

The Dark Side of Executive Compensation Duration: Evidence from Mergers and Acquisitions

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Abstract

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1. Introduction

Over the past decade, U.S. public firms face increasing vocal criticism that executives overly focus on short-term firm performance at the expense of long-term value creation for shareholders.¹ For example, in Feb. 2016, the chief executive officer of BlackRock, Larry Fink, sent a well-publicized open letter that urges corporate executives to resist “the powerful forces of short-termism” and to “invest in long-term growth”. One factor that has been blamed for excessive managerial short-termism is that executive compensation is not sufficiently tied to long-term firm value (e.g. Bebchuk and Fried, 2010). As a remedy, practitioners and researchers have advocated for extending executive pay horizon to improve managerial long-term investment decisions (e.g. Bebchuk and Fried, 2010; Bhagat and Romano, 2009; Pozen, 2014; Edmans and Gabaix, 2016; among others). This proposal, though intuitive, is not backed up by empirical evidence. Given the complexity of executive compensation contract, focusing on one dimension of compensation design may have limited impact, or even unintentional consequence, on managerial behavior. The literature thus far provides no direct evidence that executives with long horizon compensation would indeed make better long-term investments that create shareholder value.

Empirical research on executive pay horizon has been hindered by data availability on the duration of individual compensation component. More recently, several studies measure executive pay duration as the weighted average of equity grants’ vesting periods. Using different estimation methods, Chi, Gupta, and Johnson (2013) and Gopalan, Milbourn, Song, and Thakor (2014) find that CEOs with short compensation duration are more likely to engage in earnings management. Using the amount of soon-to-vest equity grants as a proxy for short compensation duration, Edmans, Fang, and Lewellen (2017) and Edmans, Fang, and Huang (2018) show that this measure is positively correlated with reduction in investment growth, share repurchases, and future M&A goodwill impairment. These studies support the idea that short pay duration is associated with certain types of managerial short-termism behavior. Nonetheless, the literature is unclear whether granting long duration pay to CEOs would improve long-term

¹ <http://www.businessinsider.com/blackrock-ceo-larry-fink-letter-to-sp-500-ceos-2016-2>.

investment decisions. This gap in literature is especially pronounced given that the strong advocacy for extending compensation duration is based on such premise. We intend to fill this gap in the literature.

In this paper, we investigate the relation between CEO compensation duration and subsequent merger and acquisition (M&A) decisions. We focus on M&A events for several reasons. First, M&A decisions are among the most significant long-term investment decisions that CEOs make and could either create or destruct significant shareholder value over the long run (Moeller, Schlingemann, and Stulz, 2004). Second, M&A deals can greatly increase firm complexity and information asymmetry between managers and shareholders. Thus, CEOs could use M&A as an opportunity to renegotiate compensation contract for higher pay at the expense of shareholders (Grinstein and Hribar, 2004; Harford and Li, 2007). Lastly, compared with internal investment decisions, such as R&D and capital expenditures, M&As have clear event dates and large value impacts that can be measured over multi-year period. For these reasons, we believe that M&A events provide a unique opportunity to examine the relation between CEO pay duration and the quality of long-term investments. If long compensation horizon indeed improves long-term managerial decisions, we expect to find a positive correlation between CEO pay horizon and subsequent M&A deal performance.

Using a sample of 1,305 U.S. public firms with detailed compensation data from 1998 to 2013, we construct a comprehensive measure of CEO compensation duration as the value weighted average of the duration of short-term and long-term components within her annual total compensation package. Unlike earlier duration measures that focus mainly on equity-based grants to CEOs (Chi, Gupta, and Johnson, 2013; Gopalan, Milbourn, Song and Thakor, 2014), we incorporate both equity- and non-equity-based pay in our estimation. Recent studies show that U.S. public firms increasingly rely on non-equity long-term performance pay to prolong executive horizons (Angelis and Grinstein, 2015; Li and Wang, 2016). Thus, incorporating non-equity pay duration allows us to estimate CEO compensation horizon more accurately. As an alternative measure, we also estimate the duration of a CEO's entire portfolio holdings. Our analysis focuses on the annual "compensation duration" measure as it reflects the board's latest intention in compensation design and will not be affected by the CEO's personal decision to unload vested equity grants. In addition, due to limited data on equity grants' vesting schedule before 2006, the estimation of CEO

portfolio duration requires additional assumptions that may lead to measurement errors (Gopalan, Milbourn, Song and Thakor, 2014). Nonetheless, we find similar results using both duration measures.

We identify 1,222 significant M&A events completed between January 1st, 1999, and December 31st, 2013.² Within our sample, the average deal size is 17% of the acquiring firm's market value, confirming the economic significance of these M&A decisions. We find that CEO compensation duration is positively associated with a firm's propensity to conduct large acquisition next year. The important question is, would CEOs with long-duration pay conduct better M&As that create long-term value?

We find that the stock market reacts more negatively towards M&As conducted by acquiring CEOs with long (above median) pay duration, with average acquirer's three-day announcement abnormal return of -1.34%, significantly lower than the -0.59% for acquirers with below median pay duration CEOs. After controlling for CEO overconfidence, various deal and firm characteristics, and industry and year fixed effects, the significant negative correlation between CEO pay duration and market reaction persists. In contrast, there is no significant difference in market's reaction towards target firms between acquiring CEOs with above or below median pay duration. In addition, we find no evidence that CEOs with long compensation duration pay higher acquisition premium than their counterparts with short pay duration. Thus, the differences in market's initial reaction towards acquirers are more likely to be driven by concern of deal quality.

It is possible that the market cannot fully understand long-term value impact of M&As when they are announced. CEOs with long compensation duration may be more willing to undertake unpopular acquisitions that will create shareholder value in the long run. Thus, the documented initial market reaction only reflects information asymmetry between managers and outside investors. To evaluate the quality of M&As, we examine post-M&A accounting and stock performance of the combined firm.

We find that firms with above median pre-M&A CEO pay duration experience significant deterioration in ROA over the three years after deal completion compared with characteristic-matched peer

² The deal value must be more than 1% of the acquirer's market value at the end of the fiscal year before M&A announcement and greater than \$ 1 million. In un-tabulated robustness tests, we further restrict the sample to M&As where the target's market value is more than 10% of that of the acquirers and find similar results.

firms. Meanwhile, acquisitions conducted by CEOs with short pay duration have comparable post-merger changes in ROA as that of matched peers. The finding contradicts the idea that CEOs with long pay duration would conduct better M&As that create long-term synergy. Next, we examine post-M&A abnormal stock performance by estimating the combined firms' buy and hold abnormal returns (BHAR) benchmarked against characteristic matched peers. We find that stocks of acquirers with above median CEO compensation duration significantly underperform after deal completion, with post-M&A three-year BHAR of -13.74%. In contrast, when acquiring CEOs have below median pay duration, the combined firms' post-M&A BHARs are indifferent from zero. The strong negative relation between pre-M&A CEO pay duration and post-M&A accounting and stock performances is robust after we control for CEO overconfidence, firm, CEO and deal characteristics, and year and industry fixed effects.

Our results are robust if we use CEO's portfolio duration as an alternative measure of executive pay horizon. In addition, as the M&A announcements and post-merger performances are only observed within firms that conduct M&As, we re-estimate a two-stage Heckman models (Heckman, 1979) to address potential self-selection bias and find similar results.

We further undertake tests to ease potential endogeneity concern. We first employ a 2SLS/IV model to address the concern that hidden factors or omitted variables might influence both executive compensation design and the M&A decisions. We use median CEO pay duration from firms within the same Metropolitan Statistical Areas (MSA) as instrument. The literature has shown that firms clustered around the same metropolitan area tend to share similar CEO compensation design (Francis, Hasan, John and Waisman, 2016). Under the 2SLS/IV model, we confirm a negative and significant relation between CEO pay duration and future M&A performance. Next, we employ propensity score matching (PSM) method to further address the concern that the initial regression models may not be able to control for non-linear differences between the long and short CEO compensation duration groups. We find that all results remain unchanged using a PSM matched sample.

