

Ex Post Estimation Error in CEO Option Grants

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Abstract

The value of option grants to CEOs is defined in two different ways. Fair values are grant-date estimates of expected values from future option contract settlement. Payouts from exercise are realized values from option contract settlement. We refer to the cumulative difference between the fair values and payouts over an individual CEO's tenure as "ex post estimation error" (EPEE), because it represents information about option contract settlement that is not available at the grant dates. We find that the average EPEE amounts to 27% of the fair value of option grants among all *ExecuComp* CEOs from 1992 to 2009, contrary to beliefs that fair values are unbiased or they understate option-related payments that CEOs take home. We find that EPEE also varies with agency relations between CEOs and shareholders. EPEE is significantly higher in companies with outsider CEOs and in companies with high institutional ownership. These findings imply that agency relations between CEOs and shareholders influence option contract settlement and that pay comparisons that ignore option contract settlement may be misleading.

Keywords: CEO pay, stock options, outsider CEOs, option exercise, institutional shareholders.

JEL classification: J33, J41, G32.

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1. Introduction

Despite the vast interest in CEO pay that is manifest in shareholder activism campaigns and business press, the value of option grants to CEOs lacks a unified definition. The Securities and Exchange Commission (SEC) mandates that companies simultaneously report two definitions in their filings: Fair values that represent expected values from future settlement of option contracts; and payouts from option exercise that represent realized cash values from the eventual settlement of option contracts. Out of the two definitions, more attention is given to the fair values, partly because of the SEC's requirement that they are disclosed in the summary annual compensation table. Moreover, academic studies on CEO pay usually argue that fair values represent the economic cost of—and incentives provided by—option grants and that payouts from exercises do not provide any incremental information about the value of option grants (Core et al., 2008). Nevertheless, a fast-growing number of companies highlight disclosures of payouts and refer to payouts as their preferred definition of option pay, largely in response to shareholder activism campaigns (Chasan, 2102).

We argue that the difference between fair values and payouts offers important information that is not available at the grant dates, because option contracts include many contingencies and provisions about future payouts that are resolved only during the contracting period (i.e., the full tenure of an individual CEO). We refer to the cumulative difference between the grant-date fair values and payouts from exercise over the full tenure of a CEO as the *ex post estimation error* (EPEE) and investigate properties of EPEE, particularly in light of the agency relations between the CEO and shareholders.

It has long been recognized that the value of options in the hands of a risk-averse executive differs from the value of options in the hands of a risk-neutral investor and that option features

such as vesting and forfeiture upon termination of employment affect the fair value of stock options (Huddart and Lang, 1996; Carpenter, 1998). Various methods have been proposed to deal with such measurement issues when using Black-Scholes and other option pricing methods (Cvitanic et al., 2008; Bettis et al., 2005; Hull and White, 2004). Companies have long used these methods to compute fair values of their option grants. Because these computations reflect adjustments for early exercise behavior and turnover (Huddart and Lang, 1996), our ex ante prediction is that EPEE is not different from zero for a large sample over a long period.

Empirically, we investigate compensation packages over the full tenure of individual CEOs in the *ExecuComp* database between the years 1992 and 2009 and find that average EPEE amounts to 27% of fair values of option grants. In other words, CEOs on average took home only 73% of the reported fair values of their options during their tenure. Our findings survive several sensitivity checks and are generally robust across years and industries. While it is not surprising that realized payouts deviate from fair values (i.e., grant-date expectations of future payouts) for an individual CEO, the finding of economically significant and statistically robust EPEE for a large sample over a long period reveals information relevant for the debate about the perceived “excessive” CEO compensation (Bebchuk and Grinstein, 2005; Gabaix and Landier, 2008).

The cumulative fair value estimates differ from cumulative payouts at the individual CEO level for two reasons. First is the natural estimation error that originates from future stock prices as well as unbiased errors in inputs to option pricing models such as return volatility, dividend yield, and risk-free rate (Hodder et al., 2006). This type of error should not be systematically affected by agency relations between the CEO and shareholders. Second is the estimation error that results from conditional terms in option contracts. For instance, option contracts include pre-set contingencies such as performance and time vesting conditions and forced exercise or

forfeiture on CEO departure.¹ Furthermore, companies can modify option terms after the option grants by, for example, revising vesting conditions, black-out periods, or equity-holding requirements; repricing underwater options; or forcing forfeiture of options when CEOs step down. Overall, option contract settlement depends in part on the resolution of such contingencies and modification of option terms. Various agency relations between the CEO and shareholders may affect this type of estimation error. To investigate, we predict how EPEE varies with two agency relations that shape CEO compensation in general: Boards' decision to hire outsider CEOs and the extent of institutional ownership.

Outsider CEOs possess transferable (general) skills yet face uncertainty about their talent and fit with the firm (Murphy and Zabojnik, 2007). Based on this characterization, adverse selection theory predicts that an outsider CEO is offered, and is willing to accept, higher performance-based pay and total pay than an insider CEO (Lazear, 1986). In other words, option grants effectively match pay to the uncertain talent of an outsider CEO as information about talent becomes available from firm performance during the CEO's tenure (Arya and Mittendorf, 2005). In this setting, pre-set contingencies and post-grant modifications to option terms likely facilitate a more effective matching of pay and talent during the CEO's tenure (Gillan et al., 2009). Consistent with this prediction, we find that outsider CEOs realized a significantly smaller portion of the fair values of their option grants (55%) than insider CEOs did (84%). The finding of higher EPEE for outsider CEOs persists after controlling for determinants of option pay including performance and length of tenure. From a different perspective, payouts from exercise as well as total payouts are not statistically different between outsider and insider CEOs,

¹ It is difficult to value performance vesting conditions that depend on subjective metrics other than stock returns. Because of the unique CEO-company relationship, it is not practical to estimate a quit rate for an individual CEO that may be used to accurately price time vesting and forfeiture provisions.

suggesting that the well-known pay differential between outsider and insider CEOs are fully offset by differences in option contract settlement in the subsequent years.

Previous research documents that CEO compensation is lower and more sensitive to firm performance when stockholdings are concentrated among institutional investors (Hartzell and Starks, 2003). This evidence is consistent with less severe agency problems between CEOs and institutional shareholders. We investigate whether institutional ownership also provides a more effective disciplining effect on CEO compensation through option settlement. We find that this is the case: EPEE increases with the percentage holdings of institutional investors, especially percentage holdings of large blockholders.

Our paper makes several contributions. First and foremost, our study is the first, to our knowledge, that documents large-scale empirical evidence about how CEO option contracts are settled. Based on our evidence, shareholders should be aware that cash settlement values of option grants are considerably less than the fair values estimated at the grant dates. From a CEO's ex ante perspective, two out of three CEOs realize less than the reported fair values of their option grants, and one out of three CEOs cannot exercise *any* of their option grants over their tenure. These findings also suggest that payouts from option exercise over a CEO's tenure are more sensitive to CEO performance than are the fair values of option grants. Overall, CEO pay is lower and more sensitive to performance than what is suggested if one only considers fair values and option deltas computed using the fair values. We believe that our findings highlight the multi-period nature of CEO pay contracts and the need for related disclosures and empirical tests that track the full tenure of individual CEOs. As such, our findings will serve the SEC, which is mandated by the Dodd-Frank Act of 2010 to develop disclosure rules about how executives are *actually* paid and how these payments relate with the financial performance.

Second, our findings are relevant for the prior findings that opportunistic CEOs manipulate various parameters of option pricing models and understate fair values of their option grants (Yermack, 1998; Aboody et al., 2006). A corollary of these findings is that CEOs who manipulate fair values of option grants will be able to take home more than the reported fair values in the long run (Ho, 2012). Our comparison of cumulative fair values with cumulative payouts over the full tenure of individual CEOs does not support this prediction.

Finally, our findings are consistent with adverse selection theory. In response to uncertain talent of outsider CEOs and uncertain match with the outsider CEOs, companies not only increase the weight of options in the CEO compensation package but also use conditional terms in option contracts to limit option settlement values. Furthermore, institutional investors help grant CEOs not only lower expected compensation but also lower take-home pay relative to the expected compensation.

The paper is organized as follows. Section 2 discusses the contracting environment between the CEO and the company, and develops our hypotheses. Section 3 describes the sample. Section 4 presents empirical results. Section 5 concludes with a discussion of the study's implications.

2. Hypothesis Development

Based on information available at the reporting date, companies compute fair values of CEO option pay as value estimates from future option contract settlement.² Companies report option payouts as the number of options exercised times the exercise premium (stock price net of exercise price) at the dates of contract settlement.³ The literature on executive compensation has

² The fair values form the basis for annual option compensation expense in financial statements (SFAS 123R).

³ Because of the irregular nature of option exercises, some advocate the use of “realizable pay” that considers the change in the value of exercisable options during a period (Farient Advisors, 2012). Realized and realizable pay converge over the tenure of a CEO so we only use realized pay over the full tenure of CEOs.

not fully explored the differences between the two definitions.⁴ The literature primarily uses fair values, because economists view fair values as regular and representative of incentives provided by option grants and, in contrast, payouts from option exercises as irregular and unrepresentative of incentives provided by option grants (Core and Guay, 1999). Nevertheless, some studies argue that option payouts are essential for the debate on whether CEO pay levels are excessive. Leone et al. (2006) argue that payouts strongly reward *past* performance and fair values do not. Similarly, Kaplan (2008) argues “[Payouts] is more appropriate for considering whether CEOs are paid for performance.”⁵ Many companies highlight disclosures of payouts for this reason, especially in response to shareholder activism campaigns (Chasan, 2102). Kaplan and Rauh (2010) suspect that confusion over the relation between executive pay and performance arises because “critics focus on ex ante or estimated pay rather than realized pay.”

2.1. *Ex post estimation error*

Stock option grants are key elements of dynamic contracting between the company and the CEO (Gillan et al., 2009; Hall and Liebman, 1998). Option grants cannot be sold or transferred, and their exercisability is subject to—besides future stock prices—various pre-set contingencies and post-grant modifications of option terms. First, there are various time- and performance-vesting contingencies for exercisability (Bettis et al., 2010). Second, the company sets insider-trading rules such as blackout periods and equity holding requirements that influence option settlement. Third, the company can force the CEO to leave, resulting in the CEO forfeiting

⁴ Between the years 2004 and 2010, 90 empirical articles about CEO pay appeared in *Journal of Finance*, *Journal of Financial Economics*, *Review of Financial Studies*, *The Accounting Review*, *Journal of Accounting and Economics*, *Journal of Accounting Research*, combined. Out of these, 77 exclusively use the estimated value of option grants, six exclusively use payouts, and seven use both measures. The eight papers that use both measures simply treat the measures as alternatives without explaining the differences.

