendar days before the acquisition announcement. Minority acquisitions are associated with smaller mean and median relative size ratios than majority acquisitions.

Both types of acquisitions are associated with positive announcement returns. I measure joint announcement returns using a market-adjusted return captured over a three-day window around the announcement date, following the Bradley, Desai, and Kim (1988) value-weighted approach. Average joint announcement returns for minority and majority acquisitions are 0.34% and 0.49%, respectively. These joint returns are statistically different from zero at the 5% level. Although there is no statistical difference between the two samples, there is a difference in the distribution of these gains. Acquirers gain more and targets gain less with minority as compared to majority acquisitions, consistent with a higher premium for control.[6]

A common prior belief is that minority acquisitions are concentrated in a few industries. However, the targets and acquirers in the minority acquisition sample operate in a diverse cross-sectional distribution of industries, as described in Table 2.2.

[6]The premium paid by the acquirer is calculated using an underlying price recorded four weeks prior to the announcement. If the estimated premium is either negative or greater than 200%, this observation is not included in the summary statistics. This methodology is adopted from Officer (2003) and used in Moeller, Schlingemann, and Stulz (2004).

2.3. Empirical results

This section presents an analysis of the decision to take a minority or majority stake. Tables 2.3 to 2.6 report results from logit regressions in which the dependent variable assumes a value of 1 if the acquisition is for minority control and a value of 0 for majority control. Standard errors are robust and account for serial correlation by allowing for clustering of the error term at the firm level. Year fixed effects are included but not reported.

2.3.1. Target managerial incentives

2.3.1.1. Public firm evidence

Column 1, Table 2.3 shows the coefficient on relative size is negative and statistically significant, indicating minority acquisitions are relatively more common when the target is small compared to the combined firm. This result is consistent with a predication of the target managerial incentives hypothesis as the costs associated with diluting target managerial incentives will be greatest when the target is small relative to the acquirer.

To isolate whether this result is driven by the size of the acquirer or the target or both, in column 2 target and acquirer market capitalizations are included separately. The sizes of both firms are significant predictors of the acquisition decision. Small targets and large acquirers are more likely to participate in minority acquisitions.

This result is surprising as one would expect the opposite sign if integration costs play a major role in acquisition decisions. Villalonga and McGahan (2005) interpret Hennart's (1988) digestibility theory to predict firms will avoid majority acquisitions of relatively large targets due to diseconomies of scale in integration. Instead, I find a majority acquisition is more likely when the target is relatively large.

Likewise, a financing constraint hypothesis predicts acquirers will prefer minority acquisitions when the target is relatively large. However, if only a subset of acquiring firms is constrained, evidence of the importance of financing constraints may be obscured in the full sample. Thus, acquiring firms most likely to be financially constrained are separated with an indicator variable, FINCON. Whited (2006) argues small non-dividend paying firms are a priori financially constrained and finds supporting evidence that these firms delay making large investments, roughly comparable to acquisitions. Thus, *FINCON* assumes the value of 1 if the acquirer is in the smallest sample quartile by total assets and does not pay dividends.

Column 3 shows a negative correlation between relative size and minority acquisitions for non-constrained acquiring firms. However, for financially constrained acquiring firms, I observe the opposite result. For financially constrained acquiring firms, the larger the relative size of the target the more likely a minority control acquisition, relative to the rest of the sample.[7] The link between financing constraints and acquisition activity is somewhat surprising in light of Rauh (2006) who finds that financing constraints have no effect on the dollar magnitude of an acquisition, given the choice to

[7] Similar results also hold using an indicator variable that captures the firms with the highest decile of financing constraints as estimated using the KZ index (Kaplan and Zingales 1997) based on Lamont, Polk, and Saa-Requejo (2001) or the second definition of financial constraints in Whited (2006), firms in the smallest decile of total assets.

pursue an acquisition.[8] I cannot infer as to whether financially constrained acquirers seek smaller target firms. However, given the decision to purchase equity in a target firm, the relatively larger the target firm, the more likely a financially constrained firm will take a minority position, thereby, reducing the size of the acquisition.

Columns 4-7 explore several cross-sectional predictions related to target managerial incentives. The target managerial incentives hypothesis predicts relative size will be a weaker predictor of the acquisition decision when equity-based incentives are less important in motivating the target's CEO or when information pertaining to managerial performance, contained in the stock price, can be inferred from other sources, such as accounting ratios.

The relative importance of equity-based incentives can be inferred by the size of the target's CEO equity stake before the acquisition announcement. I assume equity-based incentives are relatively unimportant when the target's CEO holds less than 1% of the shares outstanding in the firm.[9] This threshold is consistent with the SEC which requires a lesser amount of disclosure if CEO holdings are below 1%. Column 4 reports a positive and significant coefficient on the interaction of *target CEO hold < 1%* and relative size.[10] This suggests that for firms where equity incentives are estimated to be less important, relative size is a less important predictor of the acquisition decision. This

[8] Rauh (2006) does observe that financing constraints affect the probability of an acquisition.
[9] Target CEO holdings are estimated as the sum of stock and exercisable options, as reported in the most recent proxy statement which pre-dates the acquisition announcement.
[10] The number of observations drops because it was not possible to determine insider holdings for the complete sample. CEO insider holdings are coded missing when SEC documents strictly predating the acquisition announcement by not more than two years are unavailable to identify both the name and holding of the CEO.

result further strengthens the argument that target managerial incentives play an important role in the decision of whether to pursue a minority or majority acquisition.

I use the correlation between a firm's stock price performance and total CEO pay as a second proxy for the relative importance of equity-based incentives. As less than 15% of the target firms in the sample are covered in Execucomp, this variable is estimated at the industry level. *CEO pay sensitivity low* is an indicator variable which takes the value of 1 if the target firm is located in an industry where the mean correlation between CEO pay and stock price performance is below the sample median. Column 5 reports a positive and significant correlation on the interaction of CEO pay sensitivity low and relative size indicating that the relation between relative size and the mode of acquisition decision is weaker in industries with low CEO pay sensitivity.

The target managerial incentive hypothesis also predicts relative size to be a weaker predictor of the acquisition decision when information pertaining to managerial performance, contained in the stock price, can be inferred from other sources, such as accounting ratios. Earnings response coefficients (ERCs) reflect the extent to which stock prices replicate accounting information by measuring the stock price response to unexpected earnings. If stock prices respond strongly to unexpected earnings, as captured by a high ERC, then much of the information contained in the stock price simply reflects accounting data. On the other hand, when stock prices have modest responses to unexpected earnings, as captured by a low ERC, then stock prices reflects information which is not contained in accounting ratios.

ERC high is an indicator variable which takes a value of 1 if the firm's ERC is above the sample median. Column 6 reports a positive and significant coefficient on the interaction of ERC high and relative size indicating that the relation between relative size and the mode of acquisition decision is weaker at firms where accounting variables presumably can substitute more closely for the information lost with the delisting of the stock price.

My second proxy for relative information loss captures the importance of growth options in the firm's market price, because changes to the value of growth options are difficult to observe in accounting ratios.[11] Growth options are proxied with a binary variable, *target MB low*, which assumes a value of 1 if the target firm's market to book ratio is below the sample median of 2.06. Column 7 reports a positive and significant coefficient for target MB low interacted with relative size. Therefore, when growth options are estimated to be high, relative size is an important predictor of majority acquisitions. However, when growth options are low, the impact of relative size is insignificant, as captured by the sum of the coefficients on relative size and the interaction term. For these value firms, stock prices contain relatively less information which is not already included in accounting ratios.

2.3.1.2. Public and private firm evidence

Perhaps the most direct test of the target managerial incentives hypothesis is to compare private targets with public ones. Information used to value a private company,

[11] This proxy is similar to the value relevance of earnings measure used in the accounting literature.

such as accounting multiples and industry averages, is still available after a merger integration.[12] Therefore, a weaker relation between relative size and the acquisition decision in private as compared to public firms is predicted.

Table 2.4 reports tests of this prediction. The sample is expanded to include all US public and private targets by US public acquirers between 1993 and 2006. As in Table 2.3, the dependent variable assumes a value of 1 if the acquisition was for minority control and a value of 0 if majority control was attained. All standard errors are robust and clustered at the acquirer level. Year fixed effects are included, but not reported.

Estimates of market capitalizations for private targets are unavailable. Thus, for regressions with public and private targets, the *implied target market capitalization* is estimated as the transaction price divided by the percent of the firm acquired. Using the transaction price to determine firm size is problematic since majority acquisitions occur at a higher premium relative to minority acquisitions. To adjust for this potential bias, the transaction prices of minority acquisitions are increased so both minority and majority acquisitions have the same unconditional average premium. The transaction value for all minority acquisitions is multiplied by 1.125 or the ratio of (1 + average majority acquisition premium) / (1 + average minority acquisition premium), where average premiums were estimated using the public target sample. *Estimated relative size* is a ratio of the implied market value of the target to the sum of the implied market value of the target and the market capitalization of the acquirer.

[12] Moreover, there is little reason to expect the dilution to incentives at a private target to be correlated with relative size. For relative size to be correlated with the dilution to managerial incentives at private targets, private firm valuations must become noisier after a majority acquisition with a negative correlation between the increase in noise and the relative size of the target.

Officer (2007) finds the discount at which private firms are sold, relative to public firms, increases with the yield spread. Thus, when the yield spread is high, if private targets are available at a discount, acquirers may prefer to take larger stakes in these firms. In which case, acquirers may demonstrate time-varying preferences for majority acquisitions of private targets following the yield spread. Thus, the yield spread, estimated as the average difference in Baa – Treasury yields over a historic twelve-month window, is included. As this time-varying preference is specific to private targets, the yield spread is also interacted with an indicator variable for private targets.

Column 1 finds relatively small public targets are more likely to be associated with minority acquisitions and this relation is reversed at private targets. This result is consistent with the target managerial incentives hypothesis. There is no relation between the yield spread and acquisitions of public targets. However, for private targets, there is a significant and positive correlation between the yield spread and minority acquisitions. Officer (2007) argues private targets become more liquidity constrained as yield spreads increase. These results could indicate minority acquisitions for private targets are a means to provide liquidity, at a time of need, for private firms. Column 2 uses a sample of repeat acquirers to test whether possible differences in the set of acquirers which engage in minority acquisitions can explain the results. I find no such evidence.

Column 3 considers log acquirer and implied target market capitalizations separately. By focusing on acquirer size, and controlling for target size, alternative interpretations of the relative size results which depend directly on target size are minimized. For example, fixed costs in establishing minority shareholder protection could make it relatively more costly to take a minority position in a small private firm.

However, such an alternative explanation would not predict a different relation between the mode of acquisition decision and acquirer size for public as compared to private targets. Consistent with a target managerial incentives interpretation, large acquirers are associated with minority acquisitions of public targets and this relation is diminished with private targets. Large public targets are also associated with majority acquisitions; this pattern is reversed with private targets. Furthermore, as reported in column 4, these results are not explained by different sets of firms acquiring public and private targets.

In sum, these results suggest that firms anticipate costs associated with diluting target managerial incentives. When they expect these costs will be high, firms are more likely to pursue minority acquisitions. However, these analyses focus only on the cost of acquiring control. The ultimate decision to pursue either a minority or majority acquisition will depend on the trade-off between the costs and benefits to control.

2.3.2. Can predictions based on the benefits to control predict the acquisition decision?

This section examines predictions regarding the benefits to control from two shareholder viewpoints: control over assets and control over employees. Benefits to control which may accrue to acquirer managers also are examined. Given the importance of FINCON in predicting a majority acquisition, the variable is included as a control throughout Table 2.5.

2.3.2.1. Benefits to control over assets

To evaluate benefits to control over assets, I test the relation between acquisition decisions and proxies for benefits associated with production efficiencies (*same industry*) or increased market power (*acquirer industry Herfindahl index*). Industry classification and Herfindahl index are estimated using three-digit SIC codes. Same industry is an indicator variable which takes a value of 1 if the target and acquirer share an industry. Herfindahl index is estimated for the acquirer's industry prior to the acquisition announcement and is log transformed. The results in column 1, Table 2.5 imply that same industry and acquirer industry Herfindahl index are significant predictors of majority acquisitions, consistent with benefits to control from an increase in production efficiency and market power.

2.3.2.2. Benefits to control over employees

Benefits to control may also derive from the ability to replace underperforming managers at target firms. To proxy for under-performance, I use *target pre-announcement returns*, or the industry-adjusted 12 month target stock price return, estimated beginning 15 months before the acquisition announcement. *Target pre-announcement returns squared* is also included to capture extreme movements in stock prices. As reported in column 2, target pre-announcement returns are a negative and significant predictor of the acquisition decision and target pre-announcement returns squared is a positive and significant predictor of the acquisition decision. The mean

stock price performance in the sample is 5.4%.[13] The net effect of multiplying the mean return and mean return squared by these coefficients is -0.033, indicating an overall negative relation between minority acquisitions and target pre-announcement returns. For target firms with positive pre-announcement returns, lower returns are associated with majority acquisitions.

However, for target firms with negative pre-announcement returns, this relation is reversed. For the set of target firms with negative pre-announcement returns, relatively worse stock performance is associated with majority acquisitions, consistent with a benefit to control over under-performing employees. While it is beyond the scope of this paper to observe whether these under-performing are more likely to be replaced following a majority acquisition, the preference for control in these cases is consistent with such outcomes.

2.3.2.3. Private benefits to control to the managers of the acquiring firm

The final benefit to control assumes an agency conflict at the acquirer. When shareholder and manager incentives are misaligned, the CEO may pursue an acquisition for personal gains, such as to build his empire (Jensen, 1986). I proxy for agency-motivated acquisitions by identifying firms with both low growth options, *acquirer Q low*, and high free cash flow, *acquirer FCF high*. This approach is similar to Lang, Stulz, and Walkling (1991). Acquirer free cash flow is estimated following Lehn and Poulsen

[13] The median pre-announcement return is -3.7%.

(1989) as the firm's operating income before depreciation minus interest expense, taxes, preferred dividends, and common dividends. This value is normalized by total assets.

Results in column 3 show when the acquirer has high growth options, acquirer free cash flow is positively correlated with minority acquisitions. This may reflect the positive correlation between free cash flow and acquirer size. Moreover, a majority acquisition is more likely when the acquirer has both low growth options and high free cash flow. This result supports a proposition that managerial objectives can drive acquisition decisions and presents complementary evidence to Lang, Stulz, and Walkling (1991) and Morck, Shleifer, and Vishny (1990).

2.3.2.4. Target managerial incentives and benefits to control

Column 4, Table 2.5 reports the results of a regression that includes proxies for benefits to control and costs associated with diluting target managerial incentives. The proxy for the cost to diluting target managerial incentives, relative size, remains a significant predictor of minority acquisitions after controlling for benefits to control. To minimize multi-collinearity, only one of the proxies for the cross-sectional predictions of target managerial incentives is included in this regression: ERC high * relative size. Of the four proxies, ERC high * relative size had the greatest statistical significance. In this multivariate setting, the coefficient on ERC high * relative size remains positive and statistically significant.

The results regarding the benefits to control which were significant in the univariate setting remain significant in the multivariate setting with one exception. As

compared to the earlier columns in the table, acquirer industry Herfindahl index is no longer significant. This loss of significance may reflect high collinearity in this multivariate regression.

2.3.3. Alternative explanations of the acquisition decision

In this section, I explore additional possible influences on the acquisition decision associated with: the costs to integrating capital markets; consequences for earnings per share estimates; potential tax benefits of majority acquisitions; and, financing constraints at the target. These additional influences are not mutually exclusive to the costs associated with diluting target managerial incentives or the benefits to control and, thus, are considered additional controls.

2.3.3.1. Internal capital markets

According to the diversification discount literature, internal capital markets can be less efficient than external capital markets. Rajan, Servaes, and Zingales (2000) show value loss can occur in diversified firms when resources are over-allocated from high- to low-growth divisions. Likewise, Robinson (2007) finds firms prefer a strategic alliance over an internally organized project when the flexibility inherent to internal capital markets diminishes the incentives of the project manager. A project manager is less likely to put forth effort when future capital, necessary for the project's success, is most likely to be reallocated to alternative uses within the firm.

Since minority acquisitions preserve separate internal capital markets, I predict relatively more minority acquisitions when the costs of integrating internal capital markets are expected to be high. To estimate this cost, I adopt a proxy for investment opportunity heterogeneity from Rajan, Servaes, and Zingales (2000) and Dittmar and Shivdasani (2003). Firms with greater heterogeneity are assumed to have more pressures to transfer funds from high- to low-growth divisions. *MB difference* is calculated as the absolute value of the difference between the industry median market to book ratios for the acquirer and the target, normalized by the market to book ratio of the acquirer. Robinson (2007) predicts projects involving high R&D will be most adversely affected if governed by an internal capital market. *Target R&D* captures the R&D intensity at the target firm and is estimated as the ratio of Target R&D expenditures to total assets. If R&D expenditures are not reported by a firm, R&D expenditures are assumed to be 0.

In column 1, Table 2.6, I find MB difference is a statistically significant predictor of a minority acquisition, consistent with firms being less likely to pursue a majority acquisition when the expected cost of integrating capital markets is high. Furthermore, while MB difference is correlated with same industry, this variable captures additional information. In unreported results, MB difference is a positive and significant predictor of majority acquisitions when estimated in a regression with same industry. High target R&D intensity is also positively correlated with a minority acquisition, consistent with the predictions in Robinson (2007).

2.3.3.2. Earnings per share

Firms may be reluctant to take a majority stake which leads to consolidation if a consolidated firm will have a lower EPS as compared to the acquirer as a stand-alone firm. *EPS dilutive* is an indicator variable which takes a value of 1 if a consolidating acquisition would have lowered EPS at the acquirer, using the most recent historical earnings as a proxy for future earnings. EPS dilutive is estimated as the difference between the actual EPS at the acquirer and the sum of earnings at both firms divided by an estimated number of new shares at the consolidated firm. The total number of new shares is calculated as the sum of the existing acquirer shares outstanding plus the number of shares calculated by dividing the target market capitalization by the acquirer share price. I find no relation between EPS dilutive and the mode of acquisition, as reported in column 2.

2.3.3.3. Taxes

Majority and minority acquisitions have different tax consequences. After a majority acquisition, the merged firm may be able to reduce its tax liability by using available net operating loss (NOL) carryforwards held by either firm. Thus, I predict a majority acquisition will be more likely when one firm has positive NOL carryforwards, as captured by the proxy, *tax*. Column 3, Table 2.6 shows tax does not predict the acquisition decision in a univariate regression. In unreported results, I find similar insignificant coefficients when using alternative variations of this proxy, including the log of NOL carryforwards.

2.3.3.4. Target financing

Column 4 investigates an explanation of minority acquisitions motivated by Fee, Hadlock, and Thomas (2006). In some cases, a non-financial corporation may be an optimal lender to the target firm. This lending firm, through trading relations or other business similarities, may be more informed about the target than other providers of outside capital and, thus, willing to provide capital at a lower cost. Such a transaction could take the form of a minority acquisition. I replicate the approach in Fee, Hadlock, and Thomas (2006) and control for the cash needs of the target with a variable, *FCF negative*, which assumes a value of 1 if the firm has negative free cash flow. Free cash flow is calculated as the firm's income before extraordinary items plus depreciation and amortization minus capital expenditures. As predicted, a minority acquisition is more likely when the target has negative free cash flow, consistent with Fee, Hadlock, and Thomas (2006).

2.3.3.5. Multivariate results

In column 5, I use these proxies for alternative influences on the acquisition decision as controls in a regression with the proxies for the costs to target managerial incentives and the benefits to control. In a multivariate test, I find empirical support consistent with predictions associated with the importance of preserving target managerial incentives, benefits to control, costs to internal capital markets, cash constrained targets, and financially constrained acquirers.

2.3.4. Economic implications

To compare the relative economic magnitudes of these various influences on the acquisition decision, I start with the following multivariate regression of the mode of acquisition decision.

$$\text{Minority acquisition} = \alpha + \beta_1\text{Relative size} + \beta_2\text{Earnings response coefficient high} + \beta_3\text{Earnings response coefficient high * relative size} + \beta_4\text{Fincon} + \beta_5\text{Fincon * relative size} + \beta_6\text{Same industry} + \beta_7\text{A h index} + \beta_8\text{Target pre-announcement returns} + \beta_9\text{Target pre-announcement returns squared} + \beta_{10}\text{Acquirer Q low} + \beta_{11}\text{Acquirer FCF high} + \beta_{12}\text{Acquirer Q low * acquirer FCF high} + \beta_{13}\text{MB difference} + \beta_{14}\text{Target R\&D} + \beta_{15}\text{EPS dilutive} + \beta_{16}\text{Tax advantaged} + \beta_{17}\text{Target FCFneg} + \text{target industry fixed effects} + \text{year fixed effects} + \varepsilon.$$

For each continuous variable of interest, I estimate a prediction of the probability of a minority acquisition given a point estimate of this variable at both the first and the third quartile, while holding all other variables constant at their means. For binary variables of interest, I estimate the predictions at values of 0 and 1. I then compare the differences in these predictions. The results are reported in Table 2.7.

In this multivariate setting, I find that changes to relative size have important effects on the predicted probability of a minority acquisition. Changing the value of relative size, from the bottom to the top quartile, results in a decrease in the predicted probability of a minority acquisition by 71%. Given the regression includes the interaction of relative size and FINCON and relative size and ERC high, this effect of changing relative size should be interpreted as applying only to those deals where the acquirer is not financially constrained and the target has a low ERC. Since the importance of preserving target managerial incentives is expected to be most important in this subset of firms, it is not surprising that the changes to the predicted probability of a minority acquisition given changes to relative size are also greatest in this subset of deals. In unreported results, if the procedure is repeated, but the two relative size interactions are dropped, this effect is reduced to a more modest 27% decline.

The other key drivers of the acquisition decision are production efficiency gains, private benefits to control, and financial constraints at the target. Shifting from a diversifying to a horizontal acquisition decreases the probability of a minority acquisition by 57%. Shifting from high to low growth options and from low to high free cash flow decreases the probability of a minority acquisition by 60%. Shifting from a financially constrained target to a non-financially constrained target decreases the probability of a minority acquisition by 42%.

2.4. Robustness checks

In this section I consider several robustness checks. In the first robustness check, I further investigate my interpretation of the finding of a positive correlation between relatively small targets and minority acquisitions as evidence of firms avoiding majority acquisitions when costs associated with diluting target managerial incentives are high. I propose alternative interpretations of this finding then refute each of these alternatives. Next, I re-estimate a critical earlier finding using an instrumental variables approach.

2.4.1. Alternative explanations of the relation between relatively small targets and minority acquisitions

The finding that relatively small targets are more likely to be associated with minority acquisitions is consistent with firms anticipating costs associated with diluting target managerial incentives. However, it is possible that this finding is also consistent with alternative interpretations which are unrelated to target managerial incentives. In this section, I explore alternative possible interpretations of this finding and discuss evidence which is inconsistent with each of the suggested alternatives. The intent is not to dismiss these alternative stories as justifications for some minority acquisitions. Instead, I seek a more modest goal: to confirm the robustness of the target managerial incentives hypothesis by excluding alternative interpretations of the finding that relatively small targets are more likely to be associated with minority acquisitions.

2.4.1.1. Integration costs

If integration costs explain the finding that relatively small targets are more likely to be associated with minority acquisitions, then integration costs must be higher when the target is relatively small. Such an assumption disagrees with Hennart's (1988) digestibility theory that firms avoid majority acquisitions when the target is relatively large, due to diseconomies of scale in integration. However, integration costs may be higher when large firms acquire small targets if small targets have more open and casual workplaces compared to the more formal bureaucracies often associated with large acquirers. If costs associated with merging such different corporate cultures are high enough, this could explain the relative size findings.

To explore this alternative explanation, I isolate observations in which the target and acquirer are most similar. If dissimilarities between the target and acquirer increase integration costs, such costs should be minimized in a sample of similar firms. I consider a subset of the sample in which the target and acquirer reside in the same state and operate in the same industry (at all 4-SIC code digits). If integration costs associated with different corporate cultures explains the findings, then I will find a weaker or insignificant coefficient on relative size in this similar firm subset. Instead, with just 91 observations, I find a coefficient of -5.25 on relative size, which is significant at the 5% level. These results are not supportive of an integration costs interpretation of the relative size finding.

2.4.1.2. Real options

Alternatively, minority acquisitions may reflect a real options approach to a majority acquisition. A minority acquisition as a real option differs from a traditional toehold as the intent is to learn about the potential synergies, as opposed to buying a portion of the target before share prices rise to reflect the takeover premium. Higgins and Rodriquez (2006) find evidence that such an approach can be valuable by showing that acquirers in the biotechnology sector which had a strategic alliance (often accompanied with an equity stake) in either the target or a similar firm realize higher returns at the announcement of the acquisition. Thus, benefits from learning more about the target before committing to a majority acquisition may be important justifications for some minority acquisitions. However, for a real option approach to provide an alternative interpretation of the relative size finding, this real option approach has to be more likely with relatively small targets. In other words, uncertainty as to the value of net synergies must be greatest at the smallest targets.

To examine if small targets are associated with greater uncertainty, I rely on an argument in Hansen (1987) that acquirers prefer to use stock when acquisition values are most uncertain. In fact, in testing Hansen (1987), Martin (1996) makes the exact assumption I seek to test. Martin (1996) assumes uncertainty is increasing in target size and then uses his results that larger targets are more often purchased with stock as supporting evidence for Hansen (1987). Consistent with Martin (1996), I find a positive and significant correlation between relative target size and the use of stock as payment. Furthermore, the value to a real option approach also depends on the size of the investment and, as shown by McDonald and Siegel (1986). As the investment increases

(correlated with target size), waiting becomes more valuable. These arguments are not consistent with a real option approach being more likely with relatively small targets and, thus, a real options argument appears unable to explain the relative size findings in public targets. Instead, the results using private targets, in which public information is more limited and, thus, uncertainty may be greater, may be more consistent with a real options approach. If uncertainty is increasing in target size, a real option approach should be most valuable with the largest targets. Indeed for private targets, I find relatively larger targets are more likely to be associated with minority acquisitions.

2.4.1.3. Product market considerations

Alternatively, product market competition may explain the finding of minority acquisitions being more common with relatively small targets. Clayton & Jorgensen (2005) and Mathews (2006) argue minority stakes may be solicited by target firms to diminish the incentives of the acquiring firm to directly compete with the target. For this argument to explain the relative size finding, such minority stakes must be most successful when the target firm is small and the acquirer is large. While this is a reasonable assumption, it should hold equally for public and private firms, implying similar results regarding relative size and the acquisition decision for these two types of target firms. However, I find a statistically different relation between relative size and the acquisition decision for public versus private targets, a finding which is more consistent with the target managerial incentives interpretation.