Taken together, we find robust evidence that CEO pay duration is associated with inferior future M&A performance. Though we do not interpret the evidence as proof that long compensation duration

causes CEOs to pursue low quality M&As, our findings directly contradict the popular belief that CEOs with long duration pay would make better long-term investment decisions than those with short duration pay. Given the complex nature of compensation contract, a question arises is whether other underlying factors play a role in influencing the negative relation between compensation duration and M&A performance.

We first examine if corporate governance affects the relation between pay duration and M&A quality. We confirm that CEO pay duration is negatively correlated with future M&A performance after controlling for various governance characteristics (e.g., CEO tenure, duality, co-opted board). In addition, the interaction terms with governance characteristics show that corporate governance does not change the effect of pay duration on subsequent M&A quality.

We further examine whether the underlying form of executive pay contributes to the relation between compensation duration and M&A performance. Executive pay duration is derived from both time-vesting and performance-vesting long-term incentive plans. Earlier literature has questioned that time-vesting plans do not provide sufficient incentives as payment is only contingent on the passage of time (e.g., Murphy, 1999; Bebchuk and Fried 2004; Jensen, Murphy and Wruck, 2004; and Kay and Putten, 2007). As a result, we expect that CEOs with time-vesting long-term plans would care less about future value impact of M&As than CEOs with performance-vesting grants. To test this conjecture, we measure pay duration of time-vesting plans and performance-vesting plans separately. The use of performance-vesting contracts grows exponentially over our sample period and rivals that of time-vesting grants in 2013, as firms increasingly issue sophisticated incentive plans that tie executive pay to long-term performance (Bebchuk and Fried, 2010; Angelis and Grinstein, 2015; Li and Wang, 2016). Within our sample, time-vesting long-term plans have an average contract duration of 2.56 years, while performance-vesting grants have an average duration of 2.73 years.

We find that the documented negative relation between CEO pay duration and M&A quality is driven by time-vesting incentive plans alone. Only the duration of time-vesting pay is negatively correlated with future M&A performance. In contrast, duration of performance-vesting contracts is not related to

M&A announcement return and post-M&A performances. The results highlight the complexity of executive incentive design: extending CEO pay horizon without performance requirement could have negative impact on firm's long-term investment decisions.

This paper makes several contributions to the literature. To the best of our knowledge, this is one of the first papers that directly evaluates the relation between managerial pay horizon and the quality of managerial long-term investment decisions. There is a growing strand of literature that studies executive horizon incentives and subsequent corporate decisions, including earnings quality, disclosure of bad earnings forecasts, and executive retention (Chi, Gupta, and Johnson, 2013; Gopalan, Milbourn, Song, and Thakor, 2014; Cheng, Cho, and Kim, 2014; Gopalan, Huang, and Maharjan, 2016). Many researchers and practitioners propose to extend the duration of executive compensation contracts to facilitate long-term investment decisions. However, we find no evidence supporting this optimistic view.

Secondly, our paper is the first to provide evidence that compensation duration is related to underlying contract design and should not be treated uniformly. Earlier literature on compensation duration does not differentiate duration derived from different types of incentive contract. Our findings suggest that long duration executive pay with or without performance-contingency have different implication for long-term managerial decisions.

Lastly, the paper contributes to the strand of literature that studies the role of managerial incentives in M&A decisions. The literature has documented that certain types of compensation incentives, such as equity-based pay and CEO inside debt holdings, could affect M&A decisions and subsequent performances (Datta, Datta, and Raman 2001; Phan 2014). Our empirical evidence shows that extending CEO pay duration would not improve M&A decision and that time-based long duration compensation contract is negatively correlated with M&A quality.

2. Data and Variable Construction

We obtain the data to construct compensation duration mainly from the ISS Incentive Lab dataset. This dataset provides detailed information on equity- and non-equity-based grants to CEOs, including

award type, grant dates, the size of the plan, vesting schedule, and vesting period.³ Our duration estimation method largely follows that of Gopalan, Milbourn, Song, and Thakor (2014) (GMST (2014) afterwards) with adjustments. GMST (2014) estimate compensation duration using equity-based grants only. However, CEOs also receive non-equity-based long-term grants. For example, Li and Wang (2016) show that over one-third of the long-term accounting-based plans are cash-based during the 1996 to 2008 period. Thus, we incorporate duration from both equity-based and non-equity grants in our duration measure.⁴ We estimate a CEO's compensation duration as the value weighted average of the vesting period of each component in annual total compensation contracts:

$$\text{Compensation Duration} = \frac{(\text{Salary} + \text{Bonus}) \times 0 + \sum_{i=1}^{n_s} \text{Restricted Stock}_i \times t_i + \sum_{j=1}^{n_o} \text{Option}_j \times t_j + \sum_{k=1}^{n_c} \text{CashLong}_k \times t_k}{\text{Salary} + \text{Bonus} + \sum_{i=1}^{n_s} \text{Restricted Stock}_i + \sum_{j=1}^{n_o} \text{Option}_j + \sum_{k=1}^{n_c} \text{CashLong}_k} \quad (1)$$

In equation (1), salary and bonus are dollar values of annual salary and bonus reported in summary compensation tables. They are considered to have zero duration by the end of fiscal year. CEOs might receive multiple equity-based and non-equity grants within each year, with n_s , n_o , and n_k represent the total number of restricted stocks, options, and long-term cash-based plans granted in fiscal year t , respectively. Restricted stock $_i$ is the grant date fair value of the i^{th} stock grant with vesting period t_i (in years) by the end of the year. Option $_j$ is the Black-Scholes value of j^{th} option grant with vesting period t_j by the end of the year.⁵ Cashlong $_k$ is the grant date target value of cash-based long-term plans with corresponding vesting period t_k . We focus on a CEO's annual compensation package as our baseline measure, as it reflects the board's latest intention to influence CEO horizon and will not be affected by the CEO's personal decisions of unloading vested stocks and options. Panel A of Table 1 reports summary statistics of CEO pay and duration within our sample from 1998 to 2013.⁶ The average CEO compensation duration is 1.51 years with

³ ISS Incentive Lab database focuses on the largest 750 firms in terms of market capitalization each year. It covers around 2,000 US public companies in total from 1998 due to back-fill and forward-fill of data. The companies covered are from the S&P500 and a significant portion of the S&P400. Appendix B provides the distribution of CEO compensation duration in the ISS Incentive Lab dataset.

⁴ All our results hold using equity-based compensation duration measure as described in Gopalan, Milbourn, Song, and Thakor (2014).

⁵ We estimate the Black-Scholes value for each option grant following Coles, Daniel, and Naveen (2006) with grant dates, exercise prices, and maturity dates of option grants reported in ISS Incentive Lab.

⁶ All non-binary variables are winsorized at 1% and 99% values, and all dollar value are adjusted to constant 2006 dollars.

a median of 1.59 years. This is slightly longer than that reported in GMST (2014), possibly due to the inclusion of long-term non-equity grants.

[Insert Table 1 Here]

As a robustness check, we also estimate the duration of a CEO's existing portfolio holding as the weighted average of the vesting periods of all vested and unvested equity and non-equity grants.

