

A Comparison of CEO Pay in Public and Private US Firms*

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Abstract

We provide a comprehensive comparison of CEO pay in public and private US firms over the period 1999 through 2008. The main difference between public and private firms is the existence for public firms of an active market for the firm's shares. Consistent with the predictions of the optimal contracting models in which both managers and shareholders can trade in public equity markets we show that the structure of annual pay in public firms contains significant equity-based incentives, while private firms rely more on salary and bonus. Despite the larger amounts of equity-based pay, however, public firm CEOs have lower overall portfolio incentives. Additionally, pay in public firms is positively related to both accounting and stock price performance, while private firm pay is basically unrelated to firm performance. We also show that, all else equal, public firm CEOs earn an 18% pay premium over private firm CEOs—a result that appear to be driven by labor market segmentation between public and private firms. Finally, when firms transition from private to public status, we find that both the structure and level of pay change significantly in ways that corroborate our findings from the cross-section.

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Abstract

We provide a comprehensive comparison of CEO pay in public and private US firms over the period 1999 through 2008. The main difference between public and private firms is the existence for public firms of an active market for the firm's shares. Consistent with the predictions of the optimal contracting models in which both managers and shareholders can trade in public equity markets we show that the structure of annual pay in public firms contains significant equity-based incentives, while private firms rely more on salary and bonus. Despite the larger amounts of equity-based pay, however, public firm CEOs have lower overall portfolio incentives. Additionally, pay in public firms is positively related to both accounting and stock price performance, while private firm pay is basically unrelated to firm performance. We also show that, all else equal, public firm CEOs earn an 18% pay premium over private firm CEOs—a result that appear to be driven by labor market segmentation between public and private firms. Finally, when firms transition from private to public status, we find that both the structure and level of pay change significantly in ways that corroborate our findings from the cross-section.

Keywords: CEO pay; pay structure; total portfolio incentive; pay-performance sensitivity; private firms; public firms

JEL Classification: G34

1. Introduction

The structure and level of compensation for top executives plays a number of roles, including the provision of incentives for effort, the retention of human capital, and as a sorting mechanism. An extremely large literature exists that examines the determinants of CEO pay in public US companies (see for example, the seminal work by Jensen and Murphy (1990), the survey by Murphy (1999), and the recent book by Bebchuk and Fried (2003)). In contrast, because of data constraints, there is almost no evidence regarding pay in private companies in the US.¹ In this paper we provide some of the first comparisons of CEO pay in public and private US firms using a new database that provides detailed data on pay in a large sample of private US firms over the period 1999 to 2008. Compared to existing studies, the private companies in our database are much more representative of the sample of public firms in terms of size, industry coverage, accounting performance, and the level of disclosure. We use this data both to provide new descriptive evidence on CEO pay in private firms and to test a number of hypotheses that contrast the structure and level of CEO pay in private firms with that in public firms.

The major difference between public and private firms that we focus on in this study is the presence for public firms of an active market for the firm's stock. Having access to a market for trading the firm's shares can affect the pay-setting process in several ways. First, the ability to trade allows public firm CEOs to adjust their shareholdings once the vesting restrictions lapse. In this setting, models by Jin (2002), Garvey and Milbourn (2003), and Gao (2010) predict that the annual pay of CEOs in public firms will contain more grants of

¹ Piecemeal evidence on CEO pay in small private firms, early stage firms, private insurance companies is provided by Cavalluzzo and Sankaraguruswamy (2000), Cole and Mehran (2008), Bengtsson and Hand (2010), Ke, Petroni, and Safieddine (1999). Nakazato, Ramseyer, and Rasmusen (2009) provide a comparison of CEO pay in public and private firms using the Japanese data.

options and restricted stock, but that the overall pay-performance incentives (reflecting both outstanding ownership plus current option and stock grants) will be lower in public firms. Second, access to a liquid market allows public firm shareholders to take the “Wall Street Walk” if they are not content with firm performance. As a result, shareholders in private firms will have greater monitoring incentives all else equal. Because of this we expect that pay in private firms will be based more on subjective performance measures, while pay in public firms will rely more on accounting profits and stock prices. Finally, the lower overall amount of ownership and performance-based pay in public firms would predict that public firm CEOs have lower pay levels compared to CEOs in private firms, all else equal. It is possible, however, that CEOs of public firms compete in a different labor market and have better outside opportunities compared to CEOs in private firms, which would lead to higher pay levels in public firms.

Consistent with the predictions of the contracting models described above, private firm CEOs receive more of their annual compensation in the form of salary and bonus and less from options and restricted stock. Nevertheless, the use of option grants and equity-based compensation in private firms is non-trivial, suggesting that at least some private firms provide significant compensation incentives for CEOs to transition to public ownership in order to monetize their option and stock holdings. Finally, although public firm CEOs receive significantly more annual incentives through stock and option grants, their total portfolio incentives from both current grants and outstanding ownership of shares and options are lower.

Comparing the pay-performance sensitivity of annual CEO compensation in the two types of firms we find that changes in annual pay are positively related to both stock and

accounting performance in public firms, but that the annual flow of pay is largely unresponsive to performance in private firms. In particular, there is little evidence that private firm pay is positively related either to firm-specific accounting earnings or to stock returns of size-matched publicly traded firms in the same industry. These results are robust to controlling for ownership differences between the two firm types, and suggest that private firms rely more on subjective incentive measures as compared to public firms, which is consistent with the monitoring hypothesis and with the evidence in Ke, Petroni, and Safieddine (1999).

Next we compare pay levels between public and private firms. In terms of descriptive evidence, the growth rates in overall pay levels and in firm size are similar across both public and private firms and the elasticity of pay to firm size is also comparable across the two firm types. The fact that the time trends in pay parallel the trends in firm size in both samples is roughly consistent with the arguments in Gabaix and Landier (2008) where more talented CEOs are matched with larger firms. The results differ from those reported in Cole and Mehran (2008), however, who find that pay in a sample of private firms drawn from the small business finance data has fallen over time, and that private firms have significantly higher pay-size elasticity compared to public firms.

Although the growth rates in pay are similar across the two types of firms we find robust evidence of a substantial pay premium in public firms that survives even after controlling for firm and CEO characteristics. All else equal, CEOs in public firms have total pay (cash pay) that is 18% (6%) higher on average than CEOs in private firms. This public pay premium persists after accounting for differences in equity risk, dividend policy, and CEO turnover between public and private firms. One explanation for the large public firm pay

premium and the fact that private firm pay does not respond to stock returns in public peer firms is that the labor markets between the two types of firms are largely segmented.

Consistent with this view, we find that after controlling for firm size and performance, there is no evidence that changes in CEO pay of private firms are correlated with changes in CEO pay of similar public firms in the same industry. Further analysis of CEO turnover also suggests that the two types of firms compete in different labor markets.

Finally, we show that there is a large change in both the structure and level of pay as firms transition from private to public status. After firms become public we find that: (i) CEOs receive substantially more of their pay in the form of options and restricted stock; (ii) overall incentives from equity and option ownership decline following the IPO; (iii) the level of pay increases substantially. These changes in pay corroborate our inferences drawn from the cross-section.

The paper is organized as follows. Section 2 reviews the literature and develops our hypotheses. Section 3 describes the data and key variable construction. Section 4 presents the main empirical analysis, and Section 5 provides some additional investigation of the source of the pay premium in public firms. We conclude in Section 6 with a brief summary.

2. Prior Literature and Hypothesis Development

2.1 Related Literature

Berle and Means (1932) and Jensen and Meckling (1976) note that the separation of ownership and control in modern corporations creates significant agency conflicts between managers and shareholders that must be controlled through monitoring, bonding, and

incentive contracts. Many papers have explored the incentive mechanisms that overcome the conflicts of interest between managers and shareholders using data from public firms around the world (see the survey by Murphy (1999), and a recent paper on CEO pay comparison across countries by Fernandes, Ferreira, Matos, and Murphy (2009)).

Our paper is related to a small strand of the substantial CEO pay literature focusing on CEO pay in private firms.² Using a sample of 45 privately-held and 18 publicly-held insurers over 1994-1996, Ke, Petroni, and Safieddine (1999) show that there is a significant positive association between return on assets (*ROA*) and the level of compensation for publicly-held insurers while there is no such relation for privately-held insurers. They conclude that their results are consistent with the optimal contracting theory view of CEO pay in which ownership structure affects the relation between pay and performance. Confirming the above evidence using CEO pay from the 1993 Survey of Small Business Finances (SSBF, i.e. businesses with less than 500 employees), Cavalluzzo and Sankaraguruswamy (2000) conclude that ownership structure plays an important role in the use of accounting information (*ROA* and sales) in CEO pay contracts for privately-owned small businesses. Cole and Mehran (2008) use both the 1993 and 2003 SSBF data. They find that over time, CEO pay in privately-held firms does not grow as fast as pay in public firms. Note, however, that the firms surveyed in the SSBF are the smallest firms in the economy while, in contrast, the private firms in our sample are more comparable to public firms.

² In addition to the studies comparing CEO pay in public and private firms, Beatty and Harris (1999) and Beatty, Ke, and Petroni (2002) show that private firm executives manage earnings less aggressively than public firm executives. Given that managers in public firms have greater incentives to overstate operations, public firms require more monitoring from auditors and auditors bear more business risk when auditing public firms. Consistent with this view, O'Keefe, Simunic, and Stein (1994) find that auditors usually charge a higher fee and spend more labor hours when auditing a public firm as compared to a private firm.

Bengtsson and Hand (2010) focus on CEO pay in venture-backed companies and show that CEO cash pay is higher in firms that have successfully raised more VC financing and higher quality VC financing. Nakazato, Ramseyer, and Rasmusen (2009) compare compensation patterns at privately and publicly held firms in Japan and find that executives in private and public firms earn approximately equal incomes, and firm size is a strong determinant of compensation for both types of firms.

Our paper is particularly motivated by two recent studies that examine compensation practices across different types of public US firms, and across public firms in different countries. Using compensation data for non-ExecuComp firms for the fiscal years 2000-2004 from the Morningstar Historical Governance database, Cadman, Klasa, and Matsunaga (2010) compare CEO pay practices in non-ExecuComp firms with those in ExecuComp firms. They show that ExecuComp firms rely more heavily on earnings and stock returns in determining CEO cash pay. Further, the weight on earnings is more sensitive to differences in growth opportunities for ExecuComp firms. Finally, they show that the positive relation between institutional ownership concentration and the value of stock option grants is stronger for ExecuComp firms. They conclude that ExecuComp and non-ExecuComp firms face different contracting environments.

Using 2006 compensation information for CEOs in 3,798 firms across 27 countries, Fernandes et al. (2009) show that top executives in the US are paid more than their counterparts in foreign companies. After controlling for firm, industry, corporate governance, and CEO characteristics, the US pay premium remains economically large. They go on to show that the remaining cross-country difference in pay levels is explained by differences in the structure of pay: CEOs are paid more in firms with a higher percentage of

incentive pay (particularly equity-based pay), and CEOs in the US receive a much larger fraction of their pay through equity-based pay (primarily stock options and restricted shares), thus contributing to the observed US pay premium.

2.2 Hypotheses

The major difference between public and private firms is the existence for publicly listed firms of an active market for the firm's stock. The ability to trade the firm's stock will affect both the structure of incentive contracts as well as the monitoring incentives of shareholders.

