Implications of Estimation Error in Option Grants

for Evaluating CEO Pay

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Abstract

We document a large gap between reported estimated values of stock option grants to CEOs and CEOs' proceeds from option exercises. On average, CEOs realized 30% less than the reported value of option grants. We investigate two ways that this estimation error affects evaluation and monitoring of CEO pay. First, we predict and find higher estimation error for CEOs hired externally than for CEOs hired internally. Without the estimation error, compensation of outsider CEOs is not significantly different from that of insider CEOs—contrary to prior evidence that relies on estimated values. Second, we test whether estimation error affects shareholder monitoring through shareholder proposals and "vote no" campaigns and find evidence that it does.

Keywords: CEO compensation, stock options, outsider CEOs, option exercise, shareholder activism.
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1. Introduction

The Securities and Exchange Commission (SEC) mandates that companies estimate and report the values of CEO option grants made each year. Because there is no market for stock options similar to those granted to CEOs and other employees, companies estimate the value of option grants by using pricing models originally developed to value traded options. An extensive literature documents limitations in using the pricing models to value option grants and provides guidance to companies to correct for these limitations and provide unbiased estimates (Bettis et al. 2005, Carpenter 1998, Cuny and Jorion 1995, Cvitanic et al. 2008, Hemmer et al. 1994, Huddart 1994). Yet, the actual payments to the CEO can only be fully known in subsequent periods. In this study, we investigate how the difference between the estimated and realized values of option grants affects evaluation of pay for outsider versus insider CEOs and monitoring of CEO pay through shareholder activism campaigns.

The reported value estimates may differ from the actual proceeds from exercising options at the individual CEO level for a number of reasons. First, payouts primarily reflect realized stock returns, which are unknown at the date of the grants. Second, post-grant actions of the firm and the CEO affect actual proceeds because of contractual provisions that link exercisability of option grants to post-grant actions and events (such as CEO's departure and vesting conditions). Finally, estimated inputs to option pricing models (such as stock return volatility, dividend yield, risk-free rate, and expected term) may differ from their respective realizations (Aboody et al. 2006, Hodder et al. 2006). Yet, as evidenced by the widespread reliance on option value estimates, companies, shareholders, regulators, and academicians apparently assume that the reported option values approximate the expected proceeds from option exercises. This assumption means that, for a sufficiently broad-based sample of CEOs across industries, and over time, the average proceeds should be about equal to the average reported value of option grants. We test the validity of this critical assumption. Using *ExecuComp* CEOs between the years 1992 and 2010, we compare the sum of inflation-adjusted reported value estimates of option grants (i.e., estimated option pay) with the sum of inflation-adjusted proceeds from exercising options during the CEOs' full tenure (i.e., realized option pay).[1] We find that the proceeds from exercise are on average 30% lower than the estimated values. This significant difference holds across calendar years and industries.

A global survey by the Association of Investment Management and Research (AIMR) found that 80% of AIMR members relied on disclosed employee stock option (ESO) information to value firms (Rittenhouse 2002). Hodder et al. (2006) noted that this reliance would likely increase with SFAS 123R and that it is important to understand the nature of ESO valuation error, which is permanent because there is no truing up based on realized values. Ohlson and Penman (2005) present detailed arguments why financial claims that are based on a firm's stock price, such as ESOs, should be accounted for as marked-to-market liabilities, meaning that the change in value from the grant date to the exercise date would be included in income. Landsman et al. (2006) provide empirical support for accounting recognition of the change in option value from a valuation perspective. We refer to this change in option value (i.e., the difference between the estimated and realized option values) as the estimation error.

We investigate two implications of estimation error for evaluating and monitoring CEO pay. The first involves possible suboptimal compensation and hiring decisions for CEOs hired externally versus those promoted from within the firm. The adverse selection arguments predict that outsider CEOs receive higher option pay and total pay than insider CEOs, because outsider

[1] Our definition of estimation error is different from Hall and Murphy (2002), who compare the certainty equivalent value of options from the perspective of the CEO with the option fair values from the perspective of the firm.

CEOs have more transferable managerial skills and face greater uncertainty about their talent and employment (Murphy and Zabojnik 2007, Gillan et al. 2009). However, some find that outsider CEOs do not perform better than insider CEOs (Cazier and McInnis 2010, Kesner and Sebora 1994), attracting significant criticism from shareholders on the pay premium of outsider CEOs (Ferris 2010). We contribute to this debate by arguing that the greater uncertainty associated with outsider CEOs is likely to magnify the effects of conditional provisions and post-grant actions in limiting the exercisability of option grants. For instance, outsider CEOs receive option grants with more restrictive performance-vesting conditions (Gerakos et al. 2007, Bettis et al. 2010). Consistent with more limited exercisability of option grants for outsider CEOs, we find that outsider CEOs realized a smaller portion of their estimated option pay (55%) than insider CEOs (78%). The higher estimation error for outsider CEOs persists after controlling for determinants of pay in a regression framework. From a different perspective, *realized* option pay and total pay of outsider CEOs are not statistically different from those of insider CEOs. This finding contrasts with prior literature, which documents higher *estimated* option and total pay of outsider CEOs.

Second, we investigate whether shareholder activists adjust for estimation error when targeting firms' pay practices. Both the literature and the business press have long debated measurement issues with regard to employee stock options. The SEC has given wide latitude to companies in estimating option values. Companies have consistently provided information about proceeds from option exercises in their proxy disclosures. Overall, investors have had ample opportunity to observe estimation errors and discriminate between "soft" estimates of option value and "hard" proceeds from option exercises. To evaluate whether shareholders have recognized estimation error, we relate the incidence of executive-pay-related shareholder activism to realized pay and the estimation error over the full tenure of CEOs. We find positive and statistically similar correlations for the incidence of shareholder activism with realized pay and with estimation error. These results suggest that shareholder activists do not meaningfully differentiate between estimated and realized option pay.

To the best of our knowledge, ours is the first large-scale study that compares estimated and realized option pay over the tenures of individual CEOs. We find that cash costs of option grants are substantially less than the company estimates, despite company adjustments that consider differences between traded options and executive option grants. Two out of three CEOs do not fully realize the reported value of their option grants, and one out of three CEOs cannot exercise any of their option grants at all. More importantly, the estimation error may result in sub-optimal CEO selection and compensation decisions. This possibility is likely to be more consequential for outsider CEOs, for whom the average estimation error is significantly larger. The estimation error of option values may also mislead shareholders, leading them to target companies whose CEOs receive less compensation than is indicated by the reported values of option grants. Our evidence implies that these value-destroying possibilities are real.

The paper is organized as follows. Section 2 develops our hypotheses. Section 3 describes the sample. Section 4 presents empirical results. Section 5 concludes with a discussion of the study's implications for outsider CEOs and shareholder activism.

2. Hypothesis Development

Companies report two different values of CEO stock option grants. The estimated (i.e., fair) value of option pay is computed in the year of the grant as an estimate of the expected cost of options granted to the CEO.[2] The realized option pay is computed at the date of exercise as the number of options exercised times the difference between the stock price and the exercise price. The CEO compensation literature primarily uses estimated pay.[3] This is because economists view CEOs' proceeds from option exercises as irregular and unrepresentative of incentives provided by option grants (Core and Guay 1999). The realized option values are also used, though less frequently and with little attention drawn to the differences between the two values. The indifference between the two values stems from a largely uncontested assumption that realized pay should be about equal to the estimated pay in the long run and for a large cross-section of companies. Nevertheless, there are calls in academia that realized pay is more appropriate for the debate on the excessiveness of CEO pay levels. Leone et al. (2006) argue that option exercises provide rewards for *past* performance. Kaplan (2008) argues "[*Realized compensation*] is more appropriate for considering whether CEOs are paid for performance."[4] Kaplan and Rauh (2010) suspect that the 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. Fair value estimation for CEO option grants

Stock options are key elements of the dynamic contracting between the firm and the CEO (Gillan et al. 2009, Hall and Liebman 1998). The exercisability of CEO options is subject to various conditions and post-grant events. First, companies set time-vesting and performance-

[2] The estimated values form the basis for the annual option compensation expense (SFAS 123R). Due to the large impact of option values on financial statements and computational complexity, companies tap consulting services or use specially developed software to value option grants. Companies mostly use the Black-Scholes method, although binomial lattice and Monte Carlo simulation have recently received traction (Mun 2004).