2.4.2. Instrumental variable evidence

I have emphasized the finding of a different relation between relative size and the acquisition decision for public compared to private targets to separate the target managerial incentive story from alternatives. Data limitations prevent controlling for private firm characteristics and allow for the possibility these results are tainted by unobserved omitted variables. To address this concern, I replicate this finding using variables, exogenous to the acquisition decision, as instruments for private targets.

To instrument for private target firms, I rely on several facts. First, certain industries have higher densities of public firms due to differences in the demand for or supply of public equity. Demand by firms for public equity is likely to be higher in some industries, reflecting higher overall external capital needs or riskier investments which are more difficult to finance with debt. Supply may be higher in some industries due to demand from investors. By itself, this cross-sectional variation in the density of public firms does not guarantee exogenous instruments since industry characteristics affecting the firm's decision to go public may also influence current acquisition decisions. However, this concern can be addressed, given the inertia in the going public decision. Bharath and Dittmar (2007), using a sample of public firms tracked from IPO, find five out of six firms remain public throughout the sample and the average firm that goes private, does so after 12.9 years as a public firm. The decision to go public was likely made in the past and is unlikely to be reversed in any later time period. Thus, while historic industry characteristics will influence current acquisition decisions (to the extent historic and current industry characteristics are correlated) I can minimize any such relation by controlling for current industry characteristics.

I use three variables to identify industries with a greater density of public firms. One variable estimates the proportion of pubic firms in the target's four-digit-SIC code, *Ppublic*, calculated using IRS Form 5500 filings in 1993.[14] Because a count of all firms does not reflect which firms are likely targets, a second variable uses the proportion of public targets, within the target firm's SIC code, over the previous five years, *Fracacq*. A third variable, *IPOdensity*, is estimated as the number of firms in the target's SIC code which went public in the last five years, normalized by the number of private firms in that industry in 1993. A final instrument captures whether or not the firm is located in a state which is considered to have significant finance activity, *Finstate*. If firms are located in states with more finance activity, I expect them to be more likely to go public. I identify states with significant finance activity as those states with or bordering cities identified as having significant finance activity in Christoffersen and Sarkissian (2007). These states are California, Connecticut, Illinois, New Jersey, New York, and Pennsylvania. All four instrumental variables are negatively and significantly correlated with the target being private, relative to public, as reported in Table 2.8.

To control for current target industry risk, external capital needs, and demand for public equity, I use three proxies for industry risk: the median industry MB ratio, *industry MB*; the median industry R&D intensity, *industry RDda*; and the median industry three-

[14] IRS Form 5500 filings are required of firms with pension plans. I assume all filings which report CUSIPs are by public firms and all others filings which only report an Employer Identification Number (EIN) are by private firms. It is possible large private firms may report multiple form 5500 filings under multiple EINs. To the extent that this occurs, these large private firms will be double-counted, leading to an under count of the fraction of public firms and increasing the noise in this variable. A second source of noise in this variable comes from the fact that the very smallest private firms are also likely to be missed. As noted in Decressin, Lane, McCue, and Stinson (2005), only 11% of all 5.7 million businesses in the US Census database filed form 5500 in 1997. However, those businesses not included in the Form 5500 database are exceptionally small. Fifty-four percent of these non-matches have fewer than five employees and an additional 23% have fewer than 25 employees. While not universal, the coverage in the Form 5500 is likely to be a reasonable match to potential target firms which would be reported in SDC.

year cash flow volatility, *industry CFvol*. I control for industry external capital demands with the median industry CapEx intensity, *industry Capexda*, and the proportion of firms which pay dividends, *industry dividend payers*. I control for industry public equity investor demand with *IPOSEO*, the percent of the firms in the target industry which either went public or issued an SEO. I also include all significant controls from previous regressions which can be estimated with the data used in this test: Baa-Treasury spread, FINCON, different industry, and acquirer industry Herfindahl index. In unreported results, I find stronger results if I include a subset of these controls and, thus, report the most conservative results with the full set of proxies included.

These results are reported in Table 2.9. I use an IV-2SLS model as this approach is typically preferred to the bivariate model even with a binary dependent variable (Wooldridge 2002). Columns 1 reports coefficients from a regression with just the primary variables of interest. Column 2 reports coefficients from a regression which includes the control for current target industry risk, external capital needs, and demand for public equity. Column 3 reports coefficients from a regression where these controls are interacted with the estimated relative size.

The four instruments combined have moderate, but acceptable, explanatory power. For the regression reported in column 1, the F-statistic from a joint test of significance, estimated with the full set of controls, is 11.84 for the dependant variable private and 20.28 for private * estimated relative size. The same values for the regression reported in columns 2 and 3 are 7.45 (private) and 11.10 (private * estimated relative size) and 7.27 (private) and 10.15 (private * estimated relative size), respectively.

In all three regressions, there is a positive relation between relative size and minority acquisitions for public target firms and this relation is significantly decreased if the target is private. This result is consistent with the earlier results and supportive of the target managerial incentive hypothesis. However, these results should be interpreted with caution. In identifying industries with a high concentration of public firms, I may be identifying public firms in those industries in which equity-based incentives are most important. In which case, dilutive majority acquisitions will be even more costly and I should expect to find a stronger relation between relative size and the mode of acquisition as compared to the results using the standard non-instrumental variables approach.

2.5. Conclusion

Firms weigh costs associated with diluting target managerial incentives against benefits to control when deciding between a minority and majority acquisition. This choice between a minority and majority acquisition highlights firm characteristics associated with benefits to control. Majority acquisitions are more frequent when value gains are expected from the ability to maximize joint production, an increase to market power, or the removal of an underperforming manager. Majority acquisitions are also more frequent by acquiring firms with both a high free cash flow and low growth options, consistent with an acquiring manager seeking private benefits to control.

This paper finds evidence indicating costs associated with the dilution to target managerial incentives following a majority acquisition are important when deciding between a minority or majority control acquisition. Results indicating firms are willing to

forgo benefits to control to preserve these incentives at the target speak to the value of equity-based incentives. Furthermore, these results present new evidence of agency considerations in ownership decisions. Previous research shows that agency conflicts at the *acquirer* can lead to poor acquisition performance.[15] This research documents a different effect of agency conflicts on acquisition decisions: Firms are less likely to engage in acquisitions which have the most negative effects on *target* managerial incentives.

This finding may also provide insight into results in Betton, Eckbo, and Thorburn (2007). The authors investigate majority control acquisitions and whether the acquirer has a minority position in the target at the time of the announcement. When a minority stake is present, they find this position has typically been held for more than six months, inconsistent with traditional toehold theories. Acquirers may prefer to take an initial minority stake in firms with high growth options, when a delisted stock price is likely to be most costly. As the target firm matures, accounting information may become a better substitute for the information in the stock price, decreasing the cost of a delisted stock price. Thus, in time, benefits to control may outweigh the costs associated with a delisted stock price, leading to a majority acquisition. I find twenty-one percent of the public targets in the minority acquisition sample are later targets of a majority control acquisition by the same acquirer.

[15] Jensen (1986) argues that managers can realize large personal gains from empire building acquisitions which have little or negative shareholder value impacts, a hypothesis supported in Lang, Stulz, and Walkling (1991) and Morck, Shleifer, and Vishny (1990). Likewise, poor acquisition performance is associated with weak acquirer managerial equity-based incentives in Lewellen, Loderer, and Rosenfeld (1985) and Datta, Iskandar-Datta, and Raman (2001) and weak acquirer corporate governance in Masulis, Wang, and Xie (2007).

Table 2.1. Firm and deal characteristics for minority and majority control acquisitions between 1993 and 2006 by and of US public firms. All accounting variables are taken from the most recent annual report which strictly predates the acquisition announcement and are defined as follows: total assets (Compustat data6); R & D intensity (Compustat data 46 / Compustat data 6; this variable is set to 0 if total assets are reported for a firm in the same year but no record is reported for R&D expenditures); book to market (Compustat data 60 / market capitalization); and return on assets (Compustat data 13 / total assets). Relative size is the ratio of the target firm to the size of the combined firms using market capitalizations estimated 28 days before the deal was announced. Announcement returns are calculated using a market model and compounded as buy-and-hold returns over the observation window. The premium is calculated using an underlying price from 4 weeks prior to the announcement. If the premium was estimated to be either negative or greater than 200%, this observation was not included in the premium summary statistics.

Variable	**Minority Acquisition**		**Majority Acquisition**	
	Mean	Median	Mean	Median
Percent of shares acquired in transaction (%)	12.42	8.94	95.42	100.00
Percent of shares owned after transaction (%)	14.96	10.10	99.04	100.00
Acquirer market capitalization (millions, 2006 $)	52,725.98	7,361.28	15,230.81	1,752.77
		3,501.46	6,714.69	1,208.01
Acquirer total assets (millions, 2006 $)	16,007.53			
Acquirer R&D intensity (%)	5.43	1.66	4.88	1.34
Acquirer book to market	0.33	0.26	0.41	0.33
Acquirer return on assets (%)	12.59	13.33	11.63	13.90
Target market capitalization (millions, 2006 $)	2,027.49	167.62	1,242.31	163.01
Target total assets (millions, 2006 $)	1,095.20	100.90	954.74	156.50
Target R&D intensity (%)	12.01	3.33	7.32	0.77
Target book to market	0.45	0.31	0.58	0.44
Target return on assets (%)	-11.47	0.29	3.73	10.50
Relative size	0.11	0.03	0.18	0.11
Acquirer market adjusted returns: 3-day window (-1:1) (%)	0.11	-0.01	-0.51	-0.31
Target market adjusted returns: 3-day window (-1:1) (%)	2.72	2.52	4.59	5.77
Joint market adjusted returns: 3-day window (-1:1) (%)	0.34	0.22	0.49	0.35
Premium	35.99	22.19	53.04	45.55

Table 2.2 Industry distribution of minority and majority acquisitions between 1993 and 2006 by and of US public firms.

SIC codes		Target industry		Acquirer industry	
		Minority	**Majority**	**Minority**	**Majority**
0000 - 999	Food products	0.75%	0.25%	0.38%	0.21%
1000 -1999	Mining and construction	4.12%	5.84%	1.89%	5.48%
2000 -2999	Consumer Products	16.48%	11.52%	23.35%	14.53%
3000 -3999	Manufacturing	25.47%	32.27%	27.27%	32.75%
4000 -4999	Utilities and transportation	14.98%	9.33%	17.05%	10.22%
5000 -5999	Wholesale, retail and some services	7.49%	10.12%	6.82%	9.48%
6000 -6999	Financial Services	3.37%	1.70%	0.00%	0.00%
7000 -7999	Personal & business services	22.47%	22.79%	18.18%	21.91%
8000 -9999	Miscellaneous	4.87%	6.18%	6.06%	4.79%

Table 2.3 The Role of Preserving Target Managerial Incentives in the Acquisition Decision. The sample includes acquisitions for both minority and majority control between 1994 and 2006 by and of US public firms. The dependent variable assumes a value of 1 if minority control was attained and a 0 if a majority stake was purchased. Relative size is the ratio of the target firm to the size of the combined firms using market capitalizations estimated 28 days before the deal was announced. Market capitalizations are transformed by the log and standardized in 2006 $. FINCON is an indicator variable which assumes the value of 1 if the acquirer is in the smallest sample quartile by total assets and did not pay cash dividends in the previous year. CEO hold < 1% is an indicator variable if the CEO had insider holdings of less than 1% of the firm prior to the acquisition announcement. CEO pay sensitivity is an indicator variable which takes the value of 1 if the target firm is in an industry where the correlation between CEO pay and stock price performance is below the sample median. ERC high is an indicator variable which takes a value of 1 if the ERC estimated for the target firm is in the top half of the sample. MB low is an indicator variable if the firm's market to book ratio is in the bottom half of the sample distribution. Year and acquirer and target industry fixed effects are included. Coefficients are reported with standard errors in parentheses. Standard errors are robust and corrected for clustering in acquirer. Significance is noted as ***, **, * for 1%, 5% and 10% respectively.

	1	2	3	4	7	6	5
Relative size	-2.90		-3.73	-4.76	-4.83	-5.45	-4.41
	(0.82)***		(0.98)***	(1.53)***	(1.14)***	(2.13)***	(1.08)***
Target market capitalization		-0.27					
		(0.05)***					
Acquirer market capitalization		0.38					
		(0.06)***					
Target CEO hold < 1%				-0.46			
				(0.40)			
Target CEO hold < 1% * relative size				3.26			
				(1.78)*			
CEO pay sensitivity low					-0.36		
					(0.202)*		
CEO pay sensitivity low * relative size					2.36		
					(1.33)*		
ERC high						-0.67	
						(0.28)**	
ERC high * relative size						4.21	
						(2.00)**	
Target MB low							-0.80
							(0.24)***
Target MB low * relative size							2.50
							(1.35)*
FINCON			-1.22	-1.38	-1.25	-1.00	-1.29
			(0.50)**	(0.65)**	(0.51)***	(0.76)	(0.56)*
FINCON * relative size			4.40	5.06	4.46	4.22	4.29
			(1.73)***	(2.04)***	(1.69)***	(2.17)**	(1.83)**
Pseudo R-squared	0.09	0.12	0.10	0.11	0.10	0.10	0.11
N	2163	2163	2163	1387	2017	1516	2017

Table 2.4 Logit Model of the Minority or Majority Control Decision for Private and Public Targets. The sample includes acquisitions for both minority and majority control of US public or private targets by US public firms between 1994 and 2006. The dependent variable assumes a value of 1 if minority control was attained and a 0 if a majority stake was purchased. Estimated relative size is a ratio of the implied market value of the target to the sum of the implied market value of the target and the market capitalization of the acquirer. The implied target market value is calculated as the transaction price divided by the percent of the firm acquired. The transaction price for minority acquisitions is adjusted by the ratio 1.53/1.36 to reflect the difference in average premiums. Market capitalization values are transformed by the log and normalized in 2006 $. Baa-Treasury spread is the average difference over the last year between the yield on Baa-rated bonds and Treasury bonds. Year fixed effects are included. Coefficients are reported with standard errors in parentheses. Standard errors are robust and corrected for clustering in acquirer. Significance is noted as ***, **, * for 1%, 5% and 10% respectively.

	1	2	3	4
Private target	-3.99	-3.03	-0.42	-1.64
	(0.56)***	(1.00)***	(0.97)	(1.90)
Estimated relative size	-3.42	-3.76		
	(0.69)***	(1.04)***		
Private target * estimated relative size	4.40	5.28		
	(0.88)***	(1.83)***		
Acquirer market capitalization			0.47	0.32
			(0.06)***	(0.22)
Acquirer market capitalization * private target			-0.39	-0.31
			(0.08)***	(0.13)**
Implied target market capitalization			-0.30	-0.36
			(0.05)***	(0.10)***
Implied target market capitalization * private target			0.63	0.82
			(0.093)***	(0.19)***
Baa – Treasury spread	-0.40	0.09	-0.36	-0.26
	(0.52)	(1.01)	(0.52)	(1.00)
Baa – Treasury spread * private target	0.90	0.39	0.98	0.35
	(0.26)***	(0.45)	(0.28)***	(0.46)
FINCON	-0.55	-0.97	4.19	7.03
	(0.17)***	(0.54)*	(1.36)***	(4.98)
FINCON * estimated relative size	3.87	-224.12		
	(7.69)	(116.95)*		
FINCON * Acquirer market capitalization			-0.37	-0.56
			(0.12)***	(0.41)
FINCON * Implied target market capitalization			0.06	-0.28
			(0.10)	(0.26)
Acquirer and target industry fixed effects	Yes	Yes	Yes	Yes
Acquirer firm fixed effects	No	Yes	No	Yes
Pseudo R-squared	0.16	0.25	0.19	0.26
N	8504	1200	9046	1200

Table 2.5 The Role of Benefits to Control in the Acquisition Decision. The sample includes acquisitions for both minority and majority control between 1994 and 2006 by and of US public firms. The dependent variable assumes a value of 1 if minority control was attained and a 0 if a majority stake was purchased. Same industry is an indicator variable estimated as 1 if the target and acquirer operate in the same 3-digit SIC code. Industry Herfindahl index is transformed by the log. Target pre-announcement returns are industry adjusted returns estimated over a 12 month window, beginning 15 months before the acquisition announcement. FCF high (Q low) assumes the value of 1 if the firm's FCF (Q) is in the top (bottom) half of the sample distribution. FCF is operating income before depreciation minus interest expense, taxes, preferred dividends, and common dividends. This value is normalized by total assets. Q is market capitalization divided by book equity. Relative size is the ratio of the target firm to the size of the combined firms using market capitalizations estimated 28 days before the deal was announced. ERC high is an indicator variable which takes a value of 1 if the ERC estimated for the target firm is in the top half of the sample. FINCON is an indicator variable which assumes the value of 1 if the acquirer is in the smallest sample quartile by total assets and did not pay cash dividends in the previous year. Year fixed effects are included. Coefficients are reported with standard errors in parentheses. Standard errors are robust and corrected for clustering in acquirer. Significance is noted as ***, **, * for 1%, 5% and 10% respectively.

	1	2	3	4
Same industry	-0.66			-0.72
	(0.14)***			(0.27)***
Acquirer industry Herfindahl index	-0.26			0.02
	(0.13)**			(0.20)
Target pre-announcement returns		-0.63		-0.55
		(0.17)***		(0.24)**
Target pre-announcement returns squared		0.35		0.21
		(0.07)***		(0.11)*
Acquirer Q low			0.03	0.39
			(0.17)	(0.27)*
Acquirer FCF high			0.70	1.24
			(0.25)***	(0.39)***
Acquirer Q low * acquirer FCF high			-1.00	-2.30
			(0.403)***	(0.68)***
Fincon	-0.71	-0.63	-0.79	-1.07
	(0.22)***	(0.29)**	(0.24)***	(0.83)
Relative size				-4.60
				(2.19)**
ERC high				-0.77
				(0.33)**
ERC * relative size				4.35
				(2.04)**
Fincon * relative size				4.00
				(2.32)*
Acquirer and target industry fixed effects	Yes	Yes	Yes	Yes
Pseudo R-squared	0.09	0.08	0.08	0.14
N	2562	1847	2593	1340

Table 2.6. Logit Model of the Minority or Majority Control Decision Using Alternative Control Variables. The sample includes acquisitions for both minority and majority control between 1994 and 2006 by and of US public firms. The dependent variable assumes a value of 1 if minority control was attained and a 0 if a majority stake was purchased. MB difference is the absolute value of the difference between the industry median market to book ratios for the target and acquirer, normalized by the market to book ratio of the acquirer. Target R&D is the ratio of R&D expenditures to total assets. This variable is set to 0 if R&D expenditures are not reported. EPS dilutive is an indicator variable which takes the value of 1 if the consolidated firm would have lower EPS as compared to the stand-alone acquirer. Tax advantaged is an indicator variable which takes the value of 1 if either firm has NOLs. FCF negative is a binary variable which assumes the value of 1 if the sum of the firm's income before extraordinary items plus depreciation and amortization less capital expenditures is less than zero. All remaining variables are defined as in Table 2.5. Year fixed effects are included. Coefficients are reported with standard errors in parentheses. Standard errors are robust and corrected for clustering in acquirer. Significance is noted as ***, **, * for 1%, 5% and 10% respectively.

	1	2	3	4	5
MB difference	0.41				0.23
	(0.13)***				(0.24)
Target R&D	1.58				2.10
	(0.33)***				(0.64)***
EPS dilutive		0.20			0.07
		(0.18)			(0.27)
Tax advantaged			0.19		0.27
			(0.17)		(0.29)
Target FCF negative				0.64	0.58
				(0.22)***	(0.35)*
Fincon	-0.89	-0.70	-0.80	-0.80	-2.14
	(0.28)***	(0.26)***	(0.22)***	(0.25)***	(0.85)***
Relative size					-5.89
					(2.37)***
Earnings response coefficient high					-0.89
					(0.34)***
Earnings response coefficient high * relative size					5.07
					(2.19)**
Fincon * relative size					6.82
					(2.37)***
Same industry (3 digits)					-0.76
					(0.30)***
Acquirer industry Herfindahl index					0.15
					(0.22)
Target pre-announcement returns					-0.40
					(0.27)
Target pre-announcement returns squared					0.17
					(0.12)
Acquirer Q low					0.60
					(0.28)**
Acquirer FCF high					1.11
					(0.44)***
Acquirer Q low * acquirer FCF high					-2.69
					(0.82)***
Pseudo R-squared	0.09	0.07	0.07	0.08	0.20
N	2089	2056	2684	2223	1184

Table 2.7 Changes to the Prediction of a Minority Acquisition Given Changes to Proxies for the Costs and Benefits to Acquiring Control. This table summarizes predictions of minority acquisitions using the regression: minority acquisition = α + β_1Relative size + β_2Earnings response coefficient high + β_3Earnings response coefficient high * relative size + β_4Fincon + β_5Fincon * relative size + β_6Same industry + β_7A h index + β_8Target pre-announcement returns + β_9Target pre-announcement returns squared + β_{10}Acquirer Q low + β_{11}Acquirer FCF high + β_{12}Acquirer Q low * acquirer FCF high + β_{13}MB difference + β_{14}Target R&D + β_{15}EPS dilutive + β_{16}Tax advantaged + β_{17}Target FCFneg + target industry fixed effects + year fixed effects + ε. The underlying sample includes acquisitions for both minority and majority control between 1994 and 2006 by and of US public firms. The variable(s) of interest is assumed to take values equal to the lower and upper quartile of their distributions (for continuous variables) or at 0 and 1 for binary variables. All other variables are held constant at their mean. Relative size is the ratio of the target firm to the size of the combined firms using market capitalizations estimated 28 days before the deal was announced. Market capitalizations are transformed by the log and standardized in 2006 $. FINCON is an indicator variable which assumes the value of 1 if the acquirer is in the smallest sample quartile by total assets and did not pay cash dividends in the previous year. ERC high is an indicator variable which takes a value of 1 if the ERC estimated for the target firm is in the top half of the sample. MB difference is the absolute value of the difference between the industry median market to book ratios for the target and acquirer, normalized by the market to book ratio of the acquirer. Tax advantaged is an indicator variable which takes the value of 1 if either firm has NOLs. EPS dilutive is an indicator variable which takes the value of 1 if the consolidated firm would have lower EPS as compared to the stand-alone acquirer. FCF negative is a binary variable which assumes the value of 1 if the sum of the firm's income before extraordinary items plus depreciation and amortization less capital expenditures is less than zero. Same industry is an indicator variable estimated as 1 if the target and acquirer operate in the same 3-digit SIC code. Industry Herfindahl index is transformed by the log. Target pre-announcement returns are industry adjusted returns estimated over a 12 month window, beginning 15 months before the acquisition announcement. FCF high (Q low) assumes the value of 1 if the firm's FCF (Q) is in the top (bottom) half of the sample distribution. FCF is operating income before depreciation minus interest expense, taxes, preferred dividends, and common dividends. This value is normalized by total assets. Q is market capitalization divided by book equity.

Variable	Q1	Q3	Probability of Minority Acquisition given Q1 value	Probability of Minority Acquisition given Q3value	Change in Probability of Minority Acquisition
Relative size	0.03	0.27	10.69%	3.08%	-71.19%
Same industry	0	1	8.38%	3.62%	-56.80%
A h index	-3.10	-2.00	4.64%	5.72%	23.28%
Target pre-announcement returns	-0.30	0.23	5.56%	4.63%	-16.73%
Acquirer Q low & FCF high	0	1	3.98%	1.60%	-59.80%
MB difference	0	0.32	4.97%	5.38%	8.25%
Target R&D	0	0.10	4.22%	5.34%	26.54%
EPS dilutive	0	1	4.72%	5.59%	18.43%
Tax advantaged	0	1	5.01%	6.17%	23.15%
Target FCFneg	0	1	3.31%	5.70%	72.21%

Table 2.8 Correlation between Instrumental Variables and Private and Estimated Relative Size * Private. The sample includes acquisitions for both minority and majority control between 1994 and 2006 by US public firms of US public or private firms. Private is an indicator variable which takes a value of 1 if the target firm is private. Ppublic is the percent of firms in the target's 2-digit-SIC code which are public. This variable is transformed as log(1+x). Fractacq is the percent of public targets over the last 5 years in the target's 2-digit-SIC code. Finstate is an indicator variable which assumes the value of 1 if the firm is located in a state with significant finance activity. States with significant financial activity are California, Connecticut, Illinois, New Jersey, New York and Pennsylvania. IPOdensity is the ratio of the count of firms in the target's 2-digit SIC code industry which went public in the last 5 years normalized by the number of private firms in this industry in 1994. Estimated relative size is a ratio of the implied market value of the target to the sum of the implied market value of the target and the market capitalization of the acquirer. The implied target market value is calculated as the transaction price divided by the percent of the firm acquired and is adjusted to reflect the difference in average premiums for minority and majority control acquisitions.

	Private		Estimated relative size * private	
	correlation	p-value	correlation	p-value
Ppublic	-0.167	0.000	-0.179	0.065
Ppublic * estimated relative size	-0.286	0.000	0.458	0.000
Fracacq	-0.181	0.000	0.016	0.101
Fracacq * estimated relative size	-0.282	0.000	0.442	0.000
Finstate	-0.060	0.000	-0.059	0.000
Finstate * estimated relative size	-0.150	0.000	0.313	0.000
IPOdensity	-0.027	0.001	-0.008	0.417
IPOdensity * estimated relative size	-0.037	0.000	0.138	0.000

Table 2.9. Instrumental Variables Model of the Minority or Majority Control Decision for Private and Public Targets. The sample includes acquisitions for both minority and majority control of US public or private targets by US public firms between 1994 and 2006. The second stage dependent variable assumes a value of 1 if minority control was attained and a 0 if a majority stake was purchased. The 8 instruments used include: Ppublic, Ppublic * estimated relative size, Fractacq, Fractacq * estimated relative size, Finstate, Finstate * estimated relative size, IPOdensity, and IPOdensity * estimated relative size. Both private and private * relative size ratio are instrumented. Ppublic is the percent of firms in the target's 2-digit-SIC code which are public. This variable is transformed as log(1+x). Fractacq is the percent of public targets over the last 5 years in the target's 2-digit-SIC code. Finstate is an indicator variable which assumes the value of 1 if the firm is located in a state with significant finance activity. States with significant financial activity are California, Connecticut, Illinois, New Jersey, New York and Pennsylvania. IPOdensity is the ratio of the count of firms in the target's 2-digit SIC code industry which went public in the last 5 years normalized by the number of private firms in this industry. Estimated relative size is a ratio of the implied market value of the target to the sum of the implied market value of the target and the market capitalization of the acquirer. The implied target market value is calculated as the transaction price divided by the percent of the firm acquired and is adjusted to reflect the difference in average premiums for minority and majority control acquisitions. Industry Capexda is the median capex/assets in the target's industry. Industry MB is the median MB in the target's industry. Industry CFvol is the median variance in earnings over the last 3 years for the target's industry. Industry RDdta is the median RD expenditure/assets in the target's industry. Industry dividend payers is the fraction of public firms in the target's industry which pay dividends. Baa-Treasury spread is the average difference over the last year between the yield on Baa-rated bonds and Treasury bonds. FINCON is an indicator variable which assumes the value of 1 if the acquirer is in the smallest sample quartile by total assets and did not pay cash dividends in the previous year. Year fixed effects are included. Coefficients are reported with standard errors in parentheses. Standard errors are robust and corrected for clustering in acquirer. Significance is noted as ***, **, * for 1%, 5% and 10% respectively.