With regards to the structure of incentive contracts, the ability to trade provides CEOs with the opportunity to unwind a portion of their equity incentives once the shares are vested (Jin (2002), Garvey and Milbourn (2003), and Gao (2010)).³ In contrast, in private firms, the value of equity-based incentives depends largely on the long-term value of the firm. When the CEO can freely trade in the public market, the models derived in these papers show that the optimal period-by-period compensation contract will contain more stock and option grants in order to maintain managerial incentives.⁴

Holmström and Tirole (1993) also derive a principal-agent model that describes how

³ It is worth noting that all that is necessary in these models is that the shareholders cannot contract on the amount of ownership other than the annual incentives and that the CEO is free to trade in the market. In general, corporate insiders of public firms in the US are required to report any sales or hedging transactions and may be forbidden by their firms from entering any hedging transactions (and are totally forbidden from shorting their own firms' shares). It is possible that public as well as private firm CEOs could hedge the market risk of their equity-based pay by shorting shares of publicly listed industry peer firms (Garvey and Milbourn (2003)). We unfortunately cannot observe the CEOs' outside portfolio.

⁴ In general, managers will not completely unwind their incentives by selling shares. For example, in Gao (2010), the cost of not completely undoing the CEO's equity-based incentive is that she receives the shares for free and she can profit from higher effort (which the market correctly infers in equilibrium). The CEO trades off the amount from selling at a lower price today with the profit from retaining shares and profiting from high effort in the future.

market liquidity is related to the structure of the CEO's compensation contract. In their model they argue that the optimal contract will place more weight on current price information (stock appreciation rights and option grants) and less weight on long-term liquidation value (long-term ownership) as the liquidity of the firm's shares increases because increases in liquidity lead to more informative stock prices. A private firm has no liquid market for the firm's stock and, therefore, the value of the CEO's ownership stake is tied to the liquidation value of the firm and there is little value to providing incentives through current stock or option grants. In contrast, for public firms, current stock price provides an additional valuable signal that is useful for providing incentives. These arguments lead to the following hypothesis:

H1: Ceteris paribus, public firm CEOs will have more equity-based pay compared to private firm CEOs.

Further, the models in which managers can trade shares also yield the additional prediction that the total pay-performance sensitivity (net of shares traded) of the CEO's contract will be higher in firms with lower liquidity (private firms) leading to the following hypothesis:

H2: Ceteris paribus, public firm CEOs will have lower total portfolio incentives compared to private firm CEOs.

Finally, the presence of a public market to buy and sell company stock also gives the shareholders of public firms the opportunity to take the "Wall Street Walk" if they are not satisfied with firm performance. This will discourage shareholder monitoring because shareholders can easily exit by selling (Shleifer and Vishny (1986), Maug (1998), and Kahn and Winton (1998)). Based on this we expect that shareholders of private firms will have stronger incentives to directly monitor the CEO as compared to their counterparts in public

firms, which leads to the following:

H3: Ceteris paribus, the sensitivity of pay to accounting and stock performance will be weaker in private firms as compared to public firms.

These theories also offer some predictions regarding differences in the level of pay in public and private firms. In the standard principal-agent model the level of expected total pay is equal to the reservation wage plus additional compensation for the cost of effort and the risk premium borne by the manager. To the extent that labor markets are integrated across the two types of firms such that the reservation wages are equal, the models in which managers can unwind equity ownership by trading shares predict that pay will be lower in public firms (see Gao (2010)). The lower pay arises because the optimal contract induces a lower effort level and the ability to unwind reduces the risk premium required by the manager. Alternatively, to the extent that direct monitoring by shareholders substitutes for incentive pay in private firms, we expect that private firm pay will be lower than that in public firms because the risk premium required by the manager will be lower in this case. Finally, it is also possible that labor markets are segmented across the two types of firms, in which case differences in pay levels will be determined largely by differences in reservation wages across the two firm types. Based on this we posit the following:

H4: CEO pay levels may be either higher or lower in private firms as compared to public firms.

In our empirical analysis, we test these hypotheses and also attempt to distinguish between some of the alternative explanations for the differences. In the next section we describe our data and present summary statistics.

3. Sample Formation and Variable Construction

3.1 Sample Formation and Overview

We start with all private and public US firms with non-missing values for total assets in Capital IQ (CIQ), an affiliate of Standard & Poor's, from 1999 to 2008.⁵ We require that public firms be traded in NYSE, AMEX, or NASDAQ. CIQ classifies a firm as public or private based on its most recent status. For example, Google is classified as a public firm throughout the firm's history in CIQ even though it became a public firm only in 2004. We search all the key dates for each firm in CIQ's IPO and delisting databases, to help classify a firm's private (or public) status by back filling. In the Google example, given that its IPO was in August 2004, Google in our sample is a private firm from 1999 to 2003 and it becomes a public firm from 2004 onward. To clearly capture any difference in pay for public versus private firms, in most of our analyses, we omit the transitioning firm-year observation when a firm changes from being a private firm to becoming a public firm and vice versa.

This initial sampling, shown in Panel A of Table 1, results in 179,877 candidate firm-year observations for private firms and 51,341 firm-year observations for public firms. Note that there is a large increase in private firms covered by CIQ beginning in 2004. Next we narrow the sample by requiring the firms to have compensation data available in CIQ. For private firms this restriction is meaningful and reduces the sample to a total of 7,767 firm-year observations representing 2,767 unique firms, while for public firms we retain a sample of 38,041 firm-year observations representing 5,786 unique firms. The final column

⁵ Since the late 1990s, CIQ starts to provide data on accounting information and executive compensation for both private and public US firms, with a similar level of detail as provided by Compustat and ExecuComp for public firms. Unique to CIQ, it also provides detailed background information about the CEO, including education, gender, past experience, and age. For all covered firms, CIQ provides links to the company filings so that users can easily check the original source data.

in Panel A shows the number of public firms in our sample that overlap with the ExecuComp firms. It is clear that over the sample period, the public firms in our sample are more representative of public firms in the economy as compared to the S&P 1500 firms covered by the ExecuComp database.

Perhaps not surprisingly, most private firms do not report compensation data. To provide some assessment of the selection issues inherent in our sample, Panel A also reports the median values of sales for the firms in the CIQ population and for those firms in our final sample. The private firms that report compensation in our sample are significantly larger than private firms in the overall CIQ population, whereas, for public firms the differences are more modest. The fact that our private firm sample is biased toward larger firms actually makes our sample more comparable to public firms especially as compared to other studies of private firms that use data from the SSBF (Cavalluzzo and Sankaraguruswamy (2000) and Cole and Mehran (2008)). For example, in the overall sample, the median sales of private firms is \$173 million compared to \$236 million for public firms. By way of comparison, Cole and Mehran (2008) report median revenues of \$1.9 million in 2003 for their sample of private firms drawn from the SSBF data. Nevertheless, the reader should bear in mind the sample selection criteria imposed on us by the data when deciding how our results might generalize.

In Appendix 1, we provide a breakdown of the data sources from which CIQ obtains compensation information for private firms. Data for over half of the private firm-years in our sample come from 10-K (annual reports) filed with the SEC, a quarter of the private firm-years come from filings of forms S-1 or DEF14 (proxy statements) with the SEC due to public debt issuance, and 6% of the private firm-years are from leveraged buyouts during the

sample period. We do not have information on the data source for the rest (about 20% of our private firm sample). It is worth noting, that the private firms in our sample are those with a relatively high level of disclosure compared to other private firms in the economy. One would expect that this would lessen any differences in pay practices between private and public firms.

Panel B presents the industry distribution of our private firm sample and public firm sample based on the industry classification in Fama and French (1997). It is clear that our sample firms have broad industry representation, covering all 48 industries, with Business Services, Banking, and Utilities having the highest representation among private firms, while Banking, Business Services, and Electronic Equipment have the highest representation among public firms. It is worth noting that the extent of overall industry representation is much broader in our sample of firms as compared to prior work examining CEO pay in private firms (for example, Ke, Petroni, and Safieddine (1999), and Cole and Mehran (2008)).

3.2 Computing CEO Pay

We define a CEO's total compensation (*Totalpay*) in a given year as the sum of her salary, bonus, the grant-date value of restricted stock awards (*Stock*), and the Black-Scholes value of granted options (*Option*), and other pay (*Otherpay*) that includes items such as long-term incentive plans, premiums for insurance policies, and medical expenses.

Some private firms in our sample pay their CEOs with restricted stock, and they report the dollar value of restricted stock granted based on a hypothetical market price. In our analysis, we take the value of restricted stock granted as reported.

With respect to the value of option grants, unlike ExecuComp, CIQ simply records the

value as reported in annual reports, proxy statements, or other filings. If a firm just reports the number of shares underlying an option grant, CIQ records a zero value for that option grant.⁶ To avoid this problem and to provide a fair comparison of the value of options granted to CEOs in public and private firms we estimate the value of option grants for all sample firms (including both public and private firms) in a manner that is comparable to the ExecuComp approach.

For public firms, we retrieve relevant information about CEOs' option grants (including the number of options, strike price, grant date, and expiration date) from the Thomson Financial Insider Trading database. We then calculate the dollar value of each option grant, based on ExecuComp's modified Black-Scholes approach.⁷

For private firms, we read their filings available through CIQ and hand collect relevant information about CEOs' option grants. We note that some private firms provide option grants to their top executives, even though the firm does not have publicly traded shares.⁸ For each option grant, the firm typically states the expiration date and a hypothetical exercise price.

We compute the option grant's Black-Scholes value, by making the following assumptions: (1)

⁶ There are 613 private firm-year observations where CIQ has the dollar value of the option grant as filed by the reporting private firm. The correlation between the CIQ option values and the values based on our own calculation using the modified Black-Scholes approach is 0.78.

⁷ To compute the value of an option grant, ExecuComp assumes that the volatility is the annualized standard deviation of stock returns during the 60 months prior to the grant date; the risk-free rate is the seven-year Treasury bond yield prevailing on the grant date; the grant-date stock price is the exercise price (the option is granted at-the-money); the dividend yield is average dividend yields over a three-year period prior to the grant; and the time to maturity is equal to 70% of the stated maturity.

⁸ Anecdotal evidence suggests that there are three possible ways for private firm executives to cash out their stock and options: (1) selling them on the public market after the IPO; (2) selling them to the acquiring firm in an acquisition deal; and (3) selling them back to the issuing company in a stock repurchase transaction.

the volatility is the median volatility of public firms in the same industry and size decile;⁹ (2) the risk-free rate is the seven-year Treasury bond yield prevailing on the grant date; (3) the grant-date stock price is the exercise price (the option is granted at-the-money); (4) the dividend yield is zero; and (5) the time to maturity is 70% of the stated maturity.

In Appendix 2, we provide a detailed example of how we compute total CEO pay in private firms, and in Appendix 3, we conduct a cross-check of the CEO pay variables computed from CIQ (using our own approach) and by ExecuComp using the overlapping public firm-year observations. The data quality from CIQ appears to be comparable to that of ExecuComp.

3.3 Summary Statistics

Table 2 presents descriptive statistics of our private firm sample and public firm sample. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. The variables are defined in Appendix 4. Panel A presents descriptive statistics of CEO pay. The mean (median) CEO total pay is \$1.37 million (\$519 thousand) for the private firm sample, while the mean (median) CEO total pay is \$2.74 million (\$1.01 million) for the public firm sample. The two-sample t-test and median-test both reject the null that CEO total pay in private firms is the same as that in public firms at the 1% level. On average, total pay in public firms is approximately twice that in private firms.

