Are CEOs in U.S. Public Firms Overpaid?
New Evidence from Private Firms[*]

Huasheng Gao
Nanyang Business School, Nanyang Technological University
S3-B1A-06, 50 Nanyang Avenue, Singapore 639798
65.6790.4653
hsgao@ntu.edu.sg

Michael Lemmon
David Eccles School of Business, University of Utah
1645 E Campus Center Drive Room 109
Salt Lake City, Utah 84112
801.585.5210
michael.lemmon@business.utah.edu

Kai Li
Sauder School of Business, University of British Columbia
2053 Main Mall, Vancouver, BC V6T 1Z2
604.822.8353
kai.li@sauder.ubc.ca

First version: May, 2010   This version: April, 2012

Abstract

We provide new evidence that counters the commonly made claim that CEOs in U.S. public firms are significantly overpaid. Using public and private firm CEO pay data made available through mandated SEC disclosures over the period 1999 to 2008, we first show that after controlling for firm and CEO characteristics, public firm CEOs are paid more than private firm CEOs, with a pay premium of about 20%, and that public firm CEOs are given more on-going equity incentives. This public firm pay premium becomes economically insignificant after risk-adjusting the pay, and accounting for differences in dividend policy and CEO turnover between public and private firms. We then show that both public and private firm CEO annual compensation is positively and significantly related to firm accounting performance, and that the pay-performance link is much stronger in public firms. We provide some evidence that the pay differential is related to labor market segmentation between these two types of firms and relatively stable over time. Finally, when firms transition from private to public, we find that both the level and structure of pay change significantly in ways that corroborate our findings from the cross-section.

Keywords: CEO annual compensation; equity incentives; pay structure; pay-performance sensitivity; private firms; public firms
JEL Classification: G34

Are CEOs in U.S. public firms Overpaid? New Evidence from Private Firms

Abstract

We provide new evidence that counters the commonly made claim that CEOs in U.S. public firms are significantly overpaid. Using public and private firm CEO pay data made available through mandated SEC disclosures over the period 1999 to 2008, we first show that after controlling for firm and CEO characteristics, public firm CEOs are paid more than private firm CEOs, with a pay premium of about 20%, and that public firm CEOs are given more on-going equity incentives. This public firm pay premium becomes economically insignificant after risk-adjusting the pay, and accounting for differences in dividend policy and CEO turnover between public and private firms. We then show that both public and private firm CEO annual compensation is positively and significantly related to firm accounting performance, and that the pay-performance link is much stronger in public firms. We provide some evidence that the pay differential is related to labor market segmentation between these two types of firms and relatively stable over time. Finally, when firms transition from private to public, we find that both the level and structure of pay change significantly in ways that corroborate our findings from the cross-section.

Keywords: CEO annual compensation; equity incentives; pay structure; pay-performance sensitivity; private firms; public firms

JEL Classification: G34

1. Introduction

The level and structure of compensation for top executives plays a number of important roles, including the provision of incentives for effort, the retention of human capital, and as a sorting mechanism. A large literature exists that examines the determinants of CEO pay in U.S. public firms, leading to the debate on whether these CEOs are overpaid.[1] Bebchuk, Fried, and Walker (2002) cite the pay gap between U.S. and foreign CEOs as evidence in support of their managerial power hypothesis. Bebchuk and Fried (2004) document a substantial increase in CEO pay that accelerated after 1995, and they conclude that CEO pay in the U.S. is excessive. On the other hand, Kaplan and Rauh (2010) shows that U.S. CEOs are strongly paid for performance, and that their pay has not increased as much as similarly talented individuals like hedge fund managers and private equity investors. Using U.S. and U.K. CEO pay and incentives data for 1997 and 2003, Conyon, Core, and Guay (2011) show that U.S. CEOs have higher pay, but they also hold substantially greater equity incentives than their U.K. counterparts. After controlling for the risk premium associated with equity-based pay, the median risk-adjusted pay for U.S. CEOs is not consistently higher than that for U.K. CEOs. Using CEO pay data across 14 countries, Fernandes, Ferreira, Matos, and Murphy (2011) show that the modest pay premium between U.S. CEOs and their foreign counterparts has declined in recent years as non-U.S. firms exposed to international and U.S. capital, product, and labor markets. In this paper we contribute to the debate by providing some of the first large-sample evidence on CEO pay in private U.S. firms over the period 1999 to 2008.

There are several reasons for our focus on a sample of private firm CEOs in the U.S. First, in this paper we exploit a database of private firms to help understand public firm CEO pay. It is worth noting that the level and structure of CEO pay in private firms in themselves are of great interest to financial

---

[1] See for example, the seminal work by Jensen and Murphy (1990), the survey by Murphy (1999), and the recent book by Bebchuk and Fried (2004).

economists due to a lack of data prior to our study.[2] Second, the contrast between public and private firms in their executive compensation design serves as cross-validation of prior research on CEO pay using only public firms. We expect that the variation in agency conflicts across these two types of firms is likely to be at least as substantial as the variation within public firms, allowing us to explore the importance of agency consideration in determining the level and structure of CEO pay.

Our new database that provides detailed information on CEO pay in a large number of private firms in the U.S. is based on the following mandatory SEC disclosure requirements. First, if a company decides on a registered public offering, the Securities Act requires it to file a registration statement (Form S-1) with the SEC that contains information on executive compensation. Second and more applicable to our sample of private firms, even if a company has not registered a securities offering, it must file an Exchange Act registration statement that contains information on executive compensation if: It has more than $10 million total assets and a class of equity securities, like common stock, with 500 or more shareholders; or it lists its securities on an exchange or on Nasdaq.[3]

Data for a vast majority (about 90%) of the private firm-year observations in our sample come from Form 10-K (annual reports) filed with the SEC, and the remainder comes from Form S-1 filed with the SEC due to public securities issuances. It is important to note that compared to other studies of private firms (see for example, Ke, Petroni, and Safieddine (1999), and Bengtsson and Hand (2011)), the private firms in our sample are much more representative of the sample of public firms in terms of size and industry coverage. Moreover, the majority of these private firms are subject to similar disclosure

---

[2] By contrast, because of data constraints, there is much less evidence regarding pay in private companies in the U.S. Piecemeal evidence on CEO pay in small private firms, early stage firms, and private insurance companies is provided by Cavalluzzo and Sankaraguruswamy (2000), Cole and Mehran (2011), Bengtsson and Hand (2011), and Ke, Petroni, and Safieddine (1999).

[3] After that, the company is required to continue reporting via annual and quarterly reports (Forms 10-K and 10-Q) unless it satisfies the following "thresholds," in which case its filing obligations are suspended: It has fewer than 300 shareholders of the class of securities offered; or it has fewer than 500 shareholders of the class of securities offered and less than $10 million in total assets for each of its last three fiscal years.

requirements as public firms, thus ensuring that the compensation data of private firms is of similar quality to that of public firms in our sample and that any differences that we document are not likely to be driven by reporting differences between the two types of firms.

Using a comprehensive sample of CEO pay in public and private firms over the period 1999 to 2008, we first show that after controlling for firm and CEO characteristics including her equity ownership, CEOs in public firms have total (cash) pay that is 19% (5%) higher on average than CEOs in private firms. This public firm pay premium has been relatively stable over time, and becomes economically insignificant after adjusting for the risk premium associated with equity-based pay, and accounting for differences in dividend policy and CEO turnover between public and private firms. We then show that public firm CEOs receive less of their annual compensation in the form of salary and bonus and more from restricted stock and options. Comparing the pay-performance sensitivity of annual CEO compensation in the two types of firms we find that changes in annual pay are positively and significantly related to accounting performance, but that the pay-performance link is much stronger in public firms. These results are robust to controlling for ownership differences between the two firm types, and are consistent with the view that private firms obtain smaller benefit from basing annual pay on firm performance and instead rely more on subjective incentive measures as compared to public firms (also see Ke et al. (1999), Engel, Gordon, and Hayes (2002), and Murphy and Oyer (2003)).

We conjecture that the public firm pay premium at least partially arises from labor market segmentation and provide some preliminary evidence consistent with this idea. We find that changes in CEO pay of private firms are not correlated with changes in CEO pay of public firms in the same industry. Further, we show that private firm CEOs are much more likely to be hired from other private firms, while public firm CEOs are more likely to be hired from other public firms.

Finally, to address the sample selection concern, we employ a transition sample when firms

change ownership and a matched public firm sample to the private firm sample. We show that the level of CEO annual compensation increases substantially, and that CEOs receive substantially more of their annual compensation in the form of restricted stock and options as firms transition from private to public ownership. The matched sample results largely corroborate our inferences drawn from the transition sample, and further support the view that the contracting environment matters in CEO compensation design. Taken together, we conclude that U.S. public firm CEOs are not significantly overpaid.

Our paper makes contribution to the compensation literature along the following dimensions. First, the commonly made claim that U.S. CEOs are "overpaid" raises the question: Overpaid relative to what? If only the pay of U.S. public firm CEOs is considered excessive, then there is a natural within-country benchmarking—the pay of U.S. private firm CEOs—against which to evaluate the compensation package of any given public firm CEO. In this paper, we provide new evidence to the debate on whether CEOs in U.S. public firms are significantly overpaid using pay of their private firm counterparts as a benchmark.

Second, we study the design of CEO incentive contracts for a set of firms that have very different contracting environment characteristics from those of firms typically examined in empirical studies on executive compensation, and hence can shed insight into how contracting environments impact compensation design within the U.S.

Finally, using both a sample of IPOs where private firms transition to public firms and a matched public firm sample, our paper addresses sample selection concerns in this type of studies and offers additional evidence in support of the view that reliance on performance-based contracts in public firms can act as a substitute for direct monitoring in private firms.

The paper is organized as follows. Section 2 reviews the related literature to put our study in context. Section 3 describes the data and key variable construction. Section 4 presents the main empirical

analysis. Section 5 addresses the sample selection concern. We conclude in Section 6 with a brief summary.

2. Prior Literature

Berle and Means (1932) and Jensen and Meckling (1976) note that the separation of ownership and control in modern public corporations creates significant conflicts of interest 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 recent research on CEO pay comparison across countries by Conyon et al. (2011), and Fernandes et al. (2011)). Some have come to the conclusion with a benign view of executive compensation that public firm CEOs are paid for performance and their pay is not excessive (see for example, Mehran (1995), and Kaplan and Rauh (2010)). Others with a more critical view of executive compensation have concluded that CEO pay in U.S. public firms is not strongly linked to performance and these CEOs are overpaid (see for example, Adams, Almeida and Ferreira (2005), Bebchuk, Grinstein, and Peyer (2010), and Morse, Nanda, and Seru (2011)).

Our paper is related to a small strand of the CEO pay literature focusing on CEO pay in private firms or newly public firms. Using a sample of privately-held and publicly-held insurers, Ke et al. (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. Confirming the above evidence using CEO pay from the 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. Using the same SSBF data, Cole and Mehran (2011) find that over time, CEO pay in privately-held firms does not grow as fast as pay in public firms, and that private firms have significantly higher pay-size elasticity compared to public firms. Bengtsson and Hand (2011) show that CEO cash pay in venture-backed companies is higher in firms that have successfully raised more VC financing and higher quality VC financing.

Using a sample of IPO firms between 1996 and 1999, Engel et al. (2002) show that accounting-based measures are positively related to pay for non-Internet executives, and stock returns are positively related to pay for Internet executives. They interpret this finding to be supportive of the notion that firms' compensation practices reflect substitution away from performance measures that are less precise measures of managerial value creation. They further show that compensation grants of IPO firms with little or no venture capital influence display significantly more association with accounting (manufacturing and technology firms) and stock return (Internet firms) measures of performance, consistent with direct monitoring and the use of explicit performance measures acting as substitute governance mechanisms.