	1	2	3
Private	-0.168	-0.420	-0.416
	(0.056)***	(0.112)***	(0.116)***
Estimated relative size	-0.329	-0.797	-0.687
	(0.130)***	(0.227)***	(0.316)**
Private * estimated relative size	-0.393	0.980	0.947
	(0.190)**	(0.387)***	(0.441)***
Industry MB		0.007	0.011
		(0.005)	(0.005)**
Industry MB * estimated relative size			-0.034
			(0.028)
Industry RDda		-0.357	-0.149
		(0.214)*	(0.280)
Industry RDda * estimated relative size			-1.309
			(1.178)
Industry CFvol		0.000	-0.656
		(0.004)	(0.728)
Industry CFvol * estimated relative size			2.094
			(2.323)
Industry Capexda		-0.065	-0.119
		(0.112)	(0.206)
Industry Capexda * estimated relative size			0.083
			(0.825)
Industry dividend payers		0.005	0.001
		(0.030)	(0.046)
Industry dividend payers * estimated relative size			-0.036
			(0.172)
IPOSEO		0.000	0.000
		(0.000)**	(0.000)**
IPOSEO * relative size			0.000
			(0.000)
Baa – Treasury spread	-0.020	-0.043	-0.043
	(0.016)	(0.034)	(0.034)
FINCON	-0.003	0.033	0.035
	(0.011)	(0.032)	(0.032)
Different industry (4 digits)		0.018	0.018
		(0.008)**	(0.008)**
Acquirer industry Herfindahl index		0.000	0.000
		(0.000)	(0.000)
N	7595	3428	3428

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Chapter 3

Employee Capitalism or Corporate Socialism?
Broad-based Employee Stock Ownership

Broad-based employee share ownership (ESO) is an important economic phenomenon. The two most common types of plans which encourage ESO are Employee Stock Ownership Plans (ESOPs) and 401-K plans with employer stocks. According to the National Center for Employee Ownership, in 2007, ten and one-half million employees participated in 9,650 ESOPs, with combined assets over $675 billion at public and private firms. The corresponding numbers for ESO through 401-Ks are four million participants in 2,200 plans with $75 billion in assets. Both of these plans show an increasing long-term trend; the NCEO estimates the number of participants in ESOPs was one-quarter million in 1975, five million in 1990, and over ten million in 2007. ESO through 401-Ks has also become increasing popular since the 1990s.

Previous studies have documented worker productivity increases following adoption of ESO plans (Jones and Kato, 1995; FitzRoy and Kraft, 1987; and Beatty, 1995). The finance literature also shows positive stock price reactions to the announcement of ESOP adoptions that are not implemented under takeover pressure (Gordon and Pound, 1990; Chang and Mayers, 1992; Chaplinsky and Niehaus, 1994; and

Beatty, 1995). However, there is little evidence on how ESO plans affect employee compensation.

The effect on employee compensation is an important issue due to the obvious employee welfare implications. Moreover, any change in employee compensation also has implications for firm valuation and shareholder value. A typical ESO bestows not only cash flow rights, but also voting or other forms of control rights to employees. As the size of ESO increases, greater cash flow rights may lead to greater productivity gains through improved team effects and collective employee behavior, while greater control rights may help employees obtain higher compensation. It is not clear how greater cash flow and control rights jointly affect the shareholder value.

To illustrate, define $\Delta\pi$, ΔV, and ΔTCB as the value of productivity gains (losses), the change in shareholder value, and the change in employees' total compensation and benefits (TCB), respectively, following adoption of an ESO plan. If we ignore other costs of implementing the plan, we may define $\Delta\pi = \Delta V + \Delta TCB$. That is, productivity gains are shared by shareholders and employees. How the gains are divided may depend on the size of the ESO plan. When the size is small, the increase in employee control rights is negligible, providing them little additional bargaining power during wage negotiations. Thus, we expect ΔTCB to be small and most of $\Delta\pi$ to accrue to shareholders.

We assume the relation between the size of ESO and its effect on employee bargaining power is non-linear. That is, employee ownership must reach a certain threshold to significantly enhance workers' bargaining position during wage negotiations. When the size of an ESO plan exceeds the threshold point, $\Delta TCB > 0$ will be material,

decreasing the fraction of $\Delta\pi$ accruing to shareholders. However, ΔV needs not be smaller, because $\Delta\pi$ may be greater due to greater cash flow effects on worker productivity. If $\Delta\pi$ - ΔTCB increases with the size of ESO, ΔV will increase. Otherwise, an increase in ESO size will decrease ΔV.

An undesirable outcome arises if $\Delta TCB > \Delta\pi$ such that $\Delta V < 0$. This represents the danger of value destroying corporate socialism. When employees possess sufficient control rights, they may extract *unearned* compensations and benefits at the expense of other stakeholders, increasing the firm's marginal costs and eroding growth opportunities. Such firms will invest less, suffer poor performance, and be valued lower. Faleye, Mehrotra, and Morck (2006) observe such phenomena for firms with large ESO. However, they also raise the possibility that poorly managed and badly performing firms may establish large ESO plans to share their misfortune with employees.

This paper conducts an empirical investigation of how ESOPs affect employee compensation and shareholder value and how the effects vary with the size of ESOPs. Our data on employee compensation is obtained from a unique plant-level database maintained by the Center for Economic Studies at the U.S. Bureau of Census. We observe higher TCB per employee following the adoption of an ESOP. These compensation increases are substantially higher when firms adopt large ESOPs, which are defined as those with more than 5% of the shares outstanding. Our initial panel regression controls for plant fixed effects, state-year mean wages, plant age, and year fixed effects. The compensation increase following small ESOPs with less than 5% of the shares outstanding is significant but small (0.8%), whereas large ESOPs are followed by a 5.2% increase in TCB.

These increases in employee compensation are not temporary, as they would if the increases had simply reflected firms' reluctance to cut cash wages by the full value of the allocated shares following the adoption of ESOPs. Even when we exclude the first four years after ESOP initiations, a period during which the majority of ESOP share are allocated, we still observe a 4.5% increase in TCB following large ESOPs.

Some ESOPs in our sample are adopted by firms suffering a decline in sales (in 2006 dollars) during the year the ESOP was initiated. We define such ESOPs as "restructuring", because with sales decline and the ensuing shortage of cash inflows, the firms may be using ESOPs to pay part of wages with stocks instead of cash. Our data indeed show these restructuring ESOPs are unique; they are followed by a drop in TCB per employee. These firms also are valued substantially lower than their industry medians. When we exclude these restructuring ESOPs, we observe a permanent increase in TCB per employee by 2.8% for small ESOPs and 6.3% for large ESOPs.

There are two possible explanations for these results. The first is that small ESOPs increase productivity and employees are being rewarded for it. Compensation increases are greater with large ESOPs, because they bestow substantial control rights to employees, enabling them to extract higher compensation. The second is a non-causal story; firms already planning to increase employee compensation are electing to establish ESOPs as a means to increase employee compensation.

To separate the causal from the non-causal explanation, we conduct two tests. First, we investigate how compensation changes vary across different plants of the same firm. By law all employees must participate in an ESOP unless a union elects an

alternative form of compensation; thus, the non-causal story predicts that compensation increases will be more or less equal at all plants. However, we observe significantly greater compensation increases at plants located in states with higher unionization rates, and this phenomenon applies only to large ESOPs. Since unionized workers are better able to coordinate their voting rights to extract higher wages than non-unionized workers, this result is more consistent with the causal interpretation.

Second, we investigate how compensation increases associated with ESOPs are related to financial leverage. Bronars and Deere (1991) show that high financial leverage weakens unions' bargaining power because of the implicit threat of possible bankruptcy. We find that compensation increases following the adoption of large ESOPs are significantly lower at firms with higher leverage. This renders further credence to the causal interpretation.

Do these employee compensation increases adversely affect shareholder value? Or do they simply reflect employees' fair share of productivity gains, which also allows shareholders to enjoy higher firm valuation? To address these issues, we examine the relation between firm valuation and the presence and the size of ESOPs, using panel data on 418 publicly traded firms with ESOPs and a large number of control firms without ESOPs during the period 1980 and 2004.

We find that, on average, firms establishing ESOPs realize an 8.12% increase in firm valuation, relative to the industry median. This estimate is based on panel regressions controlling for both observable and unobservable time-invariant firm characteristics. To control for time varying firm characteristics, such as selection bias

associated with private information, we compare future valuation effects to a baseline estimated two years after an ESOP adoption. Private information is not likely to stay private for more than two years. The estimated valuation increase is even higher at 12%.[16]

When estimated separately, small ESOPs are associated with a valuation increase of 16% relative to the industry median. In contrast, large plans show no positive valuation effects. With large ESOPs, employees appear to capture all the gains, leaving little for their shareholders. The inverse U-shaped relation between firm valuation and employee ownership is not inconsistent with the Himmelberg, Hubbard, and Palia (1999) evidence of no relation between firm valuation and managerial share ownership with firm fixed effects. Our results are distinct from any underlying relation between managerial share ownership and firm value. The relation between ESOPs and firm value is significant only for those plans that distribute shares without a bias in favor of management; for those plans biased in favor of management, the relation is insignificant.

Furthermore, the unionization effect and the disciplining effect of leverage on employee compensation have remarkably consistent effects on firm valuation. The value decline associated with large ESOPs relative to small ESOPs is smaller when financial leverage is higher. This positive valuation effect of leverage can be attributed to the disciplining effect of leverage on worker compensation.

[16] These estimates, however, represent the upper tail of the distribution of possible gains associated with ESOPs. Firms not promoting ESOPs are likely to have made that decision presumably because they anticipate smaller performance gains. For example, if employees are already well motivated or if efficient monitoring mechanisms are in place, costs of implementing ESO plans may outweigh their incremental benefits of improving incentive and team effects.

Our results do not appear to be an endogenous result of firms choosing to implement an ESOP. To control for time-invariant unobserved firm characteristics, we estimate all regressions with firm fixed effects. We also carefully consider possible selection biases associated with time varying firm characteristics. None explains our results.

Finally, our findings raise the issue of why firms adopt large ESOPs, given the greater shareholder value associated with smaller plans. There are two possible non-mutually exclusive explanations. First, some management establish large ESOPs hoping that the greater cash flow rights will improve team effects and collective worker behavior, and later succumb to the demand for high wages by workers with substantial control rights, yielding most of the value gains to employees. Second, management is using a large ESOP to form a management-worker alliance, as in Pagano and Volpin (2005) and Atanassov and Kim (2008).

In the Pagano and Volpin (PV) model, managers concerned with hostile takeover threats bribe workers with above-market wages in return for their cooperation in fending off takeover bids. Indeed a substantial portion of our ESOP sample were initiated during the late 1980s, a period when the fear of a hostile takeover was high. ESOPs are also more prevalent in states with business combination statutes (BCS), which makes ESOPs more effective deterrents against hostile takeover attempts. Of 401 ESOPs in our sample adopted after New York State first enacted BCS in 1985, 305 (76%) were established by firms incorporated in states with BCS in effect.

This does not mean, however, our estimated compensation increases following ESOP initiations are driven by the BCS effect documented by Bertrand and Mullainathan (2003). They find, and our data confirm, a significant increase in employee compensation following enactments of BCS. Thus, we repeat regressions while controlling for the BCS effect. Changes in our estimates for small and large ESOPs are imperceptible. It is the substantial control rights large ESOPs bestow on workers, whether intended or not, that appear to help employees reap most of value gains arising from having ESOPs.

The rest of the paper is organized as follows. Section I briefly surveys the literature on costs and benefits of employee share ownership and identifies a number of potential motives for establishing ESOPs. Section II describes the data. Empirical results and analyses of potential selection biases are presented in Section III, followed by additional robustness checks in Section IV. Section V concludes.

3.1. Effects on employees and shareholders

In this section, we survey the relevant literature and identify four non-mutually exclusive motives to establish ESOPs: (1) an attempt to improve incentives and team efforts to enhance worker productivity, (2) management-worker alliance to thwart hostile takeover threats, (3) cash conservation by poorly performing firms by substituting stocks for cash wages, and (4) tax benefits. We first summarize the literature on the effects on worker productivity through improved incentive and team effects.

3.1.1. Productivity gains

The most often stated objective of ESO is to increase firm value by improving employee incentives. Shareholders typically do not monitor non-managerial employees;

instead, they delegate the monitoring to management, agents themselves vulnerable to their own incentive problems**.** As a supplement to delegated monitoring and to better align employee incentives with shareholder values, firms may encourage ESO as an incentive device. However, individual workers may feel they have little impact on stock price, raising doubt on the ability of ESO to alter individual behavior in tasks requiring additional individual effort or sacrifice.

Collectively, however, important benefits may arise if ESO provides a proper group-based incentive. Kandel and Lazear (1992) argue that free-rider problems can be mitigated by orientation and indoctrination of new employees about workplace norms, which creates a work environment where peer pressure enforces the group-based incentive. FitzRoy and Kraft (1987) and Blasi, Conte, and Kruse (1996) also argue that group-based incentive schemes such as ESO induce co-monitoring, reducing costly monitoring by managers. Jones and Kato (1995) argue that ESOPs induce employees to develop a sense of identity and loyalty to their company; participate more actively in productivity-enhancing activities, such as quality-control circles; and increase the quality of decision making. These arguments are consistent with the claims often made by firms initiating ESOPs that ESO improves team work by fostering a culture of employee involvement.

ESO also may help prevent value loss due to labor disputes. Cramton, Mehran, and Tracy (2007) develop a model in which share ownership by unionized workers creates incentives for unions to refrain from costly strikes.

These theoretical arguments on productivity are supported by Jones and Kato (1995) who document that an ESOP adoption in Japan leads to a 4-5% increase in productivity, starting about three years after the adoption. This is remarkable because the typical Japanese ESOP is allocated 1% or less of outstanding shares, demonstrating that even very small ESOPs generate substantial productivity gains. Japanese ESOPs do not provide tax benefits and most shares are allocated to non-executive employees.[17] In addition, FitzRoy and Kraft (1987) find that profit sharing and workers' capital ownership have positive effects on factor productivity for a sample of metal working firms in West Germany. Although there are no comparable studies on worker productivity for U.S. firms, Beatty (1995) finds an increase in sales in the two years after the adoption of an ESOP.

3.1.2. Employee compensation

How are these productivity gains shared between employees and shareholders? When ESOPs grant significant control rights to employees, as in large ESOPs, workers may use their enhanced bargaining power to extract higher compensation and benefits. In the context of managerial pursuit of a "quiet life" in Bertrand and Mullainathan (1999, 2003), employee control rights may exacerbate the managerial tendency to acquiesce to worker demands for higher wages. Large employee ownership may also indicate worker-management collusion as theorized by Pagano and Volpin (2005). Powerful employees may induce management to shift its allegiance to workers as documented by Atanassov

[17] In an earlier study (1993), Jones and Kato report that 91% of all firms listed on Japanese stock markets had an ESOP in 1989.

and Kim (2007).[18] A likely result of any of these propositions is higher employee compensation.

ESOPs also cause employees to hold less diversified portfolios and have liquidity concerns. ESOP shares cannot be sold until employees leave the company, with the exception of diversification requirements triggered at 55 and 60 years of age. In equilibrium, these risks increase employee compensation.

3.1.3. Cash conservation

Core and Guay (2001) find stock option plans for non-executive employees are often used at firms which appear cash-constrained. Likewise, issuing stocks through ESOPs may be the result of cash constrained firms substituting stocks for cash wages. Since sales is the primary sources of cash inflows, we define an ESOP "restructuring" if it is adopted by a firm suffering sales decline in the year of the plan initiation. Such ESOPs are likely to lower cash wages without changing total employee compensation. While the decision to substitute equity for cash wages may be optimal for firms facing cash shortage, it is doubtful that such plans will have the same strong uplifting effect on employee morale, team effects, and collective behavior as non-restructuring ESOPs will. Thus, we expect no significant productivity gains from having restructuring ESOPs and, hence, no compensation increases or shareholder value gains.

3.1.4. Tax effects

[18] There are no specific legal requirements regarding who can vote ESOP shares held by a trust and, thus, firms are free to set their own rules at the ESOP initiation. The two most common approaches are to vote the shares 1) according to management's preferences or 2) in an identical proportion to the votes cast by employees holding allocated ESOP shares

ESOPs are often established through a trust which borrows money to buy company stock. Over time, the company repays the loan taken by the trust which, in turn, allocates its shares to employee accounts. These loan payments (interest and principle) are treated as wages and, thus, are tax deductible, within certain payroll limits. Tax benefits *unique* to leveraged ESOPs arise when dividends paid to stocks, held by the trust, are used to pay down debt. These dividends are effectively deducted twice from the firm's taxable income, once as wages and then again as interest payments.[19] If this tax benefit has an important impact on shareholder value, leveraged ESOPs will have more favorable impact on firm valuation than non-leveraged ESOPs.

3.2. Data

Our data on ESOPs cover US public firms from 1980 through 2004. This data is hand-collected. We first identify firms with ESOPs, using the Factiva news database. For each year, we search Factiva using the terms "ESOP" and "employee stock ownership plan." We read all articles and note the first date a firm is mentioned as having an ESOP. We identify 756 unique public firms with ESOPs over the sample period. Of these firms, we drop 35 firms with total assets less than $10 million in 2006 dollars. The lack of press coverage on such small firms makes it likely that we missed other similar-sized firms with ESOPs, wrongly identifying them as non-ESOP firms. This potential error is important because our control group is derived from firms in Compustat without identified ESOPs.

[19] Prior to November 1989, banks received a tax break to fund leveraged ESOPs, which led to below market interest rates on these loans. The dividend deduction became effective in 1986.

With the remaining 721 ESOP firms, we run additional Factiva searches using the firm's name and "employee stock" to locate further information on each firm's ESOP.[20] When available, we record information on whether the ESOP was funded with debt and the ESOP initiation date.[21] We are able to identify the year of the ESOP initiation for 418 unique firms.

We determine the size of ESOPs by reading annual proxy statements for all firms with ESOPs. In most cases, ESOP share ownership is reported only if the plan has more than 5% of the firm's common equity. We assume the ESOP controls less than 5% of the firm's outstanding shares if the proxy statement does not report specific numbers concerning ESOP size. The ESOP database is then matched to Compustat and Center for Research in Security Prices (CRSP) databases for accounting and stock market variables.

The ESOP database is also matched to the Standard Statistical Establishment List (SSEL) maintained by the U.S. Bureau of Census. The SSEL provides plant-level data on annual payroll and the number of employees for all firms operating in the U.S. This plant-level data is linked across time and ownership, thus allowing the researcher to create time-series panel data for all US plants owned by public US firms.

This Census data is an improvement over the wage and employment data reported in Compustat. For one, the Census data is available at the plant level which allows us to

[20] In a few cases, this additional search led us to identify the presence of an ESOP in an earlier year. We exclude these observations because of a survivorship bias. Information about an ESOP may not have been discovered in our first search process if the firm was small and received limited press coverage. When the firm becomes more profitable and grows larger, press coverage becomes more likely, increasing the probability we observe the ESOP. This could cause a positive correlation between observed ESOPs and firm performance.

[21] If a firm underwent a bankruptcy or was dropped from Compustat for a year or more, we assume the ESOP was terminated unless other information is present.

identify changes at one specific facility as opposed to having to rely on firm-level data. Second, we are able to observe the state of location for each facility. This allows us to control for geography-dependant mean wages and to study relative wage changes at different plants owned and operated by the same firm. Finally, many active firms in Compustat do not report the number of employees and total compensation, because personnel information is subject to looser reporting and auditing requirements than financial variables.

Unionization rates are from the Union Membership and Coverage Database (unionstats).[22] This database provides public sector labor union membership by state, using data compiled from the Current Population Survey (CPS).

We also use the employee ownership dataset provided by the Department of Labor (DOL) for additional information on the structure of ESOPs unavailable in our ESOP database. The DOL database begins in 1992 and includes all ESO through company-sponsored plans, as reported on Internal Revenue Service (IRS) Form 5500 files. We do not use the DOL database as our primary source of ESOP data because it does not cover ESOPs prior to 1992, a serious drawback as 61% of ESOP implementations in our sample occur before 1992.

Table 3.1, Panel A, lists the number of new ESOP adoptions and observation counts in our ESOP database by year. It identifies 5,596 firm-year observations between 1980 and 2004 with a median ESOP size of 5.93% of shares outstanding. For the 225 ESOPs achieving a size of 5% or greater at some point during their life time, the median

[22] See Hirsch and Macpherson (2003) for more information.

and the mean employee ownership is 12.18% and 16.65% of shares outstanding, respectively.

Panel B of Table 3.1 provides summary statistics of the relevant firm level variables. The first column details the control group. It summarizes characteristics of pooled time-series observations in Compustat that meet the following criteria: (1) we do not confirm an ESOP, (2) the firm has total assets greater than $10 million in 2006 dollars, and (3) the firm has more than 3 years of Compustat data -- our empirical design requires a minimum of 4 years data to estimate ESOP effects. The second column describes firms in Compustat for which we identify an ESOP. The third column details firms with large ESOPs. An ESOP is considered large if, at any point during the lifetime of the plan, it has more than 5% of the outstanding common shares. We choose this demarcation point because proxy statements only detail the size if the ESOP has more than 5% of the firm's equity. In addition, 5% is often used as a threshold for various disclosure requirements, presumably because it signifies an important source of control rights.

Comparing Columns 1 and Column 2 reveals that firms with ESOPs tend to be larger, more capital intensive, more profitable, less R&D intensive, and more highly levered than firms without ESOPs.

3.3. Empirical results

In this section we first estimate the relation between employee compensation and the presence of ESOPs, followed by an investigation of the relation between firm value and ESOPs.

3.3.1. Employee compensation

Our compensation provides plant level annual payroll, which includes all forms of compensation, such as salaries, wages, commissions, dismissal pay, bonuses, vacation allowances, sick-leave pay, and contributions to qualified pension plans. Our measure of total compensation and benefits (TCB) per employee is the ratio of annual payroll (in thousand dollars, normalized to 2006 dollars) to the number of employees. We use the log of TCB per employee, which we shall refer hereafter simply as TCB, as the dependent variable in our regressions.

We estimate the relation between TCB at the plant level and ESOPs with panel regressions using all treatment and control firms meeting our sample construction criteria over 1982 to 2001.[23] To isolate the effect of an ESOP on TCB, we exclude some ESOP firm-year observations. The TCB at a plant before an ESOP, as captured in plant fixed effects, proxies for the expected TCB in future years, had the ESOP not been adopted. Thus, we only include those plant-year observations beginning five years prior to the ESOP adoption to capture the most current information. Second, we exclude the year of the announcement of ESOP adoption and the year after, because it may take time for effects associated with the ESOP implementation to be observed (Jones and Kato, 1995). We also exclude observations 10 years after an ESOP initiation and any observations following an ESOP termination.[24] We exclude these observations because changes

[23] We shorten our available timeline in the TCB regressions due to a change in the across time data linkages prior to 1982 and after 2001.

[24] There are 56 ESOP terminations (138 plant-year observations) in our ESOP database. Terminating an ESOP is a complex legal procedure. The firm must be able to legally justify why the ESOP was value-increasing for the firm in the past but is now value-decreasing; otherwise, it is open to lawsuits from ESOP holders and shareholders. Thus, it is more common to "freeze-out" an ESOP. A freeze-out is usually not announced officially and thus is hard to identify. In our sample, firms which are electing to freeze-out their

unrelated to the ESOP occur over time. Observations after an ESOP termination are excluded to ensure that our baseline is not picking up post-termination effects.

The base regression contains two ESOP indicator variables: *ESOP*, equal to one if the firm has an ESOP; and *ESOPg5*, equal to one if employees have more than 5% of outstanding shares through the ESOP. All compensation regressions control for plant fixed effects and year fixed effects. Year fixed effects capture economy-wide changes in wages over time. Including plant fixed effects allows us to compare TCB following the ESOP to TCB at the same plant before the ESOP.

Following Bertrand and Mullainathan (2003), we also control for plant age and state-year mean wages. Plant age is estimated as the current year minus the first year the plant appeared in the SSEL. State-year mean wages are the mean wages of all plants located in the same state as the plant, but excluding the plant itself, and matched by year. This variable controls for state-specific changes in wages over time.

Column 1 of Table 3.2 reports the base regression estimate. It shows a positive significant relation between TCB and the presence of ESOPs. It also shows that large ESOPs are associated with a much bigger increase in compensation. The economic magnitude of the relation is worth noting. While TCB increases by only 0.8% with the presence of a small ESOP, the increase associated with the presence of a large ESOP is 5.2%.

ESOP will still be recorded as having an ESOP, which is literally true because the ESOP still exists. There are some firms that have rolled up their ESOP into a 401-K plan. Such 401-K plans may still be recorded in our database as an ESOP, which is not completely off-base because they still represent ESO.

As expected, we observe a strong positive correlation between the plant-level TCB and the average TCB in the same year and in the same state of location. We also observe a positive correlation between plant age and TCB, indicating that older plants have higher wages.

In column 2, we add firm-level controls. We again follow Bertrand and Mullainathan (1999) and add asset size and sales as control variables. We also control for leverage as ESOPs are often associated with changes to firm leverage. As in column 1, we observe a positive and significant correlation between TCB and large ESOPs; however, the relation for small ESOPs is no longer significant. Furthermore, the relation between age and TCB switches signs, indicating that plant age may have been proxying for other firm attributes. We observe TCB is negatively related to asset size, but positively related to total sales and leverage. One possible interpretation is that firms with higher asset turnover (sales/assets) tend to have higher skilled labor.