The mean (median) CEO salary and bonus in private firms is \$386 thousand (\$313

⁹ Note that using either the levered volatility that accounts for the difference in leverage between a private firm and its public peer firm in the same industry, or the 75th percentile return volatility of public peer firms in the same industry as the private firm, does not change our main results (results available upon request).

thousand) and \$351 thousand (\$54 thousand), respectively, while the mean (median) CEO salary and bonus in public firms is \$507 thousand (\$420 thousand) and \$536 thousand (\$150 thousand), respectively. The median value of restricted stock and option grants is zero in both samples. The mean value of CEO restricted stock and option grants in private firms is \$125 thousand and \$187 thousand, respectively, while the mean value of CEO restricted stock and option grants in public firms is \$346 thousand and \$992 thousand, respectively. The two-sample t-test and median-test both reject the null that the value of CEO restricted stock and option grants in private firms is the same as that in public firms at the 1% level. In summary, CEO total pay in private firms is significantly lower as compared to pay in public firms. The pay difference shows up in the cash component of total pay (salary and bonus), but is particularly evident in the equity-based components of pay: restricted stock and option grants.

Panel B presents descriptive statistics of CEO characteristics. Private firm CEOs are less likely to have an MBA, are more likely to be female, and are slightly younger than their counterparts in public firms. Notably, private firm CEOs in our sample are slightly less likely to be founders or to serve as Chairman of the Board, suggesting that differences in CEO power are not likely to drive our results. The levels of CEO ownership, however, do differ significantly between private and public firms: CEOs in private firms own on average 13.86% of their companies, as opposed to 6.22% ownership for public firm CEOs. Following Jensen and Murphy (1990) and Core and Guay (1999), we compute the portfolio equity incentive as the dollar-value change of stock and options held by a CEO per \$1,000 shareholder return. Specifically, the CEO's portfolio equity incentives are computed as $[1000 \times (\# \text{ of shares owned by CEO} + 0.6 \times \# \text{ of options owned by CEO}) / \text{total } \# \text{ of shares outstanding}]$; the option

delta is assumed to be 0.6 for simplicity. We show that the average (median) CEO in private firms experiences \$157.82 (\$42.8) increase in wealth per \$1,000 shareholder return, while her public firm counterpart experience \$73.77 (\$25.74). These values are considerably larger than the \$3.25 change in CEO compensation per \$1,000 change in shareholder wealth that was based on data from the 1970s and 80s, but are in line with more recent estimates (e.g., Hall and Liebman (1998)) which reflect the dramatic growth in the use of stock options during the last 20 years. All of these differences in ownership and portfolio incentives statistically significant at the 1% level.

Panel C presents descriptive statistics of firm performance and other characteristics. For public firms, we use firm-specific stock returns to measure stock performance, and compute the volatility as the annualized standard deviation of firm-specific returns over the last 60 months. For private firms, we use the median stock return and volatility of public firms in the same industry and size decile as the private firm. We find that private firms are smaller, younger firms with weaker operating performance, slower growth, more capital expenditures, far higher leverage, and fewer segments than public firms.¹⁰

Overall, although there are significant differences in the characteristics of the two firm types, in comparison to the private firms covered in the SSBF (for example, Cavalluzzo and Sankaraguruswamy (2000), and Cole and Mehran (2008)) and to a recent study by Asker, Farre-Mensa, and Ljungqvist (2010) where they explicitly match private and public firms by size, our sample of private firms are much more representative of listed firms.

¹⁰ All the two-sample t-tests and median-tests of the null that the mean (median) value of a particular firm characteristic of the public firm sample is equal to that of the private firm sample is rejected at the 1% level, with the exception that for capital expenditures, the significance is at the 5% level.

4. Comparing CEO Pay in Public and Private Firms

The univariate analysis in the previous section indicates significant differences in the structure and level of pay between CEOs of public and private firms. Although public firms differ from private firms by having an active market for the firm's stock, they also differ along a number of other dimensions, such as firm size, and CEO ownership. In this section we provide a more formal analysis of differences in pay structure, total equity incentives, pay-performance sensitivity, and pay levels between public and private firms.

4.1 Differences in Pay Structure between Public and Private Firms

We begin our analysis by examining differences in the composition of pay between public and private firms. The model in Holmström and Tirole (1993) suggests that firms with greater market liquidity place more weight on current price information relative to long-term liquidation value in the CEO's compensation contract. Private firms represent an extreme case of market illiquidity in which there is no current price information upon which to base pay decisions. In addition, the lack of an active market for selling stock implies that CEOs obtain significant incentives through their existing shareholdings, and that there is less need for annual incentive grants. Based on these arguments, Hypothesis **H1** predicts that private firms will rely primarily on salary and bonus to pay their CEOs, and will use less equity-based pay compared to public firms.

To examine this issue, we estimate the following OLS regression:

$$\begin{aligned} \text{Pay Structure} = & \alpha + \beta_1 \text{Public} + \beta_2 \text{Firm Size} + \beta_3 \text{Other Firm Characteristics} \\ & + \beta_4 \text{CEO Characteristics} + \text{Industry FE} + \text{Year FE} + \varepsilon, \end{aligned} \quad (1)$$

where the dependent variable is either the ratio of cash pay to total pay, or the ratio of equity-based pay to total pay. *Public* is an indicator variable that takes the value of one if the firm is a public firm in that year, and zero otherwise. We introduce firm size, other firm characteristics, and CEO characteristics in stages when presenting our regression results.¹¹ We also include industry fixed effects to control for unobserved industry-specific heterogeneity and year fixed effects to account for the time trend. The coefficient estimate on the *Public* indicator variable thus measures the difference in pay structure between public and private firms that cannot be accounted for by differences in firm and CEO characteristics and industry and year effects. Table 3 presents the results.

Columns (1)-(3) report the results when the dependent variable is the ratio of cash pay to total pay. We show that compared to private firm CEOs, public firm CEOs receive a significantly lower fraction of their pay as salary and bonus. The coefficient estimate on the *Public* indicator variable is around -0.08 and significant at the 1% level. Further, the cash pay ratio is negatively associated with firm size, lagged stock returns, capital expenditures, and cash holdings, and is positively associated with ROA and leverage. Founders, older CEOs, and CEOs with higher ownership receive more of their total pay in the form of salary and bonus, while CEOs with an MBA degree and CEOs who are also Chairman of the Board receive less cash pay.

Columns (4)-(6) report the results where the dependent variable is the ratio of equity-based pay to total pay and show that compared to private firm CEOs, public firm CEOs receive a significantly higher fraction of their total pay in the form of restricted stock and options. The coefficient estimate on the *Public* indicator variable is around 0.11 and

¹¹ Instead of using sales to measure firm size in different pay regressions, we have also tried the book value of total assets and our main findings remain.

significant at the 1% level. Further, the equity-based pay ratio is negatively associated with ROA, leverage, firm age, and number of segments, while is positively associated with firm size, lagged ROA and stock returns, capital expenditures, and cash holdings. CEOs with an MBA degree and CEOs who are also Chairman of the Board receive more of their total pay in the form of restricted stock and option grants, while older CEOs and CEOs with higher ownership receive less equity-based pay. Overall, the results support the prediction from Hypothesis **H1** that private firms use less equity-based pay compared to public firms.

4.2 Differences in Portfolio Equity Incentives between Public and Private Firms

As noted above, in addition to receiving annual grants of stock and options, executives also receive significant incentives from their existing equity portfolio (outstanding stock and option ownership plus new grants of stock and options). In the case of listed firms, CEOs can use the stock market to adjust their equity positions after the vesting restrictions lapse. The models by Jin (2002) and Gao (2010) predict that the overall level of incentives (net of shares traded) will be lower in firms where managers can trade on their own account.¹² Based on these models, Hypothesis **H2** predicts that the overall portfolio incentives of CEOs will be higher in private firms.

To examine this prediction, we estimate the following OLS regression:

$$\begin{aligned}
 \text{Portfolio Equity Incentives} = & \alpha + \beta_1 \text{Public} + \beta_2 \text{Firm Size} + \beta_3 \text{Other Firm Characteristics} \\
 & + \beta_4 \text{CEO Characteristics} + \text{Industry FE} + \text{Year FE} + \varepsilon,
 \end{aligned}
 \tag{2}$$

where the dependent variable, *Portfolio Equity Incentives*, captures the dollar-value change of

¹² Consistent with this view, Ofek and Yermack (2000) find that ownership levels do not increase when CEOs acquire shares from option exercises.

all outstanding and current stock and option grants held by a CEO per \$1,000 shareholder return (Jensen and Murphy (1990) and Core and Guay (1999)). Table 4 presents the regression results.

Column (1) shows that, after controlling for firm size and industry and year fixed effects, a public firm CEO has portfolio equity incentives that are about \$62 smaller than her private firm counterpart. This difference is economically significant given that the average portfolio equity incentive for public firm CEOs is \$74. In Column (3), after including all other firm and CEO characteristics in the regression, the coefficient on the *Public* indicator variable is -\$54 and is significant at the 1% level. This result indicates that, per \$1,000 shareholder return, a public firm CEO gains about \$54 less than a private firm CEO. The results are consistent with our Hypothesis **H2** that due to their ability to trade shares in the market, public firm CEOs have lower total portfolio equity incentives than their private firm counterparts. This finding is also consistent with our prior findings that public firm CEOs are given more annual equity-based incentives in order to maintain the alignment of interests between managers and shareholders.

4.3 Differences in Pay-Performance Sensitivity between Public and Private Firms

Next, we examine Hypothesis **H3** by exploring how annual pay responds to firm performance. To the extent that the inability to sell shares increases the monitoring incentives of shareholders, we expect that CEO pay in private firms will be based more on subjective measures, and will be less sensitive to accounting profits and stock prices. To explore this question, we follow an approach similar to that used by Murphy (1985) and Aggarwal and Samwick (1999) and estimate the following panel data regression with firm

fixed effects:

$$\begin{aligned} \ln(\text{CEO Pay}) = & \alpha + \beta_1 \text{Public} + \beta_2 \text{Firm Size} + \beta_3 \text{ROA} + \beta_4 \text{Lagged ROA} + \beta_5 \text{Stock Return} + \\ & \beta_6 \text{Lagged Stock Return} + \beta_7 \text{Public} \times \text{ROA} + \beta_8 \text{Public} \times \text{Lagged ROA} + \beta_9 \text{Public} \times \text{Stock Return} + \\ & \beta_{10} \text{Public} \times \text{Lagged Stock Return} + \beta_{11} \text{Other Firm Characteristics} + \beta_{12} \text{CEO Characteristics} + \\ & \text{Firm FE} + \text{Year FE} + \varepsilon, \end{aligned} \tag{3}$$

where the dependent variable is CEO total pay. We include year fixed effects to account for the time trend in pay. The inclusion of firm fixed effects allows us to interpret the coefficient estimates on the firm performance variables as measures of pay-performance sensitivities (see Aggarwal and Samwick (1999)). The interaction terms measure the incremental differences in pay-performance sensitivity in public firms relative to that in private firms. Table 5 presents the results.¹³

Columns (1) and (2) present the full sample results. The coefficient estimates on ROA and lagged ROA indicate that pay is largely unresponsive to accounting performance in private firms. In contrast, the coefficient estimates on the interactions between the *Public* indicator variable and the ROA measures are both positive and statistically significant, indicating that pay responds positively to accounting performance for public firms. For private firms, there is some evidence that pay responds positively to the contemporaneous stock-price performance of public firms in the same industry, while for public firms, there is stronger evidence that pay responds to both current and lagged firm-specific stock returns.