⁵ Related to this observation, there were (unsuccessful) early calls to use the payouts from option exercises as the basis for option compensation expense in financial statements (Rubinstein, 1995).

unvested options and involuntarily exercising or cancelling vested options; or the CEO can resign, again triggering forfeiture or involuntary exercise. Finally, the company and the CEO can negotiate modifications to existing option plans, such as altering vesting conditions; repricing or replacing underwater options; and cancelling options held after departure.⁶ Overall, the transfer of exercise rights to the CEO is quite incomplete at the grant date, largely depending on pre-set contingencies and interactions between the company and the CEO over the contracting period.

As one specific case about the incomplete transfer of exercise rights on grant-date values, early studies extensively acknowledged that risk-averse early exercise behavior and employee turnover reduce payouts from option exercises (Hemmer et al., 1996; Cuny and Jorion, 1995; Huddart and Lang, 1996). These articles propose—and the subsequent SAB No. 107 encouraged—that companies estimate fair values using the Black and Scholes (1973) model after substituting the shorter expected term of options for the full contractual term (SEC, 2005). Other studies proposed alternative pricing methods such as analytic formulas (Cvitanic et al., 2008) and lattice models that incorporate time vesting and performance vesting based on stock returns, risk-averse exercise behavior and turnover (Bettis et al., 2005; Carpenter, 1998; Hull and White, 2004). Collectively, these studies show how option contracts settle during the contracting period, and guide companies in computing unbiased fair value estimates.⁷ Overall, the cumulative difference between fair values and payouts from option exercises over a CEO's tenure (i.e., ex post estimation error or EPEE) is determined by future stock prices, resolution of pre-set contingencies and modification of option terms that affect option contract settlement.

⁶ For example, Bell Canada Enterprises in its 2010 proxy states, “The right to exercise stock options vests 25% per year for four years from the grant date, unless the Compensation Committee determines otherwise.”

⁷ Companies tap consulting services or special software to value option grants. Companies usually use the Black-Scholes method, although binomial lattice and Monte Carlo simulation have recently received traction (Mun, 2004). Empirical evidence shows that early exercise behavior due to risk aversion can be addressed with the use of expected term in analytic models and a stock to strike price ratio in lattice models (Bettis et al., 2005). The effects of employee turnover can be addressed with quit rates in lattice and analytic models (Cvitanic et al., 2008; Hull and White, 2004).

Kaplan and Minton (2012) and Hermalin (2005) show that CEO tenure is more volatile and shorter than previously recognized, because cancellation, forfeiture, and early exercises of stock options affect CEOs more than other employees. Cvitanic et al. (2008) show that vesting restrictions have countervailing influences on the fair value of option grants; the negative effect from forfeiture outweighs the positive effect from restricting early exercise when quit rates are high. Accordingly, EPEE is likely to be higher for CEOs than for other employees. We empirically investigate EPEE of the *ExecuComp* universe of CEOs.

Our analysis covers years from 1992 to 2009, during which firms used different methods to estimate fair values.⁸ For years before 2006, we use *ExecuComp*-computed values in order to correct for differences in estimation methods across companies.⁹ After 2006, we use company-reported fair values, whose computations and disclosures are standardized by SEC mandate. We find that fair values were on average substantially greater than the payouts.

We develop two hypotheses to evaluate whether EPEE varies with agency relations between CEOs and shareholders.

2.2. *Ex post estimation errors among outsider versus insider CEOs*

Hiring a CEO from outside versus promoting a CEO from within is an important decision facing shareholders and their boards. Outsider hiring is associated with the new CEO having more general managerial talent (Murphy and Zabojnik, 2007); charisma or super-star status (Khurana, 2002; Malmendier and Tate, 2009); and the new CEO using a talent agent (Rajgopal

⁸ As discussed above, a popular approach is the Black-Scholes model with the expected term substituted for the contractual term. Until the passage of SFAS 123R in 2004, the SEC also permitted the use of a simple method that assumed a fixed annual stock return of 5% or 10% between the years of option grants and exercises.

⁹ The CEO compensation research has extensively relied on these computed values. As a sensitivity check in Section 4.2, we show that the ex post estimation error is substantially larger when we replace the *ExecuComp*-computed values with the company-reported values.

et al., 2012). At the same time, outsider CEOs face greater uncertainty about their talent as well as their relationship with their companies (Gillan et al., 2009). The adverse selection models predict higher incentive pay and total pay under greater uncertainty (Lazear, 1986). Companies use options more extensively in order to match pay with talent (Arya and Mittendorf, 2005). Empirical evidence to date finds that outsider CEOs with general managerial skills receive higher pay than insiders with firm-specific human capital (Custodio et al., 2013).

Hiring an outsider CEO suggests less executive entrenchment and more active involvement by shareholders in the hiring and compensation process. The visibility of an outsider attracts greater shareholder scrutiny. Shareholders have higher performance expectations and pay a premium for an outsider CEO.¹⁰ Higher performance expectations, greater visibility, more scrutiny by shareholders, along with more uncertainty about the fit between the CEO and the company, likely increase the role of contingencies in the settlement of options. In line with this adverse selection argument, performance-vesting conditions are used more frequently for firms hiring outsider CEOs to attract top talent (Bettis et al., 2010; Gerakos et al., 2007) and for firms in which sustainability of the relationship with the CEOs are less certain (Gillan et al., 2009). In sum, companies that use options more extensively to match pay to talent for outsider CEOs are likely to use pre-set contingencies and post-grant modifications more extensively to limit option settlement values. Overall, we predict a higher ex post estimation error for outsider CEOs versus insider CEOs.

H1. Ex post estimation error is higher for outsider CEOs than insider CEOs.

¹⁰ Anecdotal evidence indicates shareholder discontent over higher pay of outsider CEOs (Ferris, 2010). Jensen et al. (2004) argue that outsider CEOs receive “too much” compensation. Cazier and McInnis (2010) find that firms pay a premium to outsiders for prior performance, which is “...nevertheless not a predictor of high performance.” In their review of executive succession research, Kesner and Sebora (1994) do not observe any convergence in the literature about the relation between outsider CEOs and performance. However, Huson et al. (2004) find that outsider CEOs perform better. Similarly, Rajgopal et al. (2012) find that CEOs with talent agents perform better.

2.3. *Ex post estimation error and institutional ownership*

Hartzell and Starks (2003) find that the expected value of annual CEO pay is more sensitive to performance and lower in magnitude when institutional ownership is greater and more concentrated. These findings are consistent with institutional shareholders playing a monitoring role that reduces agency problems in contracting between CEOs and their firms (Cheng and Indjejikian, 2009). The pre-set contingencies for vesting or forfeiture and provisions that can be modified after the option grants make it possible for institutional shareholders to also influence option settlement. In their exploratory study, Carter et al. (2009) find that greater external monitoring by institutional investors is associated with tougher overall relative performance evaluation conditions. Overall, direct or indirect pressure from institutional investors may serve to reduce option settlement values relative to grant-date values.

H2. Ex post estimation error increases with institutional ownership.

3. Sample

We obtain CEO pay data for fiscal years between 1992 and 2009 from the *ExecuComp* database. We require non-missing pay data over CEO tenure, non-missing financials from the *CRSP* and *Compustat* databases, a press release about an insider or outsider CEO appointment from the *Factiva* database, and supporting turnover information about CEO arrival and departure dates from *ExecuComp*. In order to allow for the accumulation of compensation data over CEO tenure, we exclude CEOs who started during or after 2006 from our sample.¹¹ In order to compare a CEO's complete portfolio of option grants and the payouts from these grants, we also

¹¹ This choice works against finding a positive ex post estimation error. Section 4.1 and Figure 1 show that ex post estimation error is insensitive to the CEO's beginning year.

exclude incumbent CEOs who continue into 2010.¹² The final sample consists of 1,791 CEOs with completed tenure, i.e., CEOs who started between 1992 and 2005 and who stepped down by the end of 2009. We believe that the large number of CEOs in the sample and the length of the sample period, spanning years 1992 to 2009 which include boom and bust cycles, render our sample representative of the CEO population.

In order to make unbiased comparisons between option pay and payouts, we adjust annual CEO pay and company financials for inflation (CPI-U) to reflect 2009 year-end dollars and compute averages of CEO pay and company financials over the tenure of individual CEOs. This computation includes CEOs' partial first and last years. For example, if a company with a December 31 fiscal year end announces that an executive will start (or has started) as CEO on February 26, 1996 and the CEO will leave (or has left) on September 10, 2003, we assign 1996 as the CEO's first year and 2003 as the CEO's last year. We therefore conservatively include all option grants and exercises during the partial years of a CEO's tenure.

3.1. Differences between fair values of option grants and option payouts

Table 1, Panel A provides statistics on pay variables over CEO tenure, which is 5.1 years on average for the sample of CEOs with completed tenure.¹³ The estimated total pay, *Total Pay*, averages \$5,731,000 per year and consists of the following components: *Salary*, \$706,000 (12%), *Bonus*, \$702,000 (12%), *Other Pay*, \$463,000 (8%), payouts from long-term incentive plans *LTIP*, \$275,000 (5%), *Stock Pay*, \$745,000 (13%), and fair value of option grants *Option Pay*, \$2,838,000 (50%).

¹² If we release this constraint, we arrive at 2,235 CEOs who have completed or partial tenure by the end of 2009. Section 4.1 and Table 4 Panel B show that the results are similar with this larger sample.

¹³ This estimate is potentially shorter than the unconditional expected tenure of the CEO population because our primary sample excludes CEOs who continue to serve in 2010.

We use *ExecuComp* estimations of *Option Pay* until 2006 (WRDS, 2006) and company-reported Black-Scholes values for years after 2006, during which the SEC mandate for improved fair value reporting is in effect (SEC, 2006). We choose the *ExecuComp* estimation over company reporting prior to 2006, because the *ExecuComp* estimation, a Black-Scholes valuation, is standard across years and companies, whereas companies have reported the value of their option compensation using either Black-Scholes (44% of the sample) or the simplistic 5% method (56% of the sample).¹⁴ Furthermore, company-reported values prior to 2006 may be biased for various reasons such as expectations management or inexperience, as suggested by the widespread use of the 5% method.¹⁵

A CEO's payout from exercise is computed as the number of options exercised multiplied by the difference between stock and exercise prices on exercise dates. We inflation-adjust and aggregate payouts over the CEO's tenure. We also adjust aggregate payouts by excluding the value of option holdings at the start of the CEO's tenure (assuming that these holdings are from previous contracts with the company), and by including the value of exercisable option holdings at the end of the CEO's tenure (assuming that CEOs can exercise these exercisable holdings after they step down). Specifically, we subtract from the aggregate payouts over the CEO's tenure (fiscal years 1996 through 2003 in the above example) the intrinsic value of exercisable and unexercisable options held at the beginning of the first year (December 31, 1995), and add the intrinsic value of exercisable options at the end of the last year (December 31, 2003).¹⁶ To avoid negative values, we set the aggregate payouts to zero if the above adjustment produces a negative

¹⁴ This observation is consistent with Lam and Mensah (2007).