Our paper is closely related to two recent studies that compare compensation practices in the U.S. with the rest of the world. Conyon et al. (2011) compare U.S. and U.K. CEO annual pay and incentives. Controlling for firm characteristics, they find that U.S. CEOs have higher compensation and much higher incentives than U.K. CEOs. After adjusting for the risk premium to compensate for equity incentives, they find that risk-adjusted pay for U.S. CEOs is not consistently higher than that for U.K. CEOs. They conclude that critics of high U.S. CEO pay should give greater consideration to the equity incentives borne by these CEOs and the risk premiums required to bear these incentives.

Using a comprehensive dataset on CEO pay across firms in 14 countries with mandated disclosure rules, Fernandes et al. (2011) show that the US pay premium, after controlling for firm,

ownership and board characteristics, is economically modest, and that the premium has declined substantially over time. They also find that CEO pay levels and the use of equity-based pay are positively related to measures of good governance including institutional ownership and independent boards. They conclude that the observed US pay premium could be the result of good governance and stronger links between CEO pay and shareholder performance.

In contrast to prior work that examines either the smallest firms in the economy or private firms in a limited number of industries, and to recent work that explore foreign firm CEO pay to help assess U.S. public firm CEO pay, in this paper we employ a new database to provide some of the first comparisons of CEO pay in U.S. public and comparable private firms in order to contribute to the debate on whether CEOs in U.S. public firms are overpaid.

3. Sample Formation and Variable Construction

3.1 Sample Formation and Overview

We start with all U.S. private and public firms with non-missing values for total assets in Capital IQ, an affiliate of Standard & Poor's, from 1999 to 2008.[4] We require that public firms be traded on the NYSE, AMEX, or NASDAQ. Capital IQ 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 Capital IQ even though it became a public firm only in 2004. We search all the key dates for each firm in Capital IQ'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

---

[4] Since the late 1990s, Capital IQ starts to provide information on financial and executive compensation for both private and public firms in the U.S., with a similar level of detail as provided by Compustat and ExecuComp for public firms. Unique to Capital IQ, it also provides detailed background information about the CEO, including education, gender, past experience, and age.

2003 and it becomes a public firm from 2004 onward.

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 Capital IQ beginning in 2004. To clearly capture any difference in pay practices between public versus private firms, in most of our analyses, we remove all firm-year observations associated with 574 IPOs and 71 going private transactions. Next we narrow the sample by requiring firms to have compensation data available in Capital IQ. For private firms this restriction is meaningful and reduces the sample to a total of 5,960 firm-year observations representing 1,938 unique firms, while for public firms we retain a sample of 35,969 firm-year observations representing 5,333 unique firms. Data for a vast majority (92%) of the private firm-year observations in our sample come from Form 10-K (annual reports) filed with the SEC, and the remainder (8%) comes from Form S-1 (and its supplemental Form 424B—less than 2% of the total) filed with the SEC due to public debt issuances.[5]

To provide some assessment of the selection issues inherent in our sample, Table 1 Panel A also reports the median values of sales for firms in the Capital IQ 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 Capital IQ population, whereas, for public firms the differences are more modest. The final column in Panel A shows the number of public firms in our sample that overlap with S&P 1500 firms covered by the ExecuComp database. 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 ExecuComp firms.

Table 1 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 shows that our sample firms

---

[5] In unreported analysis, we find that there is no significant difference in the level and structure of CEO pay between firms disclosing due to their size and ownership and firms disclosing due to their public debt issuances. As a result, we pool both groups of private firms in subsequent analyses.

have broad industry representation, covering all 48 industries, with Banking, Business Services, and

Utilities having the highest representation among the private firms, while Banking, Business Services,

and Electronic Equipment having the highest representation among the public firms.

Overall, compared to other studies of private firms (see for example, Ke et al. (1999), Engel et al.

(2002), and Cole and Mehran (2011)[6]), the private firms in our sample are much more comparable to

public firms in terms of size and industry coverage, and are subject to similar disclosure requirements.

3.2 Computing CEO Pay

We define a CEO's total compensation (*Totalpay*) in a given year as the sum of her salary,

bonus,[7] the grant-date value of restricted stock awards (*Stock*), and the grant-date Black-Scholes value of

granted options (*Options*), and other pay (*Otherpay*) that includes items such as long-term incentive plans,

premiums for insurance policies, and medical expenses.[8]

Some private firms in our sample pay their CEOs with restricted stock or equivalent,[9] and they

report in their SEC filings the dollar value of restricted stock granted based on a hypothetical market price.

---

[6] For example, in the overall sample, the median sales is $184 million for private firms compared to $229 million for public firms. By way of comparison, Cole and Mehran (2011) report median revenues of $1.9 million in 2003 for their sample of private firms drawn from the SSBF data.

[7] Due to the changes made to compensation disclosure in 2006, bonus is the sum of bonus and long-term incentive plans for the period 1999-2005, and bonus is the sum of bonus and non-equity incentives after 2005.

[8] Another way to measure CEO total pay is to replace the value of options granted with the value of options exercised during the year. The former captures the *ex ante* pay and the latter captures the *ex post* pay albeit with some noises as it may represent option grants from more or less than one year (Kaplan and Rauh (2010)). Further, much of realized pay reflects the exercise of in-the-money options, CEOs will receive large payoffs when their firms' stock has risen materially, leading to a mechanical relation between firm performance and realized CEO pay, which does not allow assessment of the effectiveness of option grants (Mehran (1995), and Kaplan and Rauh (2010)). Finally, it is not possible to use the value of options exercised for our study because rarely do we observe the cash equivalent of exercised options in our private firm sample. Instead, private firm CEOs tend to hold the shares upon exercising their option grants.

[9] Restricted stock awards is a reported data item disclosed under the stock awards column in the summary compensation table. According to Capital IQ, their restricted stock awards column discloses the dollar value of stock-related awards that do not have option-like features. Examples of these include restricted stock, restricted stock units, phantom stock, phantom stock units, common stock equivalent units or other similar instrument that do not have option like features. Performance-based stock awards will also be included in this column.

In our analysis, we take the value of restricted stock granted as reported.[10]

With respect to the value of option grants, unlike ExecuComp, Capital IQ simply records the value as reported in annual reports, proxy statements, or other SEC filings. If a firm just reports the number of shares underlying an option grant, Capital IQ records a zero value for that option grant.[11] 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, around 18,000 firm-year observations are covered by the ExecuComp and the Corporate Library database, from where we retrieve relevant information about CEOs' option grants (including the number of options, strike price, grant date, and expiration date). For the remainder, we hand collect the information on option grants directly from firms' 10-K filings and proxy statements. We then calculate the dollar value of each option grant, based on ExecuComp's modified Black-Scholes approach.[12]

For private firms, we read their SEC filings available through Capital IQ and hand collect

---

[10] It is possible that private firms may use hypothetical low prices to reduce accounting expenses and CEOs' taxable income, contributing to the public firm pay premium uncovered in this study. However, there are several mitigating factors to the above bias. First, both the FASB Statement No. 123, *Accounting for Stock-Based Compensation* (revised in 2004), and the AICPA Practice Aid, *Valuation of Privately-Held-Company Equity Securities Issued as Compensation* establish standards and provide guidelines for deriving the fair value of an entity's equity instruments. Second, the SEC has to decide whether compensation cost in audited Form 10K follows the U.S. GAPP guideline. Lastly, it is worth noting that most of the CEO total pay comes from salary and bonus, with equity-based pay only representing 11% of CEO total pay in private firms and 24% of CEO total pay in public firms (see Table 2 Panel A).

[11] There are 498 private firm-year observations where Capital IQ has the dollar value of the option grant as filed by the reporting private firm. The correlation between the Capital IQ option values filed with the SEC and the values based on our own calculation using the modified Black-Scholes approach is 0.74.

[12] 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.

relevant information about CEOs' option grants.[13] 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) the volatility is the median volatility of public firms in the same

industry and size decile;[14] (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 the ratio of dividend paid out last year to the exercise price; and (5) the time to maturity

is 70% of the stated maturity.

In Appendix 1, we provide a detailed example of how we compute a CEO's total pay for private

firms. In Appendix 2, we conduct a cross-check of CEO total pay computed from Capital IQ (using our

own approach) with that from ExecuComp using the overlapping public firm-year observations (as shown

in the last column of Table 1 Panel A). The data quality from Capital IQ 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 3.

Panel A presents descriptive statistics of CEO pay. The mean (median) CEO total pay is $1.57

million ($602 thousand) for the private firm sample, while the mean (median) CEO total pay is $2.97

million ($1.10 million) for the public firm sample. The two-sample t-test and Wilcoxon-test both reject

---

[13] Anecdotal evidence suggests that there are three possible ways for private firm executives to cash out their stock and options: (1) selling them back to the issuing company in a stock repurchase transaction; (2) selling them to the acquiring firm in an acquisition deal; and (3) selling them on the public market after an IPO.
[14] 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).

the null that CEO total pay in private firms is the same as that in public firms at the 1% level. On average, CEO total pay in public firms is approximately twice that in private firms.

The mean (median) CEO salary and bonus in private firms is $409 thousand ($339 thousand) and $442 thousand ($91 thousand), respectively, while the mean (median) CEO salary and bonus in public firms is $507 thousand ($420 thousand) and $638 thousand ($175 thousand), respectively. The mean (median) ratio of cash pay (i.e., the sum of salary and bonus) to total pay in private firms is 79% (94%), while the mean (median) ratio of cash pay to total pay in public firms is 70% (78%). The median value of restricted stock and option grants is zero in private firms, while the median value of option grants is $57 thousand in public firms. The mean value of CEO restricted stock and option grants in private firms is $123 thousand and $312 thousand, respectively, while the mean value of CEO restricted stock and option grants in pubic firms is $347 thousand and $1,198 thousand, respectively. The mean (median) ratio of equity-based pay (i.e., the sum of restricted stock and option grants) to total pay in private firms is 11% (0%), while the mean (median) ratio of equity-based pay to total pay in public firms is 24% (12%). The two-sample t-test and Wilcoxon-test both reject the null that the value of CEO restricted stock and option grants in private firms (or the ratio of equity-based pay to total pay) 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 CEO total pay in public firms, and private firm CEOs are paid significantly less with equity-based pay. 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 slightly more likely to be a female, and are slightly younger than their counterparts in public firms. Notably, private firm CEOs in our sample are less likely to be founders or to serve as

Chairman of the Board, suggesting that differences in CEO power are likely to contribute to the observed pay premium in public firms. The levels of CEO ownership, however, do differ significantly between private and public firms: CEOs in private firms own on average 13% of their companies, as opposed to 6% ownership for public firm CEOs. Given that CEOs may hold a sizeable number of options in addition to shareholding, we compute their total (effective) equity ownership as [(the number of shares owned by the CEO + 0.6 × the number of options owned by the CEO)/the total number of shares outstanding]; the option delta is assumed to be 0.6 for simplicity. We show that the mean (median) CEO total equity ownership in private firms is 14.8% (3.6%), while the mean (median) in public firms is 7.2% (2.4%). All of these differences in CEO direct and total equity ownership are statistically significant at the 1% level.

Panel C presents descriptive statistics of firm performance and other characteristics. We show that private firms tend to be smaller, younger firms with weaker accounting performance and higher cash flow volatility, slower growth, lower capital expenditures, lower cash holdings, far higher leverage, and fewer segments than pubic firms. Although there are significant differences in the characteristics of the two firm types, in comparison to the private firms covered in the SSBF (see for example, Cavalluzzo and Sankaraguruswamy (2000), and Cole and Mehran (2011)) and to a recent study by Asker, Farre-Mensa, and Ljungqvist (2011) where they match private and public firms by size, our sample of privately held firms are much more representative of publicly listed firms. Nevertheless, the reader should bear in mind the sample selection criteria imposed on us by the data when deciding how our results might generalize.