The compensation increases associated with ESOPs in columns 1 and 2 may simply reflect the value of ESOP shares granted. Granting ESOP shares will lead to a one time compensation increase if the sponsoring company does not cut cash wages by the full value of the allocated shares. Data limitations do not allow us to separate between cash wages and other forms of compensation, such as allocations to pension funds. Therefore, to isolate the permanent effect of ESOPs on TCB from the value of ESOP shares granted, we exclude those years where the majority of ESOP share are allocated: the first four years after the ESOP initiation.

In columns 3, the regression estimate excludes the first 4 years after the ESOP initiation. This eliminates the years where the expensed value of ESOP shares will be most important and, at the same time, allows time for employees to accumulate sufficient voting power. As such, we are stacking the deck against finding a compensation effect, unless there is a permanent increase in TCB.

In Column 3, we compare TCB reported before the establishment of an ESOP to observations reported by the same firm at least 5 years later, relative to compensation changes for the control group of firms over the same period. The results continue to show a positive and significant effect associated with large ESOPs. In addition, small ESOPs also show a significant 1.6% increase in TCB. The magnitude for large ESOPs is 4.5%.

In our sample of ESOPs, we identify firms that suffer a decline in sales in 2006 dollars during the year the ESOP was initiated. Because sales tend to be the main source of cash inflows for most firms, we conjecture that these firms are experiencing cash shortage and that the prime motive of these ESOP implementations is to conserve cash by substituting stocks for cash wages. We distinguish these ESOPs by defining them as "restructuring" ESOPs.

In column 4, we include an indicator variable for restructuring ESOPs. The results clearly demonstrate the uniqueness of these plans. TCB increases associated with restructuring ESOPs relative to other ESOPs are significantly negative. The coefficients on other ESOP indicator variables imply that for non-restructuring ESOPs, the permanent TCB increases for small and large plans are 2.8% and 6.3%, respectively.

Employee compensation increases are also documented in states following the enactment of business combination statutes (BCS) by Bertrand and Mullainathan (1999, 2003), who attribute it to management's pursuit of quiet lives after BCS relieve them of the threat of hostile takeovers. These new regulations state that if a block of investors, unaffiliated with management, vote against a tender offer, the acquirer must wait three to five years before pursuing the takeover. Because courts have established ESOPs as "outside" investors, they can be especially effective at preventing hostile takeovers in those states. Our sample shows that 76% of ESOPs initiated after New York State first passed BCS in 1985 are established by companies incorporated in states with BCS in effect.

Thus, we check whether the increases in TCB accompanying ESOPs are proxying for the BCS effect. In column 5, we control for whether a plant-year observation belongs to a firm incorporated in a state with BCS in effect. Consistent with Bertrand and Mullainathan (1999, 2003), we find a positive and significant increase in TCB associated with BCS.[25] More important, the coefficient estimates for both small and large ESOPs remain positive and significant, with the magnitude virtually unchanged from those in Column 4.

In sum, we observe significant increases in employee compensation following the adoption of both small and large non-restructuring ESOPs. The compensation increases

[25] Our estimate of BCS effect on TCB is larger than those reported by Bertrand and Mullainathan. There are two explanations of this difference. For one, we use a different measure of TCB as compared to their 2003 paper and a different dataset as compared to their 1999 paper. Furthermore, we use a different time period.

are not just reflecting temporary increases due to the value of stocks granted. They appear permanent, and the magnitude is especially substantial following large ESOP adoption.

There are two interpretations for these results. The first is that small ESOPs improve operating performance and employees are being rewarded for it. The greater compensation increases with large ESOPs are due to substantial worker control rights, which are used to obtain higher compensation. The second is that firms that have decided to increase future wages also implement ESOPs, in which case, the presence of an ESOP will not cause the subsequent compensation increase. In the next section we attempt to separate between these two interpretations.

3.3.1.1. Establishing causality – unionization

The causal story implies that wages will increase the most when employee control rights are most affected by ESOPs. How effectively workers will use their voting rights to extract higher wages depends not only on the number of votes they control but also on their ability to coordinate their voting rights to increase their bargaining power during wage negotiations. We assume that unionized workers are more effective at coordinating and using their voting rights than non-unionized workers. Thus, our causal interpretation predicts that compensation increases more at plants that are unionized than at non-unionized plants. Although we do not have a direct measure of the unionization at each plant, there are important differences in unionization rates across states. Thus, we use the average unionization rate in the state of plant location as a proxy for the unionization at the plant. Because the presence of ESOPs may affect unionization rates, we use the unionization rate in 1983, the first year for which state-by-state unionization membership

is available from Unionstats. The causal interpretation predicts that wages increase more at plants located in states with higher unionization rates.

The non-causal story does not have the same prediction. By law, all employees must participate in an ESOP. Thus, if an ESOP is established simply as a means to increase wages, the compensation increase is likely to be more or less equal at all plants, irrespective of unionization rates. There is one exception to this mandatory ESOP participation. During collective bargaining, unions can elect alternative forms of compensation to an ESOP. Although we are unable to determine which unions do or do not participate in the ESOP, this option biases against finding a systematic relation between compensation increases and unionization rates. If a union elects an alternative compensation, it will do so because it is more beneficial to workers. And if the alternative form of compensation is not covered by annual payroll (e.g. more sick days), we will underestimate compensation increases at unionized plants, biasing against finding results consistent with the causal interpretation.

To minimize the impact of the value of ESOP shares granted on the estimate of compensation increases, we again exclude the first 4 years after the ESOP is established – the time period during which the vast majority of shares are allocated. Table 3.3, column 1 reports the panel regression estimates, which show TCB is higher at plants located in states with higher unionization rates. More important, it shows that the TCB increase associated with an ESOP is greater if the plant is located in a state with a higher unionization rate. This is consistent with our causal interpretation. The indicator variable *ESOP* captures TCB gains at all plants covered by an ESOP. Relative to this mean ESOP effect, TCB increases more at plants which are more likely to be unionized. These are the

same plants where the control rights provided through ESOPs will be used more effectively to enhance workers' bargaining position during wage negotiations.

In column 2, we add a control for the firm average wage, estimated by dividing the firm-level annual payroll by the total count of employees. Unsurprisingly, firm-level wages are strongly and positively correlated with the plant-level wages. More important, the coefficient on the interaction of unionization likelihood with the ESOP indicator variable continues to be positive.

In column 3, we add ESOPg5 and an interaction term of ESOPg5 with unionization likelihood. We observe a large, positive and significant coefficient on the interaction term and an insignificant coefficient on the interaction of ESOP and unionization. Apparently, all incremental TCB increases due to unionization are concentrated at those firms which adopt large ESOPs. Employee voting rights seem to enhance worker bargaining power at unionized plants only when ESOPs are large. In Column 4, we add the *Restructuring ESOP* indicator. The coefficient on the interaction of ESOPg5 and unionization likelihood does not change.

3.3.1.2. Establishing causality – leverage

To provide further collaborating evidence to the causal interpretation of the compensation increases, we consider the disciplining role of financial leverage. Bronars and Deere (1991) argue with supporting evidence that the ability of unions to extract concessions from shareholders can be limited by a high debt ratio because of its implied threat of bankruptcy. According to this argument, workers' ability to use the control rights bestowed by a large ESOP will be weaker if the firm has a high financial leverage.

Thus, we predict employee compensation increases following large ESOPs to be smaller at firms with higher leverage.

To test this prediction, we include an interaction of leverage and *ESOPg5* in column 5 of Table 3.3. The coefficient on the interaction term is negative and significant. The threat of bankruptcy implied in high leverage seems to suppress employee-owners' ability to extract higher wages.

In column 6, we add an interaction of leverage and ESOP. As in column 5, we continue to observe a negative and significant coefficient on the interaction of leverage and ESOPg5. However, the coefficient on the interaction of ESOP and leverage is positive. A possible explanation is provided by Berk, Stanton, and Zechner (2007) who argue that wages increase with leverage because workers must be compensated for the increased risk of bankruptcy. Thus, when ESOP is small, worker compensation increases with leverage to protect them ex-ante against the risk of bankruptcy. However, when ESOP is large enough to allow employees sufficient bargaining power to extract higher wages, the same threat of bankruptcy becomes a deterrent to potential wage increases.

3.3.2. Relation between firm valuation and ESOPs

To investigate how the presence of ESOPs and the compensation increases accompanying ESOP implementation are related to shareholder value, we regress industry adjusted Q on indicator variables for the presence of ESOPs. Our dependant variable Q_{it} is estimated as fiscal year-end market value of equity plus market value of preferred stock plus total liabilities divided by total assets. We follow Bebchuk and

Cohen (2005) and industry adjust Q by subtracting the median Q matched by industry (2-digit SIC code) and year.

Our general approach is similar to that of Himmelberg et al. (1999). We assume Q depends on the presence of an ESOP, observable firm characteristics, and unobservable firm characteristics. We include firm fixed effects to control for time-invariant unobservable firm characteristics. We also control for time series patterns with year fixed effects. To control for observable firm characteristics, we include the log of total assets (normalized in 2006 dollars), the R&D expenditures to sales ratio, the capital expenditures to assets ratio, and age. Because the indicator variable for an ESOP is comparing industry adjusted Q following the adoption of the plan to an earlier period, the coefficient on the indicator variable could pick up an age factor, if industry adjusted Q changes with firm age. We define *Age* as the difference between the current year and the first year the firm is included in Compustat.[26]

We first estimate the base regression using the ESOP database over the period 1980 to 2004. As in the earlier compensation regressions, we only include those firm-year observations beginning five years prior to the ESOP adoption to capture the most current information. We exclude the year of the announcement of ESOP adoption and the year after, observations which occur 10 years after an ESOP has been initiated and any observations following an ESOP termination.

Column 1 of Table 3.4 shows that the presence of an ESOP is associated with a statistically positive increase in industry adjusted Q. It also shows that the coefficients of

[26] Because Compustat data is not available prior to 1950, the "oldest" firm in our sample is 54.

the control variables are consistent with our expectations. Larger firms are valued less and firms with more R&D investment and capital expenditures are valued more. The negative coefficient on Age indicates that new firms have high valuations, possibly reflecting large growth options.

To give a sense of the economic magnitude of the result in Column 1, we note that the median value of Tobin's Q in our sample is 1.306. Thus, a coefficient of 0.106 implies that the presence of an ESOP is associated with a firm valuation increase of 8.12% relative to the industry median. If ESOPs are implemented to maximize shareholder value, then firms which choose not to have ESOPs may do so in anticipation of benefits being outweighed by costs. Thus, these estimates likely represent the upper tail of the potential distribution of shareholder value creation if all firms were to adopt ESOPs.

Column 2 adds *ESOPg5s* to the regression. The estimates show that the positive relation between firm value and an ESOP diminishes if the plan has more than 5% of the outstanding shares. Because the coefficients on the ESOP indicator variables are cumulative, the combined coefficient on *ESOPg5* is 0.209 – 0.190, or 0.019. To determine if large plans are associated with an overall firm value effect, we enter *ESOPg5* alone in Column 3 and find an insignificant coefficient. The relation between firm value and employee share ownership seems to be inverse-U shaped.

It is possible that this inverse-U shaped relation is driven by a similar inverse U-shaped relation between managerial share ownership and firm value, as documented by Morck, Schleifer, and Vishney (1988) and McConnell and Servaes (1990), among others.

However, Himmelberg et al. (1999) show that this relation with managerial ownership disappears with the inclusion of firm fixed effects. Since our regressions also include firm fixed effects, it is unlikely our results are confounded by managerial share ownership. Nevertheless, we check the robustness by separating ESOPs into high and low levels of managerial participation by using information available in the DOL database regarding the nondiscriminatory coverage requirement (NCR).[27] In general, if a plan satisfies the NCR, the plan does not allocate highly compensated employees, presumably management, a disproportionate fraction of the ESOP shares. Since the DOL database starts in 1992, we assume that if an ESOP satisfies the NCR in any year, then the plan satisfies the NCR in all years. Whether or not an ESOP satisfies the NCR is virtually time-invariant[28]

In Column 4, we re-estimate the regression by separating the sample according to whether or not the NCR is satisfied. The coefficient on *ESOP biased towards highly compensated employees* is negative and significant relative to *ESOP*. Likewise, the coefficient on *ESOPg5 biased towards highly compensated employees* is significantly positive relative to *ESOPg5*. Estimated separately, the coefficients on *ESOP* and *ESOPg5* at firms where the plans are biased toward highly compensated employees are not significantly different from zero. Thus, the inverse U-shaped relation between firm

[27] Specifically, the test takes into account differences between the coverage ratios for highly and non-highly compensated employees, the percentage of total employees covered, and the compensation of employees covered by the plan as compared to employees excluded by the plan. For more information, see the IRS instructions for completing form 5500 available at http://www.irs.ustreas.gov/pub/irs-prior/i5500--1998.pdf. The definition of highly compensated employee is contained in Code section 414(q), as amended by section 1431 of SBJPA, those regulations under section 414(q) that reflect current law, and Notice 97-45, 1997-33 I.R.B. 7.

[28] The mean (median) variance of an indicator variable on whether an ESOP satisfies the NCR is 0.097 (0.000).

valuation and employee share ownership is driven by firms which do not give a disproportionate share of ESOP stocks to managers.

Finally, column 5 adds an indicator variable for restructuring ESOPs, the cases where the sponsoring firm suffers a decline in sales (in 2006 dollars) the year the ESOP was initiated. Unsurprisingly, these firms are valued with significantly lower than firms with non-restructuring ESOPs. When we include *Restructuring ESOP* alone without *ESOP* or *ESOPg5* in column 6, the coefficient is still significantly negative, implying 9.26% lower firm valuation relative to the industry median. Taken together with the results on employee compensation, this result suggests that these restructuring ESOPs are motivated by poorly performing firms short of cash as a means to conserve cash by substituting stocks for cash wages.

3.3.2.1. Leverage on Q

Our earlier analyses show that employee compensation increases following large ESOPs are greater with higher leverage. To examine whether this leverage effects carry over to firm valuation, we re-estimate the relation between industry-adjusted Q and ESOPs while interacting leverage with ESOP indicator variables.

Column 1 in Table 3.5 shows a positive and significant coefficient on the interaction term with between leverage and ESOPg5; furthermore, Column 2 shows that the *ESOPg5* leverage* interaction term has a positive coefficient in absolute terms, not just relative to the interaction term between ESOP and leverage. Taken together with the compensation results, it appears that leverage mitigates the value negating effect of large ESOPs through its disciplinary effect on employee compensation.

Column 1 also shows a negative and significant coefficient on the interaction term between ESOP and leverage, implying that the value-enhancing effects of small ESOPs are less when firms have higher leverage. Perhaps there is less room for productivity improvement when workers are already under pressure due to high leverage.[29]

3.3.2.2 Tax benefits

If leverage is used in setting up an ESOP, it may give rise to unique tax benefits due to tax deductibility of dividends paid to shares held by the ESOP trust if the dividends are used to pay down debt. We investigate whether this benefit is substantive enough to effect firm value by an indicator variable for leveraged ESOPs, where the leverage classification is coded at initiation and maintained throughout the lifetime of the ESOP.[30] Column 3 in Table 3.5 reveals no differential firm valuation between levered and non-levered ESOPs. We expect a positive value associated with the ability to treat a portion of dividends as tax deductible expenses. However, this favorable tax treatment applies only to the dividends paid to shares held in trust and decreases over time as shares are allocated to employee accounts. Maybe this tax benefit is too small to be detected by our empirical methodology.

[29]Another, non-mutually exclusive explanation is the reduction in leverage over time as a leveraged ESOP releases shares to the individual accounts. This will lead to a negative coefficient on the interaction term between *ESOP* and leverage if the plan has a value-enhancing impact. This explanation, however, requires that the firm does not rebalance its capital structure as the leverage decreases.

[30]Because news articles reporting the initiation of ESOPs tend to mention the leverage status only when it is leveraged, we assume it is not leveraged if they do not clearly state as such. Most leveraged ESOPs remain leveraged for no more than ten years; hence, maintaining the leverage status throughout the lifetime of an ESOP introduces noise because there are no tax benefits when an ESOP is no longer leveraged. The alternative approach of coding on an annual basis whether the ESOP is or is not leveraged introduces a different bias, because it will capture the changes in firm characteristics following both the adoption of an unlevered ESOP and the change in the leverage status from leveraged ESOP to unlevered ESOP. We repeat regression analyses using this alternative coding and find similar results. Because our ESOP database does not have the necessary information required for this alternative coding, this robustness check is done using the DOL database which covers ESOPs only from 1993.

In sum, we find a positive association between the presence of ESOP and firm value. This positive relation applies only to small ESOPs, and disappears when the size of ESOP becomes large. Our result is not driven by observations where management has a relatively disproportionate share in the ESOP. In addition, the valuation results concerning leverage are remarkably consistent with those for compensation results. The interactive effects with leverage is negative for compensation but positive for shareholder value. This consistency in interactive effects suggests that what employees gain from ESOPs come at the expense of potential shareholder value gains, and vice versa.

So far, we have been careful to describe our results as relations between firm value and ESOPs. We will next make the argument, supported by additional empirical evidence, that these results are consistent with a causal relationship.

3.3.3. Selection bias in Q Results

To argue for a causal relation between ESOPs and firm value, we first rule out alternative explanations of our findings based on selection biases. The most common selection story argues firms that select the treatment – in our case, establish ESOPs – are inherently different from firms not selecting the treatment. Such differences may involve firm characteristics which are stationary or evolving over time. Because the inclusion of firm fixed effects in all of our regressions controls for stable firm characteristics, we concentrate on possible selection biases which depend on time-varying characteristics.

3.3.3.1. Private information story

We first consider a story where a firm has private information, predicting higher future permanent profits, and decides to reward its employees through an ESOP. In such

a case, we would expect to find a positive association between firm value and an ESOP. Industry adjusted Q will increase when the market learns the positive information following the adoption of the ESOP.

We control for this possible selection bias by relying on a stylized fact that ESOPs are often implemented over time. For example, with leveraged ESOPs, the firm establishes a trust which temporarily holds all ESOP shares. Over time, the trust allocates these shares to employee accounts, with regulation dictating that all shares must be allocated within ten years. Some non-leveraged ESOPs also allocate shares over time, especially when firms purchase shares on the open-market. Thus, we expect these ESOPs to have relatively modest effects on employee behavior in the first few years following initiation. To utilize this feature for a robustness check, we use the second full fiscal year after the announcement of the ESOP as the baseline year. [31]

If the valuation effect associated with ESOPs is due to the private information, we should observe no further valuation effect with this new baseline, because most private information does not remain private for more than two years. However, if ESOPs are affecting firm valuation through a combination of productivity gains and compensation changes, we expect to observe additional effects in later years, relative to the baseline of the 2nd year, as more shares are allocated to employees, increasing both cash flow and voting rights of employees over time.

In Table 3.6, we use this alternative baseline. We recode the firm-year observation which falls two fiscal years after the adoption of an ESOP (and thus was

[31] Data limitations prevent us from identifying which ESOP observations allocate shares over time.

originally coded as having an ESOP) as not having an ESOP. We also drop all earlier observations of ESOP firms. Now ESOP indicator variables will pick up differences in firm characteristics between this second year after an ESOP initiation and the subsequent years. The results reported in Table 3.6, Panel A, are similar to their counterparts in Table 3.4. Column 1 shows that small ESOPs continue to have positive impact on firm value even though we limit the pre-ESOP baseline to only one year (as compared to five years in the Table 3.4), increasing noise in the regression, Column 2 also confirms that large ESOPs have no valuation impact with the alternative baseline. In short, the inverted U-shaped relation between firm valuation and employee share ownership persists well after three years following ESOP adoption.

Although this persistent value effect may imply an underestimation of the valuation effect of having ESOPs at the time of initiation, it does not necessarily imply informational inefficiency in the stock market. The complexity of an ESOP makes it difficult to assess its full impact in the earlier years, because much of the details of how shares will be allocated are unknown. A worker's behavioral reaction to becoming an employee owner or the prospect of receiving more shares, is highly individual-specific. It is difficult to predict how the individual reactions will be sorted out in group behavior in the workplace. The same can be said about how the newly acquired voting rights, or the prospect of getting more, will affect employee influence on corporate decisions. These types of uncertainties require time to be resolved, and the market will reassess the firm value as shares are actually allocated and observable actions of employees materialize.

Furthermore, a large majority of ESOPs in our sample were initiated in the 1980s or early 1990s, a period when the media reaction to ESOPs was heavily focused on the anti-takeover implications of these plans.[32]

Another illustration of how ESOPs affect firm valuation over time is provided in Figure 3.1, which plots the mean sample industry-adjusted Q for firms with ESOPs around the year of ESOP initiation (year 0). For the full sample, we observe no discernable pattern of changes to Q prior to the ESOP initiation. However, starting the 3rd year after the initiation, we observe a clear steady increase in Q for small ESOPs. One possible explanation for this gradual rise in Q is that bad firms disappear from the sample over time and only good (high-Q) ESOP firms are left in the later years. To test this interpretation, we create the "Constant Sample," which is a subset of the full sample. For a firm to be included in the constant sample, the firm must have the full 16 year time series (e.g. data from year – 5 through year + 10). The Constant Samples follow very similar trends as the Full Samples.

Figure 3.1 also helps reject a "leverage" interpretation of our results. One may argue the increase in Q is due to an increase in leverage often accompanying an ESOP—e.g., leveraged ESOPs. If leverage was driving the value increase, we should observe a jump in Q at year 0 and a gradual decline over the next 5 years as the ESOP debt is paid off and the ESOP-associated leverage declines.

Finally, one may argue that if an ESOP is implemented to deter hostile takeovers, the announcement of an ESOP initiation may reveal private information that the

[32] This attention on the anti-takeover implications was also evident in the academic finance literature during the early 1990s--e.g., Gordon and Pound (1990), Chang and Mayers (1992), and Chaplinsky and Niehaus (1994).

management is concerned about possible takeover bids. This information is likely to be reflected immediately in stock prices, not three years after initiation.

3.3.3.2. Correlation between firm performance and issuance of new shares

We also explore whether our results are an artifact of the definition of the percentage of shares held by ESOPs, the ratio of the number of shares controlled by the ESOP to the number of shares outstanding. While the numerator is often constant for a number of years, the denominator fluctuates as the firm issues new shares or repurchases outstanding shares. If high performance firms issue new shares to expand their operations, the denominator will increase, making the relative size of' ESOPs smaller. Conversely, poorly performing firms may repurchase outstanding shares because they lack good investment opportunities, making the size of ESOPs larger.

To control for this possible spurious correlation, we create two additional variables to capture changes in (split-adjusted) shares outstanding. The first variable, *share difference 1 y*, is estimated as (current shares outstanding - shares outstanding from one year prior) / shares outstanding from one year prior. *Share difference 5 y* is estimated in a similar manner but with a five year change to shares outstanding. We revert to the original baseline as in Table 3.4, and compare changes following ESOP adoptions to firm-years which precede the ESOP. Column 3 in Table 3.6 reports a positive relation between the one-year share difference and firm value. However, controlling for changes in shares outstanding does not affect our principal finding of a positive coefficient on

ESOP and a negative coefficient on *ESOPg5*. Column 4 re-estimates the regression with an alternative definition of Share difference 5 y.[33] The results are robust.

3.3.3.3. Confounding policy changes

Another alternative story for our findings is that at the time of ESOP initiation, the firm implements other policy changes that affect firm value. To explain the results in Table 3.6, Panel A, the effects of these policy changes must be slow changing and continue to impact stock prices two fiscal years after the ESOP initiation. An example would be a management team that believes a hostile takeover bid is looming and the best defense is to maximize firm value by increasing efficiency. As a precautionary move, the firm also implements an ESOP. If this were the case for a large portion of our sample firms, we would observe a positive correlation between an ESOP and firm value.

Although this story may explain some of our results, it is contradicted by our overall results. First, a common method to increase efficiency is to cut employee compensation. This is contradicted by our finding of a substantial increase in the employee compensation following ESOP initiations. Second, an efficiency-based story must not only explain the increase in firm value associated with small ESOPs, but also

[33] Estimating *Share Difference 5 y* requires a minimum of five years of data on shares outstanding in CRSP, which may introduce a new bias by limiting the sample to older firms. Thus, we modify its definition. In cases where there is inadequate data to estimate share difference 5 y, we instead code the difference in shares outstanding as zero. This captures the intent of our control. For firms without an earlier time period, we should anticipate no legacy effects from earlier time periods. The results are reported in column 4. As with Column 3, we find a positive coefficient on ESOP and a negative coefficient on ESOPg5. In unreported tests, we estimate various alternative regressions, including interactions between the change in shares outstanding and the ESOP variables. We consistently find a positive and significant coefficient on ESOP and a negative and significant coefficient on ESOPg5.

the disappearance of value gains with large ESOPs. To the best of our ability, we cannot think of an efficiency-based story that can explain both.

3.4. Robustness checks

In this section we conduct additional robustness tests using alternative definitions of large ESOPs, non-linear controls for firm size, and an alternative definition of Q. In Table 3.7, we introduce *ESOPg10*, an indicator variable equal to one if the firm has an ESOP that is estimated to control more than 10% of the shares outstanding at any point in time. Although column 1 shows a negative coefficient on *ESOPg10*, its effects is not significantly different from those of *ESOPg5*.

Coles, Lemmon, and Meschke (2007) note that regression results of managerial ownership on Tobin's Q are sensitive to both the definition of and inclusion of non-linear size controls. Column 2 includes both assets and assets squared and, in Column 3, sales and sales squared. The results are robust to these additional controls.

In columns 4 to 6 we define Q as industry adjusted market to book value ratios, and then re-estimate regression with different combinations of control variables. The results remain robust.

3.5. Conclusion

In this paper we investigate whether adopting broad-based employee stock ownership enhances firm performance by improving employee incentives and team effects. That is, does employee capitalism work? If so, how are gains divided between

shareholders and employees? Our results suggest ESOPs increase productivity, which, by a process of elimination, we attribute to incentive and team effects.

Unlike the evidence of Jones and Kato (1995) on Japanese ESOPs on worker productivity, our evidence of productivity increase is obtained by estimating the effects on two main direct beneficiaries of productivity gains. When ESOPs are small, both employees and shareholders gain, with a bigger share of the value of the productivity gains accruing to shareholders. When ESOPs are large, only employees gain, and shareholders neither gain nor lose. Workers seem to be capturing all the productivity gains using their newly obtained control rights.

How shareholders are affected by large ESOPs vary across financial leverage and unionization rates. Although large ESOPs erode the otherwise positive valuation effects of ESOPs, the erosion is less when firms are highly leveraged and is greater when plants are located in states with higher unionization rates. These findings are remarkably consistent with our findings on employee compensation; compensation increases associated with large ESOPs are smaller with higher leverage and are greater with higher unionization rates.