¹⁵ If we had used company-reported values for years prior to 2006, average Option Pay would have been \$3,014,000 and ex post estimation error would have been \$904,000, or 13% larger than the reported ex post estimation error. All the results would have been similar to those reported.

¹⁶ The use of intrinsic value for the head-start adjustment for beginning option holdings may understate the value of beginning option holdings. For robustness, we use a restricted sample with no beginning option holdings. Results are qualitatively similar for this restricted sample. Similarly, the use of intrinsic value for ending option holdings may understate the actual realization for executives with sunset provisions that extend the exercise period.

value (less than 1% of the sample). Finally, we compute *Option Payout* by dividing the adjusted aggregate payouts by the number of years in the CEO's tenure. We define *Total Payout* as the sum of *Salary*, *Bonus*, *Other Pay*, *LTIP*, *Stock Pay*, and *Option Payout*.

The average payout from option exercises, *Option Payout*, is \$2,126,000 per year. The ex post estimation error *EPEE* is defined as the difference between *Option Pay* and *Option Payout*, and averages \$712,000 per year or \$2,036,000 cumulatively over CEO tenure.¹⁷ On average, *EPEE* corresponds to 12% of *Total Pay* or 25% of *Option Pay*. The median *Option Pay* is \$1,195,000 whereas the median *Option Payout* is only \$210,000, indicating that a significant number of CEOs did not realize all or most of the fair value of their option grants. Figure 1 depicts median *EPEE* across calendar years in which a CEO's tenure starts. The annual median *EPEE* deflated by *Total Pay* ranges between 9% and 30% except for years 1992 and 1993. Similarly, the annual median *EPEE* deflated by *Option Pay* ranges between 30% and 75%, except for the first and last two years of the sample. The positive *EPEE* is persistent across years of CEO inception except 1992 and 1993, and is not sensitive to economic trends.

Table 1, Panel B provides similar information to Panel A for all 2,235 CEOs, including those who have left before 2010 (CEOs with completed tenure) and those who have continued in 2010 (CEOs with partial tenure). We present this information to alleviate concerns that our analysis is biased because CEOs with partial tenure are excluded. The average *Option Payout*, which is adjusted for beginning and ending option holdings, is \$2,082,000 compared with the average *Option Pay* of \$2,697,000. The average *EPEE* of \$615,000 is about 11% of *Total Pay* or 23% of *Option Pay*, slightly but not significantly lower than for the completed tenure sample.¹⁸

¹⁷ Without the adjustment for beginning and ending option holdings, *Option Payout* is 1,568,000 per CEO-year, and the *EPEE* is even starker, \$1,339,000, corresponding to 46% of *Option Pay*.

¹⁸ If *Option Payout* is not adjusted for option holdings, average *EPEE* is larger at \$1,271,000, or 44% of *Option Pay*.

We also compute, but do not tabulate, pay comparisons during the first and last years of CEO tenure. Not surprisingly, average option pay is significantly higher in the first year (\$4,367,000) than in the last year of CEO tenure (\$1,716,000), and average payouts from option exercises are significantly higher in the last year (\$2,543,000) than in the first year (\$1,005,000). The large variance in fair values of option grants and option payouts across years justifies our methodology of comparing average option values over the completed tenure of individual CEOs.

3.2. Determinants of CEO pay

The previous literature relates CEO pay levels to various company characteristics. Accordingly, we control for the following characteristics while testing the relation between pay levels and outsider CEOs and institutional ownership:

Firm size: Estimated pay and payouts increase with size (Gabaix and Landier, 2008). We use the natural logarithm of sales as the proxy for company size.

Operational risk: CEO option grants increase with firms' operational risk (Aggarwal and Samwick, 1999; Garen, 1994). If higher risk, in addition, requires larger premiums, we expect a positive relation between firm risk and CEO pay levels. We use the standard deviation of residuals from the annual regression of daily firm stock returns on market returns as the proxy for operational risk.

Growth opportunities: The option pay and total pay of CEOs increase with growth opportunities (Smith and Watts, 1992). We use firm age and book-to-market of company assets as inverse proxies of a company's growth opportunities.

Distress: Limited by their ability to pay, companies in financial distress pay their CEOs less and grant them fewer options (Gilson and Vetsuypens, 1993). We use leverage, defined as total liabilities divided by total assets, as the proxy for financial distress.

Industry: CEO pay varies across industries because of factors such as the level of innovation, CEO monitoring costs, and sensitivity of performance to executives' actions. We use Fama-French industry indicators to control for these differences.

3.3. Shareholder activism and corporate governance

The CEO pay levels have increased dramatically during the past two decades with much of the increase in the form of stock option grants. As evidenced by media attention, regulatory interventions, and shareholder activism, negative sentiment about CEO pay has also risen in recent years, with stock options criticized for boosting CEO pay levels and rewarding CEOs based on luck (Bertrand and Mullainathan, 2001; Garvey and Milbourn, 2006).¹⁹ Shareholder activists protest excessive CEO pay in different ways. During the sample period, shareholder activists have initiated proposals and promoted vote-no campaigns in director elections citing compensation issues. Ertimur et al. (2011) show that such targeting decisions are positively related to the expected value of executive pay that includes fair values of options. Because targeting through shareholder proposals and vote-no campaigns during a CEO's tenure may indicate poor performance not captured by stock returns, we include the incidence of targeting as a control variable.

Weaknesses in corporate governance have also been cited for contributing to excessive pay or insufficient sensitivity of pay to performance. We control for various dimensions of corporate

¹⁹The Emergency Economic Stabilization Act of 2008 imposed limits on executive pay for companies that use TARP funds. The Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 granted shareholders more say on pay decisions via non-binding "say-on-pay" votes.

governance that have been linked to CEO compensation (Core et al., 1999). These include duality of CEO and Chair of the Board of Directors, the percentage of directors who are independent of management, board size, average director age, and the percentage of directors who were selected by the current CEO.

3.4. Descriptive information

Table 1, Panel C provides descriptive information for the extent of outsider CEOs, institutional ownership and control variables, all of which are annualized over CEO tenure. 28% of the sample companies recruit outsider CEOs. On average, 42% of company shares are held by institutional owners that hold more than 1% of company stock. The average annualized stock return is 8.5% for CEOs and the average ROA is 1.0% during the sample period, reflecting turbulent economic times between 1992 and 2009. The average company is 16.6 years old (using 1980 as the reference year) and reports annual sales of \$6.5 billion. The natural logarithm of the standard deviation of daily market-adjusted stock returns is 0.11. The average book-to-market ratio of assets is 71%, and the leverage ratio (debt-to-assets) is 25%. The descriptive statistics of the financial variables in the sample are not significantly different from those of all S&P 1500 companies.

An average CEO stays at the top of the company for 5.1 years and holds 0.8% of company shares. 12% of the sample companies are targeted at least once by a compensation-related shareholder proposal or a vote-no campaign. CEOs of 53% of the sample companies are also chairs on the board of directors. On average, there are 9.6 directors on the boards, 68% of whom are independent directors. Average age of directors is 59.1, and 22% of the directors are chosen during the tenure of incumbent CEOs.

3.5. Univariate relations between CEO compensation and control variables

In untabulated pair-wise correlations, we observe that the logarithm of *EPEE* is significantly correlated with the following variables: i) CEO performance, measured by logarithm of stock returns (negatively), and ROA (negatively); ii) company size, measured by logarithm of company sales (positively); iii) operational risk, measured by logarithm of volatility in market-adjusted returns (positively); iv) growth opportunities, measured inversely by the book-to-market ratio (negatively); and v) distress, measured by leverage (positively). Consistent with the negative correlation between *EPEE* and CEO performance, CEO performance variables correlate more strongly with *Total Payout* than with *Total Pay*. These correlations support Kaplan's (2008) argument that payouts to CEOs are more sensitive to performance than estimated pay. As discussed above, the greater sensitivity of payouts to performance comes from two sources. First is the sensitivity of payouts to stock returns that comes from holding options between the grant and exercise dates. Second is the sensitivity that comes through the contingencies on exercisability of options as well as post-grant modifications to option terms that are explicitly or implicitly tied to company performance. Companies that observe poor (good) performance may tighten (release) existing restrictions, create (not create) new restrictions, and, in the extreme case, terminate their contracts (continue) with the incumbent CEOs. We argue that these dynamics are associated with agency relations between the CEO and the company.

3.6. Univariate relations between outsiders and CEO compensation

We test H1 using an indicator variable *Outsider*, which is hand-collected from CEO appointment announcements in the *Factiva* database. Following Huson et al. (2004), we define *Outsider* as one if the CEO transfers from another firm within one year before the new

appointment, and zero otherwise. *Outsider* is one (zero) for 28% (72%) of the sample. Panel A of Table 2 presents univariate tests of the relations between CEO pay and *Outsider*. Consistent with prior research, Panel A shows that *Total Pay* is significantly higher for outsider CEOs (mean = \$6,917,000) relative to insider CEOs (mean = \$5,274,000). The differences in *Total Pay* are almost completely due to differences in *Option Pay* (mean = \$3,972,000 for outsiders versus \$2,401,000 for insiders). However, *Total Payout* is not different for outsider CEOs (mean = \$5,115,000) versus insider CEOs (mean = \$4,982,000), because average *Option Payout* is similar across the two groups (mean = \$2,170,000 for outsiders versus \$2,109,000 for insiders). In other words, ex post estimation error *EPEE* is substantially greater for outsider CEOs (mean = \$1,803,000) than insider CEOs (mean = \$292,000), as predicted by H1. The average value of the ratio of *EPEE* to *Total Pay* is 19.6% for outsiders versus 3.3% for insiders.

Panel B compares outsiders based on experience at other S&P 1500 companies. The highest paid outsiders are those with CEO experience or top-five executive experience in the same industry. The average option pay for outsiders with any top-five executive experience was \$4,953,000 while the average option pay for outsiders who had no top-five executive experience was \$3,336,000. Shareholder expectations are likely to be higher for outsiders with top-five experience and there is greater uncertainty about the ability of outsiders without top-five experience. Therefore, we do not make a prediction about the difference in *EPEE* between those with top-five executive experience (Column 3) and those without such experience (Column 4). We do see higher levels of *EPEE* for outsiders with executive experience corresponding to their higher pay levels but the ratio of *EPEE* to *Total Pay* is similar across these groups (20.5% for those with top-five experience and 19.1% for those with no executive experience). The average

ratio of *EPEE* to *Total Pay* is highest for outsider CEOs with same-industry experience (25.7%), possibly reflecting greater performance expectations for these CEOs.

3.7. Univariate relations between institutional ownership and CEO compensation

Panel A of Table 3 provides univariate information for CEO compensation at firms with low (below median percentage) and high (above median percentage) institutional ownership. Firms with high institutional ownership use less option pay and pay less in total than firms with low institutional ownership, consistent with substitution between monitoring by institutional shareholders and the use of compensation incentives (Hartzell and Starks, 2003). Average *EPEE* is similar between the high and low institutional ownership groups (\$688,000 versus \$736,000) but the median *EPEE* (\$428,000 versus \$213,000) and the ratio of *EPEE* to *Total Pay* (18.5% versus 11.8%) are significantly higher for the high institutional ownership group. This is consistent with stricter use of contingencies and post-grant actions that reduce option settlement values when institutional ownership is higher.