Panel D presents the correlation matrix of firm characteristics. None of the correlations are high enough to present collinearity problems for our multivariate analysis.

4. Comparing CEO Pay in Public and Private Firms

The univariate analysis in the previous section indicates significant differences in the level and structure of pay between CEOs of public and private firms, in particular, public firm CEOs receive about double the pay of their private firm counterparts. It also shows that public firms differ from private firms along a number of dimensions, such as firm size, and CEO ownership. In this section we provide a more formal analysis of differences in pay level, pay structure, and pay-performance sensitivity between public and private firms.

4.1 Differences in CEO Pay between Public and Private Firms

Using an approach similar to the one used in Conyon et al. (2011) and Fernandes et al. (2011) to examine cross-country pay differences, we estimating the following OLS regression to assess differences in pay level between public and private firms:

$$Ln(CEO\ Pay) = \alpha + \beta_1 Public + \beta_2 Firm\ Size + \beta_3 Other\ Firm\ Characteristics$$

$$+\beta_4 CEO\ Chararacteristics + Industry\ FE + Year\ FE + \varepsilon, \qquad (1)$$

where the dependent variable is the natural logarithm of either CEO total pay or cash 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.[15] 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 CEO pay between public and private firms that cannot be accounted for by differences in firm and CEO characteristics and industry and year effects. The results are reported in Table 3.

---

[15] 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.

Panel A presents the results when the dependent variable is the natural logarithm of CEO total pay. Prior work including Murphy (1985) and Gabaix and Landier (2008) has shown a strong positive relation between CEO pay and firm size. In Column (1), we only control for prior-year sales and industry and year fixed effects. The coefficient on the *Public* indicator variable is positive and significant, implying a public firm pay premium of 44% ($e^{0.366} - 1$). Further, CEO pay is strongly and positively associated with firm size.

In Column (2), we introduce other firm characteristics shown to be important determinants of CEO pay (see for example, Core et al. (1999), Gao (2010), and Graham, Li, and Qiu (2012)). The coefficient on the *Public* indicator variable remains positive and significant, implying a public firm pay premium of 33% ($e^{0.286} - 1$). Further, CEO pay is increasing in firm size, capital expenditures, cash holdings, leverage, firm age, and the number of segments, and decreasing in accounting performance, cash flow volatility, and sales growth. Apparently, the public firm pay premium is not explained by differences in firm characteristics.

In Column (3), we further add CEO characteristics and show that the coefficient on the *Public* indicator variable remains positive and significant, implying a public firm pay premium of 19% ($e^{0.171} - 1$). In addition to the significant firm characteristic determinants uncovered in Column (2), CEO pay is higher for CEOs who have an MBA degree, a male CEO, or CEOs who are also Chairman of the Board, while lower for founder CEOs. CEO pay is decreasing in her equity ownership. Importantly, after controlling for the CEO characteristics, the public firm pay premium experiences its largest drop.

Columns (1)-(3) are based on a pooled regression where we restrict the coefficients on the firm and CEO characteristics to be the same across public and private firms. In Columns (4) and (5), we separately examine pay determination in public and private firms to further explore the differences across these two types of firms. The regression specifications in Columns (4) and (5) are similar to that in

Column (3) except that there is no *Public* indicator variable and in Column (5) for public firms there are

contemporaneous and lagged stock returns. The results in Columns (4) and (5) show that public firm CEO

pay is positively and significantly associated with firm stock performance, while private firms CEO pay is

positively and significantly associated with lagged firm accounting performance. Other firm and CEO

characteristics affect CEO pay of public firms in a similar way as they affect CEO pay of private firms

except that some variables such as firm size, cash holding, and CEO ownership have stronger impacts on

CEO pay in public firms, while other variables such as firm age, the number of segments, and CEO

gender have stronger impacts on CEO pay in private firms.[16,17]

       Panel B presents the results when the dependent variable is the natural logarithm of CEO 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 5% after including all of the

control variables (see Column (3)). The fact that the public firm cash pay premium is much smaller in

magnitude than the public firm pay premium is consistent with the view that public firm shareholders rely

much more on grants of restricted stock and options to maintain managerial incentives, leading to a higher

level of CEO annual compensation especially in the form of equity-based compensation.

4.2 The Public Firm Pay Premium: Adjusted Pay

       One natural response to the public firm pay premium uncovered in the previous section is that

CEOs will ask for higher pay to compensate for bearing greater risk. To examine this response further,

---

[16] It is also worth noting that all our results remain unchanged if we remove founder CEOs from the sample (results available upon request).

[17] There are a couple of important caveats to our analysis. Due to data limitation, we do not have information on board structure (other than whether the CEO is also Chairman of the Board) and institutional ownership in private firms that are shown to be important in determining public firm CEO pay (see for example, Core et al. (1999), and Hartzell and Starks (2003)). On the other hand, to the extent that stronger boards in private firms are related to lower pay and lower equity-based pay (as shown in our Table 3 and 5), and greater presence of institutional investors in public firms are related to higher pay and higher equity-based pay (as shown by Hartzell and Starks (2003), and Fernandes et al. (2011)), these governance mechanisms would weaken our findings of the public firm pay premium.

following Hall and Murphy (2002), we measure the value of risk-adjusted option grants to CEOs by the amount of riskless cash compensation they would exchange for those grants (see Appendix 4 for details). Table 4 Panel A reports the results.

Columns (1) and (2) shows that for the same level of diversification, that is, both public and private firm CEOs invest 50% of their wealth in their firm stock, higher levels of risk aversion are associated with lower public firm pay premium: The coefficient on the *Public* indicator variable drops from 0.060 to 0.051 when CEO risk aversion increases from 2 to 3.

To capture the fact that private firm CEOs have higher ownership than public firms CEOs and hence are more under-diversified, we introduce different levels of diversification for public and private firm CEOs in Columns (3) and (4). We show that as private firm CEOs become more under-diversified, the public firm pay premium increases modestly: The coefficient on the *Public* indicator variable is around 0.08, suggesting a pay premium of 8%. In brief, risk-adjusting CEO pay leads to an economically insignificant public firm pay premium.

In addition to differences in the riskiness of CEO pay package in public versus private firms, there are also a couple of other possible reasons for the pay difference. One might argue that private firm CEOs could receive less annual compensation because their higher ownership stake leads to higher dividend payments.[18] 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 Table 4 Panel B Column (1), we repeat the regression in Column (3) of Table 3 Panel A using the dividend-adjusted pay as the dependent variable. The coefficient on the *Public* indicator variable is 0.094 implying that the predicted CEO pay is 9.9% ($e^{0.094} - 1$) higher in

---

[18] Using U.K. private and public firms, Michaely and Roberts (2012) show that private firms pay less and also smooth less dividends than their public firm counterparts.

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.[19] We define the turnover-adjusted pay as CEO total pay × (1 − turnover probability). In Panel B Column (2), the dependent variable is the turnover-adjusted pay and the coefficient on the *Public* indicator variable is 0.083 and is significant at the 1% level. This result indicates an 8.7% public firm pay premium after adjusting for employment risk.

Overall, the pay premium for public firm CEOs that we document materially decreases after accounting for greater equity incentives contained in public firm CEO pay package, and differences in dividends and employment risk between public and private firms.

Figure 1 plots the time series of the public firm pay premium, obtained by adding interaction terms between the *Public* indicator variable and the year indicator variables (using the first year 1999 as the base year) to the regression specification of Column (3) in Table 3 Panel A. Figure 1 shows that there is no discernible trend in the size of the public firm pay premium over our sample period.

4.3 Differences in CEO Pay Structure between Public and Private Firms

Our finding that public firm CEOs enjoy a mere 5% premium in cash pay but a 20% premium in total pay suggests that public firms are more likely to use restricted stock and option grants to compensate their CEOs. To formally assess this conjecture, we run the following tobit regression (see for example, Yermack (1995)):

---

[19] In untabulated analysis, we find that public firm CEOs are more likely to be replaced, indicating a high employment risk for running a publicly listed company.

$$Pay\ Structure = \alpha + \beta_1 Public + \beta_2 Firm\ Size + \beta_3 Other\ Firm\ Characteristics$$

$$+\beta_4 CEO\ Chararacteristics + Industry\ FE + Year\ FE + \varepsilon, \qquad\qquad (2)$$

where the dependent variable is the ratio of either equity-based pay or each of its two components (restricted stock versus options) to total pay. Table 5 presents the results.

Columns (1)-(5) report the results where the dependent variable is the ratio of equity-based pay to total pay. Column (1) shows that after controlling for firm size, public firm CEOs receive about 20% more of their pay in equity-linked compensation. Further, firm size is positively associated with the fraction of equity-based pay to total pay. After adding other firm characteristics, Column (2) shows that public firm CEOs receive about 16% more of their pay in equity-linked compensation. Further, the equity-based pay ratio is negatively associated with accounting performance, cash flow volatility, sales growth, and leverage, while is positively associated with firm size, capital expenditures, cash holdings, and the number of segments. After adding the CEO characteristics, Column (3) shows that compared to private firm CEOs, public firm CEOs receive 13% more of their annual total pay in the form of restricted stock and options. Further, 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. It is worth noting that the firm and CEO characteristics associated with higher pay are generally also associated with a higher fraction of equity-based pay. For example, both the level of pay and the fraction of equity-based pay are positively associated with firm size, negatively associated with cash flow volatility, positively associated with the CEO being Chairman of the Board, and negatively associated with CEO equity ownership.

Based on the regression specification in Column (3), we separately examine the determinants of pay structure in private firms (Column (4)) and in public firms (Column (5)), and find that some explanatory variables have quite different effects. For example, the amount of equity-based pay is only

significantly associated with cash flow volatility, capital expenditures, cash holdings, firm age, and the number of segments in public firms.

Finally, we report the regression results when the dependent variable is the ratio of restricted stock (option grants) to total pay in Column (6) (Column (7)). The coefficients on the *Public* indicator variable are positive and significant in both cases, suggesting that public firm CEOs receive more restricted stock and more option grants than private firm CEOs do.

Overall, the results suggest that private firms use less annual equity-based incentives compared to public firms. Then the important question is whether the public firm pay premium provides better incentives to their CEOs.

4.4 Differences in CEO Pay-Performance Sensitivity between Public and Private Firms

So far, we have uncovered a public firm pay premium. The higher pay levels in public firms could be due to executives' skimming the system. Bebchuk and Fried (2004) argue that public firm CEOs can usually dictate their pay-setting process and thus CEO contracts in public firms provide too little pay-performance sensitivity ("pay without performance"). Morse, Nanda, and Seru (2011) further show that powerful CEOs can rig their incentive contracts, leading to poor accounting performance. On the other hand, larger pay packages are responses to higher demand for performance, which could be value maximizing for shareholders (Kaplan and Rauh (2010)).

In this section, using private firms as a benchmark, we examine whether CEO pay in public firms are too insensitive to performance by estimating the following panel data regression with CEO, industry, and year fixed effects (see for example, Murphy (1985), Aggarwal and Samwick (1999), Garvey and Milbourn (2003), and Graham et al. (2012)):

$$Ln(CEO\ Pay) = \alpha + \beta_1 Public + \beta_2 Firm\ Size + \beta_3 ROA + \beta_4 Lagged\ ROA$$

$$+\beta_4 Public \times ROA + \beta_5 Public \times Lagged\ ROA + \beta_6 Other\ Firm\ Characteristics$$

$$+\beta_7 CEO\ Characteristics + CEO\ FE + Industry\ FE + Year\ FE + \varepsilon, \tag{3}$$

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

fixed effects to control for differences in the average level of compensation across CEOs in the sample.

Only the variations in a CEO's pay and her firm's performance relative to their averages over the sample

period are used to identify the pay-performance sensitivity. It is worth noting that the inclusion of CEO

fixed effects also controls for any other aspect of the CEO or firm that may affect CEO compensation,

such as the well-documented cross-sectional relationship between firm size and its CEO pay. We also

include industry and year fixed effects to account for any industry pattern and time trend in pay. The

interaction terms between the *Public* indicator variable and accounting performance measures capture the

incremental differences in pay-performance sensitivity in public firms relative to that in private firms.