Portfolio Duration =

$$\frac{\sum_{i=1}^{n_s} \text{Unvested Equity Holding}_i \times t_i + \sum_{k=1}^{n_c} \text{Unvested Nonequity Holding}_k \times t_k}{\sum_{i=1}^{n_o} \text{Unvested Equity Holding}_i + \sum_{j=1}^{n_o} \text{Vested Equity Holding}_j + \sum_{k=1}^{n_c} \text{Unvested Nonequity Holding}_k} \quad (2)$$

In equation (2), each component is value weighted by the CEO's overall portfolio holding.⁷ The vested equity holding_j is the value of all vested stocks and options that the CEO holds by the end of the fiscal year and is considered to have zero duration. Unvested equity holding_i includes the value of all unvested restricted stocks and options with vesting period t_i that the CEO holds by the end of the fiscal year.⁸ Unvested non-equity holding_k includes the value of all long term non-equity plans with vesting period t_k that the CEO holds by the end of the fiscal year. portfolio duration, has an average (median) of 0.68 (0.58) years.⁹

Next, we decompose compensation duration based on grant type. Option grant is the most widely used long-term compensation incentive for CEOs. They are granted in 71% of firm years, with an average (median) duration of 1.73 (2.00) year across all firm years. Within firm years that use option grant, the average duration is 2.46 years. The next most widely used incentive, restricted stock, is granted in 59% of firm years with an average duration of 2.75 years. Over the sample period, the use of option grant has declined by half from 1998 to 2013 (Figure 1), while restricted stock gradually replaces option grants and have become the biggest component of CEO pay duration since 2006. Long-term non-equity plans are

⁷ For grants with detailed vesting information, we follow GMST (2014) and calculate the vesting schedule of grants from prior years. For grants with missing vesting information, we follow Chi, Gupta and Johnson (2013) and estimate the approximate vesting schedule of grants from prior years. Vested nonequity grants are no longer part of a CEO's portfolio holding as they are paid out in cash (or equivalent) to CEOs once vested.

⁸ We estimate the Black-Scholes value for each option grant following Coles, Daniel, and Naveen (2006). Restricted stock value is estimated as number of shares multiply stock price per share at the end of fiscal year.

⁹ We assume that the vested equity component of CEO portfolio holding has zero duration. Thus, the weighted average of CEO portfolio holding duration is shorter compared with that of the compensation duration.

granted to CEOs in 11% of firm years on average, with the longest plan duration of 2.91 years on average. Thus, non-equity long-term plans constitute a significant component of CEO pay duration for firms that use them.

We then identify all M&As from the Security Data Company (SDC) US M&A database with an announcements date between January 1, 1999, and December 31, 2013 (8,058 deals).¹⁰ To focus on deals that have detectable performance and value impacts on acquirers, we require that the transaction value to be at least 1% of the acquirer's market capitalization and higher than \$1 million. The deal value is measured at the fiscal year end prior to the acquisition announcement date. Lastly, we require all M&As to be completed and that the acquirers have valid CEO compensation data from the ISS Incentive Lab, related CEO information from Execucomp, non-missing firm variables from the Compustat, and stock related information from the CRSP. Our final sample consists of 1,222 large M&A transactions with a median deal size of \$687.49 million, which accounts for 17% of the acquirer's market capitalization on average.

[Insert Table 2 Here]

Table 2 presents descriptive statistics of the 1,222 completed M&As from 1999 to 2013. The annual distribution of the sample, shown in Panel A, indicates that acquisitions are generally not clustered except for year 1999 and 2000 during the dot-com bubble. The overall sample includes 1,118 acquiring firms in the sample period, with each acquirer takes 1.09 M&A deals on average. Panel B of Table 2 reports deal characteristics. We split the M&A sample into two groups based on median CEO compensation duration. M&As conducted by firms with long CEO pay duration (above-median) are larger than those conducted by acquirers with short (below median) CEO pay duration (\$733.44 million vs. \$570.51 million). But the relative deal size as a percentage to acquirer is 7% (median) for both groups, as larger firms have longer CEO compensation duration than smaller firms. Further, there is no significant difference between acquirers with long and short CEO pay duration in terms of M&A payment method, hostile takeover, tender offers,

¹⁰ We start the corporate acquisition sample in 1999 as we require information on CEO compensation in the year prior to the acquisition announcement date.

or private target firms. Overall, the univariate comparison indicates that firms with long or short CEO pay duration engage in M&As of similar characteristics.

3. Empirical Methodology and Main Results

3.1 CEO Compensation Duration and Acquisition Propensity

We first investigate whether CEOs with longer compensation duration are more likely to conduct large acquisitions with the following probit regression setting:¹¹

$$\Pr(\text{Acquisition}_{i,t} = 1) = \Phi(\alpha + \beta_1 \times \text{CEO Pay Duration}_{i,t-1} + \mathbf{X}'_{i,t-1}\boldsymbol{\beta} + \varepsilon_{i,t-1}). \quad (3)$$

The dependent variable is a binary variable that takes value one if a firm announces an acquisition in year t . The independent variables, including CEO pay duration and control variables (X), are measured at the end of the fiscal year ($t-1$) prior to the acquisition announcement. Following the M&A literature (Datta et al., 2001; Malmendier and Tate, 2008; Phan, 2014), we include the following firm-level controls: logarithm of assets as a control for firm size, ROA and prior year stock returns to control for firm performance, Tobin's Q to control for growth opportunities, cash flow and sales volatility to control for firm risk, Herfindahl Index for industry concentration, and firm leverage and age. As the literature has shown that over-confident CEOs are more acquisitive (Malmendier and Tate, 2008), we further control for CEO overconfidence using an indicator variable that equals 1 if a CEO keeps option grants that are more than 100% in-the-money at the expiration year at least two times during her sample tenure. We also include year fixed effects and industry fixed effects based on the Fama-French 48 industry classifications.

[Insert Table 3 Here]

In Table 3, Column (1) reports the baseline regression results. The coefficient of CEO compensation duration is positive and significant at 5% level, indicating that CEOs with longer pay duration are more likely to conduct M&A within next year. Column (2) shows that the alternative duration measure, CEO's portfolio holding duration, is also significantly positive correlated with the likelihood of conducting large acquisitions. We report the marginal effects at the sample mean from the estimated probit model in

¹¹ In un-tabulated tables, we find similar results using the logit analysis.

Columns (3) and (4). If the CEO compensation duration extends by one year, the probability of conducting a large M&A next year increases by 0.5%, which represents a 6.2% increase from the sample acquisition probability of 8.12%. In terms of economic significance, 0.5% increase in M&A probability translates into 76 additional deals within our sample with aggregate deal value of 203 billion (based on average sample deal size of \$2,674.96 in million). As a robustness check, we rerun the likelihood regression to isolate the effect of multiple M&As by excluding acquisitions announced within one year after deal completion date of the same acquirer. The untabulated results confirm the positive and significant coefficients on CEO compensation duration and portfolio duration, respectively.

The coefficients on control variables in the probit model are largely consistent with prior M&A literature. Large firms and firms with strong past performance are more likely to conduct acquisitions next year. CEO overconfidence is also shown to have positive, though not always significant, correlation with future M&A events.

3.2 CEO Compensation Duration and M&A Announcement Abnormal Returns

If CEOs with long compensation duration are motivated to improve long-term shareholder value, we expect that they would undertake high quality M&As. We first test this hypothesis by studying stock market reaction to M&A announcements. Following Brown and Warner (1985), we calculate cumulative abnormal returns (CARs) around M&A announcement date benchmarked against Fama-French three-factor model.¹²

[Insert Table 4 Here]

Table 4 reports univariate comparison of three-day CARs around M&A announcement dates for 1,157 acquirers and 694 public targets. Within the whole sample, the acquirers have an average (median) three-day CAR of -0.97% (-0.72%), significant at 1% level. This is consistent with findings in earlier literature that large acquisitions are usually met with skepticism from the market. We next sort the acquirers into two groups based on CEO compensation duration before M&A announcement. The average (median)

¹² We use -255 through -46 trading days before M&A announcement date as estimation period. For each M&A event, we require that the acquiring firm has at least 30 non-missing trading days during the estimation periods.