Panel B of Table 3 further divides low and high institutional ownership based on Herfindahl concentration index of institutional owners, which is defined as the sum of squares of ownership percentages of all institutions that invest in the company (Hartzell and Starks, 2003). Option pay is highest for the low institutional ownership *and* low concentration group, reflecting the greater use of incentive compensation when shareholder monitoring is weak. Interestingly, *EPEE* is very low for this group, indicating that contractual contingencies do not play an important role in this group. Option pay is lowest for the high institutional ownership *and* high concentration group, again reflecting the substitution between shareholder monitoring and incentive compensation. When institutional ownership is more concentrated (under both low and high institutional

ownership), the ratio of *EPEE* to *Total Pay* is significantly higher than when institutional ownership is less concentrated. This indicates that shareholder pressure from concentrated institutional ownership is associated with greater use of contingencies and post-grant modifications that reduce option settlement values.

4. Results

We estimate the following model where all variables are annual averages over CEO tenure:

$$\begin{aligned}
 \text{Pay Levels (or Estimation Error)} = & \alpha + \beta_1 \text{ Outsider} + \beta_2 \text{ Inst. Own} + \beta_3 \text{ Log(Return)} \\
 & + \beta_4 \text{ ROA} + \beta_5 \text{ Log(Sales)} + \beta_6 \text{ Log(Risk)} + \beta_7 \text{ Book-to-Market} + \beta_8 \text{ Leverage} \\
 & + \beta_9 \text{ Firm Age} + \beta_{10} \text{ CEO Tenure} + \beta_{11} \text{ CEO Own} + \beta_{12} \text{ Targeted} + \beta_{13} \text{ CEO-Chair} \\
 & + \beta_{14} \text{ Independent Dir} + \beta_{15} \text{ Board Size} + \beta_{16} \text{ Director Age} \\
 & + \beta_{17} \text{ CEO-selected Directors} + \text{Industry fixed effects} + \varepsilon
 \end{aligned} \tag{1}$$

Table 3 presents the results of estimating Eq. (1) using the following dependent variables: (1) logarithm of *Option Pay*; (2) logarithm of *Option Payout*; (3) logarithm of *Total Pay*; (4) logarithm of *Total Payout*; (5) logarithm of *EPEE*; and (6) *EPEE* deflated by *Total Pay*. *Outsider* is an indicator that is one if the incoming CEO transfers from another company or if the CEO worked in the company for less than a year before her appointment as CEO, and zero otherwise. *Inst. Own* is a continuous variable representing the aggregate holdings of shareholders owning more than 1% of the company's shares. Other independent variables include various determinants of pay (discussed in Section 3.2) and governance variables used in prior literature.

Panel A of Table 4 presents results of estimating Eq. (1) for the sample of CEOs with completed tenure. Consistent with prior literature, we see that *Option Pay*, *Total Pay*, and *Total Payout* are higher for outsider CEOs versus insider CEOs. In testing H1, we find significantly positive coefficients on *Outsider* in the last two columns, controlling for performance and tenure. In testing H2, we find significantly positive coefficients on *Inst. Own* in the last two columns.

We find similar results when we replace *Inst. Own* with the Herfindahl index of institutional ownership to proxy for concentration of institutional owners. Overall, *EPEE* increases with both the presence of outsider CEOs and the extent of institutional ownership.

With respect to control variables, we see that *EPEE* decreases with firm performance as measured by stock returns; with operating complexity; with CEO tenure; and with growth options as measured inversely by the book-to-market ratio. We see that *Option Pay* and *Total Pay* are higher for CEOs that were targeted by shareholder activists through shareholder proposals or vote-no campaigns, consistent with Ertimur et al. (2011). Furthermore, *EPEE* is higher for firms that were targeted, possibly indicating stronger reliance on contingencies or post-grant modifications when there is more shareholder activism with regard to CEO pay. For the corporate governance variables, we observe higher *Option Pay* and *Total Pay* when the CEO is also the Chairman of the Board, and lower *Option Pay* and *Total Pay* when directors are older.

Panel B of Table 4 repeats the analysis for the extended sample, which includes CEOs with completed and partial tenure. Consistent with H1, the estimated coefficients on *Outsider* are significantly positive when either the logarithm of *EPEE* or the deflated *EPEE* is the dependent variable. Consistent with H2, the estimated coefficient on *Inst. Own* is also significantly positive. Other results are similar to those presented in Panel A.

4.1. Robustness checks

Beginning option holdings

We repeat the analysis using 981 CEOs with no option holdings at the beginning of their tenure. We do this to alleviate concerns that the findings may be biased due to beginning option holdings, despite the adjustment on *Option Payout* for the beginning option holdings. Table 5,

Panel A reports descriptive statistics for CEOs without and with beginning option holdings. 50% (1%) of CEOs without (with) beginning option holdings are outsiders. *Option Pay* is statistically similar across the subsamples with and without beginning option holdings, whereas *Option Payout* is higher for CEOs with beginning option holdings. Overall, *EPEE* is significantly higher for CEOs without beginning option holdings. Panel B provides results of estimating Eq. (1) for this sample. According to the last two columns, both $\text{Log}(EPEE)$ and $EPEE / \text{Total Pay}$ are positively related to the presence of outsider CEOs, and $EPEE / \text{Total Pay}$ is positively related to the presence of institutional ownership. Other results are similar to those in Table 4, Panel A.

The results in Tables 4 and 5 use adjusted values of option exercise described earlier (option payout is reduced by the intrinsic value of options held at the beginning of CEO tenure and is increased by the intrinsic value of options held at the end of CEO tenure). When we reperform our analyses with unadjusted payout data, the results are stronger and directionally the same as the reported results.

One-time cash payments

Signing bonuses and severance payments may compensate CEOs for unexercised options at both the front and back ends of their tenure. Signing bonuses and severance pay, which are dubbed golden hellos and goodbyes, can represent large costs to shareholders (Yermack, 2006).²⁰ We use *Other Pay*, which is available in the *ExecuComp* database, to proxy for signing bonuses and severance payments. *Other Pay* includes—besides signing bonuses and severance payments—the value of perquisites, relocation expenses, insurance premiums, and 401-K contributions. Therefore, *Other Pay* provides an upper bound on the value of signing bonus and

²⁰ As a notable case, Gary Wendt of General Electric received a \$45 million signing bonus while transferring as the CEO of Conoco. Another prior General Electric executive, Robert Nardelli, received a relatively modest \$10 million forgivable loan while signing as the CEO of Home Depot in 2000, but his severance package with an estimated value of \$210 million in 2007 drew significant attention from the media and company shareholders.

severance amounts. *Other Pay* is, on average, \$272,000 in the first year and \$1,222,000 in the last year of the CEO's tenure, suggesting significant severance packages that CEOs receive during their last year in the office. The sum of *Other Pay* in both years can explain only a portion (58%) of the ex post estimation error aggregated over CEO tenure, \$2,100,000. Both *t*-tests and Wilcoxon tests (untabulated) show that *Aggregate EPEE* is greater than the sum of *Other Pay* in the first and last years of CEO tenure (the difference is significant at 1%). We test whether *Other Pay* in the last year is higher for outsider CEOs and find that it is. However, the difference is again not sufficiently large to compensate for the higher ex post estimation error of outsider CEOs. Furthermore, we test whether *Other Pay* in the last year of CEO tenure is significantly associated with *Aggregate EPEE*, and find that it does not. We conclude that, from the CEO's perspective, one-time cash payments during the first and last years of the CEO's tenure do not significantly relate with—and do not fully compensate for—the lost value in unexercised option grants throughout the CEO's tenure.

4.2. Drivers of CEO performance

CEOs and other executives can extract rents simply by being lucky and riding favorable trends (Bertrand and Mullainathan, 2001; Bill et al., 2013). To investigate the differential role of luck in option pay versus payouts, we follow prior literature (Garvey and Milbourn, 2006) and divide CEO performance into average industry performance (which can be attributed to luck) and industry-adjusted performance (which can be attributed to CEO's effort or talent). Untabulated tests show that both average industry-specific and industry-adjusted returns negatively correlate with *EPEE*. We conclude that the performance contingency of option payouts applies to both drivers of CEO performance, i.e., luck as well as effort or talent.

5. Conclusion

We document positive and economically significant *ex-post* estimation errors on the fair value of option grants to CEOs of S&P 1500 companies, regardless of whether this estimation is carried out by the companies themselves or the independent *Execucomp* database. This error, which is persistent across calendar time and industries, is significantly larger for outsider CEOs than for insider CEOs. In other words, the settlement of option contracts for outsider CEOs is more restricted by pre-set contingencies and post-grant modifications of option terms. These findings support the adverse selection arguments, which predict more contingent pay for outsider CEOs who usually have greater general skills but more uncertain prospects in their new companies (Hermalin, 2005; Malmendier and Tate, 2009). Previous studies show that outsider CEOs receive higher estimated pay but they do not perform significantly better than insider CEOs. Our evidence extends these findings by suggesting that a balancing occurs in CEO compensation through option contract settlement. When the CEO's full tenure is considered, option payouts of an outsider CEO and, in turn, her total payouts are not statistically different from those of an insider CEO. Our finding of lower option payouts relative to the value of option grants among companies with more institutional shareholders provides additional evidence that shareholder vigilance does influence option contract settlement.

Overall, the observation of substantial ex post estimation error contributes to debate about the excessiveness of CEO pay and sensitivity of CEO pay to performance (Bebchuk and Grinstein, 2005; Gabaix and Landier, 2008). The evaluation of CEO pay levels is likely to be more complete when it includes information from both grant-date fair values and payouts from option exercises. For instance, Core et al. (2008) find that negative press coverage of executive compensation is correlated with both estimated total pay and payouts from option exercise. Core

et al. (2008) argue that the press misinterprets payouts from option exercise as components of annual pay. An alternative explanation suggested by our results is that the press monitors payouts because of the additional information about option contract settlement that is not available from fair values. Similarly, in their study of long-term trends in executive pay, Frydman and Saks (2010) argue that the rapid increase in the level and cross-sectional variance in executive pay since 1970's have likely occurred because of improved board diligence and the resulting surge in outsider CEOs, faster CEO turnover, and forced departures. Our study complements this explanation. The surge in outsider CEOs, CEO turnover, and forced departures are all significant factors that reduce payouts to CEOs. Therefore, long-term growth in payouts to CEOs must be less dramatic than long-term growth in reported CEO pay.