Table 6 presents the results.

Panel A Columns (1) and (2) present the full sample results when the dependent variable is the

natural logarithm of CEO total pay. The coefficient estimates on contemporaneous and lagged accounting

performance indicate that pay is largely unresponsive to performance in private firms. By contrast, the

coefficient estimates on the interactions between the *Public* indicator variable and the accounting

performance measures are both positive and statistically significant, indicating that pay responds

positively to performance in public firms.

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

Columns (3)-(5) estimate the pay regressions separately for private and public firms. The results largely

mirror those in the full sample regressions, with the exception that private firms show significant

pay-performance sensitivity to both contemporaneous and lagged accounting performance. By contrast,

pay responds positively to both accounting and stock-price performance in public firms similar to what

has been documented in the literature (see for example, Aggarwal and Samwick (1999)). Based on the coefficient estimates, a one percentage point increase in current (lagged) ROA is associated with a 0.56% (0.40%) increase in CEO pay in public firms; and a one percentage point increase in current (lagged) stock returns translates into a 0.09% (0.14%) increase in CEO pay in public firms. For private firms, a one percentage point increase in current (lagged) ROA is associated with a 0.28% (0.31%) increase in CEO pay.

Panel B presents the results when the dependent variable is the natural logarithm of CEO cash pay. We find similar results: While cash pay is positively associated with accounting performance in both public and private firms, this association is stronger in public firms than in private firms.

Overall, the results in Table 6 show that both private firm and public firm CEO pay is significantly related to firm accounting performance with public firm CEO pay exhibiting a stronger association with performance. These results are consistent with the view that direct monitoring incentives are stronger in private firms, which often have owner-managers and at a minimum have concentrated illiquid ownership and large private lenders providing greater monitoring incentives. As a result, boards rely more on subjective performance evaluation for setting pay in privately held firms relative to boards in listed firms. The results are similar to those presented in Mehran (1995), Ke at al. (1999), Engel et al. (2002), and Murphy and Oyer (2003) who also provide evidence of a substitution between direct monitoring and the use of explicit performance measures across firms with different ownership structures.

4.5 Possible Reasons for CEO Pay Premium in Public Firms

Once we uncover the public firm pay premium, it is important to explore why this takes place. One possible explanation is that public and private firms compete in different labor markets. 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 7.[20]

Columns (1)-(3) report the results using the mean 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 changes in CEO pay of private firms are correlated with changes in CEO 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.

To provide further evidence on this issue, 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. The results are reported in Table 8. 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 (representing 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.

---

[20] 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 (results available upon request).

5. Dealing with Sample Selection

So far, we have established that public and private firms differ in many dimensions that are correlated with level and structure of pay. In order to mitigate sample selection concerns associated with comparing these two types of firms, we investigate two mutually exclusive samples: a transition sample where private firms go through an IPO, and a propensity score-matched public firm sample.

5.1 The Transition Sample

We examine changes in pay for a set of firms during our sample period that undergo a transition in ownership status from private to public.[21] Using the transition sample directly addresses the sample selection concern because we compare the same firm as both a private and public firm, selection on time-invariant unobservable firm and CEO characteristics is controlled for. The time series result serves to provide corroborating evidence of the cross-sectional patterns documented earlier.

We identify 574 firms during our sample period 1999-2009 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.[22] 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 in the year prior to the IPO.[23] Figure 2 plots the level

---

[21] Leslie and Oyer (2009) and Asker, Farre-Mensa, and Ljungqvist (2011) show that it is very difficult to get information on CEO compensation for firms owned by private equity firms, or transitioning from public to private status. Based on a sample of 20 LBO deals, Cronqvist and Fahlenbrach (2010) show that private equity sponsors tend to re-design CEO compensation contracts after the going-private transactions. Due to data limitation, in this paper, we do not examine CEO pay as firms moving from public to private ownership.

[22] 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. Kaplan, Sensoy, and Strömberg (2009) show that at an IPO, 72% of the CEOs are the same CEO at the firm business plan. By the firm's first annual report after the IPO, only 44% of the CEOs are the same CEO as at the first business plan. They conclude that there is a great change in management around IPOs. Our numbers are consistent with theirs.

[23] Our sample of IPO firms spans the entire Fama and French 48 industries, with Business Services (16.72%), Pharmaceutical Products (10.45%), and Electronic Equipment (7.84%) being the top three industries.

of total (cash) pay and the structure of pay around the IPO year for both the IPO firms and their control firms.

Panel A shows that the mean total pay increases significantly at the time of the IPO and remains permanently higher than the level before the IPO. On average (at median), CEO total pay increases by 245% (83%) from the year prior to IPO to the year after the IPO; by contrast, the average (median) CEO in the control group only experiences an increase in total pay by 32% (3%) during the same period. The pay increase in the IPO firms is clearly more drastic than that in the control firms.

Consistent with the pay premium result that we documented earlier, Panel B shows that cash pay also increases around the IPO (on average, from $740 thousand in the year prior to IPO to $936 thousand in the year after the IPO) suggesting that most of the increase in the level of pay may come from CEOs being given significantly more equity incentives following the IPO. Panel C 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. Over the three-year period prior to the IPO, the average proportion of equity-based pay over total pay is less than 10%; this number increases to around 40% during the three-year period after the IPO.

Overall, the results indicate a significant permanent shift in the level and structure of pay as firms transition from private to public. The change in pay is largely driven by CEOs being given additional equity incentive to maximize ongoing shareholder value.

5.2 The Propensity Score-Matched Sample

One might argue that IPO firms are special and they do not represent well the general population of public and private firms. To mitigate this concern, we employ a matching technique to examine differences in level and structure of CEO pay between public and private firms more generally. The

matching procedure controls for selection based on observable firm and CEO characteristics. Our data are well suited to the matching approach given that we have a much larger pool of potential matches—the public firm sample—as compared to the treatment group—the private firm sample, which increases the likelihood of finding close matches for the private firms among the public firms.

The matching procedure that we employ is a one-to-one nearest neighbor matching with replacement (Heckman, Ichimura, and Todd (1997)). The matching starts with a logit regression, using the same set of firm and CEO characteristics as the explanatory variables as in Equation (1) and the *Public* indicator variable as the dependent variable. Then using the predicted probabilities—propensity scores—from the estimated logit regressions, we match to each private firm-year observation, the corresponding public firm-year observation that minimizes the absolute value of the difference between propensity scores. This one-to-one matching technique may discard data that are potentially valuable and may also match each private firm-year observation with more than one comparable public firm-year observations. For robustness checks, we also follow Lee and Wahal (2004) and Bae, Kang and Wang (2011) to use the Gaussian kernel and regression-adjusted local linear matching methods. The intuition of these two methods is to match each private firm-year observation to the weighted average of several public firm-year observations, where the weight given to each public observation is in proportion to the closeness of the propensity scores.

Table 9 presents the differences in level and structure of CEO pay in private firms and their matched public firms. We find that except for cash pay, there is statistically significant difference between public and private firm CEOs in their level and structure of pay.

6. Conclusions

There are growing concerns that CEOs in U.S. public firms are overpaid and that there is a general breakdown in the link between pay to performance. In this paper, we provide fresh new evidence to contribute to the debate on whether public firm CEOs are significantly overpaid using a sample of private firms where compensation practices *ex ante* are expected to suffer less from systematic poor governance practices. We first show that after controlling for firm and CEO characteristics, public firm CEOs are paid more than private firm CEOs, with a pay premium of about 20%, and public firm CEOs are given more on-going equity incentives. We then show that both public and private firm CEO annual compensation is positively and significantly related to firm accounting performance, and the pay-performance link is much stronger in public firms. We provide some evidence that the pay differential is related to labor market segmentation between the two types of firms and remains relatively stable over time. Finally, using a transition sample when firms change from private to public ownership and a matched public firm sample, we show that both the level and structure of pay behave in ways that corroborate our findings from the cross-section.

Overall, our evidence is consistent with the general idea that differences in the contracting environment in public and private firms lead to different CEO compensation designs across these two types of firms. Our results suggest that the observed public firm pay premium might actually be the result of good governance and stronger links between CEO pay and firm performance.

Appendix 1:
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: zero (the firm's dividend payment is zero in the previous year)
> Time to maturity: 70%×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).

Capital IQ covers Concentra Operating Corp. up to 2006 and over the coverage period, the CEO, Mr. Thomas did not exercise this option nor sell any of his stock holdings. We do observe one VP when he resigned from the company, he sold his share holdings back to the company.

Appendix 2:

Comparing Compensation Data between Capital IQ and ExecuComp Firms

The sample consists of 12,162 public firm-year observations that are included in both Capital IQ and ExecuComp from 1999-2008. Definitions of all variables are provided in Appendix 3. 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).

	Capital IQ		ExecuComp		
	Mean	Median	Mean	Median	Correlation Coefficient
Totalpay ($K)	5288	3002	5700	3296	0.93
Salary ($K)	736	697	768	724	0.91
Bonus ($K)	1439	626	1262	632	0.80
Stock ($K)	590	0	597	0	0.90
Options ($K)	2375	804	2844	993	0.92
Sales ($M)	5146	1468	5463	1538	0.99
Total Assets ($M)	10008	1980	10002	2012	0.99

Appendix 3:
Variable Definitions

Variable	Definition
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.
Options	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 the ratio of dividend paid out last year to the exercise price; 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 (*Stock*) and the Black-Scholes value of granted options (*Options*).
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 (*Stock*), and the Black-Scholes value of granted options (*Options*), and other pay (*Otherpay*).
Cashpay/Totalpay	the sum of salary and bonus as percentage of totalpay.
Equity-based pay/Totalpay	equity-based pay as percentage of totalpay
Stock/Totalpay	the value of restricted stock awards as percentage of totalpay
Options/Totalpay	the Black-Scholes value of granted options as percentage of totalpay
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 number of shares owned by the CEO normalized by the total number of shares outstanding. For pubic 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.

30

Total Equity Ownership	the sum of the number of shares and 0.6 times of the number of options owned by the CEO normalized by the total number of shares outstanding. The option delta is assumed to be 0.6 for simplicity.
ROA	return on assets, computed by Capital IQ as EBIT × 0.625/total assets by assuming that the average corporate tax rate is 37.5%.
CF Volatility	the standard deviation of industry-median-adjusted quarterly operating cash flows over the previous eight quarters.
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 that a firm operates.

Appendix 4:
Risk-Adjusting CEO Pay

Following Hall and Murphy (2002), we measure the value of risk-adjusted option grants to CEOs by the amount of riskless cash compensation they would exchange for those grants.

We assume that the CEO has non-firm-related wealth w, holds s shares of the firm's stock, and is awarded n options to buy n shares of stock at the exercise price k in T years.[24] We also assume that w is invested at the risk-free rate of r_f and the realized stock price at T is P_T. The CEO's wealth at T is given by:

$$W = w(1 + r_f)^T + s\, P_T + n\, max(0,\, P_T - k)$$

If she received cash V instead of the option grant and invested the cash in risk-free assets, then her wealth at time T would be:

$$W^V = (V + w)(1 + r_f)^T + s\, P_T$$

Assuming the CEO's utility over wealth to be $U(.) = \dfrac{W^{1-\rho}}{1-\rho}$, we solve for the certainty equivalent V for the CEO so that she is indifferent between the two choices,

$$\int U(W^V) f(P_T) dP_T = \int U(W) f(P_T) dP_T$$

using numerical methods. We assume that the CEO has constant relative risk aversion ρ and that the stock price follows a geometric Brownian Motion with volatility σ and drift $m = r_f + \beta(r_m - r_f)$ where β is the firm's systematic risk and r_m is the return on the market portfolio.