To provide additional evidence on how pay responds to performance in the two types

¹³ We focus on the case where total pay is used as the dependent variable, but obtain similar results when we use cash pay as the dependent variable instead (not reported). Further, we find that CEO pay in both public and private firms responds positively to the industry wide (either mean or median) operating performance, suggesting a lack of relative performance evaluation in setting pay for both types of firms

of firms, Columns (3) and (4) estimate the pay regressions separately for the two types of firms. The results largely mirror those in the full sample regressions, with the exception that private firms show some pay-performance sensitivity to lagged accounting performance. Again, there is no evidence that the pay in private firms responds to stock returns of their publicly traded industry peers. In contrast, pay responds positively to both accounting and stock price performance in public firms similar to what has been documented elsewhere in the literature. Based on the coefficient estimates, a 1% increase in current (lagged) ROA is associated with a 0.27% (0.27%) increase in CEO pay in public firms. For private firms, only lagged accounting performance appears to have any effect on CEO pay. Similarly, a 1% increase in current (lagged) stock returns translates into a 0.13% (0.14%) increase in CEO pay in public firms, but has no effect on pay in private firms.

It is possible that our stock return measure for private firms does not capture firm-specific performance (had private firms been listed), leading to a weak association between pay and stock returns for private firms. To examine this possibility, in Column (5) we separate the stock return of public firms into two parts: industry-size return and abnormal stock return. The industry-size return is the median stock return of public firms in the same industry and size decile, following the same definition of the private firm stock return; and the abnormal stock return is the difference between the public firm-specific stock return and its industry-size return. Through this decomposition, the industry-size return is the same as the stock return for private firms in Column (3), and we can clearly identify whether CEO pay in public and private firms responds differently to the same industry-level stock performance. Column (5) shows that the pay in public firms is positively and significantly associated with both the industry-size return and the abnormal stock return. A one percent increase in current

(lagged) industry-size return predicts a 0.10% (0.12%) increase in pay for public firm CEOs, as opposed to the insignificant effect of industry performance on pay in private firms shown in Column (3). We conclude that private firm pay does not respond to industry-wide stock performance, but that public firm pay responds similarly to both industry-wide and firm-specific stock returns.

The results in Table 5 are consistent with Hypothesis **H3** that there is a stronger pay-performance relation in public firms than private firms, and are consistent with Ke, Petroni, and Safieddine (1999) who show that there is an insignificant relation between return on assets and level of CEO pay in private insurance companies. Similarly, Cadman, Klasa, and Matsunaga (2010) find that in ExecuComp firms, cash pay responds more strongly to accounting and stock market performance as compared to non-ExecuComp firms. They interpret their findings as consistent with different contracting environments for ExecuComp versus non-ExecuComp firms.

As pointed out in Holmström (1979), the first-best compensation contract should be made contingent on the agent's effort, not performance, when the effort is observable and verifiable. However, when it is impossible or prohibitively costly to observe the agent's effort, the compensation should be based on noisy performance measures with more weight being placed on measures that are most informative about the agent's effort. In private firms, the inability of shareholders to sell their shares increases their monitoring incentives, all else equal.¹⁴ In contrast, in public firms, monitoring incentives are weaker and stock prices and

¹⁴ In addition to the increase in monitoring incentives arising from illiquidity, it is also possible that subjective performance measures are more valuable in private firms because private firm CEOs tend to have a close personal relation with owners, hold a significant stake in the firm, and be monitored by few majority shareholders and large private lenders (Ke, Petroni, and Safieddine (1999)). Therefore, in private firms, explicit performance measures may be used less frequently to determine CEO compensation.

accounting performance measures become more useful for determining CEO pay.

4.4 Differences in Pay Levels between Public and Private Firms

In this section we examine differences in pay levels between public and private firms. The principal agent model predicts that pay will be equal to the manager's reservation wage plus additional premiums for effort and bearing risk. The fact that public firm CEOs have lower overall incentives, suggest that, all else equal, they would be paid less than their private firm counterparts. Alternatively, to the extent that labor markets are segmented between public and private firms, pay could be higher in public firms if outside opportunities are greater for public firm CEOs.

To begin our analysis, Figure 1 plots average CEO total pay and firm size (based on sales) for both public and private firms over time.¹⁵ As seen in the figure, there are distinct upward trends in average CEO pay and in average firm size in both public and private firms. A statistical test cannot reject the null that there are no differences in the time trends of average CEO pay and average firm size between the public and private firms. This result differs from that in Cole and Mehran (2008), who report that total pay in their sample of small private firms actually fell between 1993 and 2003. Instead, our findings suggest that the link between the growth in pay and firm size for public firms documented in Gabaix and Landier (2008) is also present in large private firms.

In addition to the time trend in pay, the figure also shows that CEO pay and firm size of private firms lie below those of public firms in every sample year. To explore these differences in pay we test for the existence of a public firm CEO pay premium relative to

¹⁵ When using the sample median measures, we still observe similar time trends in both firm size and CEO pay for public and private firms.

private firm CEOs. We employ an approach similar to the one used in Fernandes et al. (2009) to examine cross-country pay differences by estimating the following OLS regression:

$$\begin{aligned} \ln(\text{CEO Pay}) = & \alpha + \beta_1 \text{Public} + \beta_2 \text{Firm Size} + \beta_3 \text{Other Firm Characteristics} \\ & + \beta_4 \text{CEO Characteristics} + \text{Industry FE} + \text{Year FE} + \varepsilon, \end{aligned} \quad (4)$$

where the dependent variable is the natural logarithm of either CEO total pay or cash pay.

The results are reported in Table 6.

Columns (1)-(3) report the results when the dependent variable is total pay.¹⁶ The coefficient on the *Public* indicator variable is positive and significant, implying a public firm pay premium of 18% ($e^{0.166} - 1$), after controlling for firm and CEO characteristics and industry and year fixed effects (see Column (3)). Columns (4)-(6) present the results when the dependent variable is cash pay. The coefficient on the *Public* indicator variable is always positive and significant under different model specifications, and the estimates imply a public firm cash pay premium of 6% after the usual controls (see Column (6)). It is worth pointing out that our sample of private firms is much more similar to listed firms than the typical private firms examined in prior work (see for example, Cavalluzzo and Sankaraguruswamy (2000)), as such, it is even more striking that we find this public firm pay premium in our sample.

To further assess the robustness of the public firm pay premium we perform several adjustments. First, there are two offsetting effects on CEO compensation of having listed shares. On the one hand, CEOs of public firms have access to a more liquid capital market for selling their shares, which should imply lower pay all else equal. On the other hand, the

¹⁶ The negative relation between pay and operating performance in the cross-section is also documented in Fernandes et al. (2009). See Murphy (1985) for an argument of why one might observe a negative relation between pay and performance in cross-sectional regressions.

exposure to equity price risk in the capital market would imply a larger risk premium for equity-based CEO pay in public firms. To explore whether public firm CEOs' exposure to equity price risk can explain the substantial pay premium that we document, we follow the method developed by Meulbroek (2001) and compute the risk-adjusted pay for our sample CEOs. Specifically, in Meulbroek's framework, the risk-adjusted value of a firm's stock to its undiversified CEO depends on the firm-specific volatility, the market portfolio volatility, the beta, and the market-adjusted excess return. The risk-adjusted value of a firm's stock option can be obtained by applying the Black-Scholes formula by replacing the firm's market stock price with the risk-adjusted stock price. We follow Meulbroek's method to obtain the risk-adjusted stock and option values for public firms. For private firms, the risk-adjusted stock and option values are obtained using the industry- and size-matched median parameters of public firms as inputs. Salary and bonus are not affected by this risk-adjustment.

In Column (1) of Table 7, we repeat the regressions in Column (3) of Table 6 using the risk-adjusted pay as the dependent variable. The coefficient on the *Public* indicator variable is 0.117 implying that the predicted risk-adjusted CEO pay remains 12% ($e^{0.117} - 1$) higher in public firms compared to pay in private firms after controlling for firm and CEO characteristics and industry and year fixed effects.

Second, private firm CEOs could receive less annual compensation because their higher ownership stake leads to higher dividend payments. Once accounting for CEOs' dividend income, there will be no public firm pay premium. To examine this possibility, we compute the dividend-adjusted pay as the sum of CEO total pay and her dividend income, where the dividend income equals the firm's aggregate annual dividend payout multiplied by the CEO ownership. In Column (2) of Table 7, we repeat the regressions in Column (3) of

Table 6 using the dividend-adjusted pay as the dependent variable.¹⁷ The coefficient on the *Public* indicator variable is 0.15 implying that the predicted CEO pay remains 16% ($e^{0.15} - 1$) higher in public firms compared to pay in private firms after adjusting for dividend income.

Finally, the public firm pay premium could also be compensation for higher employment risk if CEOs in public firms are more likely to experience job separation than their private firm counterparts. To explore this possibility, we follow Jensen and Murphy (1990) to estimate the CEO turnover probability based on the following logit regression:

$$Pr(\text{Turnover} = 1) = F(\text{Public}, \text{ROA}, \text{Lagged ROA}, \text{Stock Return}, \text{Lagged Stock Return}, \text{CEO age} \geq 65 \text{ dummy}, \text{Founder}, \text{Industry FE}, \text{Year FE}), \quad (5)$$

where the dependent variable, *Turnover*, equals one if the firm changes its CEO in that year, and zero otherwise. The function F denotes the logit cumulative distribution function. The independent variables include the public firm indicator variable, firm performance, an indicator variable for CEO beyond age 65, a founder indicator variable, and industry and year fixed effects. In untabulated analysis, we find that public firm CEOs are more likely to be replaced, indicating a high employment risk for running a public company.

We define the turnover-adjusted pay as CEO total pay \times (1 – turnover probability). The economic intuition behind this variable is as follows. Assuming that a CEO will receive \$100 as compensation if she keeps her job and nothing if she is fired, and the turnover probability is 0.1, then the ex-ante annual pay after adjusting for turnover is roughly \$90 (100×0.9). In Column (3) of Table 7, the dependent variable is the turnover-adjusted pay and the coefficient on the *Public* indicator variable is 0.127 and is significant at the 1% level. This

¹⁷ Notably, we do not include CEO ownership as our independent variable in Column (2) Table 7, because the dividend-adjusted pay is a linear function of ownership by construction.

result indicates a 14% public firm pay premium after adjusting for employment risk, as opposed to the 18% premium without the adjustment. Overall, the pay premium for public firm CEOs that we document is robust after accounting for equity risk, dividend income, and employment risk.

5. Additional Investigation

The pay premium in public firms that we document does not appear to be driven by differences in the exposure to equity price risk or the risk of job loss. Instead, a possible explanation for the large public firm pay premium is that public and private firms compete in different labor markets. We explore this issue below.

5.1 Labor Market Segmentation in Public and Private Firms

To provide some initial evidence on labor market segmentation we regress the change in CEO pay in private firms on the change in firm size, and both contemporaneous and lagged firm performance measures. We then add to this regression the change in pay of a representative public firm in the same industry. To the extent that the labor markets are integrated we expect a positive correlation between the changes in CEO pay in private and public firms after controlling for changes in firm characteristics. The results of this analysis are reported in Table 8. Columns (1)-(3) report the results using the average change in CEO pay of industry peer public firms, while Columns (4)-(6) use the median change. In all regressions, we show that the change in private firm CEO pay is significantly associated with changes in firm size, but is not significantly associated with any of the firm-specific performance measures. More importantly, there is no evidence that the pay of private firms

is correlated with changes in the pay of public firms in the same industry. The results are consistent with the view that labor markets for private and public firms are segmented.