The objective of our paper is not to argue that CEO pay contracts are inexpensive for shareholders. Both estimated pay and realized payouts to CEOs amount to millions of dollars per year in S&P 1500 companies, arguably high levels when compared to benchmarks such as pay of other executives and CEO pay in other countries. Rather, our evidence partially dispels concerns about the rent extraction arguments (Bebchuk et al., 2002). The payouts to CEOs over their tenure (and correspondingly realized costs to shareholders) are not as excessive, as insensitive to performance, or as high for outsiders as estimated pay levels (such as the heavily-used option deltas suggest). We believe these findings will be of interest to company boards, shareholders, and regulators. Policies for improving corporate governance and corporate disclosures need to consider that cash realization of option grants to CEOs differs significantly from the fair values reported at the grant dates and that these differences are shaped by agency relations between the CEO and shareholders.

Appendix: Variable Definitions and Measurement

[*Source*] refers to the data source, where (*data item*) is the variable name in the data source.

CEO compensation variables

All variables are obtained from the *Standard&Poors ExecuComp* database. Due to changes in the database in 2006, some variables have two *ExecuComp* names (reported in parentheses). All variables are adjusted for CPI-U to reflect 2009 year-end values in thousand \$'s. All variables are averaged over company fiscal years that comprise the individual CEO's tenure, including the first and last fiscal years during which the executive fills the CEO position.

Salary (*Salary* in both 1992 and 2006 formats): The value of base salary of the CEO.

Bonus (*Bonus* in both 1992 and 2006 formats): The value of bonuses of the CEO.

Other Pay (*Othcomp* in both 1992 and 2006 formats): The sum of perquisites, other personal benefits, signing bonuses, termination and change-in-control payments, contributions to defined contribution plans (e.g., 401K plans), life insurance premiums, gross-ups and other tax reimbursements, discounted share purchases. We set negative values (less than 0.5% of the observations) to zero.

LTIP (*LTIP* in 1992 format and *NonEq_Incent* in 2006 format): The amount paid to the CEO under the company's long-term incentive plan for years between 1992 and 2005. These plans measure company performance over a period of more than one year (generally three years). In the new 2006 format, LTIP is set as Non-Equity Incentive Plan Compensation, defined as the value of amounts earned during the year pursuant to non-equity incentive plans. The amount is disclosed in the year that the performance criterion was satisfied and the compensation was earned. We set negative values (less than 1% of the sample) to zero.

Stock Pay (*Rstkgrnt* in 1992 format and *Stock_awards_fv* in 2006 format): The fair value of restricted stocks granted to the CEO during the grant year. We set negative values (less than 1% of the sample) to zero. This definition is distinct from *stock_awards* in the 2006 format, which reports the cost that is charged to the company based upon the value of shares that vested during the year according to FAS 123R.

Option Pay (*Option_awards_blk_value* in 1992 format and *Option_awards_fv* in 2006 format): The fair value of option grants to the CEO. The valuations are carried out and reported by *ExecuComp* database using the modified Black and Scholes method. This definition is distinct from *option_awards* in the 2006 format, which reports cost that is charged to the company and thus to shareholders based upon the value of options vested during the year according to FAS 123R.

Option Payout (*Opt_exer_val* in both 1992 and 2006 formats with an adjustment): Value realized from option exercises. Option Payout is defined as the number of exercised options multiplied by the difference between the exercise price and the stock price on the exercise date. We exclude the beginning- and end-of-tenure option holdings in order to compare only options granted and exercised throughout the CEO's tenure. We add the value of end-of-tenure vested option holdings divided by tenure (assuming that the exercise rights are fully transferred to the CEO), and subtract the value of beginning-of-tenure vested and unvested option holdings divided by tenure (reasoning that related exercises are due to options granted before the executive assumes the CEO position). We set negative values (less than 1% of the sample) to zero.

Total Pay: The sum of Salary, Bonus, Other Pay, LTIP, Stock Pay, and Option Pay.

Total Payout: Cash-equivalent payout to the CEO, adjusted for the beginning- and end-of-tenure option holdings. Total Payout is the sum of Salary, Bonus, Other Pay, LTIP, Stock Pay, and Option Payout.

Ex Post Estimation Error or EPEE: The annualized difference between Total Pay and Total Payout. Alternatively, it is the difference between Option Pay and Option Payout.

Aggregate EPEE: EPEE aggregated over the individual CEO's tenure.

Financial variables

All financial variables are averaged over company fiscal years of CEO's tenure, including the first and last fiscal years during which the executive partially assumes the CEO position.

Return: Delisting-return-adjusted stock returns during the CEO's tenure [*CRSP*].

ROA: Income before extraordinary items (*ib*) deflated by beginning-of-the-year total assets (*at*) [*Compustat*]. ROA is winsorized at +1 and -1. The winsorized observations consist of fewer than 0.5% of the sample.

Sales: Company sales (*Sale*) [*Compustat*]. Sales is adjusted for inflation using CPI-U index to reflect 2009 year-end values in million \$'s.

Risk: Standard deviation of residuals from a market model regression of monthly company stock returns on value-weighted market returns, estimated over 36 months of returns ending with the fiscal year-end subject to a minimum of 12 monthly returns [*CRSP*].

B/M: Book-to-market of assets, defined as total assets (*at*) deflated by the sum of total liabilities (*lt*) and MCap [*Compustat*].

Leverage: The sum of current and long-term liabilities (*dlc*, *dltt*) deflated by total assets (*at*) [*Compustat*].

Firm Age: Number of years between the current fiscal year and the first fiscal year company financials appear in the *Compustat* database, the earliest of which is set to be 1980.

Corporate governance variables

All variables are averaged over company fiscal years of CEO's tenure, including the first and last fiscal years during which the executive fills the CEO position.

Outsider: Indicator variable that is one if the incoming CEO transfers from another company or if the CEO had worked for the company shorter than a year before being appointed as CEO, and zero if incoming CEO was promoted within the firm or if the CEO had worked with the firm for more than a year before the promotion [*Factiva*].

Institutional Ownership: Average percentage of shares held by institutional owners that hold more than 1% of company stock during the CEO's tenure based on 13F forms filed with the SEC [*Thomson Reuters*].

Targeted: Indicator variable that is equal to one if the firm is targeted by a compensation-related shareholder proposal or vote-no campaign during the CEO's tenure [*Factiva*, *LexisNexis*, *RiskMetrics*, *Georgeson*].

CEO Tenure: The number of years the CEO remained in the office, including the first and last fiscal years during which the executive partially assumes the CEO position.

CEO Ownership: Average percentage of shares held by the CEO during the CEO's tenure [*ExecuComp*].

CEO-Chair: Average of the annual indicator variables that are equal to one if the CEO of the company is the chair of the board of directors during the CEO's tenure [*RiskMetrics*].

Independent Directors: Average percentage of directors classified as independent by RiskMetrics during the CEO's tenure [*RiskMetrics*].

Board Size: Average number of board directors during the CEO's tenure [*RiskMetrics*].

Director Age: Average age of directors during the CEO's tenure [*IRRC*].

CEO-selected Directors: Average percentage of directors that are selected to the board during the CEO's tenure [*RiskMetrics*].

References

- Aboody, D., Barth, M.E., Kasznik, R., 2006. Do firms understate stock option-based compensation expense disclosed under SFAS 123? *Review of Accounting Studies* 11, 429-461.
- Aggarwal, R., Samwick, A., 1999. The other side of the trade-off: The impact of risk on executive compensation. *Journal of Political Economy* 107, 65-105.
- Arya, A., Mittendorf, B., 2005. Offering stock options to gauge managerial talent. *Journal of Accounting and Economics* 40, 189-210.
- Bebchuk, L., Fried, J., Walker, D., 2002. Managerial power and rent extraction in the design of executive compensation. *University of Chicago Law Review* 69, 751-846.
- Bebchuk, L., Grinstein, Y., 2005. The growth of executive pay. *Oxford Review of Economic Policy* 21, 283-303.
- Bettis, J., Bizjak, J., Coles, J., Kalpathy, S., 2010. Stock and option grants with performance-based vesting provisions. *Review of Financial Studies* 23, 3849-3888.
- Bettis, J., Bizjak, J., Lemmon, M., 2005. Exercise behavior, valuation and the incentive effects of employee stock options. *Journal of Financial Economics* 76, 445-470.
- Bill, F., Iftekhar, H., Kose, J., Zenu, S., 2013. Asymmetric benchmarking of pay in firms. *Journal of Corporate Finance* 23, 39-53.
- Black, F., Scholes, M., 1973. The pricing of options and corporate liabilities. *Journal of Political Economy* 81, 637-654.
- Bertrand, M., Mullainathan, S., 2001. Are CEOs rewarded for luck? The ones without principals are. *Quarterly Journal of Economics* 116, 901-932.
- Carpenter, J., 1998. The exercise and valuation of executive stock options. *Journal of Financial Economics* 48, 127-158.
- Carter, M.E., Ittner, C., Zechman, S., 2009. Explicit relative performance evaluation in performance-vested equity grants. *Review of Accounting Studies* 14, 269-306.
- Cazier, R., McInnis, J., 2010. Do firms contract efficiently on past performance when hiring external CEOs? Unpublished Working Paper.
- Chasan, E., 2012. Executive pay gets new spin. *Wall Street Journal*, September 25.
- Cheng, S., Indjejikian, R., 2009. The market for corporate control and CEO compensation: Complements or substitutes. *Contemporary Accounting Research* 26, 701-728.
- Core, J., Guay, W., 1999. The use of equity grants to manage optimal equity incentive levels. *Journal of Accounting and Economics* 28, 151-184.
- Core, J., Guay, W., Larcker, D., 2008. Power of the pen and executive compensation. *Journal of Financial Economics* 88, 1-25.
- Core, J., Holthausen, R., Larcker, D., 1999. Corporate governance, chief executive officer compensation, and firm performance. *Journal of Financial Economics* 51, 371-406.
- Cuny, C., Jorion, P., 1995. Valuing executive stock options with endogenous departure. *Journal of Accounting and Economics* 20, 193-205.
- Custodio, C., Ferreira, M., Matos, P., 2013. Generalists versus specialists: Lifetime work experience and chief executive pay. *Journal of Financial Economics* 108, 471-492.
- Cvitanic, J., Wiener, Z., Zapatero, F., 2008. Analytic pricing of employee stock options. *Review of Financial Studies* 21, 683-724.
- Ertimur, Y., Ferri, F., Muslu, V., 2011. Shareholder activism and CEO pay. *Review of Financial Studies* 24, 535-592.
- Fariant Advisors., 2012. Pay Definitions: What works best in pay for performance analysis. www.fariant.com
- Ferris, E., 2010. CEO succession and shareholder activism. National Investor Relations Institute Regional Conference, New Orleans, August 19.
- Frydman, C., Saks, R., 2010. Executive compensation: A new view from a long-term perspective. 1936-2005. *Review of Financial Studies* 23, 2099-2138.