For public firms, we use the firm-specific volatility and systematic risk; for private firms, we use the median value of public firms in the same industry and size decile. Following Hall and Murphy (2002), we also make the following assumptions: (1) the market equity premium $r_m - r_f$ is assumed to be 6.5%; (2) the CEO's safe wealth is assumed to be the greater of $5 million or four times cash compensation; (3) the CEO has a constant relative risk aversion of 2 or 3; (4) 50% or 67% of the CEO's total wealth is invested in the firm's stock; and (5) the risk-adjusted bonus is 80% of the actual bonus.

In summary, a CEO's risk-adjusted total pay = salary + 0.8 × bonus + risk-adjusted stock award + risk-adjusted stock options + other pay.

---

[24] Following Hall and Murphy (2002), we do not explicitly model restricted stock in the compensation package. This is because in their model, restricted stock is a special type of options with a strike price of zero.

References:

Adams, Renee, Heitor Almeida, and Daniel Ferreira, 2005. Powerful CEOs and their impact on corporate performance, *Review of Financial Studies* 18, 1403-1432.

Aggarwal, Rajesh, and Andrew Samwick, 1999. The other side of the trade-off: The impact of risk on executive compensation, *Journal of Political Economy* 107, 65-105.

Asker, John, Joan Farre-Mensa, and Alexander Ljungqvist, 2011. Does the stock market distort investment incentives? New York University working paper.

Bae, Kee-Hong, Jun-Koo Kang, and Jin Wang, 2011. Employee treatment and firm leverage: A test of the stakeholder theory of capital structure, *Journal of Financial Economics* 100, 130-153.

Bebchuk, Lucian A., and Jesse Fried, 2004. *Pay without Performance: The Unfulfilled Promise of Executive Compensation*, Cambridge, MA: Harvard University Press.

Bebchuk, Lucian A., Jesse M. Fried, and David I. Walker, 2002. Managerial power and rent extraction in the design of executive compensation, *University of Chicago Law Review* 69, 751-846.

Bebchuk, Lucian A., Yaniv Grinstein, and Urs Peyer, 2010, Lucky CEOs and lucky directors, *Journal of Finance* 65, 2363-2401.

Bengtsson, Ola, and John R.M. Hand, 2011. CEO compensation in venture-backed firms, *Journal of Business Venturing* 26, 391-411.

Berle, Adolf A., and Gardiner Means, 1932. *The Modern Corporation and Private Property*, New York, Macmillan.

Cavalluzzo, Ken, and Srinivasan Sankaraguruswamy, 2000. Pay-to-accounting performance and ownership structure in privately-held small corporations, Georgetown University working paper.

Cole, Rebel A., and Hamid Mehran, 2011. What do we know about executive compensation at privately held firms? DePaul University working paper.

Conyon, Martin J., John E. Core, and Wayne R. Guay, 2011. Are U.S. CEOs paid more than U.K. CEOs? Inferences from risk-adjusted pay, *Review of Financial Studies* 24, 402-438.

Core, John E., Robert W. Holthausen, and David F. Larcker, 1999. Corporate governance, chief executive officer compensation, and firm performance, *Journal of Financial Economics* 51, 371-406.

Cronqvist, Henrik, and Rüdiger Fahlenbrach, 2011. CEO contract design: How do strong principals do it?, Claremont Mckenna College working paper.

Engel, Ellen, Elizabeth Gordon, and Rachel Hayes, 2002. The roles of performance measures and monitoring in annual governance decisions in entrepreneurial firms, *Journal of Accounting Research* 40, 485-518.

Fama, Eugene, and Kenneth French, 1997. Industry costs of capital, *Journal of Financial Economics* 43, 153-193.

Fernandes, Nuno, Miguel A. Ferreira, Pedro Matos, and Kevin J. Murphy, 2011. Are U.S. CEOs paid more? New international evidence, University of Southern California working paper.

Gao, Huasheng, 2010. Optimal compensation contracts when managers can hedge, *Journal of Financial Economics* 97, 218-238.

Gabaix, Xavier, and Augustin Landier, 2008. Why has CEO pay increased so much? *Quarterly Journal of Economics* 123, 49-100.

Garvey, Gerald, and Todd Milbourn, 2003. Incentive compensation when executives can hedge the market: Evidence of relative performance evaluation in the cross section, *Journal of Finance* 58, 1557-1582.

Graham, John R., Si Li, and Jiaping Qiu, 2012. Managerial attributes and executive compensation, *Review of Financial Studies* 25, 144-186.

Hall, Benjamin, and Kevin J. Murphy, 2002. Stock options for undiversified executives, *Journal of Accounting and Economics* 33, 3-42.

Hartzell, Jay, and Laura Starks, 2003. Institutional investors and executive compensation, *Journal of Finance* 58, 2351-2374.

Heckman, James J., Hidehiko Ichimura, and Petra E. Todd, 1997. Matching as an econometric evaluation estimator: Evidence from evaluating a job training programme, *Review of Economic Studies* 64, 605-654.

Jensen, Michael C., and William H. Meckling, 1976. Theory of the firm: Managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3, 305-360.

Jensen, Michael C., and Kevin J. Murphy, 1990. Performance pay and top-management incentives, *Journal of Political Economy* 98, 225-264.

Kaplan, Steven N., and Joshua Rauh, 2010. Wall street and main street: What contributes to the rise in the highest incomes?, *Review of Financial Studies* 23, 1004-1050.

Kaplan, Steven N., Berk Sensoy, and Per Strömberg, 2009. Should investors bet on the jockey or the horse? Evidence from the evolution of firms from early business plans to public companies, *Journal of Finance* 64, 75-115.

Ke, Bin, Kathy Petroni, and Assem Safieddine, 1999. Ownership concentration and sensitivity of executive pay to accounting performance measures: Evidence from publicly and privately-held insurance companies, *Journal of Accounting and Economics* 28, 185-209.

Lee, Peggy, and Sunil Wahal, 2004. Grandstanding, certification and the underpricing of venture capital backed IPOs, *Journal of Financial Economics* 73, 375-407.

Leslie, Phillip, and Paul Oyer, 2009. Managerial incentives and value creation: Evidence from private equity, Stanford University working paper.

Mehran, Hamid, 1995. Executive compensation structure, ownership, and firm performance, *Journal of Financial Economics* 38, 163-184.

Michaely, Roni, and Michael R. Roberts, 2012. Corporate dividend policies: Lessons from private firms, *Review of Financial Studies* 25, 711-746.

Morse, Adair, Vikram Nanda, and Amit Seru, 2011. Are incentive contracts rigged by powerful CEOs? *Journal of Finance* 56, 1779-1821.

Murphy, Kevin J., 1985. Corporate performance and managerial remuneration: An empirical investigation, *Journal of Accounting and Economics* 7, 11-42.

Murphy, Kevin J., 1999. Executive compensation. In: Ashenfelter, O., Card, D. (Eds.), *Handbook of Labor Economics 3,* Elsevier, Amsterdam, 2485-2563.

Murphy, Kevin J., and Paul Oyer, 2003. Discretion in executive incentive contracts, University of Southern California working paper.

Yermack, David, 1995. Do corporations award CEO stock options effectively? *Journal of Financial Economics* 39, 237-269.

Table 1. Sample Distribution

The sample consists of 5,960 private firm-year observations and 35,969 public firm-year observations from 1999-2008, obtained from Capital IQ. 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 public firms in ExecuComp. Panel B presents the sample distribution by industry.

Panel A: Distribution of Sample Firms by Year

	Our Sample		Capital IQ Population		
Year	Private Firms	Public Firms	Private Firms	Public Firms	Number of Our Sample Public Firms Overlapping with ExecuComp Firms
1999	480 (33)	3142 (210)	5085 (18)	5332 (193)	964
2000	602 (102)	3593 (202)	4571 (31)	5389 (174)	1096
2001	668 (178)	3721 (207)	4320 (45)	5280 (167)	1124
2002	684 (191)	3801 (199)	4476 (49)	5188 (186)	1175
2003	693 (221)	3936 (210)	4611 (60)	5117 (212)	1279
2004	638 (247)	3807 (224)	29344 (14)	5061 (239)	1253
2005	591 (269)	3823 (263)	39691 (15)	5095 (256)	1350
2006	590 (198)	3408 (249)	35063 (14)	5065 (284)	1206
2007	528 (202)	3364 (266)	26126 (15)	4940 (290)	1289
2008	486 (185)	3374 (294)	26590 (14)	4874 (306)	1272
Total	5960 (184)	35969 (229)	179877 (15)	51341 (226)	12008

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	59	0.99%	72	0.20%	131
2 Food Products	141	2.37%	416	1.16%	557
3 Candy & Soda	20	0.34%	140	0.39%	160
4 Beer & Liquor	17	0.29%	85	0.24%	102
5 Tobacco Products	13	0.22%	58	0.16%	71
6 Recreation	57	0.96%	258	0.72%	315
7 Entertainment	177	2.97%	358	1.00%	535
8 Printing and Publishing	126	2.11%	282	0.78%	408
9 Consumer Goods	99	1.66%	500	1.39%	599
10 Apparel	37	0.62%	407	1.13%	444
11 Healthcare	108	1.81%	627	1.74%	735
12 Medical Equipment	133	2.23%	1190	3.31%	1323
13 Pharmaceutical Products	129	2.16%	2101	5.84%	2230
14 Chemicals	177	2.97%	566	1.57%	743
15 Rubber and Plastic Products	90	1.51%	219	0.61%	309

16 Textiles	53	0.89%	120	0.33%	173
17 Construction Materials	113	1.90%	507	1.41%	620
18 Construction	57	0.96%	356	0.99%	413
19 Steel Works etc	45	0.76%	445	1.24%	490
20 Fabricated Products	17	0.29%	75	0.21%	92
21 Machinery	133	2.23%	1064	2.96%	1197
22 Electrical Equipment	54	0.91%	550	1.53%	604
23 Automobiles and Trucks	59	0.99%	396	1.10%	455
24 Aircraft	21	0.35%	134	0.37%	155
25 Shipbuilding, Railroad Equipment	3	0.05%	54	0.15%	57
26 Defense	7	0.12%	79	0.22%	86
27 Precious Metals	15	0.25%	140	0.39%	155
28 Non-Metallic and Industrial Metal Mining	30	0.50%	134	0.37%	164
29 Coal	24	0.40%	67	0.19%	91
30 Petroleum and Natural Gas	111	1.86%	1289	3.58%	1400
31 Utilities	452	7.58%	1039	2.89%	1491
32 Communication	206	3.46%	1052	2.92%	1258
33 Personal Services	54	0.91%	417	1.16%	471
34 Business Services	562	9.43%	4234	11.77%	4796
35 Computers	131	2.20%	1328	3.69%	1459
36 Electronic Equipment	103	1.73%	2313	6.43%	2416
37 Measuring and Control Equipment	61	1.02%	800	2.22%	861
38 Business Supplies	87	1.46%	317	0.88%	404
39 Shipping Containers	8	0.13%	76	0.21%	84
40 Transportation	105	1.76%	838	2.33%	943
41 Wholesale	278	4.66%	1197	3.33%	1475
42 Retail	209	3.51%	1713	4.76%	1922
43 Restaurants, Hotels, Motels	235	3.94%	662	1.84%	897
44 Banking	714	11.98%	4687	13.03%	5401
45 Insurance	161	2.70%	1231	3.42%	1392
46 Real Estate	135	2.27%	248	0.69%	383
47 Trading	235	3.94%	854	2.37%	1089
48 Other	99	1.66%	274	0.76%	373
Total	5960	100%	35969	100%	41929