In Table 9, we collect all outside successions for the private firms in our sample. Then, for each private firm succession, we match to an outside succession in a public firm that is in the same Fama-French 48 industry and has the closest sales. This results in a sample of 143 outside successions in our private firm sample and 143 matched successions in public firms. For each succession we determine the characteristics of the new CEO. As shown in the table, 73% of outside hires in private firms come from other private firms, while 66% of outside hires in public firms come from other public firms. In contrast, only 20 (14%) of new CEOs in private firms were hired from CEO positions in public firms and of these, 14 of the firms subsequently go public during our sample period. In general, the results provide additional support to the view that public and private firms compete in different labor markets for CEO talent.

5.2 Changes in Pay and the Transition from Private to Public Status

As a final analysis, we examine changes in pay for the set of firms in our sample that transition from private to public status.¹⁸ The transition from private to public status creates the opportunity for the CEO to trade vested shares. Although these transitions are not completely exogenous, they nevertheless serve as an interesting setting to test the predictions from the optimal contracting models and to provide corroborating evidence of the cross-sectional patterns documented earlier.

¹⁸ Leslie and Oyer (2009) and Asker, Farre-Mensa, and Ljungqvist (2010) show that it is very difficult to get CEO pay information for firms owned by private equity firms, or transitioning from public to private status. Due to data limitation, we could not examine CEO pay as firms moving from public ownership to private ownership.

We identify 574 firms in our sample that transition from private to public status and track their CEO pay for a period of three-years prior and three-years following the transition year.¹⁹ We also match each IPO firm to a control firm: The control firm is a public firm from the same Fama-French 48 industry and has the closest sales at the IPO year. Figure 2 plots the structure of pay, ownership, portfolio equity incentive, and the level of pay around the IPO year for both the IPO firm and the control firm.

Panel A underscores the change in the structure of CEO pay showing that the proportion of total pay from restricted stock and options increases significantly after the IPO. Panel B plots the time series of the dollar-value of CEO equity ownership, which equals the number of shares owned by the CEO multiplied by the share price. For the period prior to the IPO, the share price is the IPO offer price; for the period after the IPO, the share price is obtained at each fiscal year end. On average, the dollar value of CEO ownership drops substantially after going public. Panel C plots the time series of the CEO portfolio equity incentive. We find that there is a significant decrease after the private-to-public transition. The results in Panels B and C are consistent with Mikkelson, Partch, and Shah (1997) who show that going public typically leads to a separation of managerial control and stock ownership and potentially worsens managerial incentives. Moreover, they are also consistent with the predictions of the principal-agent models where managers are able to unwind their ownership (e.g., Gao (2010)) and with our prior analysis of the pay differences that were based on the cross-section of firms.

Panel D shows that the mean total pay increases significantly at the time of the IPO and remains permanently higher than the level before the IPO. The pay increase in IPO firms

¹⁹ Limiting the sample to 282 firms which have the same CEO from one year before the IPO to one year after the IPO generates the same pattern as shown in Figure 2.

is clearly more drastic than that in the control firms. Consistent with the pay premium result that we documented earlier, Panel E shows that cash pay increases only modestly around the IPO indicating that most of the increase in the level of pay comes from CEOs being given significantly more equity incentives following the IPO. However, the increase in equity-based pay is not accompanied by a corresponding decrease in the level of cash pay, which also increases following the IPO.

Overall, the results indicate a significant permanent shift in the structure and level of pay and managerial incentive as firms transit from private to public. The change in pay is largely driven by CEOs being given additional equity incentive, while the drop in equity incentives is due to managers' ability to sell shares on the public market and hence change their ownership levels. As a result, the shareholders compensate by changing the contract to have more equity-based pay to substitute for the CEO's equity ownership that is liquidated. The overall level of ownership net of sales falls, as we see in the post-IPO period, but the contractual incentives (e.g., new options) rise to replace the sold shares.

6. Conclusions

We provide some of the first large-sample evidence on differences in CEO compensation in public and large private US firms from the period 1999-2008. In terms of contracting environments, public firm CEOs can trade in the public market, which allows them to adjust their shareholding after the vesting restrictions lapse. In addition, the lack of a liquid market implies that private firm shareholders have stronger incentives to monitor as they cannot take the "Walk Street Walk." We first show that the structure of pay in public firms contains significant equity-based incentives, while private firms rely more on salary and

bonus. In addition, public firm pay is positively related to both accounting and stock price performance, while private firm pay is basically unrelated to firm performance, consistent with direct monitoring being a substitute for explicit incentives in private firms. In terms of total portfolio incentives, there is a public firm shortfall in providing overall equity incentives. However, we find that, all else equal, public firm CEOs earn an 18% pay premium over private firm CEOs. This public pay premium persists after accounting for differences in equity risk, dividend policy, and CEO turnover between public and private firms, suggesting that public and private firms operate in segmented labor markets. Finally, we show that there is a significant change in both the structure and level of pay when firms transition from private to public status. Overall, our evidence is consistent with the predictions of the optimal contracting models in which both managers and shareholders can trade in public equity markets.

The substantive differences that we document are particularly interesting given that our sample of private firms have a relatively high level of disclosure compared to many private firms and are also more comparable to public firms in terms of size and other accounting measures. Future research, will attempt to link these differences in pay practices more directly to differences in the labor markets and contracting environments faced by the different types of firms.

Appendix 1:
Data Sources of Private Firms Covered by CIQ

The sample of private firms consists of 7,767 firm-year observations from 1999-2008, obtained from CIQ. The last column reports the accumulative number of private firms that were taken private through LBOs. The information about the firm's filings, public debt, and LBO history is also obtained from CIQ.

Year	Private Firms	Private Firms with 10-K Filings	Private Firms with Public Debt as of December 31, 2008	Private Firms Involved in LBOs
1999	627	280	59	8
2000	749	416	136	20
2001	849	486	182	21
2002	869	488	220	26
2003	941	445	245	46
2004	890	427	242	56
2005	767	392	224	61
2006	763	358	217	73
2007	661	318	214	84
2008	651	547	221	79
Total	7767	4157	1960	474

Appendix 2: Computing CEO Pay in Private Firms

Mr. Daniel Thomas is the CEO of Concentra Operating Corp. The company was founded in 1979, based in Addison, Texas, and operates in the healthcare industry. In 2004, Mr. Thomas received \$568,654 as salary, \$850,000 as bonus, \$1,636,500 as restricted stock grant, 200,000 shares of option grant, and \$18,146 as other compensation which consists of his life insurance policy and medical examination expenses.

With respect to the restricted stock grant, the footnote of the filing stated, “Because there is no active trading market for Concentra’s common stock, we rely on the Compensation Committee to determine in good faith the fair value of securities underlying awards at the time they are granted...”

The firm’s filing also provided relevant information about the option grant: It expires in 10 years, has a strike price of \$15. We apply the Black-Scholes formula with the following input:

Strike price: 15

Volatility: 0.428 (the median volatility of public firms in the healthcare industry and the same size decile)

Risk-free rate: 3.94% (the 7-year Treasury bond yield prevailing on the grant date)

Grant-date price: 15 (assuming that the option is granted at-the-money)

Dividend yield: assumed to be zero

Time to maturity: $70\% \times 10 = 7$ years (following ExecuComp’s method, we apply 70% of the stated time to maturity)

In the end, we obtain a value of \$1,523,299 for his option grant.

The total compensation for Mr. Thomas in year 2004 is thus \$4,596,599 ($\$568,654 + \$850,000 + \$1,636,500 + \$1,523,299 + \$18,146$).

Concentra Operating Corp. Form 10-K filed on Mar-29-2006 - Microsoft Internet Explorer provided by Nanyang Business School

https://www.capitaliq.com/CIQDotNet/filings/SECPopUp.aspx?dcn=0001193125-06-067009&activetext=568,654_08pageValue=568654&cId=15418223f/ieDate=12/31/2004#active

Capital IQ Concentra Operating Corp. Form 10-K filed on Mar-29-2006

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ITEM 11. EXECUTIVE COMPENSATION

Summary Compensation Table

The following table summarizes the compensation paid or earned for the fiscal year 2005, 2004, and 2003 to Concentra Holding's and Concentra Operating's Chief Executive Officer and the three most highly compensated executive officers of Concentra Holding and Concentra Operating other than the Chief Executive Officer serving in this capacity as of December 31, 2005. These executive officers are referred to as the named executive officers.

Name and Principal Position	Year	Annual Compensation			Long-Term Compensation Awards		All Other Compensation (\$ (4))
		Salary (\$)	Bonus (\$ (1))	Other Annual Compensation (\$)	Restricted Stock Awards (\$ (2) (3))	Securities Underlying Options	
Daniel J. Thomas	2005	\$569,615	\$ 38,281	—	\$ —	—	\$ 82,766
President and Chief Executive Officer, Director	2004	568,654	850,000	—	1,636,500(5)(6)	200,000	18,146
	2003	500,000	100,000	—	—	—	644
James M. Greenwood	2005	319,616	19,588	—	—	—	43,403
Executive Vice President - Corporate Development	2004	311,289	197,500	—	276,000(5)(6)	45,000	9,472
	2003	295,000	—	—	24,240	—	519
Thomas E. Kiraly	2005	349,808	9,783	—	—	—	26,395
Executive Vice President, Chief Financial Officer and Treasurer	2004	352,077	435,000	—	633,000(5)	120,000	10,472
	2003	320,000	85,000	—	90,910	—	1,525
Richard A. Parr II	2005	294,808	22,036	—	—	—	50,741
Executive Vice President, General Counsel and Corporate Secretary	2004	295,636	190,000	—	151,500(5)(6)	25,000	12,731
	2003	278,500	85,000	—	18,180	—	1,643

(1) The bonus amounts paid in 2005 were related to the termination of certain split-dollar life insurance agreements. Pursuant to such agreements, the Company paid the cost of

Appendix 3: Comparing Compensation Data between CIQ and ExecuComp Firms

The sample consists of 12,360 public firm-year observations that are included in both CIQ and ExecuComp from 1999-2008. Definitions of all variables are provided in Appendix 4. All dollar values are in 2008 dollars. The corresponding data items in ExecuComp are *TDC1* for Totalpay, *RSTKGRNT* for Stock, and *OPTION_AWARDS_BLK_VALUE* for Option (ExecuComp stops reporting *RSTKGRNT* and *OPTION_AWARDS_BLK_VALUE* after 2005; therefore the comparison of *Stock* and *Option* is for the period 1999-2005).