- Gabaix, X., Landier, A., 2008. Why has CEO pay increased so much? *The Quarterly Journal of Economics* 123, 49-97.
- Garen, J., 1994. Executive compensation and principal-agent theory. *Journal of Political Economy* 102, 1175-1199.
- Garvey, G., Milbourn, T., 2006. Asymmetric benchmarking in compensation: Executives are rewarded for good luck but not penalized for bad. *Journal of Financial Economics* 82, 197-225.
- Gerakos, J., Ittner, C., Larcker, D., 2007. The structure of performance-vested stock option grants, in Rick Antle, Pierre Jihong Liang, Froystein Gjesdahl, eds.: *Essays on Accounting Theory in Honour of Joel S. Demski* (Springer).
- Gilson, S., Vetsuypens, M., 1993. CEO compensation in financially distressed firms. *Journal of Finance* 48, 425-458.
- Gillan, S., Hartzell, J., Parrino, R., 2009. Explicit and implicit contracts: Evidence from CEO employment agreements. *Journal of Finance* 64, 1629-1655.
- Hall, B., Liebman, J., 1998. Are CEOs really paid like bureaucrats? *Quarterly Journal of Economics* 113, 653-691.
- Hartzell, J., Starks, L., 2003. Institutional investors and executive compensation. *Journal of Finance* 58, 2351-2374.
- Hemmer, T., Matsunaga, S., Shevlin, T., 1996. The influence of risk diversification on the early exercise of employee stock options. *Journal of Accounting and Economics* 21, 45-68.
- Hermalin, B., 2005. Trends in corporate governance. *Journal of Finance* 60, 2351-2384.
- Ho, V., 2012. A shareholder perspective on the valuation of stock options. *Institutional Shareholder Services Governance Report*.
- Hodder, L., Mayhew, W., McAnally, M., Weaver, C., 2006. Employee stock option fair-value estimates: Do managerial discretion and incentives explain accuracy? *Contemporary Accounting Research* 23, 933-975.
- Huddart, S., Lang, M., 1996. Employee stock option exercises: An empirical analysis. *Journal of Accounting and Economics* 21, 5-43.
- Hull, J., White, A., 2004. How to value employee stock options. *Financial Analysts Journal* 60, 114-119.
- Huson, M., Malatesta, P., Parrino, R., 2004. Managerial succession and firm performance. *Journal of Financial Economics* 74, 237-275.
- Jensen, M., Murphy, K., Wruck, E., 2004. Remuneration: Where we've been, how we got to here, what are the problems, and how to fix them. *Unpublished Working Paper*.
- Kaplan, S., 2008. Are U.S. CEOs overpaid? *Academy of Management Perspectives* 22, 5-20.
- Kaplan, S., Minton, B., 2012. How has CEO turnover changed? *International Review of Finance* 12, 57-87.
- Kaplan, S., Rauh, J., 2010. Wall Street and Main Street: What contributes to the rise of in highest incomes? *Review of Financial Studies* 23, 1004-1050.
- Kesner, I., Sebor, T., 1994. Executive succession: Past, present & future. *Journal of Management* 20, 327-372.
- Khurana, R., 2002. The curse of the superstar CEO. *Harvard Business Review* 80, 60-66.
- Lam, K., Mensah, Y., 2007. Disclosure of the fair value of executive stock options granted to top executives. *Unpublished Working Paper*.
- Lazear, E., 1986. Salaries and piece rates. *Journal of Business* 59, 405-431.
- Leone, A., Wu, J., Zimmerman, J., 2006. Asymmetric sensitivity of CEO cash compensation to stock returns. *Journal of Accounting and Economics* 42, 167-192.
- Malmendier, U., Tate, G., 2009. Superstar CEOs. *Quarterly Journal of Economics* 124, 1593-1638.
- Mun, J., 2004. *Valuing Employee Stock Options*. Wiley Publishing.
- Murphy, K.J., Zabochnik, J., 2007. Managerial capital and the market for CEOs. *Unpublished Working Paper*.
- Rajgopal, S., Taylor, D., Venkatachalam, M., 2012. Frictions in the CEO labor market: The role of talent agents in CEO compensation. *Contemporary Accounting Research* 29, 119-151.

- Rubinstein, M., 1995. On the accounting valuation of employee stock options. *Journal of Derivatives* 3, 8-24.
- Securities and Exchange Commission (SEC), 2005. Share-based payment. Staff Accounting Bulletin No. 107. Washington, DC: SEC.
- Securities and Exchange Commission (SEC), 2006. Executive compensation disclosure. Final Release No. 33-8732A. Washington, DC: SEC.
- Smith, C., Watts, R., 1992. The investment opportunity set and corporate financing, dividends, and compensation policies. *Journal of Financial Economics* 32, 263-292.
- WRDS, 2006. Modified Black-Scholes Option Valuation Methodology. Wharton Research Data Services (WRDS) Execucomp Manuals and Overviews.
- Yermack, D., 1998. Companies' modest claims about the value of CEO stock option awards. *Review of Quantitative Finance and Accounting* 10, 207-236.
- Yermack, D., 2006. Golden handshakes, separation pay for retired and dismissed CEOs. *Journal of Accounting and Economics* 41, 237-256.

Table 1 Sample

Panel A: Average annual compensation for CEOs with completed tenure [N=1,791]

	Mean	Std. Dev.	Q1	Q2	Q3
Salary	706	371	452	656	916
Bonus	702	1,126	154	372	838
Other Pay	463	1,284	26	108	364
LTIP	275	764	0	0	205
Stock Pay	745	1,871	0	53	692
Option Pay	2,838	6,447	396	1,195	2,720
Option Payout	2,126	5,923	0	210	1,724
Total Pay	5,731	8,372	1,600	3,197	6,414
Total Payout	5,019	7,980	1,120	2,463	5,829
EPEE	712	7,395	-150	316	1,400
EPEE/Total Pay	0.078	0.545	-0.056	0.153	0.411
Aggregate EPEE	2,036	41,220	-720	1,287	6,113

Panel B: Average annual compensation for CEOs with completed and partial tenure [N=2,235]

	Mean	Std. Dev.	Q1	Q2	Q3
Salary	729	371	472	682	937
Bonus	678	1,073	157	376	793
Other Pay	415	1,166	28	107	319
LTIP	377	823	0	0	419
Stock Pay	909	1,941	0	181	1,015
Option Pay	2,697	6,083	397	1,175	2,670
Option Payout	2,082	5,546	0	27	1,867
Total Pay	5,808	8,030	1,740	3,407	6,726
Total Payout	5,192	7,518	1,212	2,767	6,273
EPEE	615	6,875	-247	273	1,315
EPEE/Total Pay	0.064	0.515	0.081	0.125	0.363
Aggregate EPEE	2,100	42,858	-1,341	1,224	6,254

Table 1—Continued

Panel C: Corporate governance and financial variables over the CEO tenure [N=1,791]

	Mean	Std. Dev.	Q1	Q2	Q3
Outsider	0.28	0.45	0.00	0.00	0.00
Inst. Ownership	0.42	0.19	0.28	0.42	0.55
Return	0.085	0.298	-0.051	0.094	0.213
Log(Return)	-0.07	1.13	-0.51	0.16	0.67
ROA	0.010	0.129	-0.046	0.028	0.066
Sales	6,464	16,711	624	1,708	5,286
Log(Sales)	7.49	1.66	6.44	7.44	8.57
Log(Risk)	0.11	0.05	0.07	0.10	0.14
B/M	0.71	0.25	0.53	0.72	0.88
Leverage	0.25	0.19	0.11	0.24	0.35
Firm Age	16.6	6.3	11.5	17.5	21.5
CEO Tenure	5.1	3.0	3.0	5.0	7.0
CEO Own	0.008	0.036	0.000	0.001	0.004
Targeted	0.12	0.32	0.00	0.00	0.00
CEO-Chair	0.53	0.38	0.17	0.53	0.91
Independent Dir.	0.68	0.14	0.60	0.69	0.78
Board Size	9.6	2.5	8.0	9.3	11.0
Director Age	59.1	3.4	57.4	59.5	61.2
CEO-selected Dir.	0.22	0.12	0.14	0.21	0.27

Panel A presents summary statistics for average annual CEO compensation over the tenure of individual CEOs. The sample includes all CEOs with completed tenure (i.e., those who started between fiscal years 1992 and 2005 and left by the end of 2009). Panel B presents similar information to Panel A for the expanded sample, which includes CEOs with completed or partial tenure (i.e., those who started between fiscal years 1992 and 2005 irrespective of whether they left by the end of 2009). Panel C presents summary statistics for financial variables and corporate governance variables averaged over completed tenure of individual CEOs. All compensation levels are adjusted for inflation (CPI-U) to show thousand \$'s of year 2009. Sales are in million \$'s of year 2009. The Appendix provides variable definitions.

Table 2 Outsiders and ex post estimation errors

Panel A: CEO compensation across the outsider partition

Mean (Median)	Outsider=0 [N=1,293]	Outsider=1 [N=498]	Difference, p-value
Option Pay	2,401 (1,030)	3,972 (1,690)	0.00 (0.00)
Option Payout	2,109 (250)	2,170 (96)	0.85 (0.06)
Total Pay	5,274 (3,075)	6,917 (3,738)	0.00 (0.00)
Total Payout	4,982 (2,479)	5,115 (2,399)	0.75 (0.48)
EPEE	292 (207)	1,803 (741)	0.00 (0.00)
EPEE/Total Pay	0.033 (0.103)	0.196 (0.285)	0.00 (0.00)
Return	0.092 (0.097)	0.067 (0.077)	0.12 (0.05)
CEO Tenure	5.2 (5.0)	4.6 (4.0)	0.00 (0.00)

Panel B: CEO compensation for outsiders based on top-five executive experience

Mean (Median)	Outsiders with..				Difference [3] - [4], p-value
	[1] CEO experience [N=14]	[2] executive experience in the industry [N=76]	[3] executive experience [N=196]	[4] no executive experience [N=302]	
Option Pay	5,859 (4,753)	5,898 (2,159)	4,953 (2,231)	3,336 (1,324)	0.06 (0.00)
Option Payout	3,050 (54)	2,266 (28)	2,560 (142)	1,916 (83)	0.29 (0.12)
Total Pay	12,640 (11,753)	9,425 (4,372)	8,303 (4,882)	6,018 (3,100)	0.02 (0.00)
Total Payout	9,831 (8,673)	5,793 (2,255)	5,911 (3,134)	4,598 (2,278)	0.09 (0.01)
EPEE	2,809 (2,179)	3,632 (1,261)	2,393 (1,007)	1,420 (579)	0.25 (0.05)
EPEE/Total Pay	0.231 (0.322)	0.257 (0.341)	0.205 (0.286)	0.191 (0.283)	0.77 (0.59)
Return	0.032 (0.022)	0.049 (0.067)	0.053 (0.093)	0.076 (0.071)	0.44 (0.96)
CEO Tenure	4.6 (4.5)	4.5 (4.0)	4.5 (4.0)	4.7 (4.0)	0.35 (0.19)

Panel A presents mean and median CEO compensation values, annual stock returns over the CEO tenure as well as CEO tenure among the sample divided with respect to *Outsider*, which is an indicator variable that is one if the incoming CEO transfers from another company or if he had worked for the company for less than a year before he was appointed as CEO, and zero otherwise. The last column presents p-values for the t-test and Wilcoxon test on the differences across the partitions. Panel B presents the same statistics for outsider CEOs with the following characteristics: outsiders with CEO experience in a different S&P 1500 company (Column 1), outsiders with top-five executive experience in a different S&P 1500 company in the same two-digit SIC industry (Column 2), outsiders with top-five executive experience in a different S&P 1500 company (Column 3); outsiders with no top-five executive experience in a different S&P 1500 company (Column 4). The last column presents *p*-values for the *t*-test and Wilcoxon test on the differences across outsiders with and without executive experience. All compensation levels are adjusted for inflation (CPI-U) to show thousand \$'s of year 2009. Appendix provides the variable definitions.