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

[4] Related to this observation, there were (unsuccessful) early calls for adoption of the realized proceeds from option exercises as the basis for option compensation expense in financial statements (Rubinstein 1995).

vesting conditions for option exercisability (Bettis et al. 2010). Second, companies set insider-trading rules such as blackout periods and minimum equity holding requirements. Third, companies can alter existing option plans. Finally, companies can force CEOs to leave, resulting in CEOs forfeiting unvested options and involuntarily exercising or cancelling vested options. Similarly, employee actions such as resignations affect the exercisability of options. Thus, the transfer of exercise rights to the CEO is incomplete at the grant date, and depends on interactions between the firm and the CEO over the contracting period.

An extensive literature addresses the effects of incomplete transfer of exercise rights on the fair value of options. Early papers acknowledged the influence of risk-averse exercise behavior and employee turnover on the proceeds from exercise (Hemmer et al. 1994 1996, Huddart 1994, Cuny and Jorion 1995). Other studies documented the prevalence of early exercise by employees and executives (Huddart and Lang 1996, Marquardt 2002). These articles support—and SAB No. 107 that followed these articles encourages—that companies estimate fair values using the Black-Scholes model by substituting the expected term of options for the contractual term (SEC 2005). Subsequent studies proposed alternative estimation methods such as analytic formulas (Cvitanic et al. 2008) and lattice pricing models (Bettis et al. 2005, Carpenter 1998, Hull and White 2004). Collectively, these studies provide guidance to companies for unbiased estimation of employee stock option values.[5]

Although utility preferences vary across individual employees, companies estimate the value of option grants using parameters based on the distribution for the employee group as a whole. Because CEOs have unique contracting relations with their firms, parameters based on

[5] Empirical evidence shows that early exercise behavior due to risk aversion is adequately addressed with the use of an expected term in analytic models and a stock to strike price ratio in lattice models (Bettis et al. 2005). The effects of employee turnover may be addressed with quit rates in lattice and analytic models (Cvitanic et al. 2008, Hull and White 2004).

the distribution for the employee group as a whole may not be appropriate for CEOs. Kaplan and Minton (2010) and Hermalin (2005) observe that CEO tenures are volatile and short, suggesting that cancellation, forfeiture, and early exercises of CEO stock options are more consequential than previously recognized. 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. Consequently, estimation errors are likely to be higher for CEOs than for other employees.

Our empirical analysis covers the period from 1992 to 2009, during which firms used a variety of estimation methods.[6] The quality of option estimates varies across firms with respect to option pricing models and over time as companies change their application of option pricing models. Our research objective is to investigate the implications of estimation error, irrespective of the option pricing model used. To provide information about the magnitude and direction of estimation error, we compare estimated values of options grants reported by the companies with proceeds from option exercises throughout the tenures of individual CEOs. We find that the reported estimated values were on average substantially greater than the proceeds from option exercises, indicating a high degree of positive estimation error. We develop two hypotheses on the implications of estimation error for evaluating and monitoring CEO pay.

2.2. Outsider versus insider CEOs

Hiring a CEO from outside versus promoting a CEO from within is an important strategic decision facing boards. Outsider hiring is associated with the new CEO having more general managerial talent (Murphy and Zabojnik 2007), and charisma or super-star CEO status (Khurana 2002, Malmendier and Tate 2009), and the new CEO using a talent agent (Rajgopal et al. 2011).

[6] 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%, although a majority of the companies avoided this method.

Outsider CEOs face greater uncertainty about the sustainability of their relationship with their companies (Gillan et al. 2009). The adverse selection models predict higher variable and total pay under greater uncertainty (Lazear 1986). Empirical evidence to date consistently shows that outside CEOs receive higher pay.

A more controversial issue is whether higher pay of outsider CEOs is justified. Anecdotal evidence supports growing shareholder discontent over higher pay of outsider CEOs (Ferris 2010). Jensen et al. (2004) argue that outsider CEOs invariably receive "too much" compensation. Similarly, 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. (2011) find that CEOs with talent agents perform better. The extant evidence is primarily based on estimated annual pay. We contribute information to this debate by comparing realized and estimated pay over the tenures of outsider and insider CEOs.

In line with the greater use of option grants, performance-vesting conditions are used more frequently for firms hiring outsider CEOs to attract top talent in a sorting equilibrium (Bettis et al. 2010, Gerakos et al. 2007). In sum, we predict that higher performance expectations for outsider CEOs, greater uncertainty about sustainability of their relationships with their firms, and risky features of their compensation contracts will make the transfer of exercise rights less complete for outsider CEOs.[7]

[7] Because we define estimation error as the difference between the estimated value of option grants and the realized proceeds from option exercises over the CEO's tenure, greater estimation error means a greater positive difference between the estimated value of option grants and the actual proceeds from exercise.

H1. *Estimation error in reported values of option grants is higher for outsider CEOs than insider CEOs.*

As an alternative to using the outsider distinction to identify CEOs who have more transferable managerial ability, we identify CEOs who worked as top-five executives at larger companies at any time in the past. Similar to outsiders, we predict less complete transfer of exercise rights and higher estimation error for these CEOs.

H1a. *Estimation error in reported values of option grants is higher for CEOs who have top-five executive experience at larger companies.*

2.3. Shareholder activism

The CEO pay levels have increased dramatically during the past two decades with much of the increase in the value of stock options. Research articles contribute to both sides of the debate on whether high CEO pay is optimal (Bebchuk et al. 2002, Cheng and Indjejikian 2009, Frydman and Saks 2010, Gabaix and Landier 2008, Kaplan and Rauh 2010). As evidenced by media attention and regulatory interventions, negative sentiment about executive pay practices has also risen in recent years, with stock options criticized for boosting CEO pay levels and rewarding CEOs based on luck (Core et al. 2008, Bertrand and Mullainathan 2001, Garvey and Milbourn 2006).[8] In line with the rising negative sentiment, shareholder activists press for greater control and limits on CEO pay, using option value estimates to represent the costs of option grants to the company (Ertimur et al. 2010). Upward (downward) error in estimation of CEO stock option grants, meaning that estimates overstate (understate) the cost to firms of CEO stock options, may mislead shareholders.

[8] The Emergency Economic Stabilization Act of 2008 imposed executive pay limits on companies using the 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.

Shareholder activists take various actions to protest “excessive” CEO pay. During the sample period, activists initiated shareholder proposals and promoted vote no campaigns for directors based on compensation issues. Ertimur et al. (2010) provide evidence that such targeting decisions were positively related to the estimated values of executive pay. We investigate whether activists recognized and adjusted for estimation error of option values when making targeting decisions. To do this, we use option exercises as a measure of the actual option rights transferred to the CEO (i.e., the realized cost to the firm), and we estimate a model that relates the incidence of targeting decisions to realized pay and the estimation error. If shareholder activists recognized the estimation error, the coefficient on the estimation error would be less than the coefficient on realized pay in this model.

H2. *Compensation-based shareholder proposals and vote no campaigns is less strongly related to the estimation error of option values than to the realized pay.*

3. Sample

Using the *ExecuComp* database, we identify S&P 1500 executives who were hired as CEOs between fiscal years 1992 and 2005. We require that CEOs have non-missing annual compensation data over their tenures, non-missing company financial data from the *CRSP* and *Compustat* databases, a press release in the *Factiva* database revealing their appointment as insiders or outsiders, and announcement dates on their arrivals and departures (if they have already stepped down) from both *Factiva* and *ExecuComp* databases. The final sample consists of 2,249 CEOs, 1,804 of which have already stepped down as of the beginning of company fiscal year 2010. We use CEOs with full tenures as our primary sample in order to reliably compare estimated value of option grants and exercises from these grants.

In order to make unbiased comparisons across option grants and exercises, we adjust CEO pay variables and company financials for inflation to reflect 2009 year-end dollars, using the Consumer Price Index (CPI-U). Finally, we compute annual averages of pay variables and company financials over the tenures of individual CEOs. The annual averages include pay variables and company financials during the CEOs' partial first and last years. For example, if a company with a fiscal year end of December 31 announces that an executive will start (or has started) as CEO on February 26, 1996 and later announces that the CEO will leave (or has left) on September 10, 2003, we assign 1996 as the CEO's first fiscal year and 2003 as the CEO's last fiscal year. This methodology conservatively includes all compensation grants and option exercises during the partial first and last years of a CEO's tenure to the executive's capacity as a CEO, even though the executive may not be designated officially as CEO at the time of compensation activity.