One exception to these empirical regularities is ESOPs implemented by firms suffering decline in sales revenue and low firm valuation. These ESOPs seem to be motivated to conserve cash by substituting stocks for cash wages. They do not increase employee compensation, nor firm valuation.

Finally, we find no evidence that large ESOPs enable employees to extract *unearned* compensation increases. Although there might be some exceptions, the non-

negative valuation impact of large ESOPs does not support the notion that broad based employee share ownership leads corporate socialism. Quite to the contrary, employee share ownership seems to generate value. How stockholders and workers share the benefits of value creation seems to be largely dependent upon the size of control rights ESOPs grant to workers.

Table 3.1. Panel A. **Summary Statistics of Employee Stock Ownership by Year**.

Counts of observations and average size of employee ownership summarized over time.

Fiscal Year	ESOP Initiations	Count of ESOP observations
1980	2	4
1981	0	4
1982	2	6
1983	5	13
1984	8	22
1985	13	38
1986	14	50
1987	24	72
1988	36	105
1989	82	189
1990	53	247
1991	16	262
1992	22	275
1993	10	314
1994	24	332
1995	15	349
1996	26	388
1997	18	396
1998	16	393
1999	17	396
2000	7	381
2001	2	362
2002	1	355
2003	3	347
2004	2	296
Total / Average	418	5,596

Table 3.1. Panel B. **Summary Statistics of Firms without and with Employee Stock Ownership**. Medians are reported with averages in parentheses. All accounting variables are winsorized. Column 4 reports the difference between Column 2 (firms with ESOPs) and Column 1 (firms in control group without ESOPs). We consider two different tests of significance of these differences. When comparing the difference in medians we use a Wilcoxan ranksum test. When comparing the differences in averages (reported in parentheses) we use a student's t-test. "***", "**", and "*" indicate significance at the 0.01, 0.05, and 0.10 level.

	1 Firms in control group (without ESOP)	2 Firms with ESOP, as identified in the ESOP database	3 Firms with ESOPg5, as identified in the ESOP database	4 Difference: 2 - 1
Industry Adjusted Q	-0.02 (0.32)	-0.03 (0.16)	-0.05 (0.03)	-0.01*** -(0.16***)
Market Capitalization ($M in 2006$)	169.55 (1,540.43)	643.81 (5,013.97)	436.40 (3,501.22)	474.26*** (3,473.54***)
Total Assets ($M in 2006$)	245.83 (2,857.70)	1,585.71 (8,675.21)	1,204.11 (6,707.02)	1,339.88*** (5,817.51***)
PP&E ($M in 2006$)	36.25 (652.02)	177.99 (1,814.27)	128.87 (1,275.96)	141.74*** (1,162.25***)
EBITDA / Total Assets (%)	10.25 (8.41)	10.50 (10.64)	9.49 (9.67)	0.25*** (2.23***)
Capital Expenditures / Total Assets (%)	4.61 (6.80)	4.91 (5.88)	4.61 (5.66)	0.30*** (-0.92***)
R&D / Sales (%)	0.00 (8.12)	0.00 (1.41)	0.00 (1.01)	0.00*** (-6.71***)
Leverage (%)	12.17 (17.74)	17.46 (18.91)	17.62 (19.04)	5.29*** (1.17***)

Table 3.2. Changes in TCB per Employee Following Adoption of an ESOP. Table 3.2 reports results from an OLS panel regression. The dependent variable is calculated as the log of the ratio of annual payroll (in thousands) divided by number of employees. Annual payroll and employees are derived from the SSEL. ESOP is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t. ESOPg5 is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t and this ESOP controls more than 5% of the firm's outstanding common stock at some point during its observed lifetime. Restructuring ESOP is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t and this ESOP was implemented during a year when sales growth was negative. BCS is an indicator variable which assumes a value of 1 if the plant belongs to a firm incorporated in a state which has passed BCS. Age is measured as the current year minus the first year the observation appears in the SSEL. State-year mean wages is the mean wage for the plant's state of location, for year t, excluding the plant itself. All dollar-denominated variables are normalized to 2006 $. Assets, sales and leverage are derived from Compustat and are measured at the firm-level. Ages, state-year mean wages, assets and sales are log-transformed. The full sample runs from 1982 through 2001 and includes only plants identified as belonging to US public firms. We exclude plants belonging to firms with less than $10M in total assets and to firms for which we are unable to identify the state of incorporation. We also exclude firm-year observations for the year of- and the year after initiating an ESOP and firm-year observations which are more than five years before or more than 10 years after the initiation of an ESOP. We also exclude firm-year observations after an ESOP is terminated. In the 5+ sample we further exclude observations representing the 2nd, 3rd, and 4th year after an ESOP initiation. Coefficients are reported with standard errors in parentheses. "***", "**", and "*" indicate significance at the 0.01, 0.05 and 0.10 level.

	1	2	3	4	5
	Full Sample	Full Sample	5+ Sample	5+ Sample	5+ Sample
ESOP	0.008 (0.002)***	-0.000 (0.002)	0.016 (0.002)***	0.028 (0.002)***	0.027 (0.002)***
ESOPg5	0.044 (0.002)***	0.047 (0.002)***	0.029 (0.003)***	0.035 (0.003)***	0.034 (0.003)***
Restructuring ESOP				-0.052 (0.003)***	-0.062 (0.003)***
BCS					0.107 (0.001)***
Age	0.005 (0.000)***	-0.003 (0.000)***	-0.003 (0.000)***	-0.003 (0.000)***	-0.003 (0.000)***
State-year wages	0.820 (0.001)***	0.817 (0.001)***	0.819 (0.001)***	0.819 (0.001)***	0.819 (0.001)***
Assets		-0.004 (0.001)***	-0.004 (0.001)***	-0.003 (0.001)***	-0.003 (0.001)***
Sales		0.014 (0.001)***	0.015 (0.001)***	0.013 (0.001)***	0.013 (0.001)***
Leverage		0.018 (0.001)***	0.018 (0.001)***	0.018 (0.001)***	0.018 (0.001)***
Year fixed effects	Yes	Yes	Yes	Yes	Yes
Plant fixed effects	Yes	Yes	Yes	Yes	Yes
N	6,759,481	6,759,481	6,606,357	6,606,357	6,606,357
R-squared	0.834	0.834	0.835	0.835	0.835

Table 3.3. Changes in TCB per Employee Following Adoption of an ESOP by Unionization and Leverage. Table 3.3 reports results from an OLS panel regression. The dependent variable is calculated as the log of the ratio of annual payroll (in thousands) divided by number of employees. Annual payroll and employees are derived from the SSEL. ESOP is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t. ESOPg5 is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t and this ESOP controls more than 5% of the firm's outstanding common stock at some point during its observed lifetime. Restructuring ESOP is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t and this ESOP was implemented during a year when sales growth was negative. Age, state-year mean wages, BCS, assets, sales and leverage are included in all regressions but the coefficients are not reported to conserve space. The full sample runs from 1982 through 2001 and includes only plants identified as belonging to US public firms. We exclude plants belonging to firms with less than $10M in total assets and to firms for which we are unable to identify the state of incorporation. We also exclude firm-year observations for the year of- and the year after initiating an ESOP and firm-year observations which are more than five years before or more than 10 years after the initiation of an ESOP. We also exclude firm-year observations after an ESOP is terminated. In the 5+ sample we further exclude observations representing the 2nd, 3rd, and 4th year after an ESOP initiation. Coefficients are reported with standard errors in parentheses. "***", "**", and "*" indicate significance at the 0.01, 0.05 and 0.10 level.

	5+ Sample	5+ Sample	5+ Sample	5+ Sample	Full Sample	Full Sample
	1	2	3	4	5	6
ESOP	-0.012 (0.004)***	-0.002 (0.003)	0.018 (0.004)***	0.023 (0.004)***	-0.000 (0.002)	-0.078 (0.004)***
ESOPg5	0.027 (0.003)***	0.031 (0.003)***	-0.010 (0.006)	-0.004 (0.006)	0.058 (0.003)***	0.135 (0.004)***
Restructuring ESOP				-0.056 (0.003)***		
Unionization	0.166 (0.015)***	0.117 (0.014)***	0.115 (0.014)***	0.113 (0.014)***		
ESOP * unionization	0.075 (0.008)***	0.029 (0.008)***	-0.031 (0.011)***	-0.009 (0.012)		
ESOPg5 * unionization			0.115 (0.016)***	0.115 (0.016)***		
Firm wage ratio		0.277 (0.000)***	0.277 (0.000)***	0.277 (0.000)***		
Leverage					0.019 (0.001)***	0.017 (0.001)***
ESOP * leverage						0.314 (0.013)***
ESOPg5 * leverage					-0.052 (0.009)***	-0.361 (0.015)***
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Plant fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	6,606,357	6,606,357	6,606,357	6,606,357	6,759,481	6,759,481
R-squared	0.836	0.848	0.848	0.848	0.835	0.835

Table 3.4. **Changes to Industry Adjusted Q following the Adoption of an ESOP**. Table 3.4 reports results from an OLS panel regression. The dependent variable is industry adjusted Q, defined as fiscal year-end market value of equity plus market value of preferred stock plus total liabilities divided by total assets. Industry adjustment is calculated by subtracting the median Q matched by industry and year. ESOP is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t. ESOPg5 is an indicator variable which assumes the value of 1 if the firm's ESOP is estimated to control more than 5% of the voting shares at any point over the lifetime of the ESOP. All continuous variables are winsorized. Assets are normalized to 2006 $. Age is estimated as the difference between the current year and the first year the firm appears in Compustat. An ESOP is determined to be biased towards highly compensated employees if the plan does not satisfy nondiscriminatory coverage requirement. An ESOP is defined as a restructuring ESOP is the firm realized a decline in sales the year the ESOP was initiated. The sample starts with all firms in Compustat and all observations between 1980 and 2004. We then exclude firms with less than $10M in total assets and firm-year observations for the year of and the year after initiating an ESOP. We also exclude firm-year observations which are more than five years before the ESOP initiation and from more than 10 years after the ESOP initiation and any observations following an ESOP termination. "***", "**", and "*" indicate significance at the 0.01, 0.05, and 0.10 level.

	1	2	3	4	5	6
ESOP	0.106 (0.033) ***	0.209 (0.049) ***		0.318 (0.069) ***	0.322 (0.054) ***	
ESOPg5		-0.190 (0.066) ***	0.015 (0.045)	-0.261 (0.092) ***	-0.189 (0.066) ***	
Log assets	-0.211 (0.006) ***	-0.212 (0.006) ***	-0.211 (0.006) ***	-0.212 (0.006) ***	-0.212 (0.006) ***	-0.211 (0.006) ***
R&D / Sales	0.000 (0.000) ***	0.000 (0.000) ***	0.000 (0.000) ***	0.000 (0.000) ***	0.000 (0.000) ***	0.000 (0.000) ***
CapEx /Assets	1.178 (0.052) ***	1.178 (0.052) ***	1.176 (0.052) ***	1.178 (0.052) ***	1.178 (0.052) ***	1.176 (0.052) ***
Log age	-0.209 (0.008) ***	-0.209 (0.008) ***	-0.209 (0.008) ***	-0.209 (0.008) ***	-0.209 (0.008) ***	-0.210 (0.008) ***
ESOP biased towards highly compensated employees				-0.305 (0.121) ***		
ESOPg5 biased towards highly compensated employees				0.230 (0.156)		
Restructuring ESOP					-0.334 (0.069) ***	-0.121 (0.056) **
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	87,952	87,952	87,952	87,592	87,952	87,952
R-squared	0.577	0.577	0.577	0.578	0.577	0.577

Table 3.5. **Changes to Industry Adjusted Q Following Adoption of an ESOP: Leverage Effects and Tax Benefits**. Table 3.5 reports results from an OLS panel regression. The dependent variable is industry adjusted Q, defined as fiscal year-end market value of equity plus market value of preferred stock plus total liabilities divided by total assets. Industry adjustment is calculated by subtracting the median Q matched by industry and year. ESOP is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t. ESOPg5 is an indicator variable which assumes the value of 1 if the firm's ESOP is estimated to control more than 5% of the voting shares at any point over the lifetime of the ESOP. All continuous variables are winsorized. The sample starts with all firms in Compustat and all observations between 1980 and 2004. We exclude firms with less than $10M in total assets and firm-year observations for the year of and the year after initiating an ESOP. We also exclude firm-year observations which are more than five years before the ESOP initiation and from more than 10 years after the ESOP initiation and any observations following an ESOP termination. Levered ESOP is an indicator variable if the firm's ESOP is funded using leverage. In Columns 2 and 3, Log assets, R&D/Sales, CapEx/Assets, and log Age are included as controls. All continuous variables are winsorized at 1%. Assets are normalized to 2006 $. Age is estimated as the difference between the current year and the first year the firm appears in Compustat. "***", "**", and "*" indicate significance at the 0.01, 0.05, and 0.10 level.

	1	2	3
ESOP	0.365 (0.077) ***	0.210 (0.049) ***	0.115 (0.066) *
ESOPg5	-0.439 (0.101) ***	-0.284 (0.082) ***	-0.141 (0.098)
Leverage	-0.092 (0.021) ***	-0.095 (0.021) ***	
ESOP * leverage	-0.721 (0.278) ***		
ESOPg5 * leverage	1.164 (0.359) ***	0.446 (0.227) **	
Levered ESOP			0.139 (0.096)
Levered ESOPg5			-0.052 (0.135)
Plant fixed effects	No	No	No
Firm fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
N	87,950	87,950	87,950
R-squared	0.577	0.577	0.577

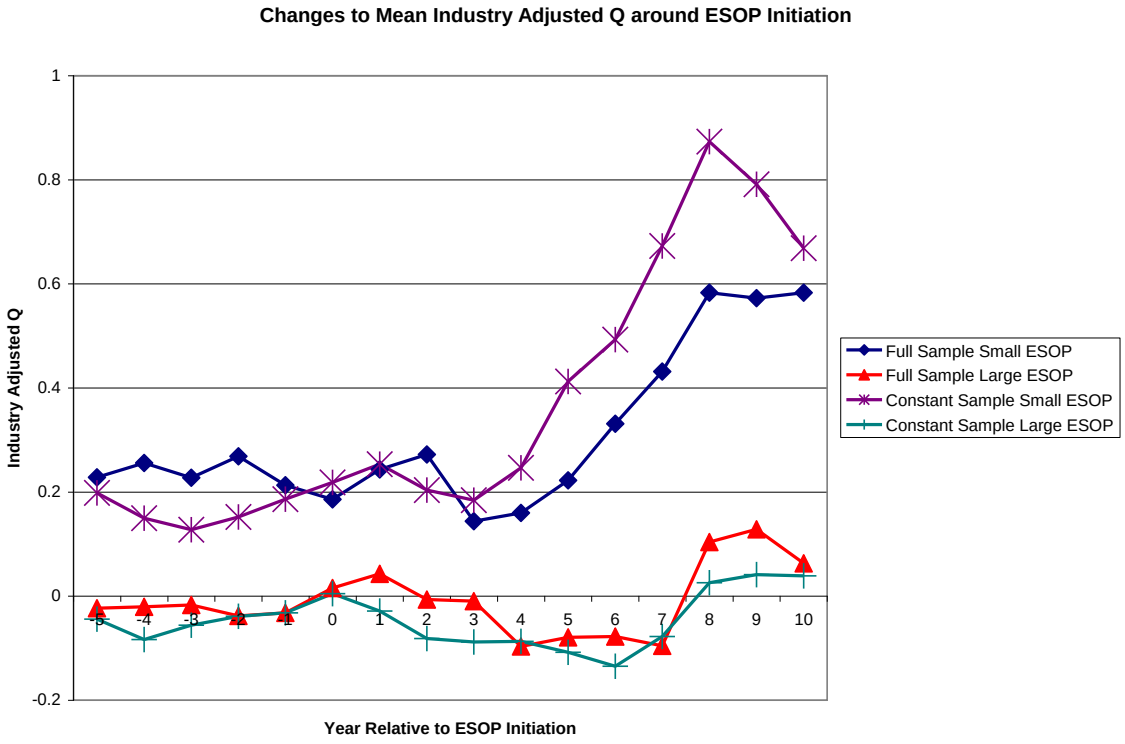
Table 3.6. **Changes to Industry Adjusted Q following Adoption of an ESOP Using Two years after Adoption as the Baseline (Panel A) and Controlling for Changes to Number of Shares Outstanding (Panel B)**. Table 3.6 reports results from an OLS panel regression. The dependent variable is industry adjusted Q, defined as fiscal year-end market value of equity plus market value of preferred stock plus total liabilities divided by total assets. Industry adjustment is calculated by subtracting the median Q matched by industry and year. ESOP is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t. ESOPg5 is an indicator variable which assumes the value of 1 if the firm's ESOP is estimated to control more than 5% of the voting shares at any point over the lifetime of the ESOP. All continuous variables are winsorized. Assets are normalized to 2006 $. Age is estimated as the difference between the current year and the first year the firm appears in Compustat. An ESOP is determined to be biased towards highly compensated employees if the plan does not satisfy nondiscriminatory coverage requirement. An ESOP is defined as a restructuring ESOP is the firm realized a decline in sales the year the ESOP was initiated. The sample starts with all firms in Compustat and all observations between 1980 and 2004 after excluding firms with less than $10M in total assets. We exclude firm-year observations for the year of and the year after initiating an ESOP. We also exclude firm-year observations which are more than five years before the ESOP initiation and from more than 10 years after the ESOP initiation and any observations following an ESOP termination. In Panel A, we also exclude all observations before an ESOP initiation. We then code the 2nd year after the ESOP adoption as the baseline year (e.g. firm-year observations two years after the adoption of an ESOP are coded as if the ESOP were still not yet implemented.) In Panel B, we use the same baseline as in columns 2-6 of Table 3.2. In Column 3, share difference 1 y and share difference 5 y are estimated as split-adjusted (shares outstanding at time t - shares outstanding at time t-1 or t-5) / shares outstanding at t-1 or t-5, respectively. In Column 4, we assign a value of 0 to share difference 1 y or share difference 5 if necessary time series data is not available from CRSP to estimate the variable.

	Panel A		Panel B	
	1	2	3	4
ESOP	0.166 (0.085) **		0.162 (0.054)***	0.208 (0.049) ***
ESOPg5	-0.135 (0.115)	0.030 (0.077)	-0.145 (0.072) **	-0.189 (0.066) ***
Log assets	-0.215 (0.006) ***	-0.215 (0.006) ***	-0.204 (0.008)***	-0.212 (0.006) ***
R&D / Sales	0.000 (0.000) ***	0.000 (0.000) ***	0.000 (0.000)	0.000 (0.000) ***
CapEx /Assets	1.169 (0.052) ***	1.169 (0.052) ***	1.455 (0.081)***	1.179 (0.052) ***
Log age	-0.210 (0.008) ***	-0.210 (0.008) ***	-0.103 (0.026)***	-0.210 (0.008) ***
Share difference 1 y			0.014 (0.005)***	-0.000 (0.000)
Share difference 5 y			-0.001 (0.001)	0.003 (0.001)***
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
N	86,763	86,763	44,998	87,952
R-squared	0.579	0.579	0.623	0.577

Table 3.7. **Changes to Industry Adjusted Q Following Adoption of an ESOP with Alternative Variable Definitions and Controls.** Table 3.7 reports results from an OLS panel regression. In columns 1 through 3, the dependent variable is industry adjusted Q, defined as fiscal year-end market value of equity plus market value of preferred stock plus total liabilities divided by total assets. In columns 4 through 6, the dependent variable is industry adjusted MB, defined as fiscal year-end market value divided by book equity. Industry adjustment is calculated by subtracting the median industry and year value. ESOP is an indicator variable which assumes the value of 1 if the firm has an ESOP at time t. ESOPg5 is an indicator variable which assumes the value of 1 if the firm's ESOP is estimated to control more than 5% of the voting shares at any point over the lifetime of the ESOP. ESOPg10 is an indicator variable which assumes the value of 1 if the firm's ESOP is estimated to control more than 10% of the voting shares at any point over the lifetime of the ESOP. All continuous variables are winsorized. The sample starts with all firms in Compustat and all observations between 1980 and 2004. We exclude firms with less than $10M in total assets and firm-year observations for the year of and the year after initiating an ESOP. We also exclude firm-year observations which are more than five years before the ESOP initiation and from more than 10 years after the ESOP initiation and any observations following an ESOP termination. All continuous variables are winsorized at 1%. Assets and sales are normalized to 2006 $. Age is estimated as the difference between the current year and the first year the firm appears in Compustat. Both age variables are normalized by dividing by 100. "***", "**", and "*" indicate significance at the 0.01, 0.05, and 0.1 level.

	1	2	3	4	5	6
ESOP	0.209 (0.049) ***	0.197 (0.049) ***	0.182 (0.049) ***	0.499 (0.091) ***	0.501 (0.091) ***	0.501 (0.091) ***
ESOPg5	-0.159 (0.096) *	-0.179 (0.066) ***	-0.149 (0.066) **	-0.219 (0.121) *	-0.212 (0.121) *	-0.356 (0.149) **
ESOPg10	-0.045 (0.098)					
Log assets	-0.212 (0.006) ***	-0.432 (0.018) ***		-0.182 (0.010) ***	-0.176 (0.010) ***	-0.176 (0.010) ***
Log assets squared		0.020 (0.002) ***				
Log sales			-0.104 (0.009) ***			
Log sales squared			0.005 (0.001) ***			
R&D / Sales	0.000 (0.000) ***	0.000 (0.000) ***	0.000 (0.000) ***	0.000 (0.000) ***	0.001 (0.000) ***	0.001 (0.000) ***
CapEx /Assets	1.178 (0.052) ***	1.215 (0.052) ***	1.179 (0.053) ***	2.058 (0.097) ***	2.058 (0.097) ***	2.058 (0.0097) ***
Log Age	-0.209 (0.008) ***	-0.196 (0.007) ***	-0.231 (0.008) ***	-0.406 (0.014) ***	-0.404 (0.014) ***	-0.403 (0.014) ***
Leverage					-0.215 (0.039) ***	-0.220 (0.039) ***
ESOPg5 * leverage						0.677 (0.410) *
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	87,952	87,952	87,952	87,952	87,952	87,952
R-squared	0.577	0.578	0.570	0.485	0.485	0.485

Figure 3.1. Changes to Mean Industry Adjusted Q around ESOP Initiation. Figure 3.1 charts the sample mean industry adjusted Q for firms which issued ESOPs relative to the year of the ESOP initiation. Year 0 is the year of the ESOP initiation. A small (large) ESOP is an ESOP which never (does) controls more than 5% of the firm's outstanding common stock during the lifetime of the ESOP. The Full Sample includes all available firm-year observations. The Constant Sample is corrected for a possible survivorship-bias. This sample is restricted to those firms for which the complete 16 year time series is available. Thus, the firm composition of the Constant Sample is the same for each year.



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Chapter 4

Hedge Funds as Investors of Last Resort?

Hedge funds have recently become an important source of funding for public companies raising equity privately. Financing young, small companies with severe informational asymmetries is an important investment strategy for some hedge funds. Since 1995, hedge funds have participated in more than 50 percent of the private placements of equity securities and have contributed about one-quarter of the capital raised in such equity issuances, a total investment which has exceeded the contributions of other investor classes. This paper sheds light on the role of hedge funds in such private placements.

In perfect financial markets it should be irrelevant whether a firm obtains funding from hedge funds or from other investors. To investigate whether the identity of the investors matters, we use a unique dataset that includes 5,244 transactions of Private Investments in Public Equity (PIPEs), which raised $77 billion between 1995 and 2002.[34] PIPEs are negotiated with a small number of sophisticated investors. Firms issuing private placements tend to be small, young, and poorly performing companies, where

[34] Other studies on private placements include Wruck (1989); Hertzel and Smith (1993); Hertzel, Lemmon, Linck, and Rees (2002); Hillion and Vermaelen (2004); Wu (2004); Krishnamurthy, Spindt, Subramaniam, and Woidtke (2005); Wu, Wang, and Yao (2005); Barclay, Holderness, and Sheehan (2005); Chou, Gombola, and Liu (2004); Chaplinsky and Haushalter (2005); Gomes and Phillips (2005); Meidan (2005); and Wruck and Wu (2005).

informational asymmetries are most severe and where market imperfections are most prevalent, as shown by Wu (2004) and Gomes and Phillips (2005). These frictions may limit the investors interested in providing outside capital to these firms and provide unique opportunities for non-traditional investors.

While public issuances of equity generally result in homogenous securities, the negotiations between the issuing companies and their investors in private issuances result in highly customized securities. We distinguish between two main security structures: Traditional and structured PIPEs. Traditional PIPEs are private placements of conventional common stock and fixed convertibles. On the other hand, structured PIPEs are private placements of securities that include repricing rights, which effectively protect the investors against price declines as shown by Hillion and Vermaelen (2004). Both securities are generally sold to investors at predetermined discounts. This heterogeneity in the specifications of the securities gives an insight into the preferences and the behavior of the different investor classes.

Hedge funds recently have come under scrutiny due to the perception that their trading activity can increase uncertainty in the market. Hedge funds are subject to limited government oversight and they tend to follow flexible and sophisticated investment strategies involving short-selling and derivative instruments.[35] These transactions enable them to partially immunize their portfolios against potential price declines. For example, hedge funds can purchase restricted PIPE securities at discounts directly from the companies and simultaneously short-sell the underlying securities of the issuing

[35] Other papers discussing the behavior and performance of hedge funds include Fung and Hsieh (1997, 1999, 2000a, 2000b, 2001), Ackermann, McEnally, and Ravenscraft (1999); Brown, Goetzmann, and Ibbotson (1999); Brown, Goetzmann, and Park (2000, 2001); Liang (2000); Brown and Goetzmann (2003); Brunnermeier and Nagel (2004); Agarwal and Naik (2004); Gupta and Liang (2005); Fung, Hsieh, Naik, and Ramadorai (2006); and Jagannathan, Malakhov, and Novikov (2006).

companies. Hedge funds might therefore be more willing to invest in companies affected by severe informational asymmetries or in companies that are temporarily over-valued.

We find that hedge funds tend to invest in companies with weaker fundamentals and higher asymmetric information and that hedge funds take steps to reduce the risk associated with these investments. First, hedge funds are much more likely than other investors to participate in price-protected structured PIPEs. In our sample, hedge funds account for 72 percent of the investments in structured PIPEs and for just 16 percent of the investments in traditional PIPEs. This behavior indicates that hedge funds have a desire to reduce their risk exposure. We also find that hedge funds are more likely to negotiate price-protected structured PIPEs when investing in companies that are short-sale constrained and that have relatively few institutional holders. Second, companies that sell their equity to hedge funds are forced to sell their securities at significantly higher discounts than companies that sell their equity to other investors, indicating that hedge-funded companies have more difficulty raising equity capital. Third, we observe that the short interest of companies issuing their securities to hedge funds increases around the time of the closing of the deal. If hedge funds are able to effectively reduce their risk exposure, they may be more willing to be an investor of last resort. This is in sharp contrast to other investors, such as mutual and pension funds, where regulatory requirements or self-imposed trading restrictions limit the use of such strategies and the purchasing of non-traditional securities.