CARs for acquirers with above-median CEO pay duration is -1.34% (-0.97%) and significant at 1%. In contrast, acquirers with below median CEO pay duration have significantly higher mean (median) CARs of -0.59% (-0.45%).

Various deal and firm characteristics could affect stock market's reaction to M&As. We further examine the relation between CEO compensation duration and the acquiring firm's announcement return using the following multivariate regression.

$$\text{Acquirer's CAR}_{i,t} = \alpha + \beta_1 \times \text{CEO Pay Duration} + \mathbf{X}'_{i,t-1}\boldsymbol{\beta} + \varepsilon_{i,t-1}. \quad (4)$$

The dependent variable is each acquirer's three-day CAR around M&A announcement date. Prior literature has identified various factors that affect market's reaction to M&A news (Datta et al., 2001; Moeller et al., 2004; Masulis, Wang, and Xie, 2007; Phan, 2014). Following the literature, we control for acquirer characteristics, including size, performance, and investment opportunities; we also control for deal characteristics, including relative deal size, whether acquirer and target firms are in the same industry, and indicators for all-cash deal, tender offer, hostile takeover, and target public status. Other control variables include CEO and pay characteristics: CEO overconfidence, age, stock ownership, and total compensations scaled by firm assets. All independent variables are measured at the end of the fiscal year prior to the acquisition announcement date. All regressions include year and industry fixed effects.

[Insert Table 5]

The first two columns in Panel A Table 5 shows that the coefficients on CEO compensation duration and portfolio duration are both negative (-0.565, -0.881) and significant. Conditional on constant control variables within the M&A sample, one standard deviation (0.87) increase in acquirer's CEO compensation duration is associated with 49 basis points reduction in the acquirer's three-day announcement CARs. The coefficients on control variables are largely consistent with findings in the earlier literature. Acquirers with public targets experience significantly lower announcement abnormal returns than acquirers with private targets (Chang, 1998). Acquirer size and relative deal size are negatively but insignificantly related to acquirers' announcement abnormal returns.

We only observe acquirers' announcement abnormal returns when firms conduct M&A deals. As a result, the regression model (4) is subject to potential self-selection bias. We use the Heckman (1976, 1979) two-stage selection model to address this concern. In the first stage, we use the same model as in Equation (3) to estimate a firm's propensity to conduct M&A in the following year.¹³ The exogenous variables used in the first stage regression are cash and sales volatility over the five years prior to M&A announcement year. Earlier literature has shown that there is strong run-up in firm volatility and risk up to four years prior to M&As, indicating that acquisitions are responses to industry shocks to reduce firm risk (Bharath and Wu, 2006). Table 3 confirms that cash and sale volatility are positively related to M&A propensity. In addition, both cash volatility and sale volatility are not correlated with M&A announcement returns, as cumulative abnormal return using daily stock return is less likely related to firm-level variables in short-term event study (Brown and Warner, 1985).¹⁴ Thus, we expect that these two exogenous variables meet the exogenous condition (Wooldridge, 2002).

The second stage model includes the same independent variables from equation (4) and the Inverse Mills Ratio estimated from the first stage of Heckman model. Columns (3) and (4) of Panel A Table 5 report the second stage results. The coefficients on acquirer CEO pay duration and portfolio duration remain negative (-0.738, -1.105) and significant at 5% level. In terms of economic significance, with a one standard deviation increase in acquirer CEO's compensation duration, the acquirer's three-day CARs around M&A announcement is expected to decrease by 49 basis point. In addition, the coefficients on Inverse Mills Ratio are insignificant, suggesting that the self-selection bias is not substantial in the original multi-regression model on acquirer abnormal announcement returns.

The lower market reaction towards acquirers with long CEO compensation duration may be driven by higher price premium paid for target firms. If so, we expect that the market would react more positively towards target firms when acquirer CEOs have long compensation duration. The bottom half of Table 4 reports three-day CARs around announcement day for public target firms. With long CEO pay duration

¹³ Columns (1) and (2) of Table 3 shows the Heckman first-stage results with compensation duration and portfolio duration, respectively.

¹⁴ In untabulated test, we find that adding cash volatility and sale volatility in the multi-regression of M&A announcement returns shows no significant correlation between the two variables and M&A announcement returns.

acquirers, target firms experience average (median) three-day CARs of 22.8% (20.04%). With short CEO pay duration acquirers, target firms have average (median) CARs of 25.46% (21.05%). The difference in CARs between the two groups is not statistically significant. The results do not support the idea that the market reacts more negatively towards long CEO duration acquirers due to greater wealth transfer from acquirer shareholders to target firms.

Further, we directly examine the relation between CEO compensation duration and merger premium paid for target firms in a multivariate regression setting.¹⁵ Following the literature (Moeller, et al., 2004, Officer, 2003), we control for acquirer and target firm size, investment opportunities and performance (i.e., ROA, pre-M&A year stock return); deal characteristics (i.e., deal size, payment method, diversifying merger, hostile takeover, tender offers, or private target firms); and acquirer CEO's pay level and overconfidence. The results are presented in Panel B, Table 5. Columns (1) and (2) show that the coefficients of CEO pay duration and portfolio duration are both insignificant, confirming that long CEO pay duration acquirers do not pay higher premium for target firms. We find confirming evidence using the two-stage Heckman selection model (Columns (3) and (4)). The coefficients on acquirer CEO pay duration and portfolio duration are all insignificant.

3.3 CEO Compensation Duration and Long-term Operating Performance

CEOs with long compensation duration may have strong incentives to undertake unpopular acquisitions that will create synergies in the long run. It is possible that at the time of the deal announcement, the market cannot fully understand the long-term value impact of these acquisitions. Therefore, the negative initial market reaction documented above only reflects information asymmetry between CEOs and outside investors. To further evaluate the quality of a CEO's acquisition decision, we examine the relation between acquirer CEO pay duration and post-M&A long-run operating performance of the combined firms.

Following the literature, We measure post-M&A long-run operating performance as abnormal change in industry-adjusted return on assets (ROA) from pre-M&A year t-1 to one-year (t+1), two-year

¹⁵ We define the premium as the value of the deal size divided by the market value of the target at least 40 days prior to and at most 50 days prior to the announcement day.

(t+2) and three-year (t+3) after M&A completion (Fu, Lin and Officer, 2013). We calculate ROA of the combined firm over a five year period (years -1 to +3) around the M&A completion year (year 0). In the pre-M&A year t-1, the combined firm's ROA is calculated as the weighted average of ROA of the acquirer and the target, weighted by the total book value of assets of the two firms at the beginning of the pre-M&A year.¹⁶ As both industry and firm characteristics affect long-run operating performance of M&A firms, we adjust the ROA of each combined firm with the industry median ROA using Fama-French 48 industry classification. In the pre-M&A year, the industry median ROA is the weighted average of the acquirer's and target's industry median ROA, weighted by the two firms' book value of assets (Healy, Palepu, and Ruback, 1992). We next match each acquirer with a non-M&A peer firm (Barber and Lyon, 1996). The matched firm must remain public within the five year window; have firm market value within the range of 90% to 110% of that of the combined firm; and have the closest ROA to that of the M&A firms in the pre-M&A year. We end up with 492 combined M&A firms with matched peers.¹⁷ We then calculate abnormal change in industry-adjusted ROA as the difference between change in industry-adjusted ROA of the combined firm from pre-M&A year to post-M&A year(s) and that of the characteristic-matched firms over the same time period.