3.1. Differences between reported and realized compensation

Panel A of Table 1 provides statistics on annual average pay variables over CEO tenure, which lasts 5.1 years on average for CEOs with full tenures.[9] The company-reported "nominal" total pay, *Nominal Pay*, averages $5,890,000 per year, and consists of the following components: *Salary*, $703,000 (12%), *Bonus*, $693,000 (12%), *Other Pay*, $460,000 (8%), pay-outs from long-term incentive plans *LTIP*, $275,000 (5%), *Stock Pay*, $744,000 (13%), and the estimated fair value of option grants *Option Pay*, $3,014,000 (51%). Consistent with prior literature, the largest component of reported CEO compensation is the estimated value of option grants, although its weight has subsided in recent years.

[9] 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 define a CEO's annual proceeds from option exercises as the number of options exercised multiplied by the difference between exercise and stock prices on exercise dates. We first inflation-adjust and aggregate proceeds over the CEO's tenure. Then, we adjust realized option pay by excluding the value of CEO's 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 their exercisable holdings after they step down). Specifically, we subtract from the aggregate value of option exercises 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).[10] To avoid negative realized values, we set the realized value equal to zero if the above adjustment produces a negative value (less than 1% of the sample). Finally, we compute *Option Exercise* by dividing the aggregate value of option exercises (adjusted for the beginning and ending option portfolios) by the number of years in the CEO's tenure. We define *Realized Pay* as the sum of *Salary*, *Bonus*, *Other Pay*, *LTIP*, *Stock Pay*, and *Option Exercise*.

The average proceeds from option exercises, *Option Exercise*, are $2,110,000 per year.[11] The difference between the estimated $3,014,000 per year and realized option pay (i.e., estimation error or *Pay Difference*) averages $904,000 per year, or $3,800,000 cumulatively over the CEO's tenure. *Pay Difference* corresponds to 15.3% of *Nominal Pay* or 30.0% of *Option*

[10] 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. The use of intrinsic value for the ending option holdings may understate the actual realization for executives with sunset provisions that extend the exercise period.

[11] We adjust realized option exercises for the beginning and ending option holdings based on assumptions that CEOs cash in these amounts. Without this adjustment, *Option Exercise* is 1,568,000 per CEO-year, and the difference between reported and realized pay is even starker, $1,445,000, corresponding to 48% of the reported option pay.

Pay. The effect of estimation error is more significant when an individual CEO's experience is considered. The median *Option Pay* is $1,337,000 whereas the median *Option Exercise* is only $202,000, suggesting that a considerable number of CEOs did not realize all or most of the value in their estimated option pay.

We believe that the large number of CEOs in the sample and the length of the sample period, spanning from years 1992 to 2009 (including boom and bust cycles), make the analyses representative of the CEO population. The long sample horizon also enables us to analyze the impact of calendar periods on the results. Figure 1 depicts median *Pay Difference* across calendar years in which a CEO's tenure starts. The annual median *Pay Difference* deflated by *Nominal Pay* ranges between 10% and 30% except for the first two years of the sample. Similarly, the annual median *Pay Difference* deflated by *Option Pay* ranges between 45% and 75%, except for the first and last two-year ends of the sample. We conclude that the positive estimation error is persistent across CEO start years, and is not unduly sensitive to macroeconomic trends.

Panel B of Table 1 provides similar information to Panel A for the sample that includes all 2,249 CEOs that started their tenures between 1992 and 2005. We present this information to alleviate concerns that our analysis is biased because we omit CEOs who were still at the helm at the end of 2009. The average annual *Option Exercise*, which is adjusted for beginning and ending option holdings, is $2,067,000 compared with the average annual *Option Pay* of $2,858,000. The *Pay Difference* of $791,000 is about 13% of *Nominal Pay* or 28% of *Option Pay*, slightly but not significantly lower than for the full tenure sample.[12]

We also made, but do not report, pay comparisons for the first and last years of CEO tenure. Not surprisingly, the average reported option pay is significantly higher in the first year

[12] If *Option Exercise* is not adjusted for option holdings, *Pay Difference* is $1,271,000, or 44% of *Option Pay*.

($4,560,000) than in the last year of the CEO tenure ($1,737,000) and the average proceeds 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 option values across years justifies our practice of aggregating option values over the tenures of individual CEOs in making comparisons.

3.2. Determinants of CEO pay

Our empirical tests on the relation between estimation error and outsider CEO control for the following company characteristics that the literature relates to CEO pay levels:

Firm size: We expect that expected and realized compensation increase with size (Gabaix and Landier 2006). We use the natural logarithm of firm sales as our proxy for firm size.

Operational risk: We expect that CEO option grants increase with firms' operational risk (Aggarwal and Samwick 1999, Garen 1994). In addition, if higher risk 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 (Core and Guay 2002, Smith and Watts 1992). We use firm age and book-to-market of company assets as inverse proxies for 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 (total liabilities divided by total assets) to proxy for financial distress.

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

Panel C of Table 1 provides descriptive information about financial variables annualized over CEO tenure. The average annualized stock return is 8.6% for CEOs and the average ROA is 0.9% during the sample period. This reflects the turbulent economic times between 1992 and 2009 that include periods of market booms and busts. The average company is 16.5 years old (using 1980 as the reference year); has a market capitalization of $8.2 billion; and reports annual sales of $6.4 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 70.9%, and the leverage ratio (debt-to-assets) is 25.1%. The descriptive statistics of the sample are not significantly different from those of all S&P 1500 companies.

3.3. Univariate relations between CEO compensation and control variables

Based on pair-wise correlations among empirical variables (untabulated), the logarithm of *Pay Difference* 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 *Pay Difference* and CEO performance, CEO performance variables correlate more strongly with *Realized Pay* than with *Nominal Pay*. These correlations support Kaplan's (2008) argument that cash payouts to CEOs are more sensitive with performance than estimated pay. The greater sensitivity of realized pay with performance comes from two sources. First is the sensitivity of realized pay to ex post stock returns that comes from holding options between the grant and exercise dates. Second is the incremental sensitivity that comes through the conditions on exercisability of options that are explicitly or implicitly tied to company performance. Companies that observe poor (good) performance, tighten (release) existing restrictions, create (do not create) new restrictions, and, in the extreme case, terminate their contracts (continue) with the incumbent CEOs.

Figure 2 depicts decreasing *Pay Difference* across deciles of CEO performance (average stock returns). CEOs in the lowest four deciles exercised almost none of the options granted throughout their tenures. The lost personal wealth due to inability to exercise corresponds to 40% of these CEOs' total nominal pay. In contrast, those CEOs in the highest performance decile realized about 140% of their reported option pay. Figure 2 shows that only those CEOs with strong stock returns over their tenure (annual average stock returns of 20% or greater) realized more than their reported nominal option pay. The positive estimation error for seven of the ten deciles is consistent with the observed 30% gap between estimated and realized pay.

Because CEO performance is likely to be associated with CEO tenure, we expect a similarly strong relation between the *Pay Difference* and CEO tenure. Figure 3 illustrates CEO tenure with respect to the median *Pay Difference* deflated by *Nominal Pay* and *Option Pay*. *Pay Difference* almost monotonically decreases with CEO tenure. CEOs who stayed three years or less did not realize about 95% of the value of their option grants, or about 30% of their total compensation. Only CEOs who stayed at their firms more than nine years realized an average amount equal to the option pay reported by their companies. Again, the fact that the pay difference is positive across almost all tenure groups is consistent with estimation error in measuring the fair value of option pay.

3.4. Univariate relations between outsiders and CEO compensation

We test H1 and H1a using indicator variables: *Outsider* to represent a CEO hired externally and *Top-five* to indicate top-five executive experience at a larger company. The

Outsider data are hand-collected from CEO appointment announcements in the *Factiva* database, whereas the *Top-five* data are derived from the *ExecuComp* 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. We define *Top-five* as one if the candidate has worked, any time in the past, as a top-five executive for another S&P 1500 firm larger in inflation-adjusted total assets than the incumbent company, and zero otherwise.[13] Note that *Top-five* does not necessarily imply that the CEO is an outsider, because an insider CEO may have worked for another company long before joining the incumbent company. *Top-five* is one (zero) for 13% (87%) of the sample. *Outsider* and *Top-five* are positively correlated with a correlation coefficient of about 0.45.