Our main result demonstrates that there is a strong association between investors and the long-term performance of the funded companies. We find a significant difference in performance between companies financed by hedge funds and companies financed by

other investors. For example, the common stocks of companies issuing traditional PIPEs purchased by hedge funds decline by 19.25 percent during the first year following the private placement, while the common stocks of companies issuing traditional PIPEs purchased by other investors decline by just 0.35 percent during the first year.

Although companies obtaining funding from hedge funds perform relatively poorly, we find that hedge funds that invest in PIPE securities perform relatively well. PIPE securities can be profitable for hedge funds because they obtain equity securities at significant discounts, because they protect themselves through embedded repricing rights and short positions, and because they can liquidate the securities after a relatively short time period. Our evidence is consistent with the hypothesis that hedge funds act as investors of last resort for firms with the fewest alternative financing options. The persistent activity of hedge funds in the PIPE market and the relatively strong performance of hedge funds involved in PIPE transactions indicate that being a lender of last resort pays off.

Our paper is related to the literature analyzing the performance of companies issuing private placements. Since the seminal paper by Wruck (1989), there has been significant interest in analyzing the performance of companies issuing private placements. Wruck (1989) shows that the announcement of a private sale of equity is accompanied by a positive abnormal return, because of improved monitoring by active investors. More recently, Hertzel, Lemmon, Linck, and Rees (2002) study the long-term performance of companies issuing private placements and find the puzzling result that positive announcement period returns are followed by abnormally low stock price returns during the next three years. Hillion and Vermaelen (2004) show that companies issuing

floating-rate convertibles, a type of structured PIPE, tend to perform particularly poorly in the long term. They suggest that such floating-priced convertibles encourage short selling by convertible holders and that the resulting dilution triggers a permanent decline in the share price. They also find evidence that these structured securities are a source of last resort financing. In a contemporaneous paper, Chaplinsky and Haushalter (2005) investigate the motivations and the returns to firms and investors using both price-protected and unprotected PIPE securities. They argue that PIPE securities enable companies barred from traditional capital markets to obtain much needed financing. Our paper shows that hedge funds play a crucial role in such transactions: The poor performance of companies issuing traditional PIPEs is concentrated among hedge fund investors and hedge funds account for the vast majority of funding for structured PIPEs.

Our paper is also related to several recent papers that study the cross-sectional variation in the performance of firms issuing private placements. Krishnamurthy, Spindt, Subramaniam, and Woidtke (2005) document that the long-term underperformance is concentrated among companies that sell equity to unaffiliated investors. Barclay, Holderness, and Sheehan (2005) show that most of the investors remain passive and that companies obtaining funding from passive investors perform worse. Their results support the entrenchment hypothesis, where management places stock with friendly investors that will remain passive. In a recent paper, Wruck and Wu (2005) demonstrate that higher-quality firms are more likely to transact with related investors rather than outside investors. Our paper is the first paper that investigates the role of hedge funds in private placements. Moreover, our paper analyzes a range of security designs, which gives important insights into the behavior and the preferences of different investors.

The remainder of the paper is structured as follows: In Section 1, we give a general overview of PIPE securities. Section 2 describes our data sources and studies the characteristics of the companies that obtain funding from different sources. Section 3 analyzes the impact of the security structure and the investor composition on the short- and long-term stock price performance. Section 4 investigates in detail the short-selling of the common stocks of PIPE issuing companies. Section 5 investigates the performance of hedge funds investing in PIPE securities and Section 6 provides a brief conclusion.

4.1. Security structures

The specific characteristics of each PIPE transaction are negotiated between the investors and the issuing companies, resulting in numerous different equity-linked security structures. We distinguish between two basic security structures: traditional and structured PIPEs.

4.1.1. Traditional PIPEs

Traditional PIPEs are private placements where the securities are sold at a predetermined price and include common stock, fixed convertible preferred stock, and fixed convertible debt. In a common stock PIPE a fixed number of shares is issued and sold at a predetermined discount to the market price. As shown in the first column of Figure 4.1, the future value of the investor's position increases proportionally with the stock price. Thus, investors in common stock PIPEs are exposed to future stock price declines because they generally cannot dispose of their shares immediately. However, they can hedge their risk by shorting the underlying stocks. In this case, investors can capture the discount while eliminating their risk exposure.

Another basic traditional security is a fixed convertible security. Fixed convertibles yield a current return through interest or dividend payments and can be converted into a fixed number of shares of the company's common stock at a predetermined conversion ratio, as shown in the second column of Figure 4.1. If the future stock price is above the conversion price, then the value of a convertible security is proportional to the value of the common stock; otherwise, the PIPE security is not converted into common stock. This inherent protection against decreases in equity prices can partially mitigate the concerns of investors regarding asymmetric information. However, the value of a position in a fixed convertible can still fall below the principal value of the embedded bond security because the company might default. Many hedge funds follow convertible arbitrage strategies by purchasing a fixed convertible security and at the same time dynamically hedging the risk exposure.

4.1.2. Structured PIPEs

Structured PIPEs are equity-based securities, where the investor can convert the PIPE security into a variable number of common stocks during the conversion period. A basic structured PIPE is a variable convertible, where the conversion price is based on market prices of the common stock during a fixed time period following the issuance. This feature protects the investor if the price of the common stock decreases after the PIPE deal is closed, since the investor will receive a larger number of shares following a decreasing stock price. For example, a basic variable convertible states that the convertible security can be redeemed for common stock with a fixed value V on the conversion date. Thus, if the stock price during the future conversion period is p, then the company would issue V/p shares to the owner of the variable convertible. Thus, the value

of the investor's position in a variable convertible would equal *V*, as long as the total value of the equity of the firm is sufficiently large. The implication of this security is that decreasing stock prices will result in a greater number of shares issued and greater dilution of existing shareholders, as shown in the third column of Figure 4.1. Variable convertibles often include caps and floors that limit the possible range of conversion prices.

This variable security is essentially "adverse-selection-proof" equity (Stein 1992), because all parties in the transaction can agree that this security has a fixed value of *V* on the conversion date – assuming the firm does not declare bankruptcy before the maturity date of the security. Repricing rights are similar to an embedded short position, which immunizes the investors from changes in the price of the underlying stock after the PIPE issuance.

Though structured PIPEs theoretically may be an ideal source of financing for firms with a high degree of asymmetric information, arguments also have been made that these contracts are faulty and leave the issuing firm prey to market manipulation. As described by Hillion and Vermaelen (2004), by short selling the underlying equity shares during the conversion period, PIPE investors might be able to temporarily depress stock prices, resulting in a more favorable conversion ratio. In such an instance, variable PIPE investors would receive a larger number of undervalued common stocks through the convertible security, and this excessive dilution would permanently reduce the stock value for the original stockholders.

4.2. Data

Our data set on PIPE transactions was provided by Sagient Research. The data includes detailed information on the characteristics of PIPE transactions and their investors. All the information from Sagient Research comes directly from SEC filings and public announcements made by the companies. Our data set includes 5,244 PIPE

transactions between 1995 and 2002.[36] To obtain accounting and stock price measures of companies issuing PIPEs, we match our PIPE data set with the CRSP/Compustat databases using the ticker symbols and the names of the issuing companies. Of the 5,244 PIPE transactions, 914 companies cannot be matched to CRSP primarily because they are not traded on one of the major exchanges. However, these unmatched transactions raise less than 5 percent of the total proceeds of PIPE transactions.

4.2.1. Summary statistics

Panel A of Table 4.1 summarizes the characteristics of the PIPE securities issued between 1995 and 2002. These 5,244 PIPE deals raised a total of $77 billion. Many companies are involved in multiple PIPE transactions. While 1,560 companies issue exactly one PIPE, 1,134 companies issue more than one PIPE. The total number of firms obtaining PIPE financing (2,694 different firms) is very similar to the number of firms obtaining financing through SEOs (2,637 different firms) over our sample period. However, the total proceeds from PIPEs ($77 billion) are considerably smaller than the proceeds from SEOs ($498 billion). The importance of PIPEs has increased gradually between 1995 and 2002. The proceeds of PIPEs equaled 6.9 percent of the SEO proceeds in the first four years and 21.1 percent in the last four years of our sample.

Traditional PIPEs account for the majority of proceeds raised through PIPE transactions. The 3,585 traditional PIPEs raised $65 billion, and the 1,659 structured deals raised $12 billion. The composition of these deals has changed considerably over

[36] We exclude 95 Reg S placements and 469 144-A placements. Regulation S placements are purchased by foreign institutional investors and have become less prevalent because of changes to SEC regulations. 144-A placements are issued by larger and more mature companies and are not considered PIPEs due to different regulatory treatments. Our qualitative results are not affected if we include the Reg S and the 144-A transactions.

time. Between 1995 and 1998 (1999 and 2002), structured PIPEs accounted for 53.0 (24.4) percent of the PIPE transactions and for 36.9 (10.3) percent of the capital raised.[37] The PIPE transactions increase the funds available for companies substantially: The average ratio of the proceeds of a PIPE and the market capitalization of the company exceeds 20 percent. The number of investors per deal ranges between one and 84, with most PIPE transactions having only one investor.

Panel B of Table 4.1 summarizes the composition of the investors in PIPE securities. Sagient Research classifies the 12,042 PIPE investors into 11 different investor classes. The investors can be identified for more than 80 percent of the capital raised in our sample. Hedge funds are the largest investor class, accounting for 24.45 percent of the total investments in PIPE securities by identified investors. Corporations, mutual funds, venture capital, and private equity funds also are important investors in this market and account for more than 10 percent of capital raised. Individual investors, who are often executives as shown by Wruck and Wu (2005), account for just 6.18 percent of the total investments in PIPE securities. However, individual investors often are involved in PIPE securities as minority partners, contributing less than 50 percent of the total proceeds.

The investor composition differs dramatically between the two basic security structures. Hedge funds account for 15.58 percent of the investments in traditional PIPEs and for 71.86 percent of the investments in structured PIPEs with known investor classifications. The remaining investors in structured PIPEs are dispersed across several

[37] According to Sagient Research, the number of traditional PIPEs has continued to grow after 2002 exceeding 1,000 deals per year in 2004 and 2005. On the other hand, the number of structured PIPEs has decreased to 72 deals in 2003 and has recovered subsequently to 193 and 322 deals in 2004 and 2005, respectively.

investor classes. Thus, we find a very strong clientele effect for the two security structures, showing that hedge funds are associated with securities that protect against price declines.

Sagient Research also categorizes the companies issuing PIPEs into 11 industries listed in Panel C. Most companies issuing PIPEs are in high-tech industries, such as communications, healthcare, and technology.

4.2.2. Characteristics of PIPE securities

The detailed specification of PIPE securities is customized to the needs of the investors and the issuing companies. Thus, we should expect the detailed contract provisions to differ between the various investor classes. Table 4.2 summarizes the characteristics of PIPE transactions by the two investor classes (hedge funds vs. other investors) and by the security structure (traditional vs. structured PIPEs). PIPE transactions are allocated to "Hedge Funds" if hedge funds account for more than 50 percent of the total proceeds and to "Other Investors" if other known investors account for more than 50 percent. For some deals, we do not know the identity of the investor or the investor classification. Therefore, we cannot allocate all PIPE transactions to the two investor classes considered here.[38] We find that hedge funds are majority investors in 26.5 percent of traditional PIPEs with known investors and they are majority investors for 74.6 percent of structured PIPEs. The table summarizes the means of various characteristics. To determine whether there is a statistical difference in the characteristics

[38] We do not include deals with unknown or unclassified investor classes in the category "Other Investors" because these investors also might be hedge funds. Hedge funds might be more likely to be unknown or unclassified than other investor classes such as corporations, mutual funds, brokers, banks, or insurance companies because hedge funds generally are not as well known as these other investor classes, which are in direct contact with retail investors and customers.

between the two investor groups, we test for the differences using a *t*-test for the means taking into account clustering by individual firms. The pairs, where the means are significantly different from each other at the ten percent confidence level, are indicated in italics.

Companies obtaining financing from hedge funds tend to obtain significantly smaller investments than other companies, indicating that investors might be unwilling to take a large stake in such companies. The average hedge-funded PIPE raises $9.17 million or 12.27 percent of market capitalization, while the average non-hedge-funded PIPE raises $25.21 million or 21.79 percent of market capitalization.

Investors in PIPEs are often induced to participate in these deals because of favorable contract specifications, which include significant discounts and valuable warrants. We compute the discount of common stocks as the difference between the market price and the purchase price divided by the market price. The discount of variable convertibles does not need to be computed since it is already included in the specifications of the contract.[39] The Black-Scholes values of the warrants are computed by Sagient Research using the historical standard deviation over the month prior to the close.

The total costs associated with issuing PIPEs can be very significant. Companies issuing common stock PIPEs to hedge funds accept an average discount of 14.12 percent, whereas companies issuing common stock PIPEs to other investors accept an average

[39] We can compute the discounts for common stock PIPEs and for variable convertibles, but we cannot compute the discount of fixed convertibles since we do not have sufficient information on the convertibility features to compute a reliable value of the convertible bonds.

discount of only 9.02 percent.[40] The discounts on variable convertibles are also substantial. In addition, a significant fraction of PIPE transactions include warrants, which effectively increase the discount of the securities. We find that hedge-funded PIPEs are significantly more likely to include warrants. The average value of the warrants included in private placements is substantial and is estimated at 14.82 percent of the proceeds of PIPEs. These significant discounts offered to hedge funds are consistent with our conjecture that these firms are not able to raise capital from other investors or through other means.

4.2.3. Characteristics of PIPE companies

Table 4.3 summarizes some characteristics of firms issuing PIPEs prior to the issuance of the PIPE transactions. Panel A reports several stock market measures, and Panel B reports several accounting measures.

Companies placing equity to hedge funds tend to be more risky and more subject to asymmetric information. Companies issuing PIPEs tend to be relatively young and small companies.[41] Companies obtaining financing from hedge funds are significantly smaller than companies obtaining financing from other identified investors. Hedge-funded companies exhibit significantly higher standard deviations and higher CAPM-betas during the year prior to the PIPE issuance compared to other PIPE companies. Furthermore, companies issuing structured PIPEs to hedge funds have significantly less analyst coverage than companies issuing traditional PIPEs.[42] Since the number of

[40] Meidan (2005) analyzes the determinants of the discounts in detail and shows that discounts have an important impact in explaining long-term performance.
[41] For each company we determine the age relative to the first listing in the CRSP database.
[42] We obtain the number of analysts making EPS forecasts for PIPE companies three months prior to the PIPE issuance from I/B/E/S. See Brennan and Subrahmanyam (1995), Aboody and Lev (2000), and Wu (2004). Diether, Malloy, and Scherbina (2002) show that the dispersion of the earnings forecasts by

analysts following a security is often used as a proxy for asymmetric information, this difference confirms our view that companies issuing structured PIPEs are potentially more subject to informational asymmetries and might have more difficulties in raising capital publicly.

Although companies obtaining financing from hedge funds tend to be significantly smaller, they exhibit higher trading volumes and higher short interest positions six months prior to the close of the PIPE transaction than other companies.[43] This relationship might be caused by the fact that hedge funds prefer to purchase companies that are more liquidly traded since they often pursue more aggressive trading strategies involving short-sales and dynamic trading.

Companies obtaining funding through structured PIPEs tend to have significantly smaller institutional holdings than companies obtaining funding through traditional PIPEs.[44] Whereas large institutions hold 21.49 percent of the common shares of companies issuing traditional PIPEs, they hold only 11.47 percent of the companies issuing structured PIPEs. D'Avolio (2002) shows that the main suppliers of stock loans are institutional investors and that stocks with low institutional holdings are more expensive to borrow.[45] This evidence justifies why hedge funds are more likely to negotiate price-protected securities whenever firms are short-sale constrained.

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analysts is a measure of asymmetric information. We also find that companies issuing structured PIPEs have a significantly higher dispersion of earnings forecasts than companies issuing traditional PIPEs. However, we do not use this alternative proxy of asymmetric information, since this dispersion information often is not available for our sample of PIPE companies because 79.6 percent of PIPE companies have no or only one analyst following their earnings.

[43] The monthly short positions of stocks listed on NYSE, AMEX, and NASDAQ are obtained directly from the respective stock exchanges.

[44] We obtain the CDA/Spectrum Institutional 13(f) common stock holdings from Thompson Financial.

[45] See Asquith, Pathak, and Ritter (2005) and Nagel (2005) for additional evidence of the interaction between institutional holdings and short-selling.

Brav and Gompers (1997) show that venture capital backing adds value even after the initial public offering. In our sample, 25.7 percent of the PIPE companies that went public during the five years prior to the PIPE issuance are venture-backed, according to the SDC database. Companies that obtain funding from hedge funds are significantly less likely to be venture-backed, indicating that venture backing also has an impact on the opportunities to raise funds subsequent to the IPO.

Panel B reports several accounting measures during the fiscal year prior to the issuance of the PIPE transactions.[46] Companies obtaining financing through structured PIPEs and hedge funds tend to have relatively smaller asset values and book values. Companies in our sample experience poor operating performance during the fiscal year prior to the issuance of the PIPEs. The return on assets for the average company issuing a PIPE is -62.8 percent and only 14.6 percent of companies issuing PIPEs have positive returns on assets. Furthermore, companies obtaining funding from hedge funds are even less likely to be profitable than companies obtaining funding from other investors.

Companies issuing PIPEs make substantial capital expenditures and research and development investments despite their poor operating performance. We do not find that companies obtaining funds from hedge funds have significantly different capital expenditures and research and development investments. These companies need to raise external funds to maintain their investment levels.

The dismal operating performance may pose difficulties in raising capital through public debt markets and secondary equity offerings. According to SDC, just 0.20 percent of PIPE companies issue public debt and 3.2 percent of PIPE companies make secondary

[46] The data are obtained from Compustat. We give the exact definitions of the accounting variables in Appendix C. All the accounting measures are winsorized at the 1 percent level to eliminate the impact of extreme outliers.

equity offerings in the year of PIPE transactions. This supports our earlier contention that firms which issue PIPEs are limited, due to their size and recent poor performance, in their abilities to raise financing in the more conventional public debt and equity markets. These firms must resort to PIPE securities and hedge funds to be able to maintain their investment levels and to avoid more severe financial distress.[47]

Our results on the characteristics of firms which sell PIPEs show that hedge funds are more likely to invest in smaller, riskier firms with high asymmetric information. Traditional investors are reluctant to take a large undiversified position in such companies. On the other hand, hedge funds are able to act as investors of last resort because they can offset the risk by short-selling the underlying securities or by negotiating non-traditional protected securities.

4.3. Stock price performance

This section studies the short- and long-term stock performance of companies that issue PIPEs. The stock return analysis estimates the returns that original shareholders of common stocks would have experienced had they held their stocks for several years post issuance. The return of these original investors will, in general, be different from the return of the new investors who purchase the PIPEs.

Figure 4.2 depicts the average daily buy-and-hold returns 250 trading days before and 500 trading days after the closing. The PIPE companies are divided into four groups according to the security structure (traditional vs. structured PIPE) and according to the investor classification (hedge funds and other investors). The buy-and-hold returns are

[47] The cost of information production as it relates to the decision to sell equity privately versus publicly is explored in Chemmanur and Fulghieri (1999) and Habib and Johnsen (2000).

normalized to one on the closing day.[48] Consistent with Hertzel, Lemmon, Linck, and Rees (2002), we find a negative relation between short- and long-term returns for traditional PIPEs. Though PIPE issuing companies experience, on average, a positive short-term announcement performance, they experience a negative long-term performance. We find the stock price performance differs dramatically between the two investor classes. Companies issuing traditional PIPEs to hedge funds perform significantly worse than companies that issue traditional PIPEs to other investors. For structured PIPE companies, we find a significant decline in the market value for both investor classifications. The results for the structured PIPEs are similar to the ones reported by Hillion and Vermaelen (2004), who study floating convertible PIPEs issued between January 1995 and August 1998. The remainder of this section tests the robustness of these results using different risk-adjustments.

4.3.1. Short-term stock price performance

The performance of stock prices of PIPE companies for different time windows is summarized in Panels A (raw buy-and-hold returns) and B (abnormal returns relative to the benchmark) of Table 4.4. We follow Barber and Lyon (1997) and benchmark performance by using a single control firm for each PIPE firm. We match each company in our sample to a comparable company according to its industry, market capitalization, book-to-market ratio, and momentum characteristics in the previous month, as described in more detail in Appendix B.[49]

[48] The abnormal returns between trading days [6, 500] after the PIPE issues include only a portion of the abnormal returns for PIPE issuances in 2002, because we only have available stock return data until December 2003. The results do not change qualitatively if we only analyze the PIPE deals issued between 1995 and 2001, which have complete return series.

[49] We also compute results using alternative benchmarks (e.g., market return; the appropriate size and book-to-market matched portfolio by Fama and French; industry and size matched firms; industry, size, and

Companies issuing PIPEs to non-hedge investors experience a strong positive return during a 10-day event window around the close of the PIPE transaction (first row labeled [-4, 5]), whereas companies issuing PIPEs to hedge investors experience no significant positive return during the announcement period. This result is partially due to the fact that hedge funds are more likely to participate in structured PIPEs, which tend to have lower announcement effects.

4.3.2. Long-term stock price performance

Table 4.4 divides the long-term performance of the stock returns after the PIPE issuance into three different time periods (i.e., [6, 100], [6, 250], and [6, 500]). We observe in the first column of Panel B that companies issuing PIPEs to hedge funds tend to underperform the matched companies by 31.40 percent over the two years after the PIPE issuance. On the other hand, the underperformance of non-hedge funded companies is just 13.33 percent over the same time period.[50] A long-term underperformance is consistent with the prior literature on private placements and also can be found for initial public offerings and for seasoned equity offerings.[51] We also find that companies issuing structured PIPEs perform significantly worse in the long term than companies issuing traditional PIPEs. The dismal performance of these companies justifies the earlier observation that these firms offer securities with repricing rights to enable investors to protect themselves against price declines.

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book-to-market matched firms; and SEO-matched firms). The results are not significantly different using these alternative benchmarks and are not reported because of space constraints.

[50] Choosing non-overlapping time periods does not affect qualitatively the results. For example, hedge funded companies experience abnormal returns of -12.51*** percent during [101, 250] and -12.75*** percent during [251, 500], whereas non-hedge funded companies experience excess returns of -8.75*** percent during [101, 250] and -6.69 percent during [251, 500].

[51] See, for example: Spiess and Affleck-Graves (1995) and Loughran and Ritter (1995, 1997).

We also find performance differences between hedge funded and non-hedge funded companies after conditioning on the security structure. Companies issuing traditional PIPEs to hedge funds underperform their benchmarks by 19.53 percent in the two years following the PIPE issue. However, companies obtaining traditional financing from other investors do not underperform their benchmarks sufficiently to generate statistically significant results. On the other hand the abnormal returns do not differ significantly between the two investor classifications for structured PIPEs. This insignificant result is caused by the relatively small number of structured PIPEs by "Other Investors" and by the fact that the composition of the "Other Investors" differs between traditional and structured PIPEs. For example, regulated mutual funds account for a large fraction of traditional PIPEs and for a very small fraction of structured PIPEs, as shown in Table 4.1. On the other hand, brokers and dealers, who are like hedge funds unregulated and flexible to use sophisticated trading strategies, account for a relatively large fraction of structured PIPEs.

Companies issuing structured PIPEs and companies obtaining funding from hedge funds experience a substantial deterioration of their stock valuations over the two years considered here. These abnormal returns are economically and statistically highly significant. On the other hand, the underperformance of companies issuing traditional PIPEs to non-hedge investors is less pronounced, particularly during the first year following the PIPE issuance. The statistical inference is not affected much if the standard errors are estimated using bootstrap-simulations following Lyon, Barber, and Tsai (1999).[52]

[52] A relatively large number of companies issue multiple PIPEs over our sample period. Thus, the returns of these companies are weighted more heavily. However, our results are not affected significantly if we

In unreported results, we also analyze the short- and the long-term performance of PIPE companies using a more detailed definition of PIPE securities and using additional investor categories. Our results remain consistent using these alternative classifications.[53]

The poor performance of companies issuing structured PIPEs is consistent with the manipulation hypothesis of Hillion and Vermaelen (2004). However, the poor performance of companies issuing traditional PIPEs to hedge funds cannot be explained by market manipulation, because investors in traditional PIPEs do not have a possibility to increase the value of their position through short-selling pressure during the conversion period. Instead, we argue that hedge funds are investors of last resort for troubled firms. At the time of the closing of the PIPE, the market may not have been fully aware of the troubled state of the issuing firm. Subsequently, as the market becomes informed, prices decline. The relatively slow market adjustment can be justified by the fact that companies often do not identify immediately the investors in their private placements. Furthermore, these firms are very small firms with little analyst coverage, which might cause an additional delay in the market reaction. Hedge funds are ideally suited to be investors of last resort as they have few restrictions in establishing short positions to hedge any possible downside risk associated with investing in troubled firms, as described in Section 4.

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exclude multiple deals. Moreover, our results do not change qualitatively if we exclude companies with stock prices below $5 on the closing day of the transaction or if we exclude companies with market capitalizations below $10 million. See Ball, Kothari, and Shanken (1995) for a discussion of potential problems caused by low-price stocks.

[53] Appendix A summarizes the detailed security structures.

4.3.3. Calendar time portfolios

In this section, we compute calendar-time abnormal returns of companies that issue PIPEs. Fama (1998) and Mitchell and Stafford (2000) argue that the event study methodology does not appropriately take into account cross-sectional dependencies in returns. In a first step, we form a buy-and-hold portfolio of all the common stocks of companies that issue PIPEs during the past 500 trading days between 1996 and 2002.[54] In a second step, we compute the abnormal returns using various factor models. The equally weighted portfolio invests $1 in each PIPE issuing company the day after the close of the PIPE transaction. Thus, the portfolio holds each position for 500 days.