	CIQ		ExecuComp		Correlation Coefficient
	Mean	Median	Mean	Median	
Totalpay (\$K)	6689	4001	6614	4068	0.95
Salary (\$K)	783	742	799	759	0.95
Bonus (\$K)	1296	640	1109	620	0.87
Stock (\$K)	886	0	649	0	0.93
Option (\$K)	3702	1419	3598	1628	0.91
Sales (\$M)	5887	1665	6233	1734	0.99
Total Assets (\$M)	11847	2260	11863	2268	0.99

Appendix 4: Variable Definitions

<i>Variable</i>	<i>Definition</i>
Public	an indicator variable that takes the value of one if the firm is a public firm, and zero otherwise
Cashpay	the sum of salary and bonus.
Stock	When public and private firms in our sample pay their CEOs with restricted stock, we take the value of restricted stock as reported by the firm.
Option	For public firms, we calculate the dollar value of each option grant, based on ExecuComp's modified Black-Scholes approach. To compute the value of an option grant, ExecuComp assumes: (1) the volatility is the annualized standard deviation of stock returns during the 60 months prior to the grant date; (2) the risk-free rate is the seven-year Treasury bond yield prevailing on the grant date; (3) the grant-date stock price is the exercise price (the option is granted at-the-money); (4) the dividend yield is average dividend yields over a three-year period prior to the grant; and (5) the time to maturity is equal to 70% of the stated maturity. With respect to the value of option grants for private firm CEOs, we hand collect relevant information and make the following assumption to compute the value: (1) the volatility is the median volatility of public firms in the same industry and size decile; (2) the risk-free rate is the seven-year Treasury bond yield prevailing on the grant date; (3) the grant-date stock price is the exercise price (the option is granted at-the-money); (4) the dividend yield is zero; and (5) the time to maturity is 70% of the stated maturity.
Equity-based Pay	the sum of the grant-date value of restricted stock awards (<i>Stock</i>) and the Black-Scholes value of granted options (<i>Option</i>).
Otherpay	the sum of long-term incentive plans, premiums for insurance policies, and medical expenses.
Totalpay	the sum of the CEO's salary, bonus, the grant-date value of restricted stock awards (<i>Stock</i>), and the Black-Scholes value of granted options (<i>Option</i>), and other pay (<i>Otherpay</i>).
MBA	an indicator variable that takes the value of one if the CEO holds an MBA degree, and zero otherwise.
Male	an indicator variable that takes the value of one if the CEO is a male, and zero otherwise.
Founder	an indicator variable that takes the value of one if the CEO is one of the firm's founders, and zero otherwise.
Chairman	an indicator variable that takes the value of one if the CEO is Chairman of the Board, and zero otherwise.
Ownership	the firm's shares owned by the CEO normalized by the total number of shares outstanding. For public firms, we first collect the ownership data from ExecuComp, Corporate Library, and IRRC; for firms not covered in those databases, we hand collect the ownership data from the firm's annual reports and proxy statements. For private firms, we hand collect the ownership data from the firm's annual reports and proxy statements.
Portfolio Equity Incentive	the dollar-value change of the stock and options held by a CEO per \$1,000 shareholder return. Specifically, portfolio equity incentive is computed as $[1000 \times (\text{stock owned by CEO} + 0.6 \times \text{options owned by CEO}) / \text{total shares outstanding}]$; the option delta is assumed to be 0.6 for simplicity.
ROA	return on assets.
Stock return	For public firms, we use firm-specific stock return to measure the stock performance.

	To measure the stock return for private firms, we first sort public firms into sales deciles by industry and year, based on the CRSP-Compustat merged database. We then match each private firm to public firms in the same industry and size decile, and use the corresponding median stock return as the private firm's stock return.
Volatility	For public firms, we compute the volatility as the annualized standard deviation of firm-specific returns over the last 60 months. To measure the volatility for private firms, we first sort public firms into sales deciles by industry and year, based on the CRSP-Compustat merged database. We then match each private firm to public firms in the same industry and size decile, and use the corresponding median volatility as the private firm's volatility.
Capex	normalized by book value of total assets.
Cash	normalized by book value of total assets.
Book Leverage	normalized by book value of total assets.
Firm Age	the number of years since the firm's incorporation.
Number of Segments	the number of segments a firm has.
Industry-size Return	the median stock return of public firms in the same industry and size decile.
Abnormal stock return	the difference between the public firm-specific stock return and its industry-size return.
Dollar-value ownership	the number of shares owned by the CEO multiplied by the share price. For the period prior to the IPO, the share price is the IPO offer price; for the period after the IPO, the share price is obtained at each fiscal year end.

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Table 1. Sample Distribution

The sample consists of 7,767 private firm-year observations and 38,041 public firm-year observations from 1999-2008, obtained from CIQ. Panel A presents the sample distribution by year. The number in parentheses is the median sales (\$M) in 2008 dollars. The last column reports the number of sample public firms that overlap with the firms in ExecuComp. Panel B presents the sample distribution by industry.

Panel A: Distribution of Sample Firms by Year

Year	Our Sample		CIQ Population		Number of Our Sample Public Firms Overlapping with ExecuComp Firms
	Private Firms	Public Firms	Private Firms	Public Firms	
1999	627 (26)	3285 (216)	5085 (18)	5332 (193)	996
2000	749 (90)	3721 (208)	4571 (31)	5389 (174)	1127
2001	849 (200)	3866 (207)	4320 (45)	5280 (167)	1146
2002	869 (195)	3961 (203)	4476 (49)	5188 (186)	1204
2003	941 (195)	4107 (216)	4611 (60)	5117 (212)	1311
2004	890 (230)	3984 (233)	29344 (14)	5061 (239)	1281
2005	767 (230)	4042 (265)	39691 (15)	5095 (256)	1382
2006	763 (175)	3684 (259)	35063 (14)	5065 (284)	1246
2007	661 (227)	3667 (274)	26126 (15)	4940 (290)	1339
2008	651 (255)	3724 (297)	26590 (14)	4874 (306)	1328
Total	7767 (173)	38041 (236)	179877 (15)	51341 (226)	12360

Panel B: Distribution of Sample Firms by Industry

Fama and French 48 Industry	Private Firms	Percentage of Total Private Firms	Public Firms	Percentage of Total Public Firms	Total
1 Agriculture	66	0.85%	80	0.21%	146
2 Food Products	164	2.11%	432	1.14%	596
3 Candy & Soda	24	0.31%	145	0.38%	169
4 Beer & Liquor	17	0.22%	86	0.23%	103
5 Tobacco Products	14	0.18%	58	0.15%	72
6 Recreation	60	0.77%	268	0.70%	328
7 Entertainment	223	2.87%	374	0.98%	597
8 Printing and Publishing	155	2.00%	298	0.78%	453
9 Consumer Goods	132	1.70%	524	1.38%	656
10 Apparel	51	0.66%	428	1.13%	479
11 Healthcare	151	1.94%	712	1.87%	863
12 Medical Equipment	176	2.27%	1267	3.33%	1443
13 Pharmaceutical Products	250	3.22%	2349	6.17%	2599
14 Chemicals	207	2.67%	583	1.53%	790
15 Rubber and Plastic Products	104	1.34%	229	0.60%	333

16 Textiles	58	0.75%	121	0.32%	179
17 Construction Materials	121	1.56%	514	1.35%	635
18 Construction	68	0.88%	358	0.94%	426
19 Steel Works Etc	55	0.71%	463	1.22%	518
20 Fabricated Products	27	0.35%	80	0.21%	107
21 Machinery	163	2.10%	1083	2.85%	1246
22 Electrical Equipment	81	1.04%	574	1.51%	655
23 Automobiles and Trucks	74	0.95%	406	1.07%	480
24 Aircraft	25	0.32%	138	0.36%	163
25 Shipbuilding, Railroad Equipment	4	0.05%	57	0.15%	61
26 Defense	11	0.14%	89	0.23%	100
27 Precious Metals	20	0.26%	141	0.37%	161
28 Non-Metallic and Industrial Metal Mining	50	0.64%	141	0.37%	191
29 Coal	31	0.40%	76	0.20%	107
30 Petroleum and Natural Gas	170	2.19%	1367	3.59%	1537
31 Utilities	472	6.08%	1072	2.82%	1544
32 Communication	276	3.55%	1133	2.98%	1409
33 Personal Services	81	1.04%	438	1.15%	519
34 Business Services	884	11.38%	4605	12.11%	5489
35 Computers	201	2.59%	1384	3.64%	1585
36 Electronic Equipment	162	2.09%	2442	6.42%	2604
37 Measuring and Control Equipment	67	0.86%	819	2.15%	886
38 Business Supplies	98	1.26%	329	0.86%	427
39 Shipping Containers	16	0.21%	86	0.23%	102
40 Transportation	125	1.61%	872	2.29%	997
41 Wholesale	353	4.54%	1250	3.29%	1603
42 Retail	308	3.97%	1837	4.83%	2145
43 Restaurants, Hotels, Motels	296	3.81%	721	1.90%	1017
44 Banking	865	11.14%	4826	12.69%	5691
45 Insurance	212	2.73%	1321	3.47%	1533
46 Real Estate	164	2.11%	258	0.68%	422
47 Trading	305	3.93%	918	2.41%	1223
48 Other	130	1.67%	289	0.76%	419
Total	7767	100%	38041	100%	45808

Table 2. Descriptive Statistics

The sample consists of 7,767 private firm-year observations and 38,041 public firm-year observations from 1999-2008, obtained from CIQ. Definitions of all variables are provided in Appendix 4. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Panel A presents descriptive statistics of CEO pay. Panel B presents descriptive statistics of CEO characteristics. Panel C presents descriptive statistics of firm characteristics.

Panel A: CEO Pay Characteristics

	Private Firms		Public Firms	
	Mean	Median	Mean	Median
Totalpay (K)	1374	519	2743	1010
Salary (K)	386	313	507	420
Bonus (K)	351	54	536	150
Stock (K)	125	0	346	0
Option (K)	187	0	992	0
Otherpay (K)	177	13	190	24

Panel B: CEO Characteristics

	Private Firms		Public Firms	
	Mean	Median	Mean	Median
MBA	0.15	0	0.17	0
Male	0.96	1	0.98	1
Founder	0.12	0	0.15	0
Chairman	0.49	0	0.62	0
CEO Age	51.76	52	53.40	53
Ownership	13.86%	3.27%	6.22%	1.70%
Portfolio Equity Incentive	157.82	42.80	73.77	25.74

Panel C: Firm Characteristics

	Private Firms		Public Firms	
	Mean	Median	Mean	Median
Sales (M)	937.76	172.66	1879.09	235.92
Total Assets (M)	3058.75	220.66	5936.68	456.13
ROA	-7.56%	2.19%	0.82%	3.13%
Lagged ROA	-2.86%	2.79%	0.86%	3.23%
Stock Return	9.27%	10.95%	11.94%	12.14%
Lagged Stock Return	11.37%	10.43%	15.85%	12.76%
Volatility	0.53	0.49	0.52	0.47
Sales Growth	31.88%	8.01%	22.09%	9.54%
Capex	4.81%	2.61%	4.23%	2.49%
Cash	13.29%	4.47%	16.90%	7.48%
Book Leverage	41.67%	35.03%	18.61%	13.67%
Firm Age	30.74	15	40.79	25
Number of Segments	1.51	1	1.95	1