[Insert Table 6 Here]

Table 6 shows that within acquirers with long CEO compensation duration, the combined firms' change in industry-adjusted ROA after deal completion is significantly negative, as merged companies significantly underperform their characteristic matched peers. The abnormal change in adjusted ROA ranges from -1.34% (significant at 5%) one year after M&A to -2.55% (significant at 1%) three years after M&A. In contrast, when acquirers have short pay duration CEOs, the combined firms' post-M&A change in industry-adjusted ROA is comparable with that of matched peers two to three years after M&A. The abnormal change in adjusted ROA is 0.05% two years after M&A and 0.02% three years after M&A. The last two columns show the difference in abnormal changes in combined firms' ROA between acquiring

¹⁶ As only public target firms disclose accounting information, the analysis is restricted to the subsample of M&As with public targets.

¹⁷ The number of observations drops to 466 (440) over the next two (three) years after M&A completion year.

CEOs with long and short compensation duration. The results indicate that with long compensation duration CEOs, the combined firms' are likely to experience significantly worse changes in long-run abnormal operating performance than acquirers with short pay duration CEOs.

We further examine the relation between compensation duration and post-M&A long-term operating performance using the following multivariate regression model.

$$\text{Change in ROA}_{i,t-1 \text{ to } t+3} = \alpha + \beta_1 \times \text{CEO Pay Duration}_{i,t-1} + \mathbf{X}'_{i,t-1} \boldsymbol{\beta} + \varepsilon_{i,t-1}. \quad (5)$$

The dependent variable is the changes in industry-adjusted ROA of the combined firms from one year before M&A announcement to three years after M&A completion. We control for M&A deal characteristics, acquirer characteristics, pre-M&A performance, and acquirer CEO overconfidence.

[Insert Table 7]

Table 7 reports the regression results. In Column (1), the coefficient on CEO compensation duration is negative (-1.193) and significant at 1% level, confirming that acquirer CEO pay duration is associated with significantly lower abnormal long-term operating performance after M&A completion. Column (3) presents the Heckman model with Inverse Mills Ratio to control for the self-selection concern and show similar results. Columns (2) and (4) show a consistent negative relation between acquirer CEO portfolio duration and the change of post-M&A long-run operating performance of the combined firm.

3.4 CEO Compensation Duration and Long-Term Stock Performance

CEOs with long compensation duration may focus on improving firms' long-run stock performance after M&A, as it is directly tied to shareholder wealth. In this section, we examine the relation between acquirer CEO pay duration and post-M&A long-run stock performance. Following the literature (Barber and Lyon, 1997), we calculate post-M&A buy-and-hold abnormal returns (BHARs) of acquiring firms. The BHAR is estimated as the difference between cumulative stock returns of the acquirers over one to three years after M&A completion and that of matched benchmark firms over the same period.

For each acquiring firm, we follow Barber and Lyon (1997) and select a matched benchmark firm that has not been involved in any M&A over the past 3 years, has market value within the range of 70%-

130% of the acquirer’s market value measured 11 days prior to M&A announcement date, and has the closest market to book value to that of the acquirer at the end of pre-M&A fiscal year. We end up with 1,206 acquirers with matched peers that have at least one year valid stock returns after deal completion. The number of observations drops to 1,173 and 1,130 acquirers two to three years after M&A completion respectively.

[Insert Table 8 Here]

Table 8 presents mean and median post-M&A BHARs of acquiring firms. Column (1) shows that acquirers with long CEO pay duration significantly underperform their matched peers after M&A, with 2- and 3-year BHAR significantly negative at -9.33% to -13.74% after deal completion. In contrast, the BHARs of acquirers with short CEO pay duration are indifferent from zero over 1- to 3-years after M&A, indicating that the combined firms do not underperform compared with their matched peers. Column (3) reports the difference in long-run BHARs between the two duration groups. After M&A deal completion, the BHAR of acquiring firms with long pay duration CEOs is 3.51% (8.16%) lower than that of acquirers with short pay duration CEOs over one-year (three-years) window.

Following Datta, Datta, and Ramen (2001), we further investigate the relation between acquirer CEO pay duration and post-M&A BHARs using a multivariate regression model:

$$BHAR_{i,t} = \alpha + \beta_1 \times CEO\ Pay\ Duration_{i,t-1} + \mathbf{X}'_{i,t-1}\boldsymbol{\beta} + \varepsilon_{i,t-1} \quad (6)$$

The dependent variables are acquirers’ long-term BHARs over 24- and 36-months after M&A announcement. The BHARs have been adjusted for firm size and q. Following earlier studies on post-M&A stock performance (Datta et al, 2001; Chen, Harford and Li, 2007; Phan, 2014), we further control for sales, performance, leverage, cash flow, stock volatility, firm age, and deal and CEO characteristic, measured at the end of the fiscal year prior to the deal announcement. We also include time and industry fixed effects.

[Insert Table 9]

Columns (1) and (5) of Table 9 show that acquirer CEO pay duration has a significantly negative relation with post-M&A abnormal stock returns. In terms of economic significance, a one standard

deviation increase in acquirer CEO compensation duration is correlated with a 4.78% (4.92%) decrease in post-M&A BHAR within a 24 (36) month window. We find similar results when using portfolio duration as an alternative measure of CEO pay horizon (Columns (2) and (6)). Under the Heckman selection model, we confirm the negative relation between CEO pay duration and subsequent BHARs. Overall, the evidence shows that acquirers with long duration pay CEOs experience significant deterioration in both operation and stock performance after M&A completion.

3.5 Addressing endogeneity concerns

The documented evidence above consistently shows a negative relation between acquirer CEO pay duration and future M&A performance. However, to confirm the validity of the results, it is important to adequately address potential endogeneity concerns. It is possible that omitted variables or hidden factors jointly determine the design of CEO compensation contracts and the quality of subsequent M&A deals. In this section, we undertake additional empirical analyses to address such concern.

3.5.1 2SLS/IV estimation

We use a 2SLS/IV model to address endogeneity concern related to unobserved time varying omitted variables. We choose median CEO compensation duration from local peer firms that are within the same MSA code as an instrument. Past literature has shown that a firm's executive compensation design is highly correlated with that of their local peers since compensation packages of local firms reflect opportunities from local labor market (Francis, Hasan, John and Waisman, 2016). Further, the MSA-based median CEO pay duration should not be directly related to a firm's specific future M&A performance. Thus, we expect this instrument to meet both the relevance and exclusion restrictions. Testing the relevance and strength of the instrumental variable, Kleibergen-Papp test rejects the null hypothesis that our instrumental variable is irrelevant with the endogenous variable, CEO pay duration. In addition, both first-stage F-statics and Anderson-Rubin Wald F-statistics are significant, and the Cragg-Donald Wald F-statistics are higher than the Stock-Yogo weak ID test critical values. Overall, test results reject the null hypothesis that our instrumental variable is weak.

[Insert Table 10 Here]

Table 10 presents the 2SLS/IV regression results on acquirers' M&A announcement return (i.e., three-day CAR), post-M&A operating performance (i.e., change in industry-adjusted ROA), and post-M&A stock performance (i.e., 24- and 36-month BHARs), respectively. To preserve space, we only present coefficients on the instrument variable, MSA peer firm median pay duration, in the first stage and coefficients on the predicted CEO pay duration in the second stage. The regression control variables are the same as those presented in Table 5, 7, and 9 respectively. The first stage results presented in Column (1), (3) and (5) shows that our MSA peer firm median pay duration is significantly and positively related to the CEO pay duration at firm level.¹⁸ The second stage results presented in Columns (2), (4) and (6) confirm that acquiring firms with long CEO pay duration experience significantly lower abnormal returns around M&A announcement dates, lower change in abnormal ROA after M&A completion, and lower post-M&A long-run abnormal stock returns.

3.5.2 Propensity score matching method

Another concern is that firms that grant CEOs long pay duration are inherently different from those use short duration compensation contract. The current control variables and regression model may fail to control for omitted variables related to nonlinear form of firm characteristics (Rosenbaum and Rubin, 1983; Dehejia and Wahba, 2002; Hirano, Imbens, and Ridder, 2003). To address this concern, we re-examine the main tests using a propensity score matched sample.