Panels A and B of Table 2 present univariate tests of the relations between CEO pay and outsiders. In Panel A, we see that *Nominal Pay* is significantly higher for outsider CEOs (mean = $6,855,000) relative to insider CEOs (mean = $5,523,000), consistent with prior research. The mean difference in *Nominal Pay* is almost completely due to *Option Pay* (mean = $3,928,000 for outsiders versus $2,666,000 for insiders). However, *Realized Pay* is not different for outsider CEOs (mean = $5,099,000) versus insider CEOs (mean = $4,943,000), because average *Option Exercise* is similar across the two groups (mean = $2,172,000 for outsiders versus $2,086,000 for insiders). In other words, estimation error of option values is substantially greater for outsider CEOs (mean *Pay Difference* = $1,763,000) than insider CEOs (mean *Pay Difference* = $580,000), as predicted by H1.

In Panel B, we see a large difference in *Nominal Pay* between CEOs with experience as top-five executives at larger companies (mean = $7,166,000) versus other CEOs (mean =

[13] The empirical results are similar if we use alternative *Top-five* indicators for i) whether the CEO previously worked as a top-five executive for *any* S&P 1500 firm, or ii) whether the stock returns of the previous S&P 1500 firm were higher than the current company over the period the CEO worked at the previous firm.

$5,698,000). However, *Realized Pay* for CEOs with top-five experience averaged $4,864,000, which is less than *Realized Pay* of other executives, $5,004,000. Again, the differences in *Nominal Pay* are attributed to differences in *Option Pay* (mean = $4,259,000 versus $2,826,000). Because the *Option Exercise* amounts are similar across the two groups (mean = $1,958,000 versus $2,133,000), the gap in *Pay Difference* (mean = $2,302,000 versus $694,000) indicates that CEOs with top-five experience at larger companies realized proportionately less from option exercise than other CEOs, consistent with H1a.

4. Regression results

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

$$\begin{aligned} &\textit{Pay Levels (or Pay Difference)} = \alpha + \beta_1 \textit{ Outsider} + \beta_2 \textit{Top-five} + \beta_3 \textit{ Log(Return)} \\ &\quad + \beta_4 \textit{ ROA} + \beta_5 \textit{ Log(Sales)} + \beta_6 \textit{ Log(Risk)} + \beta_7 \textit{ Book-to-Market} + \beta_8 \textit{ Leverage} \\ &\quad + \beta_9 \textit{ Firm Age} + \textit{Industry fixed effects} + \varepsilon \end{aligned} \tag{1}$$

The independent variables include various determinants of pay used in prior literature (discussed in Section 3.2). Table 4 presents the results of estimating Eq. (1) for various dependent variables. The dependent variables in the columns of Table 4 from left to right are (1) logarithm of nominal option pay, (2) logarithm of realized option exercise, (3) logarithm of nominal total pay, (4) logarithm of realized total pay, (5) logarithm of pay difference, and (6) pay difference deflated by nominal total pay.

4.1. Estimation error of option values and outsider CEOs

The last two columns of Table 3 support H1 and H1a. By definition, estimation error increases (decreases) with estimated (realized) option pay. The positive and significant coefficients on *Outsider* in the last two columns provide strong support for H1 that estimation error of option vales is significantly greater for outsider CEOs. We also find support for H1a (significant and positive coefficient in the deflated pay difference equation) that estimation error of option values is greater for CEOs with top-five executive experience at larger companies. With respect to control variables, we see that the pay difference decreases with firm performance as measured by stock returns and ROA, and with growth options as measured inversely by the book-to-market ratio. The proportional pay difference (pay difference deflated by nominal total pay) decreases with stock returns and ROA. It also decreases with size, firm risk and both measures of growth opportunities, book-to-market (inversely) and firm age.

Unlike traditional pay models using annual observations, our model uses annual averages over the CEO's tenure. Therefore, we do not see the same relations between pay and performance that would be manifest in a model that related periodic pay to periodic performance. For instance, prior studies find a positive relation between annual company performance and annual nominal pay (Baber et al. 1996, Leone et al. 2006). We find in contrast that the average reported option pay and nominal total pay decrease with average return-on-assets (ROA) over the CEO's tenure, while they increase with stock returns.

Panel B of Table 3 repeats the analysis for the larger sample that includes all CEOs who have started their jobs between 1992 and 2005, whether or not they completed their tenures. The estimated coefficients on *Outsider* are significantly positive (at 1% level) in both the logarithm of pay difference specification and the deflated pay difference specification, consistent with our H1. The estimated coefficients on *Top-five* are not incrementally significant (H1a). Other results are similar to those presented in Panel A.

4.2. Robustness checks

First, we consider a sample where CEOs have no option holdings at the beginning of their tenures. We do this to alleviate concerns that our analysis is biased due to beginning option holdings, despite our adjustment. Table 4, Panel A presents descriptive statistics for this sample versus those CEOs with beginning option holdings. We see that about half of the CEOs with no beginning option holdings are outsiders. In other respects, the samples are similar. The realized value of option pay is about 64% of the estimated value of option pay for the restricted sample (compared to about 70% for the full sample reported above). Panel B provides results of estimating the empirical model for the restricted sample. Results of this estimation with regard to H1 and H1a are similar to those presented for the full-tenure sample in Panel A of Table 3.

The results reported in Tables 3 and 4 reflect the adjusted values of option exercise described earlier (realized option pay is reduced by the intrinsic value of options held at the beginning of the CEO's tenure and is increased by the intrinsic value of options held at the end of the CEO's tenure). When we run the analyses with unadjusted realized pay, the results are qualitatively similar.

Second, we consider one-time cash payments to incoming and outgoing CEOs. The signing bonuses and severance payments may compensate CEOs for their 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).[14] We use *Other Pay*, which is readily available in the *ExecuComp* database, as our measure for signing bonuses and severance payments. The *Other Pay* includes—besides signing bonuses and

[14] As a notable case, Gary Wendt of General Electric received a $45 million signing bonus while transferring as the CEO of Conseco. 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 payments—the value of perquisites, relocation expenses, insurance premiums, and 401K contributions. Therefore, *Other Pay* represents an upper bound on the value of signing bonus and 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. The sum of *Other Pay* in both years can only explain a portion (39%) of the unrealized pay difference aggregated over the CEO tenure of $3,800,000. Both t-tests and Wilcoxon tests (untabulated) show that the aggregate pay difference 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, but the difference is not sufficiently large to compensate for the greater estimation errors of option values. We also test whether *Other Pay* in the last year of CEO tenure increases significantly with the aggregate pay difference but find that it does not.

Third, we consider differences in systematic and unsystematic performance. A criticism of CEO compensation is that CEOs extract rents without individual effort or talent, but simply by being lucky or riding favorable trends in the industry and the economy in general (Bertrand and Mullainathan 2001). We follow prior literature (Garvey and Milbourn 2006), and divide CEO performance into average industry returns (which can be attributed to luck) and industry-adjusted returns (which can be attributed to CEO's effort or talent). Untabulated tests show that both average industry-specific and industry-adjusted returns correlate with *Pay Difference*. We conclude that the performance contingency of option compensation applies to both performance drivers of the CEO, the luck and personal effort.

4.3. Estimation error of option values and shareholder activism

An implication of estimation error of option values is that shareholder activists may rely on misleading information for the purpose of monitoring and protesting "excessive pay". To evaluate this argument, we investigate whether the incidence of shareholder activism with regard to CEO compensation is related to the difference between reported and realized pay (estimation error). Following Ertimur et al. (2010), we estimate the determinants of the targeting decision by shareholder proposals and vote no campaigns using a multivariate probit regression model.

$$\begin{aligned}Targeted = \alpha &+ \beta_1\, Pay\ Difference + \beta_2\, Realized\ Pay + \beta_3\, Log(Return) + \beta_4\, ROA \\ &+ \beta_5\, Log(Sales) + \beta_6\, \%\ Institutional\ Ownership + \beta_7\, \%\ Executive\ Ownership \\ &+ \beta_8\, CEO\ Chairman + \beta_9\, Board\ Size + \beta_{10}\, \%\ Independent\ Directors \\ &+ \beta_{11}\, Independent\ Director\ Ownership{>}1\% + \beta_{12}\, Entrenchment\ Index \\ &+ \beta_{13}\, Tenure + Industry\ Fixed\ effects + \varepsilon \qquad (2)\end{aligned}$$

The dependent variable, *Targeted*, is an indicator for targeting decision by either a compensation-related shareholder proposal or vote no campaign during the CEO's tenure. Alternative specifications of the model are also estimated where the dependent variables are *Targeted by Shareholder Proposals* and *Targeted by Vote No Campaigns* respectively. The Appendix provides definitions of the shareholder activism variables.