Table 3. Difference in Pay Structure between Public and Private Firms

The sample consists of 7,767 private firm-year observations and 38,041 public firm-year observations from 1999-2008, obtained from CIQ. Columns (1)-(3) present the regression results when the dependent variable is the ratio of cash pay to total pay. Columns (4)-(6) present the regression results when the dependent variable is the ratio of equity-based pay to total pay. Definitions of all variables are provided in Appendix 4. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	Cashpay/Totalpay			Equity-based Pay/Totalpay		
	(1)	(2)	(3)	(4)	(5)	(6)
Public	-0.080*** [0.000]	-0.079*** [0.000]	-0.064*** [0.000]	0.117*** [0.000]	0.109*** [0.000]	0.096*** [0.000]
Ln(Sales)	-0.045*** [0.000]	-0.064*** [0.000]	-0.058*** [0.000]	0.042*** [0.000]	0.060*** [0.000]	0.053*** [0.000]
ROA		0.183*** [0.000]	0.171*** [0.000]		-0.169*** [0.000]	-0.149*** [0.000]
Lagged ROA		-0.027 [0.249]	-0.054** [0.022]		0.036* [0.072]	0.067*** [0.001]
Stock Return		-0.003 [0.337]	-0.004 [0.265]		0.005 [0.125]	0.005 [0.100]
Lagged Stock Return		-0.019*** [0.000]	-0.019*** [0.000]		0.021*** [0.000]	0.020*** [0.000]
Volatility		-0.029** [0.023]	-0.031** [0.015]		0.026** [0.027]	0.021* [0.077]
Sales Growth		-0.003 [0.408]	-0.004 [0.232]		0.002 [0.408]	0.003 [0.329]
Capex		-0.155*** [0.001]	-0.176*** [0.000]		0.209*** [0.000]	0.222*** [0.000]
Cash		-0.180*** [0.000]	-0.179*** [0.000]		0.202*** [0.000]	0.196*** [0.000]
Book Leverage		0.035*** [0.001]	0.029*** [0.006]		-0.049*** [0.000]	-0.039*** [0.000]
Ln(Firm Age)		0.002 [0.467]	0.002 [0.383]		-0.005* [0.050]	-0.003 [0.200]
Number of Segments		0.003 [0.125]	0.003 [0.163]		-0.004** [0.045]	-0.003 [0.139]
MBA			-0.028*** [0.000]			0.032*** [0.000]
Male			-0.011 [0.469]			0.002 [0.905]

Founder			0.015*			-0.010
			[0.050]			[0.151]
Chairman			-0.040***			0.034***
			[0.000]			[0.000]
Ln(CEO Age)			0.054***			-0.137***
			[0.001]			[0.000]
Ownership			0.243***			-0.285***
			[0.000]			[0.000]
Constant	1.522***	1.933***	1.607***	-0.620***	-0.976***	-0.284***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]

Industry and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45808	39269	38271	45808	39269	38271
Adj R2	17%	20%	21%	20%	22%	24%

Table 4. Difference in Portfolio Equity Incentive between Public and Private Firms

The sample consists of 7,767 private firm-year observations and 38,041 public firm-year observations from 1999-2008, obtained from CIQ. The dependent variable is the CEO's portfolio equity incentive. Definitions of all variables are provided in Appendix 4. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects (FE) are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	(1)	(2)	(3)
Public	-61.959*** [0.000]	-44.486*** [0.000]	-53.985*** [0.000]
Ln(Sales)	-12.473*** [0.000]	-20.909*** [0.000]	-21.337*** [0.000]
ROA		47.161*** [0.000]	49.353*** [0.000]
Lagged ROA		49.427*** [0.000]	43.031*** [0.000]
Stock Return		0.880 [0.569]	0.315 [0.830]
Lagged Stock Return		-1.903 [0.188]	-3.033** [0.030]
Volatility		33.619*** [0.000]	34.152*** [0.000]
Sales Growth		1.020 [0.494]	-0.142 [0.923]
Capex		56.559* [0.091]	34.510 [0.282]
Cash		-5.190 [0.640]	-10.384 [0.333]
Book Leverage		43.905*** [0.000]	44.129*** [0.000]
Ln(Firm Age)		0.591 [0.729]	2.245 [0.179]
Number of Segments		3.979*** [0.001]	3.371*** [0.004]
MBA			-11.154*** [0.000]
Male			11.961 [0.263]
Founder			66.311*** [0.000]

Chairman			47.168***
			[0.000]
Ln(CEO Age)			46.970***
			[0.000]
Constant	388.963***	488.693***	260.933***
	[0.000]	[0.000]	[0.000]
Industry and Year FE	Yes	Yes	Yes
Observations	42234	38509	38271
Adj R2	12%	13%	20%

Table 5. Difference in Pay-Performance Sensitivity between Public and Private Firms

The sample consists of 7,767 private firm-year observations and 38,041 public firm-year observations from 1999-2008, obtained from CIQ. The dependent variable is Ln(Totalpay). Columns (1) and (2) present the full sample results. Column (3) employs only the private firm sample. Columns (4) and (5) employ only the public firm sample. Definitions of all variables are provided in Appendix 4. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Firm and year fixed effects are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	Full Sample		Private Firms	Public Firms	Public Firms
	(1)	(2)	(3)	(4)	(5)
Public	0.077** [0.036]	0.071* [0.073]			
Ln(Sales)	0.194*** [0.000]	0.194*** [0.000]	0.215*** [0.000]	0.192*** [0.000]	0.193*** [0.000]
ROA	-0.183 [0.119]	-0.193 [0.109]	0.025 [0.880]	0.271*** [0.000]	0.275*** [0.000]
Lagged ROA	-0.035 [0.785]	0.049 [0.714]	0.303** [0.048]	0.271*** [0.000]	0.270*** [0.000]
Stock Return	0.095*** [0.005]	0.103*** [0.003]	0.048 [0.262]	0.130*** [0.000]	
Lagged Stock Return	0.006 [0.902]	0.000 [0.994]	0.039 [0.451]	0.141*** [0.000]	
Industry-size Return					0.101*** [0.000]
Lagged Industry-size Return					0.121*** [0.000]
Abnormal Stock Return					0.131*** [0.000]
Lagged Abnormal Stock Return					0.135*** [0.000]
Public × ROA	0.606*** [0.000]	0.596*** [0.000]			
Public × Lagged ROA	0.331** [0.026]	0.254* [0.097]			
Public × Stock Return	0.029 [0.393]	0.023 [0.509]			
Public × Lagged Stock Return	0.129*** [0.010]	0.137*** [0.007]			
Volatility	-0.015 [0.665]	-0.004 [0.919]	0.029 [0.825]	-0.009 [0.801]	-0.008 [0.831]
Sales Growth	-0.004	-0.001	0.024	-0.000	0.000

	[0.535]	[0.938]	[0.236]	[0.980]	[0.977]
Capex	0.825***	0.839***	-0.079	0.977***	0.981***
	[0.000]	[0.000]	[0.813]	[0.000]	[0.000]
Cash	0.214***	0.199***	0.268	0.210***	0.209***
	[0.000]	[0.000]	[0.124]	[0.000]	[0.000]
Book Leverage	-0.170***	-0.156***	-0.290***	-0.152***	-0.153***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln(Firm Age)	0.181***	0.165***	0.033	0.184***	0.182***
	[0.000]	[0.000]	[0.638]	[0.000]	[0.000]
Number of Segments	-0.004	-0.004	-0.006	-0.003	-0.003
	[0.484]	[0.443]	[0.678]	[0.569]	[0.564]
MBA		0.007	-0.077	0.015	0.015
		[0.727]	[0.227]	[0.495]	[0.479]
Male		0.134***	-0.194	0.173***	0.173***
		[0.006]	[0.152]	[0.001]	[0.001]
Founder		-0.134***	0.106	-0.140***	-0.139***
		[0.000]	[0.383]	[0.000]	[0.000]
Chairman		0.080***	0.248***	0.073***	0.073***
		[0.000]	[0.000]	[0.000]	[0.000]
Ln(CEO Age)		0.040	-0.428**	0.077	0.075
		[0.460]	[0.026]	[0.174]	[0.182]
Ownership		-0.211***	0.177	-0.345***	-0.344***
		[0.002]	[0.184]	[0.000]	[0.000]
Constant	9.640***	9.387***	11.327***	9.277***	9.266***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Firm and Year FE	Yes	Yes	Yes	Yes	Yes
Observations	39269	38271	4363	33908	33908
Adj R2	42%	44%	48%	40%	40%

Table 6. Difference in CEO Pay between Public and Private Firms

The sample consists of 7,767 private firm-year observations and 38,041 public firm-year observations from 1999-2008, obtained from CIQ. Columns (1)-(3) present the regression results when the dependent variable is Ln(Totalpay). Columns (4)-(6) present the regression results when the dependent variable is Ln(Cashpay). Definitions of all variables are provided in Appendix 4. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects (FE) are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	Ln(Totalpay)			Ln(Cashpay)		
	(1)	(2)	(3)	(4)	(5)	(6)
Public	0.342*** [0.000]	0.225*** [0.000]	0.166*** [0.000]	0.170*** [0.000]	0.087*** [0.000]	0.055** [0.039]
Ln(Sales)	0.217*** [0.000]	0.475*** [0.000]	0.449*** [0.000]	0.180*** [0.000]	0.325*** [0.000]	0.309*** [0.000]
ROA		-0.657*** [0.000]	-0.616*** [0.000]		-0.234*** [0.000]	-0.218*** [0.000]
Lagged ROA		-0.241*** [0.001]	-0.144* [0.055]		-0.425*** [0.000]	-0.384*** [0.000]
Stock Return		0.130*** [0.000]	0.133*** [0.000]		0.113*** [0.000]	0.115*** [0.000]
Lagged Stock Return		0.176*** [0.000]	0.174*** [0.000]		0.109*** [0.000]	0.108*** [0.000]
Volatility		-0.081* [0.080]	-0.057 [0.206]		-0.229*** [0.000]	-0.189*** [0.000]
Sales Growth		-0.004 [0.711]	0.001 [0.939]		-0.024** [0.039]	-0.019 [0.101]
Capex		0.334* [0.051]	0.385** [0.024]		0.050 [0.760]	0.090 [0.589]
Cash		1.013*** [0.000]	1.028*** [0.000]		0.489*** [0.000]	0.522*** [0.000]
Book Leverage		0.098** [0.012]	0.129*** [0.001]		0.177*** [0.000]	0.200*** [0.000]
Ln(Firm Age)		0.024** [0.014]	0.018* [0.062]		0.047*** [0.000]	0.035*** [0.001]
Number of Segments		0.015** [0.034]	0.014** [0.031]		0.026*** [0.002]	0.025*** [0.003]
MBA			0.101*** [0.000]			0.041** [0.031]
Male			0.061 [0.208]			0.024 [0.516]

Founder			-0.060*			-0.097**
			[0.056]			[0.040]
Chairman			0.214***			0.153***
			[0.000]			[0.000]
Ln(CEO Age)			0.031			0.293***
			[0.608]			[0.000]
Ownership			-0.907***			-0.553***
			[0.000]			[0.000]
Constant	9.675***	4.304***	4.582***	9.783***	6.710***	5.815***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Industry and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	45808	39269	38271	45808	39269	38271
Adj R2	38%	55%	56%	31%	41%	42%

Table 7. Difference in CEO Pay between Public and Private Firms, Adjusted Pay

The sample consists of 7,767 private firm-year observations and 38,041 public firm-year observations from 1999-2008, obtained from CIQ. The dependent variable in Column (1) is the natural logarithm of the risk-adjusted total pay, following Meulbroek (2001). For public firms, the equity risk is based on the firms' specific information; for private firms, equity risk is based on the industry median value. The dependent variable in Column (2) is the natural logarithm of dividend-adjusted total pay. Dividend-adjusted total pay is defined as the sum of *Totalpay* and the CEO's dividend income, where the dividend income equals the CEO ownership multiplied by the firm's dividend payment. The dependent variable in Column (3) is the natural logarithm of turnover-adjusted total pay. Turnover-adjusted total pay is defined as $Totalpay \times (1 - \text{turnover probability})$, where turnover probability is the probability of the CEO turnover estimated from Equation (2). Definitions of all variables are provided in Appendix 4. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects (FE) are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	(1) Adjust for Equity Risk	(2) Adjust for Dividend	(3) Adjust for Turnover
Public	0.117*** [0.000]	0.150*** [0.000]	0.127*** [0.000]
Ln(Sales)	0.432*** [0.000]	0.475*** [0.000]	0.450*** [0.000]
ROA	-0.516*** [0.000]	-0.654*** [0.000]	-0.499*** [0.000]
Lagged ROA	-0.130* [0.078]	-0.160** [0.032]	-0.106 [0.156]
Stock Return	0.124*** [0.000]	0.125*** [0.000]	0.188*** [0.000]
Lagged Stock Return	0.181*** [0.000]	0.167*** [0.000]	0.227*** [0.000]
Volatility	-0.115** [0.011]	-0.194*** [0.000]	-0.061 [0.180]
Sales Growth	-0.001 [0.937]	0.003 [0.815]	0.004 [0.725]
Capex	0.312* [0.064]	0.330* [0.051]	0.363** [0.030]
Cash	1.011*** [0.000]	1.106*** [0.000]	1.018*** [0.000]
Book Leverage	0.119*** [0.002]	0.083* [0.050]	0.116*** [0.003]
Ln(Firm Age)	0.024** [0.011]	0.030*** [0.002]	0.001** [0.032]
Number of Segments	0.017** [0.013]	0.016** [0.016]	0.013** [0.037]
MBA	0.090***	0.091***	0.096***