We define the treated firms as acquirers with above median CEO compensation duration in year t . We first use a probit model to estimate the propensity score of a firm with long CEO pay duration in year t . Following GMST (2014), we control for firm size, growth opportunities, R&D intensity, firm risk, and stock performance in year t .¹⁹ We also include year and industry fixed effects using the Fama-French 48 industry classification. We then match each treated firm to control firms with the closest propensity score without replacement. To ensure the quality of matching procedure, we exclude firms that do not have propensity score matches within a caliper of 1.5%. We end up with 394 acquirers with matched firms.

¹⁸ We report three 2SLS regressions with different first stage results since the dependent variables in the second stage are different for each 2SLS regression.

¹⁹ GMST (2014) show that CEO pay duration is longer in firms with larger size, more growth opportunities, more long-term assets, greater R&D intensity, lower firm risk, and better recent stock performance.

[Insert Table 11 Here]

To evaluate the robustness of the matching process, we compare firm characteristic of treated and matched control firms. Panel A of Table 11 shows that there is no significant difference in mean firm characteristics between the treated and the control group.

Panel B of Table 11 reports performance regression results using propensity score matched control firms. The regression specifications are the same as that used in Table 5, 7, and 9. We only report coefficients on CEO compensation duration to conserve space. The results confirm all our earlier findings.

Overall, addressing endogeneity concern does not change our main finding that CEO pay duration is associated with inferior M&A performance. We do not intend to interpret the evidence as proof that long compensation duration causes CEOs to make bad M&A decisions. Rather, the documented pattern does not support the idea that CEOs with long compensation duration would make better long-term investment decisions than CEOs with short duration pay.

4. What influences the relation between CEO pay duration and M&A quality?

Given the complex nature of executive incentive design, a question arises is whether other firm and contract attributes influence the negative relation between CEO compensation duration and M&A performance.

We first examine whether corporate governance affects the relation between pay duration and M&A quality. Earlier literature has shown that corporate governance plays an important role in influencing various aspects of M&A decisions (e.g., Hoechle, Schmid, Walter, and Yermack, 2012; Duchin and Schmid, 2013; among many others). CEOs of well-governed firms may pursue high quality M&As regardless of their pay duration. Following the literature, we use three measures that have been shown correlated with corporate governance: CEO tenure, CEO duality, and the percentage of board comprised of co-opted independent directors.²⁰ Table 12 reports regression results controlling for the three governance measures

²⁰ Earlier studies have shown the CEOs could gradually gain power over boards through tenure (Hermalin and Weisbach, 1998; Berger, Ofek, and Yermack, 1997; Harford and Li, 2007; among others). Researchers and activists have long argued that combining CEO and chairman responsibility would weaken board monitoring and corporate control (Fama and Jensen, 1983; Lorsch and MacIver, 1989; Goyal and Park, 2001; among others). Coles, Daniel and Naveen (2014) show that as the percentage of co-opted independent directors increases, board monitoring decreases.

and their interactions with CEO pay duration respectively. The other control variables in the performance regression specifications are the same as that used in Panel A Table 5, 7, and 9. We only report coefficients on CEO compensation duration, the governance measures and their interaction terms to conserve space.

The results confirm that acquirer CEO pay duration is negatively correlated with M&A announcement abnormal return, post-M&A abnormal change in ROA, and post-M&A long term abnormal stock performance after controlling for corporate governance. The coefficients on the interaction terms between CEO pay duration and governance characteristics are mostly insignificant, suggesting that corporate governance does not change the correlation between CEO pay duration on subsequent M&A quality. Overall, the results show that corporate governance cannot alleviate the negative relation between compensation duration and M&A performance.

Next, we examine whether the underlying vesting type of CEO incentive pay contributes to the relation between compensation duration and M&A performance. CEO annual compensation duration is derived from both time-vesting and performance-vesting long-term incentive plans granted that year. However, these two types of grants may provide different incentives to executives. Earlier literature has shown that time-vesting grants may provide insufficient incentives to CEOs, as the vesting of such grants is only contingent upon the passage of time (Bebchuk and Fried, 2004; Gerakos, Ittner, and Larcker, 2007). In contrast, performance-vesting plans directly tie executive pay to future performance and thus provide greater incentive for CEOs to improve performance measures specified in the plan (Johnson and Tian, 2000; Kuang, 2006; Li and Wang, 2016). As a result, we expect that CEOs with long-term time-vesting grants care less about future performance impact of M&As than CEOs with performance-vesting grants.

We decompose CEO compensation duration into two components: duration of time-vesting grants, and duration of performance-vesting grants. Figure 2 shows that after 2004, firms increasingly use performance-vesting grants to incentivize CEOs. By the end of our sample period in 2013, the percentage of firms use performance-vesting plans is on par with that of firms use time-vesting plans. The pattern is consistent with that documented in earlier literature (Bebchuk and Fried, 2010; Angelis and Grinstein, 2015; Li and Wang, 2016). On the individual grant level, the average length of performance-vesting plan is

slightly longer than that of time-vesting plan. As shown in Panel A of Table 1, within firms that use such incentive, the average duration of performance-vesting grant is 2.73 years, while time-vesting grant has an average duration of 2.56 years.

[Insert Table 13 Here]

Table 13 reports the effect of time-vesting and performance-vesting compensation duration on M&A performance. Each regression setting contains the same controls as in performance regressions in Panel A Table 5, 7 and 9. We only report coefficients on time-vesting and performance-vesting compensation duration to save space. The coefficients show that acquirer CEO's time-vesting pay duration has significant and negative correlation with acquirer's three-day announcement CAR, post-M&A change in abnormal ROA, and long-run abnormal stock performance. In contrast, duration from performance-vesting pay has a positive, but insignificant correlation with M&A announcement abnormal returns and the change of ROA. In addition, Column (3) shows that acquirers with long CEO performance-vesting duration do not experience worse long-run stock performance. The results show that the documented negative relation between compensation duration and M&A performance is mainly driven by long-term time-vesting incentive pay. Consistent with earlier literature (Bebchuk and Fried, 2004; Gerakos, Ittner, and Larcker, 2007), our findings suggest that time-vesting pay alone does not provide proper incentive for CEOs to focus on creating long-term firm value. Simply extending CEO pay duration without performance requirement would have negative impact on firm's long-term investment decisions.

5. Conclusion

Despite the recent public discussion in favor of lengthening compensation duration to curb executive short-termism and promote long-term shareholder value, there is no empirical evidence on whether long pay duration indeed induces better investment decisions in the long-term. In this paper, we fill this gap in the literature. Using a new comprehensive compensation duration measure derived from earlier literature, we find that CEOs with long pay duration are more likely to engage in large acquisitions. However, these acquisitions receive significantly worse stock market reaction and experience lower post-

M&A abnormal operating and stock performance compared with deals conducted by CEOs with short pay duration. Such a negative relation between compensation duration and M&A performance is unaffected by corporate governance and is robust under various test specifications.

We find that duration from different compensation plans is not created equal. The documented negative relation between compensation duration and M&A performance is mainly driven by long-term time-vesting contracts. These time-vesting grants do not provide sufficient financial incentives to executives as payment is only contingent on the passage of time. In contrast, duration from long-term performance-vesting plans is not associated with low quality M&As as they tie executive pay closer to future firm performance.

Overall, our study highlights that executive compensation duration is deeply intertwined with complicated contract design, which may introduce conflicting incentives on managerial investment behavior. Thus, focusing on extending compensation duration alone does not necessarily generate long-term firm value. This paper also suggests that the board needs to carefully review the compensation structure and incentive motivations when extending compensation duration.