Table 5 presents the results of estimating Eq. (2). The results in the first column (*Targeted*) indicate that compensation-related activism is directed at firms with higher levels of both *Pay Difference* and *Realized Pay*. In terms of economic significance, the predicted probability of being targeted during the CEO's tenure increases from 1.86% to 1.94% when *Pay Difference* increases by $1 million around its mean of $0.9 million (from $0.4 million to $1.4 million) while keeping the other variables at their mean. In comparison, the predicted probability of being targeted during the CEO's tenure increases from 1.88% to 1.95% when average realized pay increases by $1 million around the realized pay mean of $5.0 million (from $4.5 million to $5.5 million). The increases in probabilities are economically similar. Furthermore, the coefficient estimates on *Pay Difference* and *Realized Pay* are not significantly different from each other, supporting the argument underlying H2 that shareholder activists do not recognize the estimation error when making targeting decisions. Results for the alternative specifications for shareholder proposals and vote no campaigns are similar. As for the control variables, consistent with prior studies, we find that larger firms are more likely to be targeted by compensation-related activism. In addition, the likelihood of being targeted is higher for CEOs who stay longer.

5. Conclusion

To the best of our knowledge, ours is the first large-scale study that compares estimated and realized option pay over the tenures of individual CEOs. Shareholders should be aware that the cash costs of option grants are considerably less than those estimated by their companies, despite company adjustments to take into account differences between traded options and executive option grants. Two out of three CEOs do not fully realize the reported value of their option grants, and one out of three CEOs cannot exercise any of their option grants. We believe that our evidence highlights the multi-period nature of CEO pay contracts and calls for empirical tests of agency theory predictions that track full tenures of individual executives.

We find that estimation error of option values is higher for outsider CEOs than insider CEOs and for CEOs with top-five executive experience at larger companies than other CEOs. This indicates differences in the market for outsider CEOs, where contracts are designed to entice and motivate CEOs with higher general talent yet with greater uncertainty about potential success (Hermalin 2005, Malmendier and Tate 2009). We see somewhat richer severance payments for outsider CEOs, but not at a level to compensate for the estimation errors. Overall, outsider CEOs' proceeds from option exercises and, in turn, their total cash compensation is not statistically different from those of insider CEOs. This finding is in contrast to prior literature that documents significantly higher reported option and total pay of outsider CEOs. We argue that the seemingly higher compensation of outsider CEOs may influence boards to make sub-optimal CEO selection and compensation decisions.

We also find statistically similar correlations for the incidence of shareholder activism with realized pay and for the incidence of shareholder activism with the estimation error. These results suggest that shareholder activists do not meaningfully differentiate between the actual costs of option pay and the estimation errors, leading them to target companies whose CEOs receive less abnormal pay than is indicated by the estimated grant values.

Collectively, the substantial estimation errors of option value estimates that are persistent across time and industries have implications for the ongoing debate about the excessiveness of CEO pay levels and sensitivity of CEO pay to performance (Bebchuk and Grinstein 2005, Gabaix and Landier 2008). The objective of our paper is not to argue that CEO pay contracts are inexpensive for shareholders. Both nominal and realized pay in S&P 1500 companies amount to millions of dollars per year, arguably high levels when compared to benchmarks such as non-CEO executive pay and CEO pay in other countries. Rather, our evidence partially dispels concerns about the excessive rent extraction arguments (Bebchuk et al. 2002). The payouts to CEOs over their tenures (and correspondingly the costs to shareholders) are not as excessive, as insensitive to performance, or as high for outsiders as the nominal pay levels suggest. We believe these findings will be of interest to company boards, shareholder activists, and regulators. Policies for improving corporate governance need to consider that cash realization of CEO option pay significantly differs from the reported values.

Appendix

Variable Definitions and Measurement

This Appendix defines financial, contracting, and executive compensation variables used in the study. [*Source*] refers to the data source, where (*data item*) is the data variable name from the referred data source. Firm-specific subscripts are omitted for ease of exposition.

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

ROA: Annual 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.

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.

MCap: Market capitalization defined as the fiscal year closing price (*prcc_f*) multiplied by number of common shares outstanding (*csho*) [*Compustat*]. MCap is adjusted for inflation using CPI-U index to reflect 2009 year-end values in million $'s.

Sales: Annual 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*].

Book-to-market: 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*].

Contracting variables

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 named 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*].

Top-five: Indicator variable that is one if the incoming CEO previously worked for another S&P 1500 firm larger, in inflation-adjusted total assets, than the incumbent company, and zero otherwise [*ExecuComp*].

CEO compensation variables

All CEO compensation variables are obtained from the *ExecuComp* database. Due to changes in the reporting of some pay components in the database in 2006, some variables used in the paper have two *ExecuComp* variable names (reported in parentheses). All compensation variables are adjusted for CPI-U to reflect 2009 year-end values in thousand $'s. All compensation 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 partially assumes the CEO position.

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

Bonus (*Bonus* in both 1992 and 2006 formats): The value of bonuses earned by 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 out 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 observations) 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 observations) to zero. This definition is distinct from stock_awards in the 2006 format, which reports the cost that is charged to the company (and thus to shareholders) based upon the value of shares that vested during the year according to FAS 123R.

Option Pay (*Option_awards_rpt_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 the companies primarily 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 Exercise (*Opt_exer_val* in both 1992 and 2006 formats with the following adjustment): Annual value realized from option exercises. Option Exercise is defined as the number of exercised options multiplied by the difference between the exercise price and the market price of the stock on the exercise date. We exclude the effect of the beginning-of-tenure and end-of-tenure option holdings in an effort to compare only options granted and exercised throughout the CEO's tenure. For this reason, we add the value of end-of-tenure vested option holdings divided by tenure (assuming that the option 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 observations) to zero.

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

Realized Pay: Annual payout of the CEO, adjusted for the beginning- and end-of-tenure option holdings. Realized Pay is the sum of Salary, Bonus, Other Pay, LTIP, Stock Pay, and Option Exercise.

Pay Difference: The annual difference between Nominal Pay and Realized Pay. Alternatively, it is the difference between Option Pay and Option Exercise.

Aggregate Pay Difference: Pay difference aggregated over the individual CEO's tenure.

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.

Shareholder activism variables

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.

Targeted by Shareholder Proposals: Indicator variable that is equal to one if the firm is targeted by a compensation-related shareholder proposal during the CEO's tenure [*RiskMetrics*].

Targeted by Vote No Campaigns: Indicator variable that is equal to one if the firm is targeted by a compensation-related vote no campaign in director elections during the CEO's tenure. [*Factiva*, *LexisNexis*, *RiskMetrics*, *Georgeson*].

% of Executive Ownership: Average percentage of shares held by the top five executives during the CEO's tenure [*ExecuComp*].

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

CEO Chairman: Average of annual indicator variables that are equal to one if the CEO of the company is also the chair of the board of directors annually during the CEO's tenure [*IRRC*].

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

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

Independent Director Ownership>1%: An indicator variable that is equal to 1 if average percentage of shares held by independent directors exceeds 1% [*IRRC*].

Entrenchment Index: The average number of the following provisions that are in place at the firm during the CEO's tenure: chartered board, poison pill, golden parachute, requirement to approve merger, limited ability to amend charter and limits to amend bylaws (Bebchuk, Cohen, and Ferrell, 2009) [*IRRC*].