	[0.000]	[0.000]	[0.000]
Male	0.072	0.041	0.063
	[0.134]	[0.412]	[0.190]
Founder	-0.052*	-0.067**	0.005
	[0.100]	[0.030]	[0.880]
Chairman	0.209***	0.203***	0.221***
	[0.000]	[0.000]	[0.000]
Ln(CEO Age)	0.090	0.097	-0.001
	[0.133]	[0.131]	[0.529]
Ownership	-0.825***		-0.874***
	[0.000]		[0.000]
Constant	4.540***	3.916***	4.626***
	[0.000]	[0.000]	[0.000]
Industry and Year FE	Yes	Yes	Yes
Observations	38271	38271	38271
Adj R2	55%	57%	57%

Table 8. Pay Change in Private Firms versus Pay Change in Public Firms

The dependent variable is the change in total pay (ΔPay) for our sample of private firms, where ΔPay is defined as $Ln(Totalpay)_t - Ln(Totalpay)_{t-1}$. For each private firm-year observation, we compute the mean and median ΔPay for the public firms in the same industry in that year (*Mean Public ΔPay* and *Median Public ΔPay* , respectively). The variable $\Delta Sales$ is the change in sales, defined as $Ln(Sales)_t - Ln(Sale)_{t-1}$. Definitions of all variables are provided in Appendix 4. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects are included in the regressions and the heteroskedasticity-consistent standard errors account for possible correlation within a firm cluster. Superscripts ***, **, * correspond to statistical significance at the 1, 5, and 10 percent levels, respectively. P-values are reported in brackets.

	(1)	(2)	(3)	(4)	(5)	(6)
Mean Public ΔPay	0.094 [0.350]	0.141 [0.169]	0.088 [0.431]			
Lagged Mean Public ΔPay			-0.081 [0.483]			
Median Public ΔPay				0.182 [0.317]	0.178 [0.315]	0.018 [0.925]
Lagged Median Public ΔPay						0.025 [0.892]
$\Delta Sales$	0.181*** [0.000]	0.147*** [0.000]	0.158*** [0.000]	0.181*** [0.000]	0.148*** [0.000]	0.160*** [0.000]
ROA		0.052 [0.403]	-0.031 [0.666]		0.052 [0.402]	-0.031 [0.666]
Lagged ROA		-0.108 [0.208]	0.038 [0.707]		-0.108 [0.207]	0.039 [0.698]
Stock Return		0.024 [0.632]	0.037 [0.525]		0.027 [0.592]	0.044 [0.449]
Lagged Stock Return		-0.023 [0.641]	-0.066 [0.240]		-0.024 [0.635]	-0.073 [0.199]
Constant	0.014 [0.890]	-0.189 [0.135]	-0.179 [0.201]	0.015 [0.883]	-0.187 [0.139]	-0.186 [0.183]
Industry and Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	4576	3947	3619	4576	3947	3619
Adj R2	2.9%	2.8%	2.5%	3%	2.8%	2.5%

Table 9. Difference in CEO Talent Pool between Public and Private Firms

The sample consists of 143 outside successions in our private firm sample and 143 matched outside successions in our public firm sample. We first collect all outside successions for private firms in our sample. Then for each private firm outside succession, we match to an outside succession in a public firm based on the following criteria: (1) The succession in the public firm is within one year of the private firm succession, and (2) the public firm is in the same Fama-French industry and closest in sales in the year of the private firm succession.

	Private Firms	Public Firms
The new CEO worked as a CEO in a private firm	73 51%	30 21%
The new CEO worked as a non-CEO executive in a private firm	32 22%	17 12%
The new CEO worked as a CEO in a public firm	20 14%	41 28%
The new CEO worked as a non-CEO executive in a public firm	18 13%	55 38%
Total	143 100%	143 100%

Figure 1. CEO Pay and Firm Size over Time

The sample consists of 7,767 private firm-year observations and 38,041 public firm-year observations from 1999-2008, obtained from CIQ. Definitions of all variables are provided in Appendix 4. This figure presents the plots of sample mean CEO total pay (in thousands of dollars) and firm size (sales, in millions of dollars) across the public and private firm samples over time.

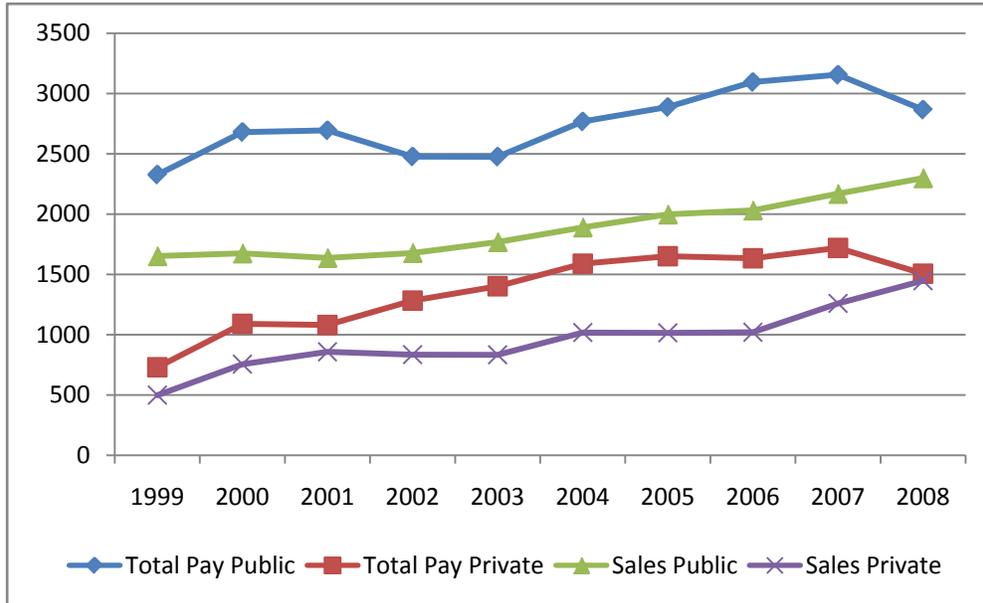
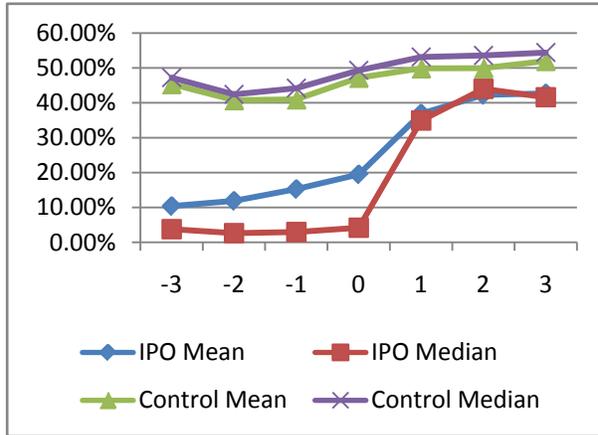


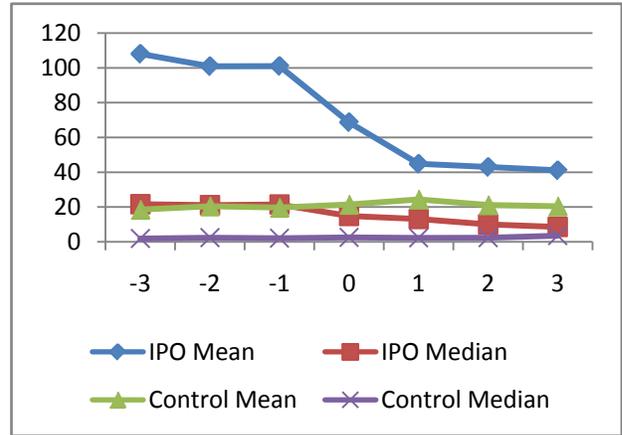
Figure 2. Change in CEO Pay around IPO

This figure is based on 574 IPO deals covered in our sample. We plot the time series of the structure of CEO pay, CEO ownership, CEO portfolio equity incentive, and the level of CEO pay centered around the year of IPO, which is year 0 in the plot. Each IPO firm is matched to a control firm that is a public firm in the same Fama-French 48 industry and has the closest sales in the IPO year. Definitions of all variables are provided in Appendix 4.

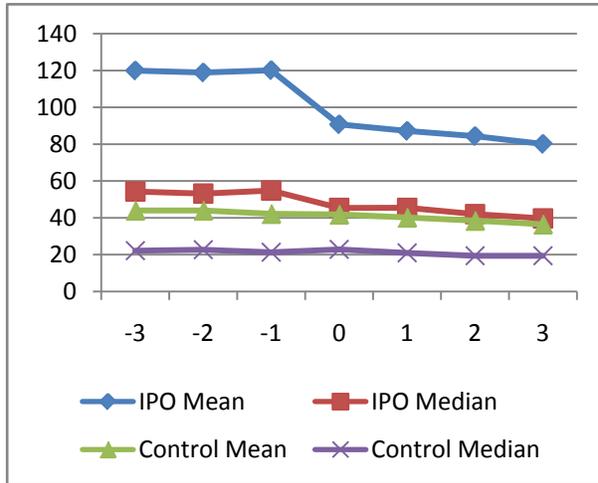
Panel A: Equity-based Pay / Totalpay



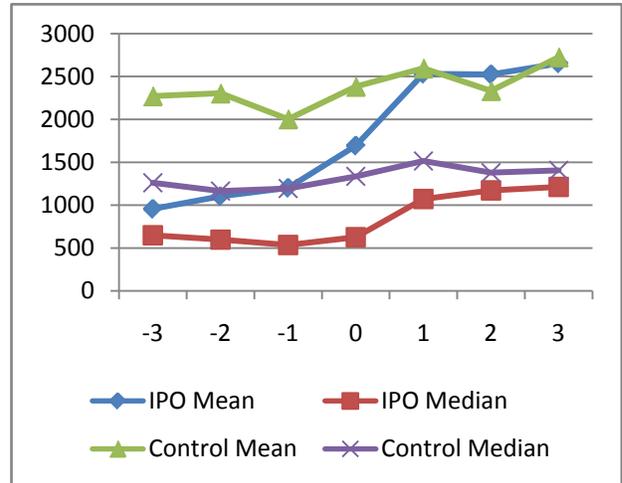
Panel B: Dollar-value CEO Ownership (M)



Panel C: Portfolio Equity Incentive



Panel D: Totalpay (K)



Panel E: Cashpay (K)