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Table 1. Summary Statistics

Panel A of the table presents summary statistics of CEO compensation duration for all CEOs covered under Execucomp and ISS Incentive Lab from 1998 to 2013. Panel B presents summary statistics of firm and other CEO characteristics for all firm years covered under Execucomp and ISS Incentive Lab from 1998 to 2013. Detailed variable definitions are reported in Appendix A. All dollar values are converted to constant 2006 dollars. All non-binary variables are winsorized at 1% and 99%.

<i>Panel A. CEO Compensation</i>				
	Full Sample			
	Obs	Mean	Median	St.dev.
Total compensation (\$ thousand)	15,049	7,297.857	5,028.786	7,559.900
Salary (\$ thousand)	15,049	858.819	841.922	370.958
Bonus (\$ thousand)	15,049	719.677	85.121	1,341.542
Option (\$ thousand)	15,049	3,810.642	1,363.812	7,874.815
Restricted stock (\$ thousand)	15,049	2,150.260	620.825	4,160.405
Compensation duration (years)	15,049	1.511	1.585	0.874
Portfolio duration (years)	15,049	0.680	0.582	0.583
Option duration (years)	15,049	1.737	2.000	1.350
Stock duration (years)	15,049	1.529	1.500	1.551
Long-term non-equity duration (years)	15,049	0.301	0.000	0.913
Performance-vesting duration (years)	15,049	1.191	0.000	1.513
Time-vesting duration (years)	15,049	2.085	2.349	1.264
<i>Duration in firm-years with valid grants</i>				
Option duration (years)	10,609	2.463	2.500	0.892
Stock duration (years)	8,769	2.755	3.000	1.007
Long-term non-equity duration (years)	1,556	2.913	3.000	0.668
Performance duration (years)	6,578	2.726	3.000	1.028
Time duration (years)	12,254	2.561	2.500	0.862
<i>Panel B. Firm and CEO Characteristics</i>				
	Full Sample			
	Obs	Mean	Median	St.dev.
Total assets (\$ million)	15,049	19,224.447	4,459.807	51,502.314
Total sales (\$ million)	15,049	8,598.960	3,031.326	15,849.572
Leverage	15,049	0.229	0.221	0.165
Firm's Q	15,049	1.967	1.495	1.351
Long term assets	15,049	0.414	0.423	0.247
R&D expense	15,049	0.025	0.000	0.047
Cash flow	15,049	0.090	0.081	0.120
ROA	15,049	0.152	0.138	0.108
ROE	15,049	0.105	0.117	0.247
Prior year return	15,049	0.183	0.109	0.695
Sale growth	15,049	0.106	0.075	0.234
Cash volatility	15,049	0.112	0.063	0.192
Sale volatility	15,049	0.218	0.134	0.298
Firm age	15,049	29.308	25.000	17.730
Herfindahl index	15,049	0.224	0.167	0.189
Stock spread (%)	14,578	0.153	0.101	0.183
CEO overconfidence	15,049	0.269	0.000	0.443
CEO share holdings (%)	14,702	1.632	0.211	4.386
CEO age (years)	14,624	55.675	56.000	7.017
CEO tenure	13,298	7.332	5.666	6.589
CEO duality	13,298	0.628	1.000	0.483
Co-opted board	11,848	0.454	0.417	0.308

Table 2. Distribution and Descriptive Statistics of M&A Deals, 1999-2013

Panel A of the Table presents the annual distribution of 1,222 completed acquisitions announced during 1999 to 2013. We restrict the sample to M&A deals with transaction value at least 1% of the acquirer's size and with valid accounting, stock, and CEO compensation information. Panel B presents summary statistics of M&A deals. Detailed variable definitions are reported in Appendix A. All dollar values are converted to constant 2006 dollars. All non-binary variables are winsorized at 1% and 99%. *, ** and *** indicate the significant level at 10%, 5%, or 1% levels, respectively.

<i>Panel A: Distribution of M&A Deals by Year</i>				
Announcement Year	Number of Acquisitions	Number of Firms	% of Acquisition Sample	% of Firm Sample
1999	149	125	12.19%	11.18%
2000	160	131	13.09%	11.72%
2001	99	92	8.10%	8.23%
2002	63	59	5.16%	5.28%
2003	84	79	6.87%	7.07%
2004	94	84	7.69%	7.51%
2005	91	86	7.45%	7.69%
2006	73	68	5.97%	6.08%
2007	85	82	6.96%	7.33%
2008	58	57	4.75%	5.10%
2009	56	51	4.58%	4.56%
2010	66	63	5.40%	5.64%
2011	54	53	4.42%	4.74%
2012	49	48	4.01%	4.29%
2013	41	40	3.36%	3.58%
Total	1,222	1,118	100%	100%

Panel B. Deal Characteristics

	Full Sample				Long Duration subsample				Short Duration subsample				Long-Short	
	Obs	Mean	Median	St.dev.	Obs	Mean	Median	St.dev.	Obs	Mean	Median	St.dev.	Dif.in Mean	Dif. in Median
Deal Value (\$ million)	1222	2,674.96	687.49	5,761.97	611	3,051.04	733.44	6,410.89	611	2,298.87	570.51	5,007.22	752.17**	162.93**
Relative Deal Size	1222	0.17	0.07	0.30	611	0.17	0.07	0.35	611	0.18	0.07	0.25	0.00	0.00
All Cash	1222	0.32	0.00	0.47	611	0.30	0.00	0.46	611	0.33	0.00	0.47	-0.03	0.00
Diversified M&A	1222	0.59	1.00	0.49	611	0.60	1.00	0.50	611	0.58	1.00	0.50	0.02	0.00
Hostile	1222	0.01	0.00	0.09	611	0.01	0.00	0.08	611	0.01	0.00	0.09	0.00	0.00
Tender	1222	0.12	0.00	0.32	611	0.11	0.00	0.32	611	0.13	0.00	0.33	-0.01	0.00
Public target	1222	0.64	1.00	0.48	611	0.64	1.00	0.48	611	0.64	1.00	0.48	-0.01	0.00

Table 3. CEO Compensation Duration and Acquisition Propensity

This table reports the probit regression results of acquisition propensities. The dependent variable is a binary variable set to one if the firm announces an acquisition in year t with deal value exceeds 1% of the firm's market value at the end of year $t-1$, and zero if the firm does not have any acquisition in year t . All the independent variables are measured at the end of year $t-1$. Time fixed effects and Fama-French 48 industry fixed effects are included for estimation. Columns (1) and (2) present baseline regression results with CEO compensation duration and portfolio duration, respectively. Columns (3) and (4) present marginal effects estimated at the mean for continuous variables and for a change in indicator variables from zero to one. All firm- and CEO-level explanatory variables are measured at the end of the fiscal year before M&A announcement. See detailed variable definition in Appendix A. Heteroscedasticity-robust standard errors clustered by firms are reported in parentheses. All non-binary variables are winsorized at 1% and 99%. *, ** and *** indicate the significant level at 10%, 5%, or 1% levels, respectively.