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Table 1
Sample

Panel A: Average annual compensation for CEOs with full tenures (N=1,804)

(Thousand $'s)	Mean	Std. Dev.	Q1	Q2	Q3
Salary	703	371	451	654	913
Bonus	693	1,122	148	364	818
Other Pay	460	1,280	25	107	352
LTIP	275	764	0	0	206
Stock Pay	744	1,874	0	50	689
Option Pay	3,014	5,663	430	1,337	3,267
Option Exercise	2,110	5,902	0	202	1,689
Nominal Pay	5,890	7,871	1,627	3,277	6,900
Realized Pay	4,986	7,869	1,107	2,446	5,801
Pay Difference	904	6,573	-44	410	1,676
Aggregate Pay Difference	3,800	40,159	-211	1,715	7,786
Tenure	5.1	3.0	3.0	4.0	7.0

Panel B: Average annual compensation for CEOs with full and partial tenures (N=2,249)

(Thousand $'s)	Mean	Std. Dev.	Q1	Q2	Q3
Salary	728	372	471	682	936
Bonus	667	1,057	154	372	770
Other Pay	413	1,164	28	105	316
LTIP	379	831	0	0	419
Stock Pay	911	1,946	0	180	1,012
Option Pay	2,858	5,385	439	1,314	3,139
Option Exercise	2,067	5,507	0	273	1,846
Nominal Pay	5,958	7,588	1,759	3,504	7,164
Realized Pay	5,167	7,491	1,197	2,747	6,217
Pay Difference	791	6,140	-102	359	1,594
Aggregate Pay Difference	3,789	41,558	-521	1,669	7,946
Tenure	5.8	3.4	3.0	5.0	8.0

Table 1—*Continued*

Panel C: Financial variables over the CEO tenure (N=1,804)

	Mean	Std. Dev.	Q1	Q2	Q3
Return	8.6%	31.6%	-5.2%	9.3%	21.5%
Log(Return)	3.5%	33.9%	-5.4%	8.9%	19.5%
ROA	0.9%	13.1%	-0.5%	2.8%	6.5%
Firm Age	16.5	6.3	11.5	17.5	21.5
Mcap	8,211	22,655	569	1,611	5,983
Log(MCap)	7.5	1.8	6.3	7.4	8.7
Sales	6,422	16,663	625	1,706	5,202
Log(Sales)	7.5	1.7	6.4	7.4	8.6
Log(Risk)	0.11	0.12	0.08	0.11	0.16
Book-to-market	70.9%	25.2%	53.2%	72.4%	89.2%
Leverage	25.1%	18.8%	10.9%	23.4%	35.2%

***Notes*:** This table provides summary statistics on the CEO compensation and financial variables in our sample. Panel A presents summary statistics for average annual CEO compensation over the tenures of individual CEOs. The sample includes all CEOs with full tenures (i.e., those who started between 1992 and 2005 and left by the end of 2009). Panel B presents similar information to Panel A for the expanded sample that includes CEOs with full tenures and CEOs with partial tenures (i.e., those who started between 1992 and 2005 and did not leave by the end of 2009). Panel C presents summary statistics for the financial variables averaged over tenures of CEOs who left by the end of 2009. All compensation and financial variables are adjusted for inflation (CPI-U) to show 2009 $'s. Appendix provides variable definitions.

Table 2
Outsiders and estimation errors

Panel A: CEO compensation across the outsider partition

	Outsider=0 (N=1,307)		Outsider=1 (N=497)		p-value	
(Thousand $’s)	Mean	Median	Mean	Median	t-test	Wilcoxon
Option Pay	2,666	1,198	3,928	1,805	0.00	0.00
Option	2,086	245	2,172	93	0.78	0.08
Nominal Pay	5,523	3,103	6,855	3,801	0.00	0.00
Realized Pay	4,943	2,456	5,099	2,395	0.71	0.56
Pay Difference	580	311	1,756	782	0.09	0.00
Return	9.3%	9.6%	6.8%	7.6%	0.13	0.05
Tenure	5.2	5	4.6	4	0.00	0.00

Panel B: CEO compensation across the top-five executive partition

	Top-five=0 (N=1,568)		Top-five=1 (N=236)		p-value	
(Thousand $’s)	Mean	Median	Mean	Median	t-test	Wilcoxon
Option Pay	2,826	1,269	4,259	1,935	0.00	0.00
Option	2,133	224	1,958	94	0.67	0.31
Nominal Pay	5,698	3,196	7,166	4,294	0.01	0.17
Realized Pay	5,004	2,449	4,864	2,402	0.80	0.96
Pay Difference	694	358	2,302	868	0.01	0.00
Return	9.0%	9.4%	6.2%	8.2%	0.13	0.10
Tenure	5.2	5	4.3	4	0.00	0.00

Notes: The table presents summary CEO compensation statistics of the sample divided across the following two contracting indicators: (1) Outsider: 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 named as CEO, and zero otherwise, and (2) Top-five: an indicator variable that is one if the incoming CEO had previously worked as one of the top five executives for another S&P 1500 company larger than the incumbent company (in 2009 $’s), and zero otherwise. Panels A and B present average annual option pay, option exercises, total nominal pay, total realized pay, pay difference, and annual stock returns over the CEO tenure as well as the average number of years the CEO stays in the position. The last two columns present p-values for the t-test and Wilcoxon test on the differences across the partitions. The pay levels are in 2009 thousand $’s. Appendix provides the variable definitions.

Table 3
Nominal and realized CEO compensation

Panel A: CEOs with full tenure

	Dependent variable					
	(1)	(2)	(3)	(4)	(5)	(6)
	Log (Option Pay)	Log (Option Exercise)	Log (Nominal Pay)	Log (Realized Pay)	Log (Pay Difference)	Pay Difference / Nominal Pay
Outsider	0.710***	0.081	0.320***	0.210***	1.221***	0.082***
	(6.14)	(0.49)	(6.99)	(4.35)	(3.73)	(2.91)
Top-five	0.026	-0.028	0.102	-0.058	0.527	0.072**
	(0.16)	(-0.13)	(1.48)	(-0.78)	(1.22)	(1.97)
Log(Return)	0.471**	4.444***	0.156*	0.759***	-5.195***	-0.474***
	(2.16)	(11.75)	(1.65)	(6.10)	(-8.43)	(-7.34)
ROA	-1.293**	-0.307	-0.683**	-0.163	-2.307*	-0.284**
	(-2.13)	(-0.39)	(-2.50)	(-0.54)	(-1.72)	(-2.05)
Log(Sales)	0.586***	0.468***	0.477***	0.484***	0.076	-0.016*
	(14.75)	(7.78)	(28.28)	(26.86)	(0.66)	(-1.70)
Log(Risk)	1.026	-0.679	0.409	0.778	-4.548	-1.112***
	(0.65)	(-0.35)	(0.47)	(0.91)	(-1.30)	(-3.23)
Book-to-	-2.022***	-2.193***	-0.819***	-0.773***	1.180*	0.153***
	(-7.51)	(-5.57)	(-5.79)	(-4.71)	(1.79)	(2.55)
Leverage	-0.779*	-0.745*	-0.351*	-0.142	1.295	0.047
	(-1.94)	(-1.70)	(-1.76)	(-0.68)	(1.56)	(0.69)
Firm Age	-0.013	0.012	0.004	0.014***	-0.003	-0.004*
	(-1.30)	(0.93)	(1.12)	(3.41)	(-0.11)	(-1.95)
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes
N	1,804	1,804	1,804	1,804	1,804	1,804
Adj. R^2	24.6%	35.3%	51.1%	52.8%	15.3%	18.0%

Table 3—*Continued*

Panel B: CEOs with full and partial tenure

	Dependent variable					
	(1)	(2)	(3)	(4)	(5)	(6)
	Log (Option Pay)	Log (Option Exercise)	Log (Nominal Pay)	Log (Realized Pay)	Log (Pay Difference)	Pay Difference / Nominal Pay
Outsider	0.699***	0.076	0.318***	0.206***	1.351***	0.081***
	(6.83)	(0.51)	(8.12)	(4.94)	(4.54)	(3.36)
Top-five	-0.004	-0.022	0.110**	0.001	0.144	0.043
	(-0.03)	(-0.12)	(1.96)	(0.02)	(0.37)	(1.37)
Log(Return)	0.457**	4.474***	0.194**	0.806***	-5.271***	-0.481***
	(2.19)	(12.12)	(2.19)	(6.80)	(-8.80)	(-7.96)
ROA	-1.309***	0.296	-0.708***	-0.093	-3.392**	-0.352***
	(-2.37)	(0.39)	(-2.84)	(-0.34)	(-2.64)	(-2.76)
Log(Sales)	0.596***	0.443***	0.474***	0.477***	0.149	-0.013
	(16.72)	(8.36)	(32.90)	(30.91)	(1.44)	(-1.61)
Log(Risk)	1.451	-1.664	0.354	0.540	-2.952	-0.955***
	(1.02)	(-0.92)	(0.46)	(0.72)	(-0.92)	(-3.13)
Book-to-market	-2.070***	-2.634***	-0.805***	-0.758***	2.070***	0.156***
	(-8.79)	(-7.36)	(-6.60)	(-5.38)	(3.43)	(3.00)
Leverage	-0.729**	-0.573	-0.292*	-0.091	1.102	0.022
	(-2.02)	(-1.42)	(-1.68)	(-0.50)	(1.42)	(0.36)
Firm Age	-0.012	0.007	0.005	0.013***	0.001	-0.002
	(-1.44)	(0.65)	(1.63)	(3.94)	(0.05)	(-1.22)
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes
N	2,249	2,249	2,249	2,249	2,249	2,246
Adj. R^2	25.2%	34.5%	52.9%	53.9%	15.5%	17.7%

***Notes*:** Panels A and B present results of six models regressing CEO compensation variables on the contracting and financial variables for the sample of CEOs with full tenure (i.e., those who started between 1992 and 2005 and left by the end of 2009) and the sample of CEOs with full tenure and partial tenure (i.e., those who started between 1992 and 2005 and did not leave 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 (Pay Difference) is defined differently in a stepwise approach. Log (Pay Difference) is: Log (Pay Difference+1) if Pay Difference>=0, and (-1)*Log (-1*(Pay Difference-1)) if Pay Difference<0. Fama-French 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. Appendix provides variable definitions.