Due to the low liquidity in some of the companies issuing PIPEs, daily closing prices often are stale. Therefore, we analyze the weekly instead of daily returns and additionally include lagged factor returns.[55] We compute abnormal returns using different factor models. The first model simply computes the average excess return relative to the market return.[56] The second model estimates the abnormal return using the one-factor CAPM. The third model follows Fama and French (1993) and includes a market, size, and book-to-market factor. The fourth model adds a momentum factor following Carhart (1997). The fifth model follows the conditional model of Ferson and Schadt (1996) and uses predetermined instruments to capture time-varying factor loadings. Our specification includes interaction terms between the Carhart factor returns and various demeaned

[54] The results are consistent if we only include companies which issued PIPEs in the last 100 or 250 trading days.
[55] We obtain similar results if we use daily returns and if we do not include the lagged factor returns. Actually, the standard errors tend to be lower with daily returns.
[56] The daily factor returns for the three-factor model are obtained from Kenneth French's Web site: http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library. The daily momentum return is constructed following the description on French's website.

lagged macro-economic variables.[57] We obtain similar results if we use a conditional model based on a one- or a three-factor model. The sixth model is based on the factor model by Eckbo, Masulis, and Norli (2000) and includes six macro factors, which control for event-dependent risk characteristics.[58] Eckbo, Masulis, and Norli (2000), Carlson, Fisher, and Giammarino (2006), and Lyandres, Sun, and Zhang (2006) argue that the risk exposure changes around seasoned equity offerings. Such risk changes might explain the underperformance of the issuing companies relative to matched companies.[59]

Table 4.5 summarizes the annualized abnormal returns for various portfolios of PIPE issuing companies, according to the investor composition and the security structure. The first row shows that a portfolio including all the stocks that issue PIPEs to hedge funds during the previous two years has an average annualized excess return of -32.37 percent per year relative to the market. On the other hand, a corresponding portfolio of companies obtaining financing from other investors does not exhibit a significantly negative excess return.

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[57] The macro variables of Ferson and Schadt (1996) are the one-month Treasury bill yield, the dividend yield of the CRSP value-weighted index, the Treasury yield spread (10-year minus 1-year Treasury bond yields), the quality spread in the corporate bond market (AAA minus BAA corporate bond yields), and a January indicator variable.

[58] The macro factors of Eckbo, Masulis, and Norli (2000) are the value-weighted market index, the return spread between Treasury bonds with 10-year and 1-year maturities, the return spread between 90- and 30-day Treasury bills, the seasonally adjusted percent change in real per capita consumption of nondurable goods, the difference in the monthly yield change on BAA- and AAA-rated corporate bonds, and unexpected inflation The Treasury and corporate bond yields are obtained from the Web site of the Board of Governors of the Federal Reserve System: http://www.federalreserve.gov/releases/. The Treasury bill yields are obtained from CRSP. Per capita non-durable consumption is obtained from the NIPA accounts of the Bureau of Economic Analysis (http://www.bea.doc.gov), and the consumer price inflation is obtained from the Bureau of Labor Statistics (http://www.bls.gov/cpi/). The estimation of expected inflation follows Eckbo, Masulis, and Norli (2000) by running a regression of real T-bill returns on a constant and 12 of its lagged values. We regress the portfolio returns on the original raw factor series, as reported in Panel D from Table 9 of Eckbo, Masulis, and Norli (2000).

[59] We do not find large changes in risk for our sample of PIPE companies during the two years following the PIPE issuances. Whereas the standard deviation of the returns decreases slightly during the two years after a PIPE issuance, the beta does not decrease. Furthermore, risk levels would need to change dramatically to explain the dismal returns of PIPE issuing companies.

The calendar time portfolios confirm our previous results that companies issuing structured PIPEs and companies raising capital from hedge fund investors perform poorly. Thus, our results are not driven by common variation in risk levels and risk premia or by changes of the fundamentals of the companies which result from equity issuances.

4.3.4. Determinants of stock price performance: regression evidence

This section analyzes whether our results are robust if we include additional control variables in a multi-variate regression specification. The dependent variable is the excess buy-and-hold return of a PIPE issuing company relative to one of the six Fama-French size and book-to-market portfolios. The independent variables are indicator variables for the security structure and the investor composition and additional firm and deal characteristics. All the accounting variables are winsorized at the 1 percent level to eliminate the impact of extreme outliers. The standard errors are robust and corrected for clustering of observations by the same company. All estimations include year- and industry-fixed effects.

The first three columns of Table 4.6 summarize the results over the 10-day event window using the first specification. We find that companies obtaining financing from hedge funds perform substantially worse in the short-term even after controlling for the security structure. Moreover, the results indicate that companies issuing structured PIPEs also perform significantly worse than companies receiving funding from other investor classes.

The remaining columns summarize the regression results using the long-term excess returns over two different time periods ([6, 250], and [6, 500]) as the dependent

variables. The indicator variables for hedge fund investors and for structured PIPEs enter significantly and confirm the previous results. These results are not affected substantially if we control for additional variables. Companies with larger market capitalizations experience larger underperformance than smaller companies. An important determinant of stock price performance is the indicator variable for whether a company recently received venture capital funding. Companies that are venture capital backed outperform companies that are not venture capital backed by a substantial margin.

4.3.5. Additional measures of long-term performance

We find that companies receiving funding from hedge funds are more likely to be delisted within two years of the PIPE issuance. For example, in the two years following the PIPE issuance, 34.6 percent of companies receiving funding from hedge funds and just 25.6 percent of companies receiving funding from other known investors are delisted. Looking at the delisting codes in CRSP indicates that the vast majority of companies are delisted because they do not satisfy the listing requirements (e.g., price fell below acceptable level; violations of exchange's financial guidelines; insufficient float or assets). Only 15 percent of delisted companies merged with other companies.[60]

In unreported results, we analyze whether there is a relationship between security structure and investor composition and the accounting performance. Consistent with the stock-market performance, we find that companies obtaining financing from hedge funds

[60] Delisted companies are included in our stock performance analysis. We use the actual daily returns until the delisting date and the delisting return from CRSP on the last trading date. The returns of delisted companies in the event study are replaced by the returns of the matched company after being delisted to avoid missing observations. In the calendar time portfolios, the portfolios are rebalanced on the delisting date. Shumway (1997) documents a bias in CRSP because correct delisting returns are often not available. He finds that this effect biases returns upward for delists due to bankruptcy and other negative reasons. In our case, this effect would bias against our results since companies obtaining financing from hedge funds and through structured PIPEs are more likely to be delisted.

and through structured PIPEs tend to experience worse operating performance after the PIPE issuance.

We do not argue that the poor long-term performance is caused by the involvement of hedge funds. It is possible that many of the companies that obtain funding from hedge funds might not have been able to attract other investors and would have performed even worse without the hedge fund investment, since many of these companies might have been forced into default or more acute financial distress.

The poor long-term performance of hedge funded companies is consistent with worse fundamentals and with more difficulty to obtain financing from other more conservative investors. Hedge funds act as investors of last resort for firms with the fewest alternative financing options. Hedge funds often are more willing to invest in companies with substantial asymmetric information or in companies that are temporarily over-valued, because they are able to hedge the downside risk by either negotiating PIPE securities with repricing rights or by entering into short positions of the underlying stocks of the issuing companies. This is in sharp contrast to other investors, such as mutual and pension funds, where regulatory requirements or self-imposed trading restrictions limit the use of such strategies.

4.4. Short interest of PIPE issuing companies

This section investigates whether short-selling pressure is associated with hedge fund investors. Hedge fund investors often use short-selling or derivative securities. Other investors are more likely to be buy-and-hold investors because of regulatory requirements or a lack of knowledge and experience using sophisticated trading strategies.

Investors might be interested in hedging their risk exposure of PIPE securities through short-selling because they might have anticipated that these firms would perform poorly in the long term. The incentives to hedge tend to be larger for traditional PIPEs then for structured PIPEs because structured PIPEs are already partially protected against price declines. On the other hand, Hillion and Vermaelen (2004) argue that a structured PIPE might give the investors incentives to manipulate the price downward in order to receive a higher percentage of the firm upon conversion. One way to temporarily reduce the effective price is to short-sell the stocks aggressively during the conversion window. In this case, we should observe a significant increase in the short interest for companies that issue structured PIPEs.

To investigate the short-selling behavior around the closing date of the PIPE securities, we compute the average ratio between securities shorted in a specific month and the total number of securities outstanding for firms surrounding the PIPE transaction. Unfortunately, we do not observe the identity of the short-sellers. Thus, we do not know whether short-selling is driven by the investors in the deals or whether it is driven by unaffiliated short-sellers. Also, if investors are attempting to manipulate a security, they have an incentive to hide their actions, making it more difficult for us to find an effect.

Figure 4.3 reports the abnormal short interest of companies issuing traditional and structured PIPEs for hedge fund and non-hedge fund investors. Abnormal short interest is defined as the difference between the short interest of companies issuing PIPEs and the short interest of matched companies according to industry, size, book-to-market, and momentum, as described in Section 3. We find that traditional PIPE companies that obtain financing from hedge funds have significantly higher initial levels and

significantly larger increases in the short interest around PIPE issuances. This result is consistent with hedge funds eliminating their risk exposure after investments in PIPE securities by taking short positions in the underlying stocks. The increase is larger for common stock than for fixed convertible PIPEs. This should be expected since the optimal hedge ratio is substantially larger for common stock than for fixed convertible securities, as discussed in Section 1. Moreover, we find that the abnormal short interest of traditional PIPE companies that obtain financing from hedge funds decreases gradually within the first two years after the PIPE issuances. This result is consistent with hedge funds closing out their short positions as they dispose of the stocks acquired through their original PIPE purchase.[61]

For structured PIPEs, we find that the short interest increases for transactions done by both hedge and non-hedge fund investors. However, the change in short interest for hedge fund deals is not significantly different from the change in short interest for other deals. This can be explained by the fact that "Other Investors" for structured PIPEs often are brokers and dealers, who might follow similar trading strategies as hedge funds. We find that the increase in short interest is less pronounced for companies issuing structured PIPEs to hedge funds than for companies issuing traditional PIPEs to hedge funds. Furthermore, as discussed in Section 3.5, companies exhibit negative operating performance after issuing structured PIPE securities. The lack of a substantial increase in short interest for companies issuing structured PIPEs and the poor operating performance

[61] The short interest of companies issuing traditional PIPEs to hedge funds increases on average by 0.9 percent of the shares outstanding. On the other hand, the median hedge fund investment for these deals is 6.6 percent of the market capitalization. It should not be expected that the short interest increases by the whole amount of the proceeds. First, investors might hedge using derivative securities or using off-shore markets. Second, a significant portion of traditional PIPEs are fixed convertible securities, which have an optimal hedge ratio of less than 100 percent. Third, it might be difficult to short-sell some less liquid securities. We find that the increase in short-selling is concentrated in a small number of companies, which have relatively high institutional holdings.

of these companies is more consistent with the investor of last resort hypothesis than with market manipulation.

Table 4.7 analyzes the relationship between the short interest after the PIPE issuance using a multivariate regression. Three dependent variables are considered based on the average short interest during the first six months, the second six months, and the second year after the PIPE issuance. The independent variables include indicator variables for the security structure and the investor composition, the lagged value of short interest, and additional control variables. All regressions include year- and industry-fixed effects and correct the standard errors for clustering.

The regression results are consistent with Figure 4.3 and indicate that companies that issue traditional PIPEs to hedge funds have significantly higher short interest during the first year after the issue of a PIPE. Furthermore, we also find that companies that issue structured PIPEs experience an increase in short interest. However, the results for the security structure tend to be less significant than the results for the investor classification.

These results indicate there is a significant association between short interest and investor classifications. We find that companies that issue traditional PIPEs to hedge funds and companies that issue structured securities experience a significant increase in short interest in the month after the PIPE issuance. This result supports our hypothesis that hedge funds are an investor of last resort. Hedge funds are willing to invest in poorly performing companies because they are able to protect themselves either by obtaining price-protected structured PIPEs or by short-selling the underlying stocks.

4.5. Performance of hedge funds that invest in PIPEs

Although the performance of the underlying stocks of companies obtaining funding from hedge funds is very poor, it is not necessarily the case that the PIPE investors also perform poorly. Unfortunately, we cannot compute the returns investors generate in specific deals for several reasons: First, we do not know when the investors exercise their conversion rights and liquidate their positions.[62] Second, we do not observe whether the investors short-sell the stocks of the issuing firm. Third, PIPE securities are usually sold at significant discounts and often include warrants, various convertibility features, repricing rights, and other option-like characteristics. We generally do not have sufficiently detailed information to price these various security components.[63]

Whereas we cannot observe the profitability of individual transactions of hedge funds, we can investigate whether hedge funds repeatedly invest in PIPE securities and whether hedge funds investing in PIPE securities tend to perform poorly. First, we should expect that hedge funds would stop participating in PIPE investments if these investments are unprofitable. Second, if PIPE investments are unprofitable for hedge funds, then we should observe that hedge funds specializing in PIPEs experience poor performance subsequent to the PIPE investments.

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[62] Companies cannot generally sell the securities on the open market before their registration statement to the SEC is declared effective. If there are no material problems with the registration statement, it can generally be declared effective within 20 days. Unfortunately, we do not have these effective dates for most of our PIPE transactions. However, we checked a sample of 1,757 PIPE transactions between 2003 and 2005 and found that the median filing date occurs 32 days after the close of the PIPE transaction and the median effective date occurs 71 days after the close. The inter-quartile range between the closing and the filing date is 17—58 days and the inter-quartile range between the closing and the effective date is 38—118 days.

[63] A related literature investigates the performance of investors in private equity. Moskowitz and Vissing-Jørgensen (2002) investigate the returns on non-public traded equity. Lerner, Schoar, and Wong (2005) compute the performance of different investors in private equity fund investments and show substantial heterogeneity in the performance of different classes of limited partners.

The Sagient Research database identifies over our sample period a total of 1,666 different hedge funds, of which 1,452 participate in less than 10 PIPE transactions. The remaining 214 hedge funds participate, on average, in 23.86 PIPEs over an average time span of 3.58 years. The fact that some hedge funds invest in multiple PIPE securities over relatively long time periods supports the hypothesis that these PIPE transactions are profitable for hedge funds.

To investigate the performance of hedge funds investing in PIPEs, we merge our database of PIPE investors with the Lipper TASS hedge fund database. Unfortunately, we cannot match all funds between the two databases.[64] We can find hedge fund investors in TASS for around 30 percent of the PIPE transactions with hedge funds as main investors. However, these PIPEs represent about 58 percent of the capital raised through PIPE transactions.

Table 4.8 summarizes the raw and abnormal performance of hedge funds that recently invested in PIPEs. The abnormal returns are computed by subtracting the return of a comparable hedge fund which has the same strategy and the nearest asset size according to TASS. If asset size is missing in TASS, then the fund was matched randomly to the contemporaneous return of another fund with the same strategy and with missing assets.[65] We find that the average return of hedge funds equals 2.03 percent in the month they purchase PIPE securities. The performance decreases if we include a

[64] This problem seems to plague hedge fund studies that use the available databases. Liang (2000) argues that the TASS database is generally superior to the HFR (Hedge Fund Research) database. He shows that there is not a very large overlap in the coverage between different hedge fund databases. For example, in 1997/1998 there were 465 live and dead funds included in both TASS and HFR. However 697 funds in HFR were not included in TASS and 1,162 funds in TASS were not included in HFR.

[65] The hedge funds purchasing PIPEs and the matched hedge funds have similar risk exposures. The market beta of hedge funds that purchase PIPEs during the prior 12 months is 0.49, whereas the beta of matched hedge funds is 0.44. The average annualized standard deviation over the prior 12 months of hedge funds purchasing PIPEs is 14.4 percent, whereas the corresponding standard deviation for matched hedge funds is 13.8 percent.

longer time window. For example, the average return decreases to 1.02 percent per month or about 12 percent per year if we consider all the hedge funds that purchased PIPEs during the prior 12 months.[66] Table 4.8 also documents that hedge funds purchasing PIPE securities do not significantly underperform matched hedge funds.[67]

Hedge funds investing in PIPEs tend to exhibit relatively favorable annualized Sharpe ratios, which are computed for each hedge fund as the ratio between the annualized excess return of the fund relative to the risk-free rate divided by the annualized standard deviation of the returns between the time period of the first PIPE investment and 24 months after the last PIPE investment. The average Sharpe ratio for hedge funds purchasing PIPEs equals 0.71.

The persistent activity of hedge funds in the PIPE market and the relatively strong performance of hedge funds involved in PIPE transactions indicate that being a lender of last resort pays off for hedge funds, even if the underlying stocks performed relatively poorly.

4.6. Conclusions

This paper discusses the role of hedge funds in private placements. We find investments by hedge funds are associated with significantly negative long-run performance of the underlying equity, even after controlling for the security type. On the

[66] The longer term performance results are also consistent with the monthly raw returns of funds in the TASS database that list "Reg-D" as an investment focus. The raw return of these hedge funds is 0.84 percent per month over our sample period and exceeds significantly the return of matched funds. Regulation D concerns the limited sale and offering of securities without registration and covers PIPE securities.

[67] Consistent with Fung and Hsieh (2000) we find a significant "instant history bias." Eliminating backfilled returns tends to reduce the levels of the returns. For example, the average raw returns of hedge funds investing in PIPEs equals 2.14 (current month), 1.21 (6 months), 0.81 (12 months), and 0.54 (24 months) after eliminating backfilled returns.

other hand, we find little to no abnormal performance in firms issuing traditional private placements to other investors.

We find evidence consistent with the fact that firms that sell their equity to hedge funds have few alternatives to raise external finance due to the presence of severe information asymmetries and poor operating performance. Firms that obtain equity financing from hedge funds tend to be smaller and riskier and are less likely to have analyst coverage, compared to firms that obtain financing from other investor classes. The firms that obtain equity financing from hedge funds also are more likely to sell their securities at a greater discount and with more warrants and shorter times to first conversion.

Hedge funds are well suited to act as investors of last resort. Either by negotiating repricing rights, shorting the underlying security, or through other means hedge funds are able to reduce their risk in what could otherwise be a high-risk and illiquid position. Thus, hedge funds might be more willing to lend capital to firms that otherwise would be shut out of the external capital market. We also show that hedge funds that invest in PIPE securities tend to perform relatively well, even though the companies they invest in perform poorly. Our results are consistent with the hypothesis that hedge funds act as investors of last resort, playing an important role in the market for young, high-risk firms with substantial asymmetric information and large capital needs.

Table 4.1. Summary Statistics. This table summarizes the characteristics of PIPE transactions.

Panel A: Characteristics of PIPE Transactions

	All PIPEs	Traditional PIPEs	Structured PIPEs
Number of Transactions	5,244	3,585	1,659
Total Capital Raised (in Millions)	76,871	65,240	11,631
Mean Capital Raised (in Millions)	14.66	18.20	7.01
Median Capital Raised (in Millions)	4.50	5.00	3.30
Mean Capital Raised to Market Value (in Percent)	20.92	22.84	16.76
Median Capital Raised to Market Value (in Percent)	9.93	10.81	8.54
Mean Number of Investors per Deal	4.45	5.02	3.23
Median Number of Investors per Deal	1	2	1

Panel B: Proportion of Capital Raised by Various Known Investor Classes (in Percent)

	All PIPEs	Traditional PIPEs	Structured PIPEs
Hedge Funds	24.45	15.58	71.86
Corporations	17.29	19.60	4.92
Mutual Funds and Institutional Advisors	16.99	19.69	2.58
Venture Capital	11.79	12.93	5.71
Buyout Firm and Private Equity	11.55	13.57	0.71
Various Individual Investors	6.18	6.48	4.60
Brokers and Dealers	6.08	6.11	5.88
Banks	2.19	2.10	2.67
Insurance Companies	2.02	2.25	0.81
Pension Funds	0.91	1.06	0.09
Charitable, Educational, and Family Trusts	0.55	0.62	0.18

Panel C: Proportion of Capital Raised by Industry Composition (in Percent)

	All PIPEs	Traditional PIPEs	Structured PIPEs
Communications	37.16	37.47	35.46
Healthcare	20.20	19.86	22.13
Consumer Cyclical	9.79	10.46	6.03
Technology	8.60	7.40	15.27
Industrial	7.31	7.23	7.77
Financial	7.19	7.92	3.09
Energy	3.33	3.46	2.65
Consumer Noncyclicals	2.83	2.39	5.27
Utilities	2.31	2.57	0.86
Basic Materials	1.18	1.18	1.21
Diversified	0.09	0.06	0.27

Table 4.2. Characteristics of PIPE Transactions. The table summarizes the characteristics of the PIPE transactions by investor type (Hedge Funds vs. Other Investors) and by security structure (Traditional vs. Structured). PIPE transactions are allocated to "Hedge Funds" if hedge funds account for more than 50 percent of the investment and to "Other Investors" if other known investors account for more than 50 percent of the investment. We test for the differences between the two investor classes (hedge funds and other investors) using a *t*-test for the means taking into account clustering by firm. The pairs that are significantly different at the ten percent confidence level are indicated in italics.

	All PIPEs		Traditional PIPEs		Structured PIPEs	
	Hedge Funds	Other Investors	Hedge Funds	Other Investors	Hedge Funds	Other Investors
Number of Observations	1,367	1,818	586	1,559	781	259
Capital Raised (in Millions)	*9.17*	*25.21*	*10.60*	*27.96*	8.09	8.66
Capital Raised to Market Capitalization (in Percent)	*12.27*	*21.79*	*13.58*	*22.74*	*11.29*	*16.08*
Discount for Common Stocks (in Percent)	*14.12*	*9.02*	*14.12*	*9.02*		
Discount for Variable Convertibles (in Percent)	16.86	17.59			16.86	17.59
Fraction of Deals with Warrants (in Percent)	*49.59*	*29.40*	*46.47*	*28.14*	*51.94*	*36.96*
Relative Value of the Warrants (in Percent)	*17.19*	*13.04*	*19.56*	*12.61*	15.40	15.67
Term for Convertible Securities (in Months)	*35.95*	*55.55*	*43.80*	*63.83*	*34.56*	*39.88*
Days to First Conversion for Convertible Securities	33.02	43.71	*15.13*	*32.78*	*38.36*	*72.31*

Table 4.3. Characteristics of PIPE Companies. The table summarizes in Panel A the stock market characteristics of the PIPE transactions by investor type (Hedge Funds vs. Other Investors) and by security structure (Traditional vs. Structured). PIPE transactions are allocated to "Hedge Funds" if hedge funds account for more than 50 percent of the investment and to "Other Investors" if other known investors account for more than 50 percent of the investment. Panel A summarizes stock market measures of PIPE companies. Panel B compares accounting variables of PIPE companies. We test for the differences between the two investor classes (hedge funds and other investors) using a *t*-test for the means taking into account clustering by firm. The pairs that are significantly different at the ten percent confidence level are indicated in italics.

Panel A: Stock Market Characteristics of PIPE Companies

	All PIPEs		Traditional PIPEs		Structured PIPEs	
	Hedge Funds	Other Investors	Hedge Funds	Other Investors	Hedge Funds	Other Investors
Number of Observations	1,367	1,818	586	1,559	781	259
Market Capitalization (in Millions)	*151.86*	*301.67*	*176.81*	*328.58*	133.14	139.71
Stock Return in Year Prior to Close (in Percent)	41.91	31.61	41.84	31.28	41.96	33.48
Standard Deviation in Year Prior to Close (in Percent)	*118.98*	*101.38*	*118.45*	*101.90*	*119.43*	*98.32*
Beta in Year Prior to Close	*2.00*	*1.73*	1.93	1.76	*2.05*	*1.59*
Volume Six Months Prior to Close (in Percent)	*253.73*	*151.54*	*229.79*	*146.16*	*273.71*	*183.30*
Proportion of Institutional Holdings (in Percent)	*16.22*	*19.77*	21.98	21.29	11.73	10.73
Short Interest Six Months Prior to Close (in Percent)	*2.61*	*2.00*	*2.61*	*1.96*	2.61	2.23
Number of Analysts	*1.24*	*1.60*	1.68	1.70	0.91	0.99
Venture Capital Backed for Recent IPOs (in Percent)	*22.75*	*27.72*	27.47	28.67	19.21	22.01
Age (in Years)	7.08	6.62	7.62	6.66	6.66	6.40

Panel B: Accounting Characteristics of PIPE Firms

	All PIPEs		Traditional PIPEs		Structured PIPEs	
	Hedge Funds	Other Investors	Hedge Funds	Other Investors	Hedge Funds	Other Investors
Number of Observations	1,260	1,688	565	1,457	695	231
Total Assets (in Million $)	*104.80*	*233.13*	*132.81*	*257.93*	82.02	76.73
Book-to-Market Ratio (in Percent)	*33.44*	*45.61*	*35.22*	*48.42*	31.97	28.03
Leverage (in Percent)	*56.00*	*60.77*	*54.99*	*61.36*	56.82	57.08
Positive Return on Assets (in Percent)	*11.89*	*16.55*	15.48	17.48	8.97	10.57
Return on Assets (in Percent)	-63.42	-61.06	-64.85	-60.15	-62.26	-66.85
Relative Capital Expenses and R&D (in Percent)	33.34	32.54	36.79	32.29	30.54	34.09

Table 4.4. Returns to Common Stocks of Companies That Issue PIPEs

The table summarizes the mean raw and abnormal returns for companies issuing PIPEs by investor type (Hedge Funds vs. Other Investors) and by security structure (Traditional vs. Structured). PIPE transactions are allocated to "Hedge Funds" if hedge funds account for more than 50 percent of the investment and to "Other Investors" if other known investors account for more than 50 percent of the investment. Abnormal returns are computed by subtracting the raw return for companies matched in the month prior to the PIPE deal according to industry, size, book-to-market ratio, and momentum from the return of PIPE companies. The returns are expressed in percent. The standard errors for the means are reported in parentheses and are corrected for clustering by firm. The significance levels for each individual raw and abnormal return are denoted by '*', '**', and '***' and indicate whether the results are statistically different from zero at the 10, 5, and 1 percent confidence levels. We test for the differences between the two investor classes (hedge funds and other investors) using a *t*-test for the means taking into account clustering by firm. The pairs that are significantly different at the ten percent confidence level are indicated in italics.