Table 2. Descriptive Statistics

The sample consists of 5,960 private firm-year observations and 35,969 public firm-year observations from 1999-2008, obtained from Capital IQ. Definitions of all variables are provided in Appendix 3. 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 D presents the correlation matrix with *p*-values in brackets. The last two columns of the table in Panels A to C present test statistics of the t-test and the Wilcoxon test of the differences in CEO pay, CEO characteristics, and firm characteristics between the private and public firm samples. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A: CEO Pay Characteristics

	Private Firms			Public Firms			Test of Differences	
	Mean (1)	Median (2)	StdDev (3)	Mean (4)	Median (5)	StdDev (6)	t-test (4) – (1)	Wilcoxon test (5) – (2)
Totalpay (K)	1570	602	3106	2966	1095	4239	1396***	493***
Salary (K)	409	339	325	507	420	326	98***	81***
Bonus (K)	442	91	1025	638	175	1284	196***	84***
Cashpay/Totalpay	79%	94%	26%	70%	78%	28%	-9%***	-16%***
Stock (K)	123	0	646	347	0	1085	224***	0***
Options (K)	312	0	1322	1198	57	2059	886***	57***
Equity-based pay/Totalpay	11%	0%	23%	24%	12%	28%	13%***	12%***
Stock/Totalpay	3%	0%	10%	7%	0%	15%	4%***	0%***
Options/Totalpay	8%	0%	18%	17%	0.01%	24%	9%***	0.01%***
Otherpay (K)	108	9	353	91	14	275	-17***	5***

Panel B: CEO Characteristics

	Private Firms			Public Firms			Test of Differences	
	Mean (1)	Median (2)	StdDev (3)	Mean (4)	Median (5)	StdDev (6)	t-test (4) – (1)	Wilcoxon test (5) – (2)
MBA	0.15	0	0.36	0.17	0	0.38	0.02***	0***
Male	0.96	1	0.19	0.98	1	0.14	0.02***	0***
Founder	0.09	0	0.29	0.14	0	0.35	0.05***	0***
Chairman	0.48	0	0.49	0.62	0	0.48	0.14***	0***
CEO Age	52	53	8	53	53	8	1***	0***
Ownership	13.03%	2.70%	21.29%	6.04%	1.50%	11.47%	-6.99%***	-1.20%***
Total Equity Ownership	14.81%	3.59%	23.24%	7.15%	2.37%	12.36%	-7.66%***	-1.22%***

Panel C: Firm Characteristics

	Private Firms			Public Firms			Test of Differences	
	Mean (1)	Median (2)	StdDev (3)	Mean (4)	Median (5)	StdDev (6)	t-test (4) – (1)	Wilcoxon test (5) – (2)
Sales (M)	957	183	2451	1901	229	5152	944***	46***
Total Assets (M)	3247	273	15612	6036	467	48986	2789***	194***
ROA	0.26%	2.48%	10.67%	1.27%	3.13%	9.52%	1.01%***	0.65%***
Lagged ROA	0.32%	2.61%	11.53%	1.05%	3.16%	10.10%	0.73%***	0.55%***
CF Volatility	4.22%	2.17%	5.39%	3.03%	2.03%	3.39%	-1.19%***	-0.14%***
Sales Growth	22.14%	5.74%	72.01%	19.94%	8.95%	57.64%	-2.2%**	3.21%***
Capex	3.98%	2.23%	5.59%	4.05%	2.38%	5.19%	0.07%***	0.15%***
Cash	10.43%	3.77%	17.34%	16.29%	7.19%	19.81%	5.86%***	3.42%***
Book Leverage	39.62%	35.29%	32.99%	18.41%	13.73%	19.56%	-21.21%***	-21.56%***
Firm Age	33.39	17	37	41.41	25	38	8.02***	8***
Number of Segments	1.56	1	1.01	1.98	1	1.37	0.42***	0***

Panel D: Correlation Matrix

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1 Public	1																
2 Ln(Sales)	0.14	1															
	[0.00]																
3 ROA	0.08	0.23	1														
	[0.00]	[0.00]															
4 Lagged ROA	0.07	0.37	0.31	1													
	[0.00]	[0.00]	[0.00]														
5 CF Volatility	-0.11	-0.26	-0.34	-0.31	1												
	[0.00]	[0.00]	[0.00]	[0.00]													
6 Sales Growth	-0.02	-0.07	-0.13	-0.26	0.04	1											
	[0.01]	[0.00]	[0.00]	[0.00]	[0.00]												
7 Capex	0.01	0.05	0.05	0.06	0.04	0.11	1										
	[0.35]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]											
8 Cash	0.11	-0.33	-0.34	-0.36	0.23	0.15	-0.09	1									
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]										
9 Book Leverage	-0.32	0.10	0.00	0.02	0.04	-0.04	0.09	-0.32	1								
	[0.00]	[0.00]	[0.81]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]									
10 Ln(Firm Age)	0.15	0.31	0.26	0.27	-0.15	-0.21	-0.07	-0.25	-0.01	1							
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.04]								
11 Number of Segments	0.11	0.36	0.17	0.17	-0.13	-0.07	-0.02	-0.18	0.05	0.25	1						
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]							
12 MBA	0.02	0.06	-0.01	-0.02	-0.01	0.01	0.00	0.06	-0.01	0.00	0.05	1					
	[0.03]	[0.00]	[0.02]	[0.00]	[0.16]	[0.15]	[0.54]	[0.00]	[0.41]	[0.63]	[0.00]						
13 Male	0.04	0.02	0.01	0.01	-0.02	0.01	0.02	-0.03	0.03	-0.00	0.02	0.00	1				
	[0.00]	[0.00]	[0.08]	[0.07]	[0.00]	[0.29]	[0.00]	[0.00]	[0.00]	[0.94]	[0.00]	[0.38]					
14 Founder	0.05	-0.09	-0.09	-0.09	0.06	0.08	0.04	0.18	-0.06	-0.19	-0.08	-0.04	0.02	1			
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]				
15 Chairman	0.10	0.14	0.08	0.07	-0.02	-0.00	0.04	-0.06	0.01	0.07	0.10	-0.00	0.06	0.17	1		
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.88]	[0.00]	[0.00]	[0.02]	[0.00]	[0.00]	[0.83]	[0.00]	[0.00]			
16 Ln(CEO Age)	0.05	0.08	0.12	0.14	-0.08	-0.11	-0.04	-0.11	0.00	0.24	0.09	-0.08	0.05	0.01	0.21	1	
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.01]	[0.00]	[0.49]	[0.00]	[0.00]	[0.00]	[0.00]	[0.08]	[0.00]		
17 Ownership	-0.18	-0.17	-0.04	-0.03	0.15	0.02	0.03	0.03	0.07	-0.10	-0.07	-0.08	0.011	0.22	0.17	0.06	1
	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.00]	[0.03]	[0.00]	[0.00]	[0.00]	

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

The sample consists of 5,960 private firm-year observations and 35,969 public firm-year observations from 1999-2008, obtained from Capital IQ. Panel A presents the regression results when the dependent variable is the natural logarithm of CEO total pay. Panel B presents the regression results when the dependent variable is the natural logarithm of CEO cash pay. Definitions of all variables are provided in Appendix 3. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects (FEs) are included in the regressions and the heteroskedasticity-consistent standard errors (reported in brackets) account for possible correlation within a firm cluster. Superscripts ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: CEO Total Compensation

	Full Sample			Private Firms	Public Firms
	(1)	(2)	(3)	(4)	(5)
Public	0.366***	0.286***	0.171***		
	[0.029]	[0.029]	[0.029]		
Ln(Sales)	0.236***	0.222***	0.203***	0.126***	0.232***
	[0.007]	[0.008]	[0.007]	[0.010]	[0.010]
ROA		-0.059**	-0.042*	-0.187	-0.231**
		[0.026]	[0.022]	[0.141]	[0.106]
Lagged ROA		-0.180***	-0.123**	0.242*	0.122
		[0.067]	[0.061]	[0.132]	[0.098]
Stock Return					0.076***
					[0.011]
Lagged Stock Return					0.167***
					[0.012]
CF Volatility		-2.983***	-2.550***	-2.877***	-2.626***
		[0.274]	[0.267]	[0.471]	[0.316]
Sales Growth		-0.030***	-0.030***	-0.056**	-0.047***
		[0.012]	[0.011]	[0.022]	[0.013]
Capex		0.390**	0.463**	-0.315	0.333
		[0.198]	[0.189]	[0.362]	[0.205]
Cash		0.963***	0.986***	0.608***	0.932***
		[0.073]	[0.069]	[0.152]	[0.073]
Book Leverage		0.324***	0.340***	0.223***	0.422***
		[0.050]	[0.049]	[0.077]	[0.059]
Ln(Firm Age)		0.072***	0.065***	0.098***	0.064***
		[0.011]	[0.011]	[0.020]	[0.012]
Number of Segments		0.125***	0.119***	0.175***	0.101***
		[0.008]	[0.008]	[0.023]	[0.008]
MBA			0.201***	0.135**	0.182***
			[0.025]	[0.059]	[0.026]
Male			0.206***	0.363***	0.168**
			[0.062]	[0.108]	[0.067]
Founder			-0.090***	0.084	-0.054
			[0.033]	[0.085]	[0.034]
Chairman			0.324***	0.324***	0.301***
			[0.020]	[0.050]	[0.022]
Ln(CEO Age)			-0.089	0.062	0.058
			[0.069]	[0.157]	[0.072]
Ownership			-1.576***	-0.649***	-2.013***
			[0.087]	[0.125]	[0.108]
Constant	9.221***	8.870***	9.365***	10.045***	8.313***
	[0.186]	[0.178]	[0.319]	[0.650]	[0.359]
Industry and Year FEs	Yes	Yes	Yes	Yes	Yes
Observations	41929	41929	41929	5960	35696
Adj R2	37%	40%	44%	44%	47%

Panel B: CEO Cash Compensation

	Full Sample			Private Firms	Public Firms
	(1)	(2)	(3)	(4)	(5)
Public	0.188***	0.129***	0.052**		
	[0.025]	[0.026]	[0.026]		
Ln(Sales)	0.191***	0.168***	0.158***	0.119***	0.170***
	[0.005]	[0.006]	[0.006]	[0.010]	[0.007]
ROA		-0.004	0.005	0.053	0.052
		[0.009]	[0.009]	[0.148]	[0.082]
Lagged ROA		-0.100**	-0.075	0.141	-0.100
		[0.050]	[0.048]	[0.136]	[0.076]
Stock Return					0.107***
					[0.009]
Lagged Stock Return					0.113***
					[0.009]
CF Volatility		-1.944***	-1.671***	-2.608***	-1.290***
		[0.229]	[0.225]	[0.445]	[0.268]
Sales Growth		-0.037***	-0.035***	-0.045**	-0.043***
		[0.009]	[0.009]	[0.020]	[0.010]
Capex		-0.086	-0.026	-0.152	-0.094
		[0.165]	[0.160]	[0.348]	[0.176]
Cash		0.490***	0.522***	0.555***	0.500***
		[0.056]	[0.054]	[0.144]	[0.058]
Book Leverage		0.303***	0.313***	0.339***	0.340***
		[0.041]	[0.040]	[0.073]	[0.048]
Ln(Firm Age)		0.103***	0.092***	0.103***	0.082***
		[0.009]	[0.009]	[0.017]	[0.010]
Number of Segments		0.107***	0.102***	0.156***	0.091***
		[0.007]	[0.006]	[0.021]	[0.007]
MBA			0.078***	0.038	0.076***
			[0.019]	[0.053]	[0.021]
Male			0.164***	0.381***	0.107**
			[0.047]	[0.095]	[0.052]
Founder			-0.045*	0.122	-0.042
			[0.027]	[0.076]	[0.029]
Chairman			0.234***	0.229***	0.225***
			[0.017]	[0.046]	[0.018]
Ln(CEO Age)			0.197***	0.220	0.249***
			[0.058]	[0.149]	[0.061]
Ownership			-0.927***	-0.430***	-1.265***
			[0.081]	[0.126]	[0.102]
Constant	9.630***	9.413***	8.667***	8.989***	8.368***
	[0.151]	[0.141]	[0.261]	[0.617]	[0.296]
Industry and Year FEs	Yes	Yes	Yes	Yes	Yes
Observations	41929	41929	41929	5960	35696
Adj R2	38%	41%	43%	45%	43%