Table 4
Compensation of CEOs without beginning option holdings

Panel A: CEO Compensation with or without beginning option holdings

	Zero Beginning Option Holdings (N=993)		Positive Beginning Option Holdings (N=811)		p-value	
	Mean	Median	Mean	Median	t-test	Wilcoxon
Outsider	49.5%	0.0%	0.6%	0.0%	0.00	0.00
Top-five	20.6%	0.0%	3.8%	0.0%	0.00	0.00
Option Pay	2,847	1,152	3,217	1,579	0.17	0.00
Option Exercise	1,810	103	2,476	402	0.02	0.00
Nominal Pay	5,375	2,870	6,520	3,903	0.00	0.00
Realized Pay	4,338	2,017	5,780	3,147	0.00	0.00
Pay Difference	1,037	371	741	477	0.34	0.80

Panel B: Regressions for the sample without beginning option holdings

	Dependent variable					
	(1) Log (Option Pay)	(2) Log (Option Exercise)	(3) Log (Nominal Pay)	(4) Log (Realized Pay)	(5) Log (Pay Difference)	(6) Pay Difference / Nominal Pay
Outsider	1.164***	-0.062	0.485***	0.305***	2.072***	0.140***
	(7.48)	(-0.31)	(7.83)	(4.59)	(5.35)	(4.22)
Top-five	0.182	0.124	0.121	-0.085	0.549	0.087**
	(0.99)	(0.51)	(1.56)	(-0.98)	(1.14)	(2.14)
Log(Return)	0.555**	3.898***	0.168	0.747***	-4.501***	-0.424***
	(2.07)	(9.50)	(1.31)	(4.38)	(-6.60)	(-5.66)
ROA	-1.474**	-0.678	-0.825**	-0.432	-1.857	-0.143
	(-2.11)	(-0.71)	(-2.29)	(-1.08)	(-1.18)	(-0.88)
Log(Sales)	0.544***	0.543***	0.456***	0.493***	0.033	-0.030**
	(8.78)	(6.60)	(17.23)	(17.29)	(0.21)	(-2.23)
Log(Risk)	0.526	0.759	-0.181	0.571	-5.594	-1.221***
	(0.27)	(0.31)	(-0.15)	(0.47)	(-1.30)	(-2.88)
Book-to-market	-1.871***	-2.209***	-0.810***	-0.821***	0.787	0.134*
	(-5.05)	(-4.37)	(-3.98)	(-3.45)	(0.98)	(1.70)
Leverage	-0.691	-0.456	-0.564*	-0.208	0.363	-0.030
	(-1.32)	(-0.83)	(-1.89)	(-0.65)	(0.35)	(-0.34)
Firm Age	-0.018	0.020	0.003	0.014**	-0.002	-0.005*
	(-1.32)	(1.20)	(0.58)	(2.31)	(-0.05)	(-1.88)
Industry indicators	Yes	Yes	Yes	Yes	Yes	Yes
N	993	993	993	993	993	993
Adj. R^2	27.0%	34.5%	44.5%	46.3%	17.5%	20.7%

Table 4—*Continued*

***Notes*: **Panel A presents comparisons of contracting and CEO compensation variables between the CEOs who do not have beginning option holdings and those who have beginning option holdings. Both samples include only CEOs with full tenure (those who started between 1992 and 2005 and left by the end of 2009). The last two columns present p-values for the t-test and Wilcoxon test on the differences across the partitions. Panel B present results of six models regressing CEO compensation variables on the contracting and financial 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 (Pay Difference) is defined differently in a stepwise approach. Log (Pay Difference) is: Log (Pay Difference+1) if Pay Difference>=0, and (-1)*Log (-1*(Pay Difference-1)) if Pay Difference<0. Fama-French 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. Appendix provides variable definitions.

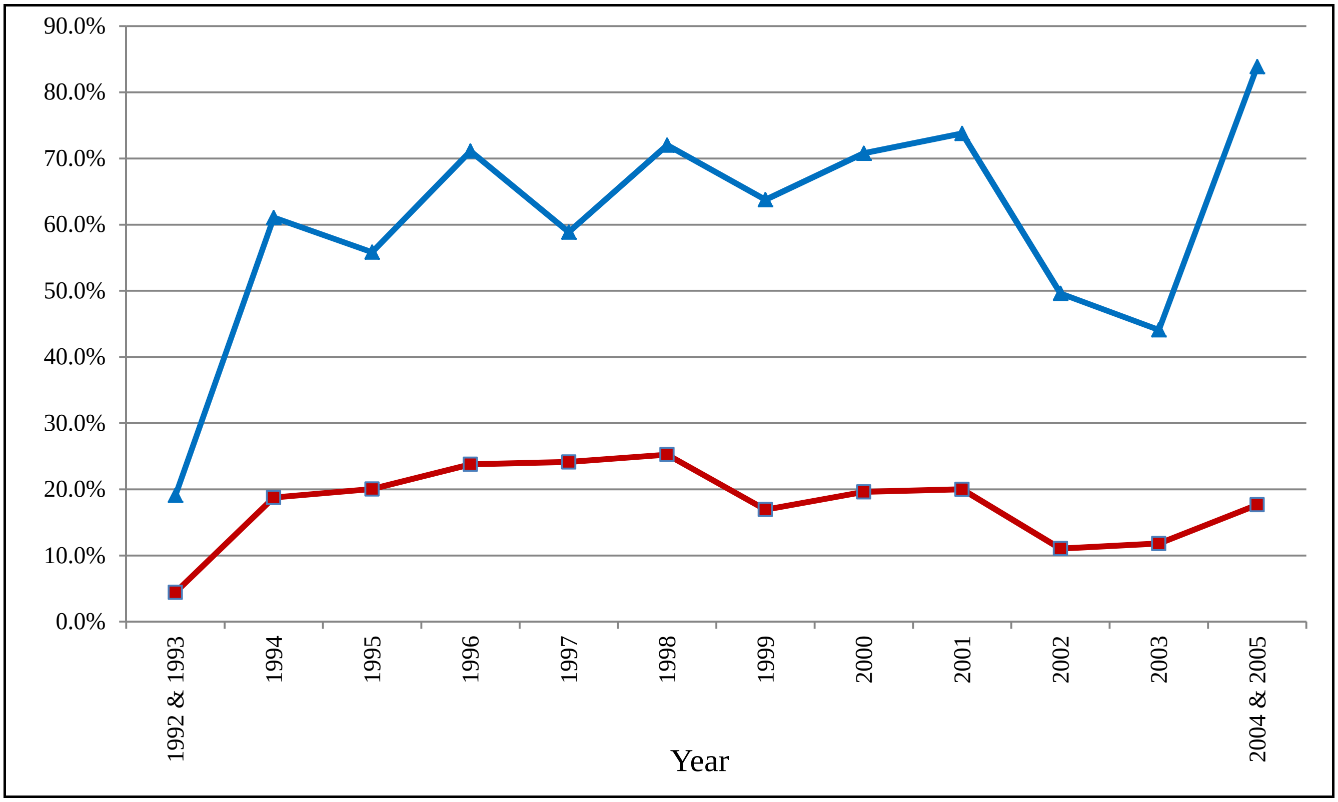
Table 5
Shareholder activism and estimation errors