Panel A: Raw Buy-and-Hold Returns

	All PIPEs		Traditional PIPEs		Structured PIPEs	
	Hedge Funds	Other Investors	Hedge Funds	Other Investors	Hedge Funds	Other Investors
Observations with Available Data	1,242	1,609	553	1,370	689	239
Announcement Term [-4, 5]	*1.22*	*6.95****	*3.60****	*7.71****	-0.68	2.59
	(0.81)	(0.77)	(1.13)	(0.85)	(1.15)	(1.67)
Short Term [6, 100]	*-14.68****	*-2.21*	*-7.48***	*-0.94*	*-20.45****	*-9.47***
	(2.15)	(1.89)	(3.65)	(2.09)	(2.48)	(4.24)
Medium Term [6, 250]	*-19.25****	*-0.35*	*-14.29****	*2.29*	-23.22***	-15.47**
	(3.61)	(3.71)	(4.93)	(4.19)	(4.86)	(6.39)
Long Term [6, 500]	*-31.70****	*-8.77**	*-27.39****	*-6.21*	-34.42***	-21.65**
	(4.13)	(5.03)	(5.49)	(5.64)	(5.66)	(8.83)

Panel B: Excess Buy-and-Hold Returns Relative to Matched Companies

	All PIPEs		Traditional PIPEs		Structured PIPEs	
	Hedge Funds	Other Investors	Hedge Funds	Other Investors	Hedge Funds	Other Investors
Observations with Available Data	1,242	1,609	553	1,370	689	239
Announcement Term [-4, 5]	*1.40*	*5.74****	*3.70****	*6.29****	-0.44	2.58
	(0.93)	(0.88)	(1.24)	(0.98)	(1.34)	(1.85)
Short Term [6, 100]	*-10.85****	*-4.02**	-4.97	-1.68	-15.57***	-17.43***
	(2.57)	(2.16)	(4.20)	(2.32)	(3.02)	(5.01)
Medium Term [6, 250]	*-18.06****	*-7.49**	-11.07**	-2.64	-23.67***	-35.27***
	(3.94)	(4.18)	(5.47)	(4.42)	(5.33)	(12.15)
Long Term [6, 500]	*-31.40****	*-13.33**	-19.53***	-7.88	-38.87***	-40.65***
	(5.88)	(7.03)	(7.00)	(7.90)	(8.21)	(12.35)

Table 4.5. Returns of Calendar Time Portfolios of Companies That Issue PIPEs. This table summarizes the abnormal returns of a portfolio that includes all the stocks of companies which closed a PIPE deal during the last 500 trading days. The abnormal returns are expressed in percent and are annualized. The standard errors are summarized in parentheses. '*', '**', and '***' denote abnormal returns that are statistically different from zero at the 10, 5, and 1 percent confidence levels. We also test for the differences between the characteristics of traditional and structured PIPEs and for the two investor classes (hedge funds and other investors) by computing the intercept of the factor regressions using the difference in the raw returns of the two portfolios as the dependent variable. The pairs that are significantly different at the ten percent confidence level are indicated in italics.

	All PIPEs		Traditional PIPEs		Structured PIPEs	
	Hedge Investors	Other Investors	Hedge Investors	Other Investors	Hedge Investors	Other Investors
Excess Return Above Market	*-32.37****	*-11.83*	-16.50	-7.24	*-42.03****	*-24.49**
	(11.62)	(9.97)	(12.45)	(10.05)	(12.16)	(12.59)
CAPM Alpha	*-35.85****	*-14.86*	-19.77*	-9.90	*-45.99****	*-28.69***
	(10.91)	(9.39)	(11.77)	(9.49)	(11.47)	(12.04)
3-Factor Fama-French Alpha	*-29.78****	*-10.52**	-13.99*	-5.71	-39.99***	-24.81**
	(7.19)	(5.91)	(8.22)	(6.15)	(8.58)	(10.00)
4-Factor Carhart Alpha	*-27.54****	*-11.22**	-14.44*	-6.71	-36.05***	-22.64**
	(7.35)	(6.02)	(8.42)	(5.87)	(8.74)	(10.23)
4-Factor Ferson-Schadt Alpha	*-29.61****	*-13.23***	-16.53*	-8.84	-37.07***	-24.91**
	(7.15)	(5.87)	(8.51)	(6.10)	(8.59)	(10.61)
6-Factor Eckbo-Masulis-Norli Alpha	*-35.43****	*-14.51*	-19.41*	-9.56	*-45.51****	*-28.39***
	(10.76)	(9.27)	(11.72)	(9.40)	(11.28)	(11.84)

Table 4.6. Determinants of Short- and Long-Term Stock Performance. This table summarizes the results of regressing the excess returns during several time periods around and after the close of the PIPE transaction on the characteristics of the PIPE. The excess returns are computed by subtracting the appropriate return of the six Fama-French size/book-to-market portfolios from the return of the individual stocks. All regressions include indicator variables for the years of the close of the deal and the industry sectors. The standard errors are robust, corrected for clustering of observations by the same company and are summarized in parentheses. '*', '**', and '***' denote estimates that are statistically different from zero at the 10, 5, and 1 percent confidence levels.

	Announcement-Term Excess Return (in Percent, [-4, 5])			Medium-Term Excess Return (in Percent, [6, 250])			Long-Term Excess Return (in Percent, [6, 500])		
Hedge Fund	-5.63***	-3.98***	-3.89***	-17.65***	-12.65***	-13.80***	-26.43***	-17.34***	-16.60**
Investor	(1.06)	(1.10)	(1.16)	(4.72)	(4.61)	(5.07)	(6.20)	(5.94)	(6.83)
Structured PIPE		-4.27***	-4.25***		-12.95***	-9.49*		-21.39***	-17.83**
		(1.20)	(1.20)		(5.02)	(5.51)		(6.77)	(7.61)
Log of Proceeds from PIPE			0.90			-0.27			0.61
			(0.60)			(2.77)			(3.87)
Log of Market Value at Close			-1.31*			-8.29***			-12.40***
			(0.76)			(3.17)			(4.28)
Book-to-Market Ratio in Year Prior to Close			2.52**			3.13			-1.51
			(1.25)			(4.57)			(6.49)
Excess Return in Year Prior to Close			-0.71**			-1.44			-3.56***
			(0.30)			(1.10)			(1.18)
Log of Volume Six Months Before Close			0.23			2.83			1.44
			(0.50)			(2.40)			(2.37)
Short Interest Six Months Prior to Close			-25.13*			-86.94*			-109.98
			(14.77)			(51.61)			(71.16)
Venture Capital Funded During Prior Five Years			0.56			12.59*			18.29**
			(1.30)			(7.19)			(9.25)
Return of Assets at Fiscal Year Before Close			-1.90			3.48			0.20
			(1.36)			(3.78)			(6.07)
Leverage at Fiscal Year Before Close			0.58			16.33**			22.88**
			(1.19)			(7.29)			(10.47)
Number of Analysts			0.03			0.87			4.79***
			(0.22)			(0.86)			(1.22)
Proportion of Institutional Holdings			1.56			34.06**			40.48**
			(2.44)			(13.96)			(18.90)
Number of Observations	2,851	2,851	2,407	2,851	2,851	2,407	2,459	2,459	2,049
R-Squared (in Percent)	2.52	2.85	4.40	8.10	8.29	9.77	6.39	6.76	9.92

Table 4.7. Determinants of Short Interest. This table summarizes the results of regressing the average short interest during several time periods after the close of the PIPE transaction on the characteristics of the PIPE and firm attributes. All regressions include indicator variables for the years of the close of the deal and the industry sectors. The standard errors are robust and corrected for clustering of observations by the same company and are summarized in parentheses. '*', '**', and '***' denote estimates that are statistically different from zero at the 10, 5, and 1 percent confidence levels.

Dependent Variables:	Short Interest During the First Six Months After Close (in Percent)		Short Interest During the Second Six Months After Close (in Percent)		Short Interest During the Second Year After Close (in Percent)	
Traditional PIPE and Hedge Fund Investor	0.79***	0.84***	0.62***	0.69***	0.01	0.17
	(0.16)	(0.16)	(0.22)	(0.22)	(0.30)	(0.29)
Structured PIPE	0.39*	0.64***	0.33	0.67**	0.47	0.97**
	(0.20)	(0.21)	(0.29)	(0.31)	(0.43)	(0.44)
Structured PIPE and Hedge Fund Investor	0.17	0.14	0.31	0.23	-0.28	-0.35
	(0.22)	(0.24)	(0.32)	(0.34)	(0.47)	(0.47)
Short Interest During the Six Months Before Close	0.86***	0.80***	0.68***	0.60***	0.54***	0.42***
	(0.03)	(0.03)	(0.03)	(0.04)	(0.05)	(0.05)
Log of Proceeds of PIPE Transaction		0.13*		0.20**		0.20*
		(0.07)		(0.10)		(0.12)
Log of Market Value at Close		0.44***		0.69***		0.91***
		(0.08)		(0.12)		(0.16)
Book-to-Market Ratio in Year Prior to Close		-0.01		0.00		0.30
		(0.10)		(0.15)		(0.33)
Excess Return in Year Prior to Close		0.12***		0.13**		0.05
		(0.03)		(0.05)		(0.05)
Log of Trading Volume Six Months Before Close		-0.07		-0.15**		-0.22***
		(0.05)		(0.07)		(0.08)
Venture Capital Funded During Prior Five Years		-0.18		-0.14		-0.23
		(0.14)		(0.21)		(0.32)
Return on Assets at Fiscal Year Before Close		-0.04		0.04		-0.24
		(0.09)		(0.13)		(0.22)
Book Leverage at Fiscal Year Prior to Close		-0.20**		-0.10		-0.01
		(0.10)		(0.14)		(0.24)
Number of Analysts		0.02		0.04		0.09
		(0.03)		(0.05)		(0.06)
Proportion of Institutional Holdings		0.63*		0.91		1.96**
		(0.38)		(0.61)		(0.97)
Number of Observations	2,665	2,362	2,379	2,124	1,567	1,414
R-Squared (in Percent)	63.24	67.62	39.28	44.98	23.99	33.11

Table 4.8. Performance of Hedge Funds Investing in PIPE Securities. This table summarizes the performance of hedge funds that recently invested in PIPE securities. The abnormal returns are computed by subtracting the return of a hedge fund which has the same strategy and the nearest asset size according to TASS. If asset size is missing in TASS, then the fund was matched randomly to the contemporaneous return of another fund with the same strategy and with missing assets. The returns are expressed in percent and are computed at a monthly frequency. The standard errors are summarized in parentheses. The number of monthly observations for each sample is noted in brackets. '*', '**', and '***' denote abnormal returns that are statistically different from zero at the 10, 5, and 1 percent confidence levels.

	Monthly Raw Return of Hedge Funds Invested in PIPEs (in Percent)			Monthly Abnormal Return of Hedge Fund Invested in PIPEs Relative to Matched Hedge Fund (in Percent)		
	All PIPEs	Traditional PIPEs	Structured PIPEs	All PIPEs	Traditional PIPEs	Structured PIPEs
Current	2.03***	2.20***	1.69***	0.49	0.12	1.31***
Month	(0.36)	(0.49)	(0.27)	(0.45)	(0.62)	(0.43)
	[477]	[333]	[161]	[477]	[333]	[161]
6 Months	1.40***	1.38***	1.45***	0.60***	0.53**	0.68**
	(0.19)	(0.23)	(0.23)	(0.23)	(0.27)	(0.34)
	[1,525]	[1,236]	[520]	[1,525]	[1,236]	[520]
12	1.02***	0.97***	1.20***	0.37**	0.33	0.61**
Months	(0.15)	(0.18)	(0.21)	(0.18)	(0.21)	(0.28)
	[2,216]	[1,881]	[780]	[2,216]	[1,881]	[780]
24	0.80***	0.76***	1.07***	0.18	0.17	0.31
Months	(0.12)	(0.14)	(0.18)	(0.15)	(0.16)	(0.23)
	[3,161]	[2,759]	[1,084]	[3,161]	[2,759]	[1,084]

Figure 4.1. Basic Security Structures in PIPE Transactions

We depict the valuation diagrams and the number of shares issued in three basic PIPE securities: Common Stocks, Fixed Convertibles, and Variable Convertibles.

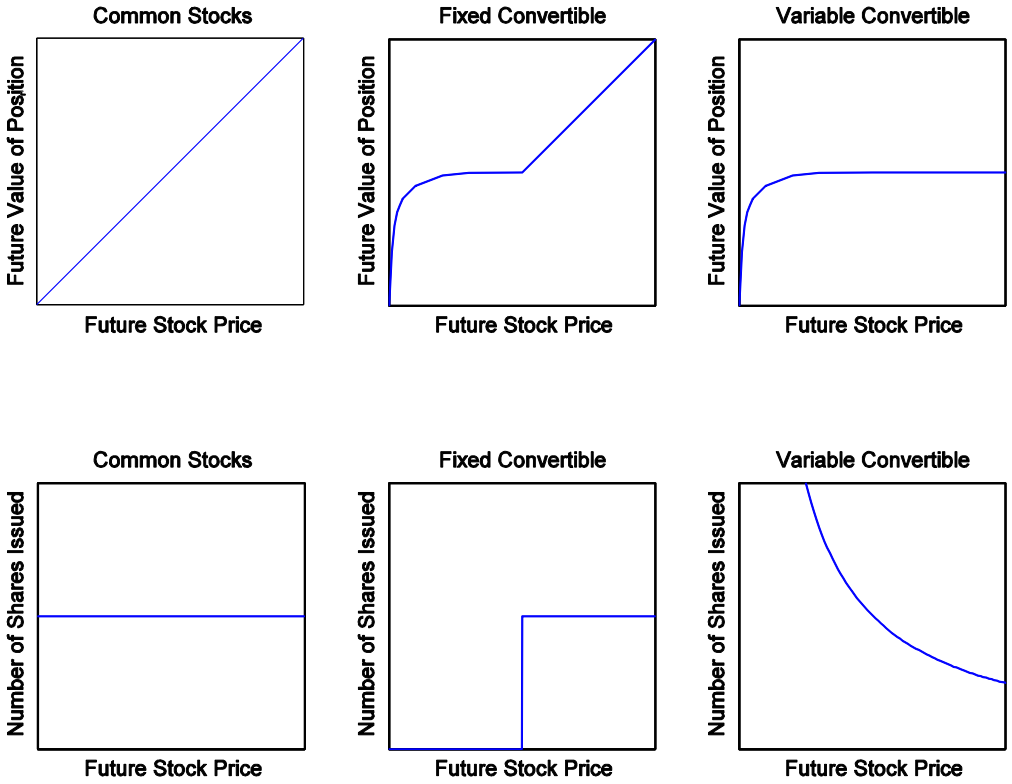


Figure 4.2. Performance of Companies Issuing PIPEs by Security Type

The figure depicts the average buy-and-hold return of companies that issue PIPEs by security structure (Traditional and Structured PIPE) and by Investor (Hedge Funds and Other Investors). PIPE transactions are allocated to "Hedge Funds" if hedge funds account for more than 50 percent of the investment and to "Other Investors" if other known investors account for more than 50 percent of the investment. The return is normalized to 1 on the issue date of the PIPE.

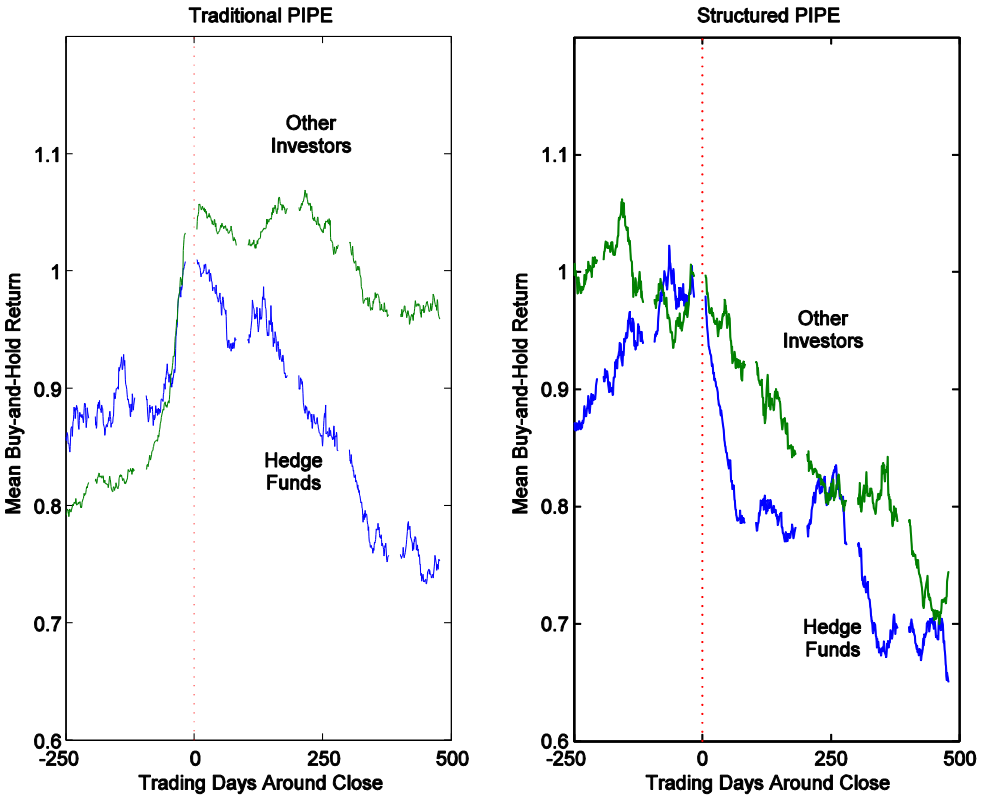
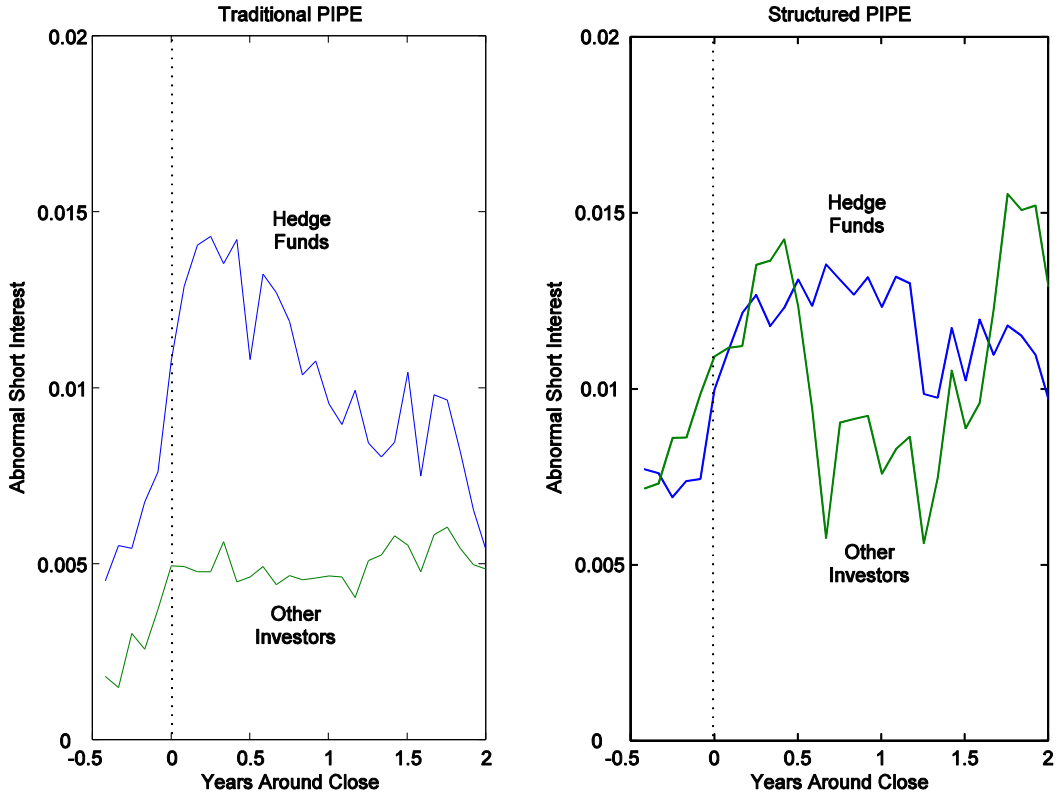


Figure 4.3. Abnormal Short Interest for Companies Issuing PIPEs

We depict the abnormal short interest of companies issuing PIPEs by security structure and investor. Short interest is defined as the proportion of shares sold short relative to shares outstanding. Abnormal short interest is the difference between the short interest of companies issuing PIPEs and the short interest of matched companies according to industry, size, book-to-market, and momentum. PIPE transactions are allocated to "Hedge Funds" if hedge funds account for more than 50 percent of the investment and to "Other Investors" if other known investors account for more than 50 percent of the investment.



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Chapter 5

Conclusion

The ownership of assets can affect their valuation, a subject which is explored in this thesis. In the first two chapters, we concentrate on the role of employee ownership. As first argued by Jensen and Meckling (1976), the incentives of employees with large equity stakes in their firm are more aligned with shareholders, which can lead to higher firm valuations. As shown by Himmelberg, Hubbard, and Palia (1999), the existing literature is inconclusive as to the value of equity-based incentives due to the inherent endogeneity in testing these benefits directly. We use an indirect approach, comparing the decision between a minority and majority acquisition, where only the majority acquisition is expected to affect target managerial incentives. Thus, the choice between a minority and majority acquisition will reflect the value firms place on efficient managerial incentives at the target. Using a sample of 1671 acquisitions between 1994 and 2005, we find evidence consistent with firms avoiding majority control acquisitions when the expected dilution to target managerial incentives is most high.

In the second chapter, we focus on plans which promote ownership by all employees of a firm, such as ESOPs or employee stock ownership plans. We use stylized facts regarding these plans, such as the time lag between an ESOP announcement and actual implementation, to better separate a causal relationship from a selection bias. We find evidence that broad-based employee ownership can increase firm values, however,

as the stake of employee ownership increases the workers are able to extract employee benefits at the expense of other stakeholders in the firm, thus, decreasing any value gains.

In the final chapter, we consider the role of hedge funds as financiers. Hedge funds have become major investors in companies raising equity privately. We find significant negative long-term stock-market performance following such investments. We argue that hedge funds are investors of last resort and provide funding for companies that are otherwise constrained from raising equity capital.

Appendix

A. Detailed Security Structures

This appendix describes the various PIPE securities in more detail. Securities (1) – (4) are traditional PIPEs and securities (5) – (10) are structured PIPEs.

(1) The most basic security is a *common stock PIPE*, where a fixed number of shares are issued and sold at a predetermined discount to the market price. A common stock PIPE sometimes includes warrants that let the investor purchase additional shares at a fixed price during a specific time period.

(2) *A Fixed convertible preferred stock PIPE* represents equity ownership that is ranked higher than common stock in case of bankruptcy or liquidation. A fixed convertible yields a current return through dividend payments and can be converted by the investor into a fixed number of shares of the company's common stock at a predetermined ratio. The implied fixed conversion price is usually above the current market price. The investor in a fixed convertible exchanges the PIPE security for common stocks if the stock price is sufficiently high on the conversion date.

(3) *A fixed convertible debt PIPE* is a loan obligation of the company that ranks higher than any equity securities and that pays a current interest rate. The other specifications are identical to a fixed convertible preferred stock.

(4) A small number of PIPEs are *shelf sales of common stocks*, which are sales of a company's common stock from an existing shelf registration statement. The registration allows the company to sell the securities over a period of time.

(5) *A floating convertible preferred stock PIPE* has a variable conversion price that is based on the future market price of the common stock after the issuance. This

feature protects the investor if the price of the common stock changes after the PIPE deal is closed, because the investor will receive an increasing number of shares if the stock price decreases. Floating convertibles often include caps and floors, which limit the possible range of conversion prices.

(6) *A floating convertible debt PIPE* has very similar specifications as a floating convertible preferred stock PIPE, except for the ranking in case of bankruptcy or liquidation.

(7) *A structured equity line* is an agreement that requires the investor to purchase a predetermined value of the company's common stock over a certain period of time. The price of the stock is usually determined as an average of the closing prices during a pre-specified period in the future minus a fixed discount.

(8) A small number of common stock private placements are classified as *common stock reset PIPEs*. These deals include repricing rights, which allow the investor to receive additional shares of common stocks if the market price decreases after the closing date. The repricing clause functions very similarly to a floating convertible in that the number of shares issuable can change every day.

(9) *A reset convertible preferred stock PIPE* has a fixed conversion price that is subject to a number of resets at specific times following the closing date. At the time of each of the resets, the fixed conversion price is adjusted as a percentage of the current market price and then remains fixed at this new price until the next reset date.

(10) *A reset convertible debt PIPE* is similar to a reset convertible preferred stock PIPE except for the ranking in case of bankruptcy or liquidation.

B. Estimation Methodology

This section explains the methodology used to perform the event study in Section 3. First, we download at the end of each calendar year from CRSP the SIC codes and the market capitalizations of all the common stocks that are not closed-end funds, ADRs, REITs, and that are headquartered in the U.S. We merge this data set with the corresponding book-to-market ratios from Compustat. For companies with fiscal-year-ends before October, we use the book value at the end of the current fiscal year; and for companies with fiscal-year-ends after September, we use the book values at the end of the previous fiscal year to allow some time delay for the publication of the accounting values after the end of the fiscal year.

Second, we match companies according to their industry classification, size, book-to-market ratio, and momentum. We classify all the companies into 48 industries according to the SIC codes, as described in Fama and French (1997). We rank the companies in each of these 48 industries by their market capitalization, their book-to-market ratio, and their return during the previous 12 months. At the end of each month, we match each company to another company in the same industry that did not issue a PIPE in the previous two years such that the sum of the absolute deviations of the size, the book-to-market ratio, and the momentum rankings is smallest. If either the size, the book-to-market ratio, or the momentum returns are missing, then we match the company to another company in the same industry group with missing size, book-to-market ratio, or momentum returns. The distribution of the characteristics for the PIPE and the comparable companies is very close.

Third, we compute the daily buy-and-hold returns for all companies in our sample during a 750 trading day window starting 250 days prior to the close of the PIPE transaction. If the returns for a company that issues a PIPE are not available in CRSP, we set the returns equal to the returns of the matched company. If the holding period returns for a matched company are not available in CRSP, then we replace this company with the company that had the next-closest match at the end of the calendar year prior to the closing date of the PIPE.

Fourth, we compare these average returns for different PIPE deals over various sample periods. The abnormal return is defined as the difference between the buy-and-hold return of the PIPE company and the buy-and-hold return of the matched company.

C. Compustat Data Definitions

The Compustat data items to calculate the ratios, total assets (item 6), market-adjusted leverage (book debt (total liabilities (item 181) + preferred stock liquidating value (item 10, if unavailable, preferred stock redemption value (item 56)) – deferred taxes (item 35) – convertible debt (item 79))/(book debt + market capitalization)), book to market (book equity (item 60)/(common shares used to calculate EPS (item 54) * fiscal year close price (item 199))), return on equity (income before extraordinary items (item 237)/book equity (item 60)), operating profit (operating income before depreciation (item 13)), capital expenditures & research and development/total assets (capital expenditures (item 128) + research and development expense (item 46)/total assets (item 6)).