Table 3 Institutional ownership and ex post estimation errors

Panel A: CEO compensation across institutional ownership partition

Mean (Median)	Low institutional ownership [N=896]	High institutional ownership [N=895]	Difference, <i>p</i> -value
Option Pay	3,368 (1,108)	2,307 (1,293)	0.00 (0.25)
Option Payout	2,632 (145)	1,620 (263)	0.00 (0.64)
Total Pay	6,617 (3,164)	4,844 (3,233)	0.00 (0.92)
Total Payout	5,881 (2,321)	4,156 (2,547)	0.00 (0.58)
EPEE	736 (213)	688 (428)	0.97 (0.03)
EPEE/Total Pay	0.063 (0.118)	0.093 (0.185)	0.24 (0.09)
Return	0.063 (0.090)	0.108 (0.099)	0.00 (0.15)
CEO Tenure	5.1 (5.0)	5.0 (5.0)	0.73 (0.94)

Panel B: CEO compensation across ownership concentration partition

Mean (Median)	Low institutional ownership			High institutional ownership		
	Low concentration [N=448]	High concentration [N=448]	Difference, <i>p</i> -value	Low concentration [N=447]	High concentration [N=448]	Difference, <i>p</i> -value
Option Pay	4,254 (1,938)	2,482 (644)	0.00 (0.00)	2,724 (1,511)	1,892 (1,030)	0.00 (0.00)
Option Payout	4,054 (703)	1,210 (4)	0.00 (0.00)	2,141 (537)	1,099 (69)	0.00 (0.00)
Total Pay	8,630 (4,395)	4,604 (1,903)	0.00 (0.00)	5,633 (3,733)	4,056 (2,747)	0.00 (0.00)
Total Payout	8,430 (4,395)	3,332 (1,333)	0.00 (0.00)	5,051 (3,193)	3,263 (1,898)	0.00 (0.00)
EPEE	200 (125)	1,272 (263)	0.09 (0.02)	583 (453)	793 (396)	0.48 (0.27)
EPEE/Total Pay	-0.017 (0.056)	0.143 (0.180)	0.00 (0.00)	0.031 (0.157)	0.155 (0.200)	0.00 (0.00)
Return	0.125 (0.122)	0.000 (0.028)	0.00 (0.00)	0.142 (0.121)	0.074 (0.069)	0.00 (0.00)
CEO Tenure	5.6 (5.0)	4.5 (4.0)	0.00 (0.00)	5.4 (5.0)	4.9 (4.0)	0.01 (0.00)

Panel A presents mean and median CEO compensation values, CEO performance (annual stock returns over CEO tenure) and CEO tenure among the sample divided with respect to the level of a company's institutional ownership (cutoff value at 42.3%). Investors that hold more than 1% of company stock are considered institutional investors. The last column presents p -values for the t -test and Wilcoxon test on the differences across the partitions. Panel B presents the statistics of the same variables for the institutional ownership subsamples based on high and low concentration of institutional ownership groups. The institutional ownership concentration is the Herfindahl index, which is defined as the sum of squares of ownership percentages of all institutions that invest in the company. The differences across the groups are tested using the t -test and Wilcoxon test, and the resulting p -values of these tests are presented. All compensation levels are adjusted for inflation (CPI-U) to show thousand \$'s of year 2009. The Appendix provides the variable definitions.

Table 4 Estimated and realized CEO compensation

Panel A: CEOs with completed tenure [N=1,791]

	Dependent variable					
	(1)	(2)	(3)	(4)	(5)	(6)
	Log (Option Pay)	Log (Option Payout)	Log (Total Pay)	Log (Total Payout)	Log (EPEE)	EPEE / Total Pay
Outsider	0.620*** (5.90)	0.127 (0.85)	0.297*** (7.11)	0.175*** (3.88)	1.047*** (3.49)	0.078*** (2.85)
Inst. Own	1.220*** (3.58)	0.692* (1.71)	0.692*** (4.77)	0.453*** (2.92)	1.844** (2.48)	0.168** (2.54)
Log(Return)	-0.044 (-0.79)	1.563*** (19.27)	-0.009 (-0.35)	0.236*** (7.32)	-2.782*** (-17.21)	-0.219*** (-13.97)
ROA	-0.914 (-1.55)	-0.481 (-0.66)	-0.703*** (-2.90)	-0.120 (-0.44)	0.761 (0.60)	-0.150 (-1.10)
Log(Sales)	0.504*** (10.31)	0.372*** (5.44)	0.453*** (22.04)	0.458*** (20.77)	-0.044 (-0.32)	-0.023* (-1.76)
Log(Risk)	5.607*** (3.69)	9.829*** (5.07)	2.163*** (2.72)	2.345*** (2.96)	-6.424* (-1.66)	-1.083*** (-2.98)
B/M	-2.245*** (-9.08)	-2.028*** (-6.89)	-0.939*** (-6.78)	-0.783*** (-5.52)	0.375 (0.60)	0.109* (1.85)
Leverage	-0.591* (-1.68)	-0.011 (-0.03)	-0.334** (-2.02)	0.010 (0.06)	-0.353 (-0.44)	-0.056 (-0.84)
Firm Age	-0.027*** (-2.69)	-0.014 (-1.12)	-0.001 (-0.24)	0.008** (2.01)	0.015 (0.58)	-0.003 (-1.41)
CEO Tenure	0.117*** (6.10)	0.297*** (10.96)	0.031*** (4.37)	0.059*** (6.40)	-0.288*** (-5.01)	-0.018*** (-3.58)
CEO Own	-7.130*** (-3.01)	-7.520*** (-4.08)	-2.099** (-2.88)	-2.506*** (-3.75)	1.733 (0.51)	0.257 (0.92)
Targeted	0.462*** (3.28)	-0.156 (-0.65)	0.221*** (3.87)	0.114* (1.77)	1.425*** (2.75)	0.106*** (2.71)
CEO-Chair	0.628*** (4.48)	0.352* (1.85)	0.151*** (2.99)	0.052 (0.94)	0.492 (1.32)	0.022 (0.70)
Independent Dir	0.741* (1.77)	0.331 (0.60)	0.254* (1.73)	0.250 (1.59)	0.689 (0.65)	0.053 (0.52)
Board Size	0.051 (1.52)	0.088** (2.06)	0.014 (1.16)	0.015 (1.26)	-0.008 (-0.09)	0.004 (0.48)
Director Age	-0.081*** (-4.76)	-0.037 (-1.64)	-0.027*** (-4.50)	-0.021*** (-3.01)	-0.032 (-0.76)	-0.005 (-1.11)
CEO-selected Directors	-0.445 (-0.97)	0.137 (0.20)	-0.112 (-0.66)	-0.056 (-0.26)	-0.524 (-0.35)	-0.004 (-0.03)
Two-digit SIC F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	32.8%	46.9%	55.9%	58.1%	30.1%	27.8%

Table 4—Continued

Panel B: CEOs with completed and partial tenure [N=2,235]

	Dependent variable					
	(1) Log (Option Pay)	(2) Log (Option Payout)	(3) Log (Total Pay)	(4) Log (Total Payout)	(5) Log (EPEE)	(6) EPEE / Total Pay
Outsider	0.616*** (6.68)	0.152 (1.15)	0.305*** (8.48)	0.191*** (4.91)	1.008*** (3.92)	0.073*** (3.09)
Inst. Own	1.245*** (4.25)	0.932*** (2.62)	0.699*** (5.62)	0.529*** (4.02)	1.454** (2.17)	0.130** (2.30)
Log(Return)	-0.034 (-0.69)	1.523*** (20.53)	-0.001 (-0.03)	0.226*** (8.30)	-2.812*** (-18.60)	-0.210*** (-15.05)
ROA	-1.087** (-2.01)	-0.359 (-0.52)	-0.785*** (-3.47)	-0.140 (-0.54)	0.163 (0.14)	-0.215* (-1.74)
Log(Sales)	0.517*** (11.66)	0.384*** (6.38)	0.454*** (25.38)	0.457*** (23.89)	0.013 (0.11)	-0.023* (-1.78)
Log(Risk)	5.990*** (4.24)	9.564*** (5.18)	2.195*** (3.11)	2.390*** (3.39)	-7.195** (-1.99)	-1.115*** (-3.36)
B/M	-2.264*** (-10.43)	-2.473*** (-8.55)	-0.908*** (-7.55)	-0.751*** (-6.03)	0.826 (1.47)	0.096* (1.92)
Leverage	-0.659*** (-2.07)	0.208 (0.57)	-0.337** (-2.31)	0.024 (0.16)	-0.887 (-1.18)	-0.106* (-1.76)
Firm Age	-0.023*** (-2.82)	-0.022** (-2.09)	0.001 (0.16)	0.006** (1.96)	0.019 (0.86)	-0.001 (-0.38)
CEO Tenure	0.088*** (5.44)	0.252*** (10.97)	0.028*** (4.80)	0.052*** (7.14)	-0.238*** (-4.92)	-0.014*** (-3.33)
CEO Own	-7.308*** (-3.60)	-6.961*** (-4.21)	-1.986*** (-3.25)	-2.229*** (-3.91)	-0.588 (-0.18)	0.128 (0.52)
Targeted	0.435*** (3.42)	-0.159 (-0.78)	0.217*** (4.57)	0.106** (1.98)	1.166*** (2.60)	0.105*** (3.33)
CEO-Chair	0.518*** (4.35)	0.363** (2.22)	0.143*** (3.36)	0.061 (1.27)	0.342 (1.02)	0.016 (0.61)
Independent Dir	0.596 (1.61)	0.560 (1.14)	0.266** (2.08)	0.368*** (2.69)	-0.086 (-0.09)	-0.030 (-0.34)
Board Size	0.057** (1.99)	0.088** (2.39)	0.014 (1.42)	0.019* (1.86)	-0.588 (-0.18)	0.001 (0.17)
Director Age	-0.074*** (4.99)	-0.037* (-1.90)	-0.024*** (-4.56)	-0.019*** (-3.23)	-0.012 (-0.30)	-0.003 (-0.72)
CEO-selected Directors	-0.072 (-0.18)	0.386 (0.66)	-0.085 (-0.59)	-0.046 (-0.26)	-0.140 (-0.11)	-0.024 (-0.21)
Two-digit SIC F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	32.7%	46.2%	57.4%	59.1%	30.0%	27.2%

Panels A and B present results of six models regressing CEO pay variables on *Outsider*, *Institutional Ownership*, and financial and corporate governance variables using the sample of CEOs with completed tenure (i.e., those who started between 1992 and 2005 and left by the end of 2009) and the sample of CEOs with completed or partial tenure (i.e., those who started between 1992 and 2005 irrespective of whether they left by the end of 2009), respectively. The dependent variables are presented at the top of each column. All variables are averaged over the CEO's tenure and adjusted for inflation (CPI-U) to show 2009 \$'s. The log of a variable is defined as the natural logarithm of \$1 plus the variable. \$1 is added to avoid missing values in case the underlying variable is \$0. Since its underlying variable can be both positive and negative, *Log (EPEE)* is defined in a stepwise approach. *Log (EPEE)* is defined as the following: $\text{Log}(EPEE+1)$ if $EPEE \geq 0$, and $(-1) * \text{Log}(-1 * (EPEE-1))$ if $EPEE < 0$. Two-digit SIC industry fixed effects are included in the regressions, but not reported for brevity. Huber-White-adjusted *t*-statistics are reported in parentheses below each coefficient estimate. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. The Appendix provides variable definitions.