Table 4. Difference in CEO Pay between Public and Private Firms, Adjusted Pay

The sample consists of 5,960 private firm-year observations and 35,969 public firm-year observations from 1999-2008, obtained from Capital IQ. Panel A presents the regression results when the dependent variable is the natural logarithm of the risk-adjusted total pay. Following Hall and Murphy (2002), risk-adjusted total pay = salary + 0.8 × bonus+ risk-adjusted stock award + risk-adjusted stock options + other pay. Panel B presents the regression results when the dependent variable in Column (1) is the natural logarithm of the dividend-adjusted total pay and the dependent variable in Column (2) is the natural logarithm of the turnover-adjusted total pay. Dividend-adjusted total pay is computed 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. Turnover-adjusted total pay is computed as *Totalpay* × (1 − turnover probability), where turnover probability is estimated as a function of firm and CEO characteristics including the *Public* indicator variable, accounting performance, an indicator variable for CEO beyond age 65, a founder indicator variable, and industry and year fixed effects. Definitions of all variables are provided in Appendix 3. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects (FEs) are included in the regressions and the heteroskedasticity-consistent standard errors (reported in brackets) account for possible correlation within a firm cluster. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Risk-Adjusted Pay

	(1) $\rho = 2$ 50% of CEO wealth invested in the firm's stock for both CEOs	(2) $\rho = 3$ 50% of CEO wealth invested in the firm's stock for both CEOs	(3) $\rho = 2$ 50% of public firm CEO's wealth, 67% of private firm CEO's wealth invested in their respective firm's stock	(4) $\rho = 3$ 50% of public firm CEO's wealth, 67% of private firm CEO's wealth invested in their respective firm's stock
Public	0.060**	0.051*	0.086***	0.082***
	[0.027]	[0.026]	[0.027]	[0.026]
Ln(Sales)	0.190***	0.180***	0.189***	0.180***
	[0.007]	[0.007]	[0.007]	[0.007]
ROA	-0.113	-0.079	-0.108	-0.072
	[0.077]	[0.074]	[0.077]	[0.074]
Lagged ROA	0.090	0.057	0.091	0.058
	[0.071]	[0.068]	[0.071]	[0.068]
CF Volatility	-1.437***	-1.324***	-1.427***	-1.312***
	[0.193]	[0.185]	[0.192]	[0.184]
Sales Growth	-0.039***	-0.038***	-0.039***	-0.038***
	[0.010]	[0.010]	[0.010]	[0.010]
Capex	0.235	0.148	0.235	0.147
	[0.175]	[0.168]	[0.175]	[0.167]
Cash	0.774***	0.699***	0.774***	0.699***
	[0.063]	[0.060]	[0.063]	[0.060]
Book Leverage	0.329***	0.334***	0.335***	0.341***
	[0.045]	[0.043]	[0.045]	[0.043]
Ln(Firm Age)	0.076***	0.076***	0.075***	0.075***
	[0.010]	[0.010]	[0.010]	[0.010]
Number of Segments	0.114***	0.110***	0.114***	0.111***
	[0.007]	[0.007]	[0.007]	[0.007]
MBA	0.170***	0.152***	0.169***	0.151***
	[0.023]	[0.021]	[0.023]	[0.021]
Male	0.184***	0.179***	0.185***	0.180***
	[0.056]	[0.054]	[0.056]	[0.053]
Founder	-0.065**	-0.061**	-0.065**	-0.062**
	[0.030]	[0.028]	[0.030]	[0.028]
Chairman	0.301***	0.284***	0.300***	0.282***
	[0.019]	[0.018]	[0.019]	[0.018]
Ln(CEO Age)	0.043	0.091	0.046	0.095
	[0.064]	[0.061]	[0.064]	[0.061]
Ownership	-1.360***	-1.240***	-1.349***	-1.227***
	[0.081]	[0.079]	[0.081]	[0.080]
Constant	9.015***	8.947***	8.979***	8.900***
	[0.300]	[0.286]	[0.299]	[0.285]
Industry and Year FEs	Yes	Yes	Yes	Yes
Observations	41929	41929	41929	41929
Adj R2	46%	46%	46%	46%

Panel B: Adjusting for Dividends and CEO Turnover

	(1)	(2)
	Adjust for Dividend	Adjust for Turnover
Public	0.094***	0.083***
	[0.032]	[0.029]
Ln(Sales)	0.217***	0.212***
	[0.008]	[0.007]
ROA	-0.194**	-0.174*
	[0.087]	[0.090]
Lagged ROA	0.098	0.102
	[0.080]	[0.086]
CF Volatility	-3.182***	-2.975***
	[0.270]	[0.264]
Sales Growth	-0.046***	-0.039***
	[0.011]	[0.011]
Capex	0.318	0.326*
	[0.193]	[0.192]
Cash	0.929***	0.895***
	[0.069]	[0.069]
Book Leverage	0.301***	0.310***
	[0.051]	[0.049]
Ln(Firm Age)	0.097***	0.077***
	[0.011]	[0.011]
Number of Segments	0.126***	0.120***
	[0.008]	[0.008]
MBA	0.193***	0.212***
	[0.025]	[0.025]
Male	0.165***	0.188***
	[0.064]	[0.062]
Founder	-0.141***	-0.126***
	[0.034]	[0.033]
Chairman	0.288***	0.257***
	[0.020]	[0.020]
Ln(CEO Age)	0.041	-0.090
	[0.072]	[0.070]
Ownership		-1.495***
		[0.085]
Constant	8.588***	9.007***
	[0.333]	[0.321]
Industry and Year FEs	Yes	Yes
Observations	41929	41929
Adj R2	44%	43%

Table 5. Difference in CEO Pay Structure between Public and Private Firms

The sample consists of 5,960 private firm-year observations and 35,969 public firm-year observations from 1999-2008, obtained from Capital IQ. Columns (1)-(5) present the Tobit regression results when the dependent variable is the ratio of equity-based pay to total pay. Column (6) presents the Tobit regression results when the dependent variable is the ratio of restricted stock grant to total pay. Column (7) presents the Tobit regression results when the dependent variable is the ratio of options grant to total pay. Definitions of all variables are provided in Appendix 3. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects (FEs) are included in the regressions and the heteroskedasticity-consistent standard errors (reported in brackets) account for possible correlation within a firm cluster. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

| | Equity-based Pay/Totalpay | | | | | Stock/Totalpay | Options/Totalpay |
	(1) Full Sample	(2) Full Sample	(3) Full Sample	(4) Private Firms	(5) Public Firms	(6) Full Sample	(7) Full Sample
Public	0.196***	0.162***	0.128***			0.158***	0.083***
	[0.012]	[0.012]	[0.012]			[0.016]	[0.013]
Ln(Sales)	0.056***	0.060***	0.049***	0.025***	0.055***	0.037***	0.048***
	[0.002]	[0.003]	[0.003]	[0.005]	[0.003]	[0.003]	[0.003]
ROA		-0.225***	-0.171***	-0.129	-0.162***	-0.203***	-0.105***
		[0.039]	[0.038]	[0.108]	[0.040]	[0.052]	[0.038]
Lagged ROA		0.010	0.063*	-0.168*	0.096**	-0.011	0.065*
		[0.037]	[0.036]	[0.100]	[0.038]	[0.047]	[0.036]
Stock Return					0.000		
					[0.004]		
Lagged Stock Return					0.037***		
					[0.005]		
CF Volatility		-1.043***	-0.845***	-0.279	-1.020***	-0.160	-0.905***
		[0.118]	[0.112]	[0.296]	[0.118]	[0.141]	[0.115]
Sales Growth		-0.010**	-0.010**	-0.022*	-0.013***	-0.006	-0.010**
		[0.005]	[0.005]	[0.013]	[0.005]	[0.006]	[0.005]
Capex		0.335***	0.364***	-0.134	0.369***	0.131	0.324***
		[0.073]	[0.068]	[0.197]	[0.072]	[0.082]	[0.072]
Cash		0.257***	0.245***	-0.007	0.286***	-0.031	0.301***
		[0.025]	[0.024]	[0.084]	[0.024]	[0.028]	[0.024]
Book Leverage		-0.051***	-0.041**	-0.240***	0.028	0.059***	-0.083***
		[0.019]	[0.018]	[0.042]	[0.020]	[0.021]	[0.019]
Ln(Firm Age)		0.005	0.008**	-0.001	0.007*	0.014***	0.006
		[0.004]	[0.004]	[0.010]	[0.004]	[0.005]	[0.004]
Number of Segments		0.010***	0.010***	0.017	0.007**	0.010***	0.006**
		[0.003]	[0.003]	[0.012]	[0.003]	[0.003]	[0.003]
MBA			0.062***	0.087***	0.058***	0.036***	0.060***
			[0.008]	[0.027]	[0.008]	[0.010]	[0.009]
Male			0.024	0.032	0.028	-0.019	0.046*
			[0.022]	[0.054]	[0.023]	[0.024]	[0.024]
Founder			-0.012	-0.035	-0.003	-0.065***	0.011
			[0.012]	[0.046]	[0.012]	[0.015]	[0.012]
Chairman			0.069***	0.117***	0.056***	0.039***	0.062***
			[0.007]	[0.024]	[0.008]	[0.009]	[0.008]
Ln(CEO Age)			-0.241***	-0.226***	-0.232***	-0.226***	-0.174***
			[0.024]	[0.075]	[0.024]	[0.028]	[0.024]
Ownership			-0.815***	-0.676***	-0.883***	-0.660***	-0.746***
			[0.043]	[0.075]	[0.053]	[0.064]	[0.045]
Constant	-1.078***	-1.152***	0.005	0.579*	-0.083	-0.044	-0.458***
	[0.072]	[0.077]	[0.121]	[0.320]	[0.125]	[0.138]	[0.125]
Industry and Year FEs	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	41929	41929	41929	5960	35696	41929	41929
Pseudo R2	15%	17%	21%	15%	22%	27%	19%

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

The sample consists of 5,960 private firm-year observations and 35,969 public firm-year observations from 1999-2008, obtained from Capital IQ. Panel A presents the regression results when the dependent variable is the natural logarithm of CEO total pay. Panel B presents the regression results when the dependent variable is the natural logarithm of CEO cash pay. 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 3. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. CEO, industry, and year fixed effects (FEs) are included in the regressions and the heteroskedasticity-consistent standard errors (reported in brackets) account for possible correlation within a firm cluster. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