	Dependent variable		
	(1) Targeted	(2) Targeted by Shareholder Proposals	(3) Targeted by Vote No Campaigns
Pay Difference (mn $)	0.015**	0.014**	0.026***
	(2.30)	(2.16)	(3.04)
Realized Pay (mn $)	0.019***	0.019***	0.032***
	(2.86)	(2.82)	(3.22)
Log(Return)	0.183	0.104	-0.250
	(0.93)	(0.56)	(-0.54)
ROA	-1.165	-1.137*	0.007
	(-1.93)	(-1.85)	(0.01)
Log(Sales)	0.530***	0.535***	0.549***
	(10.35)	(10.20)	(5.59)
% Institutional Ownership	-0.144	-0.228	2.436***
	(-0.53)	(-0.83)	(3.48)
% Executive Ownership	-0.103	-0.111	-0.242
	(-0.77)	(-0.67)	(-0.32)
CEO Chairman	0.027	0.047	-0.377
	(0.20)	(0.35)	(-1.23)
Board Size	-0.020	-0.013	-0.092
	(-0.74)	(-0.47)	(-1.46)
% Independent Directors	0.341	0.260	0.070
	(0.88)	(0.67)	(0.09)
Independent Director Ownership>1%	0.134	0.123	-0.016
	(0.91)	(0.82)	(-0.04)
Entrenchment Index	0.001	0.004	-0.133
	(0.02)	(0.08)	(-1.11)
Tenure	0.090***	0.087***	0.151***
	(5.70)	(5.55)	(4.03)
Industry indicators	Yes	Yes	Yes
Test of differences (z-values):			
Pay Difference-Realized Pay=0	0.62	0.64	0.76
N	1,804	1,804	1,804
Pseudo R^2	34.1%	34.7%	49.2%

Table 5—*Continued*

***Notes*:** The table presents the analysis of the characteristics of the targeted firms using a probit regression. In column (1), the dependent variable, Targeted, is an 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. In column (2), the dependent variable, Targeted by Shareholder Proposals, is an indicator variable that is equal to one if the firm is targeted by a compensation-related shareholder proposal during the CEO's tenure. In column (3), the dependent variable, Targeted by Vote No Campaigns, is an indicator variable that is equal to one if the firm is targeted by a compensation-related vote no campaign in director elections during the CEO's tenure. All compensation and financial variables are adjusted for inflation (CPI-U) to show 2009 $'s. Fama-French industry fixed effects are included in the regressions, but not reported for brevity. Huber-White-adjusted z-statistics are reported in parentheses below each coefficient estimate. ***, **, and * indicate 1%, 5%, and 10% significance, respectively. Appendix provides variable definitions.

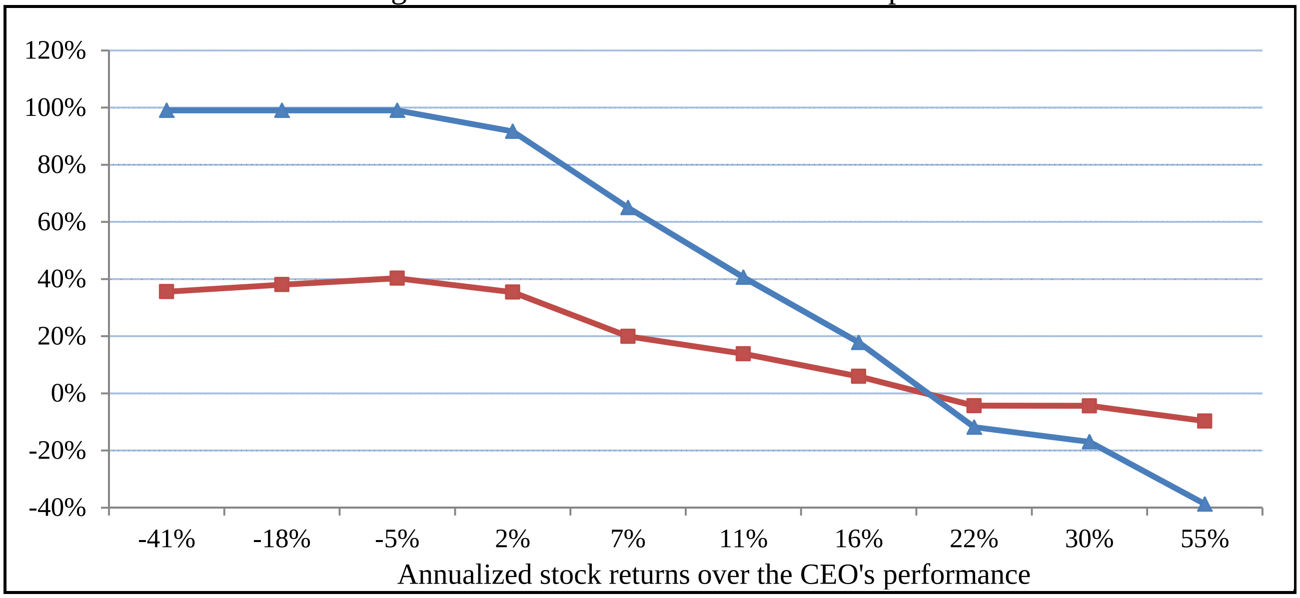
Figure 1
Percentage estimation errors across calendar years



Notes**:** The figure depicts median percentage estimation errors of option value (i.e., *Pay Difference*) for the sample divided into calendar years in which CEO tenure starts. The line with triangle marker shows median ratio of *Pay Difference* to *Option Pay*. The line with square marker shows median ratio of *Pay Difference* to *Total Pay*. The x-axis shows calendar years. The two years at the front (1992 and 1993) and back (2004 and 2005) ends of the sample are combined so that the number of observations per year exceeds 100 for each bin. The Appendix provides variable definitions.

Figure 2

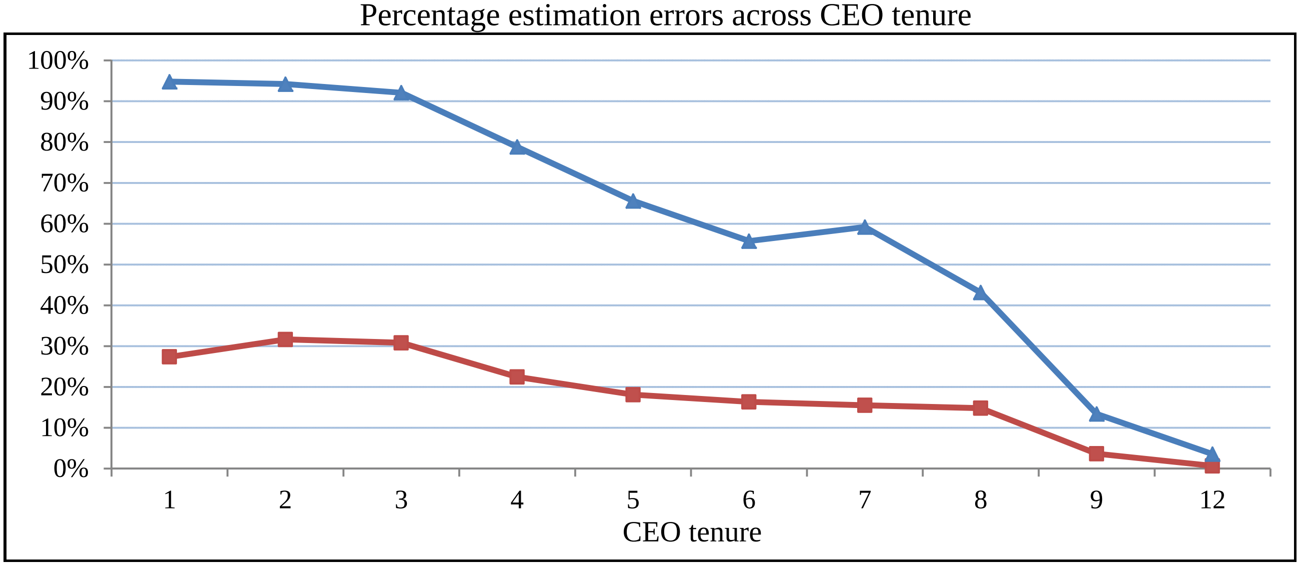
Percentage estimation errors across CEO stock performance deciles



***Notes*:** The figure depicts median percentage estimation errors (i.e., *Pay Difference*) for the sample divided into deciles of CEO performance over CEO tenure. The line with triangle marker shows median ratio of *Pay Difference* to *Option Pay*. The line with square marker shows median ratio of *Pay Difference* to *Total Pay*. The x-axis shows average annual stock returns over the CEO's tenure for each performance decile. Appendix provides variable definitions.

Figure 3

Percentage estimation errors across CEO tenure



***Notes*:** The figure depicts median percentage estimation errors for the sample divided into the length of CEO tenure. The line with triangle marker shows median ratio of *Pay Difference* to *Option Pay*. The line with square marker shows median ratio of *Pay Difference* to *Total Pay*. The x-axis shows the average number of years the CEOs hold the position. Appendix provides variable definitions.