Table 5 Compensation of CEOs without beginning option holdings

Panel A: Compensation of CEOs with or without beginning option holdings					
Mean (Median)	Zero Beginning Option Holdings [N=981]	Positive Beginning Option Holdings [N=810]	Difference, p-value		
Outsider	0.503 (1.000)	0.006 (0.000)	0.00 (0.00)		
Inst. Own.	0.411 (0.421)	0.429 (0.431)	0.04 (0.13)		
Option Pay	2,841 (1,080)	2,834 (1,353)	0.98 (0.00)		
Option Payout	1,829 (112)	2,486 (406)	0.02 (0.00)		
Total Pay	5,394 (2,829)	6,139 (3,643)	0.06 (0.00)		
Total Payout	4,382 (2,064)	5,790 (3,162)	0.00 (0.00)		
EPEE	1,012 (334)	348 (277)	0.06 (0.02)		
EPEE/Total Pay	0.120 (0.182)	0.028 (0.131)	0.00 (0.00)		

Panel B: Regressions for the sample of CEOs without beginning option holdings [N=981]						
	Dependent variable					
	(1)	(2)	(3)	(4)	(5)	(6)
	Log (Option Pay)	Log (Option Payout)	Log (Total Pay)	Log (Total Payout)	Log (EPEE)	EPEE / Total Pay
Outsider	0.954*** (6.64)	-0.135 (-0.73)	0.402*** (7.17)	0.224*** (3.55)	1.634*** (4.48)	0.122*** (3.70)
Inst. Own.	1.489*** (3.26)	1.143** (2.18)	0.755*** (3.77)	0.411* (1.88)	1.251 (1.34)	0.177** (2.19)
Log(Return)	-0.005 (-0.06)	1.392*** (13.21)	0.008 (0.19)	0.240*** (4.39)	-2.480*** (-12.13)	-0.193*** (-9.54)
ROA	-0.993 (-1.50)	-0.626 (-0.71)	-0.679** (-2.31)	-0.087 (-0.26)	1.489 (0.97)	-0.096 (-0.62)
Log(Sales)	0.396*** (5.34)	0.404*** (4.23)	0.400*** (12.98)	0.431*** (12.94)	-0.101 (-0.57)	-0.031* (-1.71)
Log(Risk)	4.267** (2.20)	10.826*** (4.42)	1.461 (1.35)	2.178** (2.03)	-6.376 (-1.32)	-1.243*** (-2.98)
B/M	-2.267*** (-6.64)	-2.160*** (-5.29)	-0.929*** (-4.66)	-0.787*** (-3.90)	-0.066 (-0.08)	0.056 (0.73)
Leverage	-0.520 (-1.14)	0.039 (0.08)	-0.332 (-1.42)	0.111 (0.45)	-1.162 (-1.15)	-0.129 (-1.51)
Firm Age	-0.039*** (-2.77)	-0.018 (-1.02)	-0.004 (-0.66)	0.007 (1.11)	0.024 (0.71)	-0.004 (-1.52)

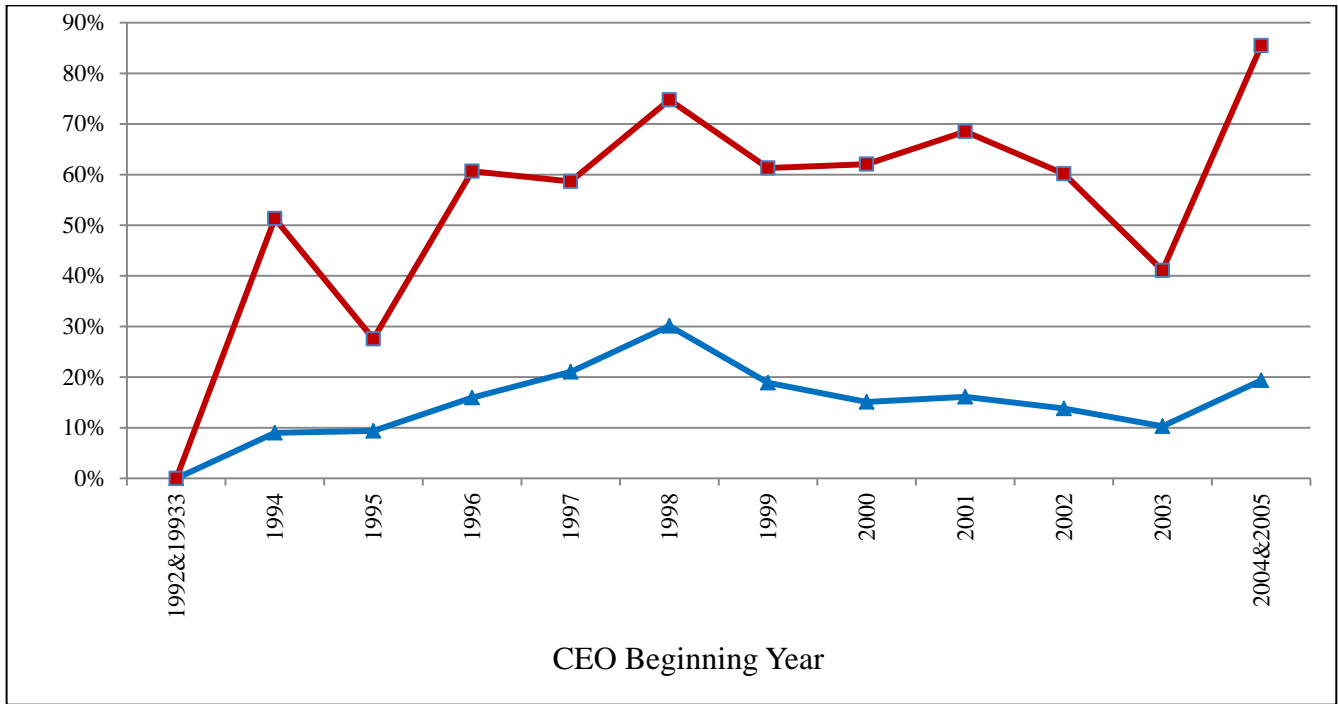
Table 5 Panel B – continued

CEO Tenure	0.117*** (4.32)	0.365*** (9.90)	0.032*** (2.82)	0.074*** (4.91)	-0.419*** (-5.58)	-0.032*** (-4.56)
CEO Own	-7.122*** (-2.27)	-9.892*** (-4.02)	-2.335** (-2.29)	-2.647*** (-3.06)	4.470 (1.28)	0.369 (1.10)
Targeted	0.591** (2.32)	0.371 (1.07)	0.301*** (3.14)	0.198* (1.90)	0.818 (1.08)	0.087 (1.59)
CEO-Chair	0.892*** (4.55)	0.665** (2.53)	0.319*** (4.18)	0.172** (2.07)	0.285 (0.58)	0.014 (0.33)
Independent Dir	1.012 (1.61)	0.579 (0.72)	-0.071 (-0.30)	-0.086 (-0.34)	1.165 (0.79)	0.127 (0.79)
Board Size	0.095* (1.95)	0.113* (1.86)	0.045** (2.37)	0.052*** (2.62)	0.010 (0.08)	0.000 (0.02)
Director Age	-0.093*** (-4.30)	-0.089*** (-2.83)	-0.039*** (-4.58)	-0.038*** (-3.55)	-0.105 (-0.18)	-0.002 (-0.32)
%CEO-selected Directors	-0.438 (-0.69)	-0.277 (-0.27)	-0.153 (-0.62)	-0.003 (-0.01)	0.059 (0.03)	-0.024 (-0.12)
Two-digit SIC F.E.	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	37.3%	47.6%	52.1%	53.5%	31.6%	29.6%

Panel A presents mean and median *Outsider*, *Institutional Ownership*, and CEO pay variables between the CEOs who do not have beginning option holdings and those who have beginning option holdings. Both samples include only CEOs with completed tenure (those who started between fiscal years 1992 and 2005 and left by the end of 2009). The last column presents p-values for the t-test and Wilcoxon test on the differences across the partitions.

Panel B presents results of six models regressing CEO pay variables on *Outsider*, *Institutional Ownership*, and other financial and corporate governance variables for the sample of CEOs without beginning option holdings. The dependent variables are presented at the top of each column. All compensation and financial variables are adjusted for inflation (CPI-U) to show 2009 \$'s. The log of a variable is defined as the natural logarithm of \$1 plus the variable. \$1 is added to avoid missing values in case the underlying variable is \$0. Since its underlying variable can be both positive and negative, *Log (EPEE)* is defined in a stepwise approach. *Log (EPEE)* is defined as the following: $\text{Log}(EPEE+1)$ if $EPEE \geq 0$, and $(-1) * \text{Log}(-1 * (EPEE-1))$ if $EPEE < 0$. Two-digit SIC industry fixed effects are included in the regressions, but not reported for brevity. Huber-White-adjusted *t*-statistics are reported in parentheses below each coefficient estimate. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. The Appendix provides variable definitions.

Figure 1
Ex post estimation errors across calendar years



The figure depicts median ex post estimation errors of option value (i.e., *EPEE*) across calendar years in which executives start as CEOs. The square marker line plots median ratio of *EPEE* to *Option Pay*. The triangle marker line plots median ratio of *EPEE* to *Total Pay*. The first two years (1992 and 1993) and the last two years (2004 and 2005) of the CEO beginning years are combined so that the number of observations per year exceeds 100 for each year. The Appendix provides variable definitions. The sample period during which annual CEO pay is accumulated is between years 1992 and 2009.