Panel A: CEO Total Compensation

	Full Sample		Private Firms	Public Firms	Public Firms
	(1)	(2)	(3)	(4)	(5)
Public	0.089*	0.032			
	[0.051]	[0.047]			
Ln(Sales)	0.031***	0.029***	0.012**	0.033***	0.033***
	[0.003]	[0.003]	[0.005]	[0.003]	[0.003]
ROA	0.205	0.183	0.275**	0.719***	0.555***
	[0.134]	[0.127]	[0.138]	[0.061]	[0.062]
Lagged ROA	0.132	0.078	0.305**	0.368***	0.400***
	[0.112]	[0.109]	[0.143]	[0.060]	[0.062]
Public × ROA	0.686***	0.558***			
	[0.153]	[0.137]			
Public × Lagged ROA	0.249**	0.340***			
	[0.119]	[0.118]			
Stock Return					0.086***
					[0.008]
Lagged Stock Return					0.137***
					[0.008]
CF Volatility		-0.159	0.023	-0.203	-0.118
		[0.155]	[0.360]	[0.171]	[0.172]
Sales Growth		0.057***	0.035**	0.059***	0.039***
		[0.007]	[0.017]	[0.007]	[0.007]
Capex		1.097***	0.278	1.271***	1.203***
		[0.111]	[0.263]	[0.122]	[0.123]
Cash		0.167***	0.006	0.188***	0.150***
		[0.040]	[0.130]	[0.043]	[0.043]
Book Leverage		-0.252***	-0.279***	-0.243***	-0.183***
		[0.033]	[0.069]	[0.037]	[0.037]
Ln(Firm Age)		0.046**	0.095**	0.061**	0.074***
		[0.018]	[0.042]	[0.025]	[0.025]
Number of Segments		0.017***	0.025*	0.017***	0.018***
		[0.005]	[0.015]	[0.006]	[0.006]
Ownership		-0.328***	-0.232	-0.317***	-0.329***
		[0.072]	[0.152]	[0.083]	[0.083]
Constant	11.164***	11.192***	10.964***	11.091***	10.964***
	[0.734]	[0.738]	[0.876]	[0.868]	[0.876]
CEO, Industry, and Year FEs	Yes	Yes	Yes	Yes	Yes
Observations	41929	41929	5960	35969	35969
Adj R2	22%	21%	23%	20%	21%

Panel B: CEO Cash Compensation

	Full Sample		Private Firms	Public Firms	Public Firms
	(1)	(2)	(3)	(4)	(5)
Public	0.009	0.053			
	[0.039]	[0.040]			
Ln(Sales)	0.024***	0.021***	0.008*	0.024***	0.025***
	[0.002]	[0.002]	[0.004]	[0.002]	[0.002]
ROA	0.373***	0.312***	0.301***	0.895***	0.733***
	[0.107]	[0.108]	[0.113]	[0.046]	[0.047]
Lagged ROA	0.011	0.011	0.111	0.053	0.108***
	[0.089]	[0.089]	[0.095]	[0.040]	[0.041]
Public × ROA	0.630***	0.584***			
	[0.115]	[0.115]			
Public × Lagged ROA	0.055	0.062			
	[0.102]	[0.102]			
Stock Return					0.111***
					[0.006]
Lagged Stock Return					0.090***
					[0.006]
CF Volatility		-0.210**	0.050	-0.258***	-0.276***
		[0.088]	[0.221]	[0.097]	[0.097]
Sales Growth		0.047***	0.048***	0.047***	0.034***
		[0.005]	[0.014]	[0.006]	[0.006]
Capex		0.582***	0.277	0.665***	0.673***
		[0.086]	[0.218]	[0.093]	[0.094]
Cash		0.061**	-0.070	0.075**	0.047
		[0.031]	[0.108]	[0.033]	[0.033]
Book Leverage		-0.165***	-0.175***	-0.164***	-0.116***
		[0.025]	[0.057]	[0.028]	[0.028]
Ln(Firm Age)		0.090***	0.155***	0.096***	0.107***
		[0.014]	[0.035]	[0.019]	[0.019]
Number of Segments		0.018***	0.034***	0.015***	0.016***
		[0.004]	[0.012]	[0.004]	[0.004]
Ownership		-0.100*	-0.275**	-0.132**	-0.104
		[0.055]	[0.126]	[0.063]	[0.064]
Constant	12.651***	12.352***	12.330***	15.586***	10.815***
	[0.568]	[0.571]	[0.253]	[1.039]	[0.665]
CEO, Industry, and Year FEs	Yes	Yes	Yes	Yes	Yes
Observations	41929	41929	5960	35969	35969
Adj R2	13%	14%	8%	15%	16%

Table 7. Pay Change in Private Firms versus Pay Change in Public Firms

The sample consists of only private firm-year observations from 1999-2008, obtained from Capital IQ. The dependent variable is the change in total pay (ΔPay), computed as $Ln(Totalpay)_t - Ln(Totalpay)_{t-1}$. For each private firm-year observation, we compute the mean and median change in total pay for the public firms in the same industry in that year (*Mean ΔPublic Pay* and *Median ΔPublic Pay*, respectively). The variable *ΔSales* is the change in sales, computed as $Ln(Sales)_t - Ln(Sale)_{t-1}$. Definitions of all variables are provided in Appendix 3. All dollar values are in 2008 dollars. All continuous variables are winsorized at the 1st and 99th percentiles. Industry and year fixed effects (FEs) are included in the regressions and the heteroskedasticity-consistent standard errors (reported in brackets) account for possible correlation within a firm cluster. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Mean ΔPublic Pay	0.126	0.127	0.164			
	[0.108]	[0.108]	[0.118]			
Lagged Mean ΔPublic Pay			0.107			
			[0.138]			
Median ΔPublic Pay				0.187	0.188	0.167
				[0.193]	[0.193]	[0.206]
Lagged Median ΔPublic Pay						0.221
						[0.222]
ΔSales	0.097***	0.092***	0.105***	0.098***	0.093***	0.107***
	[0.029]	[0.030]	[0.030]	[0.029]	[0.030]	[0.030]
ROA		0.133	0.071		0.131	0.068
		[0.133]	[0.135]		[0.127]	[0.132]
Lagged ROA		-0.110	-0.014		-0.107	-0.009
		[0.155]	[0.158]		[0.159]	[0.166]
Constant	-0.204*	-0.200*	-0.173	-0.206*	-0.201*	-0.181
	[0.111]	[0.112]	[0.113]	[0.111]	[0.112]	[0.114]
Industry and Year FEs	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3924	3924	3604	3924	3924	3604
Adj R2	2%	2%	2%	2%	2%	2%

Table 8. 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	30
	51%	21%
The new CEO worked as a non-CEO executive in a private firm	32	17
	22%	12%
The new CEO worked as a CEO in a public firm	20	41
	14%	28%
The new CEO worked as a non-CEO executive in a public firm	18	55
	13%	38%
Total	143	143
	100%	100%

Table 9. Propensity Score Matching

This table presents the comparison of level and structure of CEO pay in private firms and their propensity score-matched public firms. We match each private firm to a public firm using the nearest neighborhood, a Gaussian kernel, and local linear regression methods. The variables we use in matching are Ln (sales), ROA, lagged ROA, CF volatility, sales growth, capex, cash, book leverage, Ln(firm age), the number of segment, CEO's MBA degree indicator, male CEO indicator, founder CEO indicator, indicator for CEOs being Chairman of the Board, Ln (CEO age), CEO ownership, and industry and year fixed effects. To test pairwise differences in means between the two samples, we use bootstrapped standard errors based on 50 replications with replacement which are reported in parentheses. ***, **, * denote statistical significance at the 1, 5, and 10 percent levels, respectively

Variables	Nearest neighborhood	Gaussian Kernel	Local linear regression
Total pay (K)	321***	444***	274***
	(118)	(70)	(79)
Cashpay (K)	55	121***	13
	(47)	(28)	(32)
Equity-based pay/Totalpay	8.69%***	8.28%***	8.91%***
	(0.008)	(0.005)	(0.006)

Figure 1. Time Series of Public Firm CEO Pay Premium

The sample consists of 5,960 private firm-year observations and 35,969 public firm-year observations from 1999-2008, obtained from Capital IQ. Start with the regression specification of Column (3) in Table 3 Panel A, we add interaction terms between the *Public* indicator variable and the year indicator variables (using the first year of our sample 1999 as the base year). We then plot the yearly public firm pay premium as the sum of the coefficient on the *Public* indicator variable and the coefficient on the interaction term involving each of the sample years, except the base year of 1999. For example, the coefficient on the *Public* indicator variable is 0.146, and the coefficient on the interaction term Public × Year 2000 is 0.042, then we plot $e^{(0.146+0.042)} - 1 = 20.68\%$ as the public firm pay premium for the year 2000.
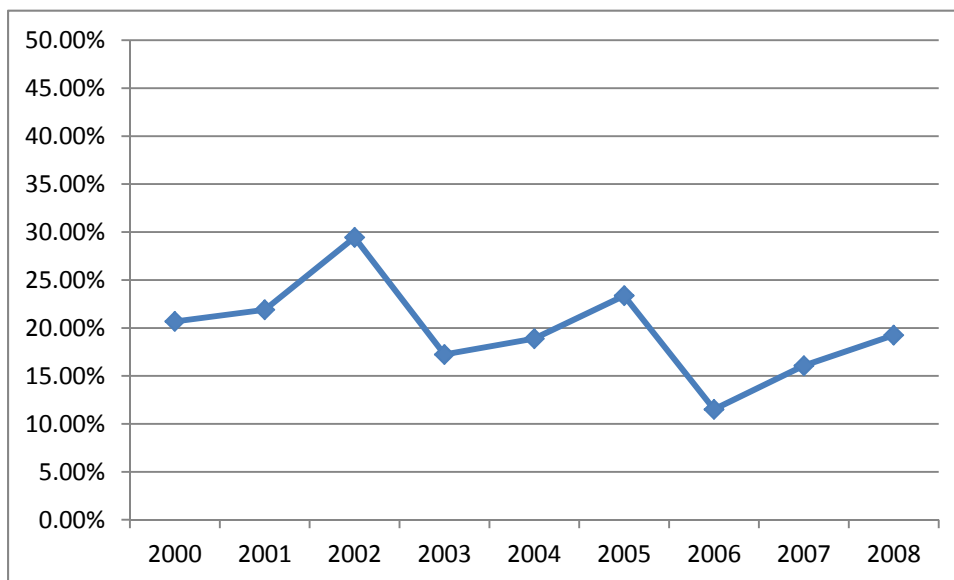
Figure 2. Change in CEO Pay around IPO

This figure is based on 574 IPO deals covered in our sample. We plot the time series of the level of CEO total pay, the level of CEO cash pay, and the structure 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 year prior to the IPO. Definitions of all variables are provided in Appendix 3.

Panel A: Totalpay (K)
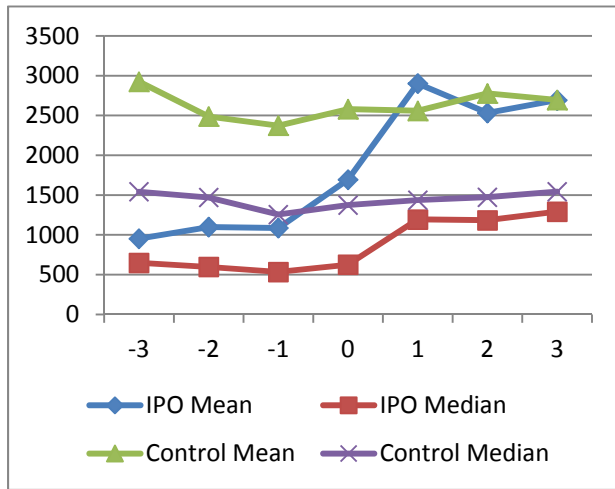
Panel B: Cashpay (K)
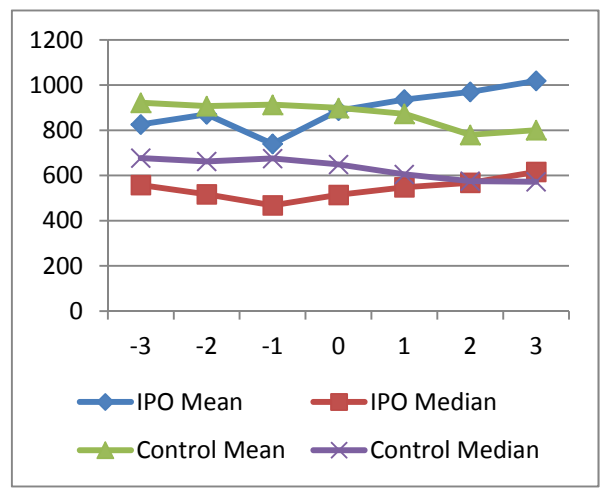
Panel C: Equity-based Pay/Totalpay