	Probit Coefficients		Marginal Effects	
	(1)	(2)	(3)	(4)
Compensation duration	0.047** (0.019)		0.005** (0.002)	
Portfolio duration		0.073*** (0.027)		0.008*** (0.003)
CEO overconfidence	0.069 (0.043)	0.095** (0.044)	0.008 (0.005)	0.010** (0.005)
Log (Assets)	0.067*** (0.016)	0.072*** (0.016)	0.007*** (0.002)	0.008*** (0.002)
ROA	1.129*** (0.215)	1.123*** (0.214)	0.123*** (0.024)	0.122*** (0.023)
Firm's Q	-0.033** (0.017)	-0.028* (0.017)	-0.004** (0.002)	-0.003* (0.002)
Prior year returns	0.164*** (0.035)	0.160*** (0.035)	0.018*** (0.004)	0.017*** (0.004)
Sale growth	0.218*** (0.073)	0.227*** (0.073)	0.024*** (0.008)	0.025*** (0.008)
Leverage	-0.297** (0.126)	-0.295** (0.126)	-0.032** (0.014)	-0.032** (0.014)
Long-term asset	0.227** (0.114)	0.234** (0.114)	0.025** (0.012)	0.026** (0.012)
Cash flow	-0.606*** (0.145)	-0.602*** (0.144)	-0.066*** (0.016)	-0.065*** (0.016)
Cash volatility	0.152* (0.085)	0.156* (0.085)	0.017* (0.009)	0.017* (0.009)
Sale volatility	0.044 (0.057)	0.044 (0.056)	0.005 (0.006)	0.005 (0.006)
Firm age	-0.080*** (0.030)	-0.082*** (0.030)	-0.009*** (0.003)	-0.009*** (0.003)
Herfindahl index	-0.195 (0.127)	-0.196 (0.126)	-0.021 (0.014)	-0.021 (0.014)
Constant	-1.211*** (0.400)	-1.228*** (0.395)		
<i>Pseudo-R</i> ²	0.081	0.081		
Observations	15,049	15,049		
Ind. and Yr. Fixed Effects	Yes	Yes		

Table 4. Univariate Analysis of CEO Compensation Duration and Market Reaction around Announcement

This table reports M&A announcement abnormal returns of acquiring firms and public target firms. We further separate the sample into sub-groups based on median acquirer CEO compensation duration measured at the fiscal year end proceeding to M&A announcements. Cumulative abnormal returns (CARs) are estimated using the Fama-French three-factor model. The parameters of the three-factor model are estimated based on daily stock returns from trading days -253 to -46 with at least 65 non-missing stock returns. The CARs are calculated over a three-day event window around the deal announcement dates. Column (1) to (3) report the mean/median of CAR for the full sample, the above median (long) acquirer CEO compensation duration subsample, and the below median (short) duration subsample, respectively. Column (4) reports the differences in mean/median between long and short duration groups, with *P-values* from t-test/Wilcoxon Signed-rank test are reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

CARs	(1)			(2)			(3)			(4)	
	Obs	Mean	Median	Obs	Mean	Median	Obs	Mean	Median	Dif. in Mean	Dif. in Median
Acquirer											
[-1,+1]	1157	-0.97%*** (0.00)	-0.72%*** (0.00)	579	-1.34%*** (0.00)	-0.97%*** (0.01)	578	-0.59%** (0.04)	-0.46%*** (0.00)	-0.75%* (0.08)	-0.51%* (0.07)
Target											
[-1+1]	694	24.16%*** (0.00)	20.31%*** (0.00)	346	22.87%*** (0.00)	20.04%*** (0.00)	348	25.46%*** (0.00)	21.05%*** (0.00)	-2.59% (0.13)	-1.01% (0.27)

Table 5. CEO Compensation Duration, Market Reaction, and Target's Premium

This table presents results from regressions of market reaction around M&A announcements and target merger premium on CEO compensation duration and portfolio duration. In Panel A, the dependent variable is the acquirers' cumulative abnormal returns over a three-day event window around M&A announcements, measured in percentage. In Panel B, the dependent variable is the target firm's merger premium measured as the value of the deal divided by market value of the target firm at least 40 days prior to announcement day. Columns (1) and (2) report results from baseline OLS regressions. Columns (3) and (4) report the second stage results from the Heckman selection model. All firm- and CEO-level explanatory variables are measured at the end of the fiscal year before M&A announcement. See detailed variable definition in Appendix A. Heteroscedasticity-robust standard errors clustered by firms are reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

Panel A. Multivariate Regression on Acquirer's Three-day CARs				
	OLS		Heckman	
	(1)	(2)	(3)	(4)
Compensation duration	-0.565** (0.284)		-0.738** (0.321)	
Portfolio duration		-0.881* (0.481)		-1.105** (0.518)
CEO overconfidence	0.452 (0.547)	0.110 (0.584)	0.452 (0.626)	0.039 (0.699)
Log (assets)	-0.338 (0.216)	-0.402* (0.210)	-0.354 (0.242)	-0.436* (0.240)
ROA	3.235 (2.273)	3.262 (2.236)	4.635 (4.401)	4.569 (4.409)
Firm's Q	-0.005 (0.063)	-0.020 (0.061)	-0.141 (0.120)	-0.149 (0.120)
Prior year return	-0.025 (0.542)	0.050 (0.536)	0.067 (0.841)	0.150 (0.834)
CEO age	-2.016 (2.007)	-2.107 (2.023)	-2.371 (2.112)	-2.392 (2.099)
CEO share holdings	0.027 (0.054)	0.013 (0.054)	0.022 (0.056)	0.007 (0.057)
Annual compensation	0.029 (0.077)	0.012 (0.078)	0.036 (0.086)	0.013 (0.089)
Relative deal size	-2.576 (1.742)	-2.451 (1.748)	-2.539 (1.714)	-2.366 (1.717)
All cash	0.421 (0.528)	0.437 (0.529)	0.489 (0.532)	0.506 (0.534)
Hostile	-0.430 (1.899)	-0.370 (1.908)	-0.236 (1.821)	-0.189 (1.839)
Tender	0.014 (0.716)	0.093 (0.728)	-0.121 (0.721)	-0.028 (0.737)
Public target	-1.922*** (0.597)	-1.893*** (0.595)	-1.882*** (0.569)	-1.860*** (0.566)
Diversified M&A	0.569 (0.527)	0.630 (0.526)	0.714 (0.524)	0.777 (0.525)
Herfindahl Index	2.454 (1.912)	2.218 (1.919)	2.117 (1.997)	1.836 (2.002)
Inverse Mills Ratio			-1.469 (3.204)	-1.307 (3.148)
Constant	11.052 (8.069)	11.572 (8.187)	15.166 (9.645)	15.178 (9.663)
R^2	0.118	0.118	0.124	0.123
Observations	1,067	1,067	1,042	1,042
Ind. and Yr. Fixed Effects	Yes	Yes	Yes	Yes

Panel B. Multivariate Regression on Target's Merger Premium				
	OLS		Heckman	
	(1)	(2)	(3)	(4)
Compensation duration	0.075 (0.061)		0.088 (0.067)	
Portfolio duration		-0.057 (0.063)		-0.077 (0.063)
CEO overconfidence	-0.108* (0.059)	-0.103* (0.061)	-0.118* (0.062)	-0.106 (0.067)
Log (assets)	-0.050 (0.032)	-0.029 (0.028)	-0.054* (0.032)	-0.026 (0.030)
ROA	0.292 (0.532)	0.311 (0.529)	0.128 (0.501)	0.245 (0.484)
Firm's Q	-0.008 (0.014)	-0.006 (0.012)	-0.006 (0.025)	-0.010 (0.026)
Prior year return	0.087 (0.103)	0.080 (0.100)	0.079 (0.131)	0.092 (0.132)
CEO age	0.624 (0.652)	0.507 (0.599)	0.563 (0.668)	0.401 (0.606)
CEO share holdings	0.008 (0.007)	0.003 (0.009)	0.009 (0.007)	0.003 (0.009)
Annual compensation	0.008 (0.009)	0.012 (0.009)	0.007 (0.009)	0.012 (0.010)
Relative deal size	-0.334** (0.156)	-0.321** (0.153)	-0.221* (0.132)	-0.209 (0.129)
All cash	-0.152** (0.077)	-0.145* (0.076)	-0.132* (0.077)	-0.126 (0.077)
Hostile	-0.128 (0.167)	-0.122 (0.168)	-0.139 (0.173)	-0.130 (0.173)
Tender	0.097 (0.077)	0.086 (0.079)	0.107 (0.077)	0.095 (0.080)
Public target	0.100 (0.300)	0.133 (0.296)	0.063 (0.351)	0.120 (0.344)
Diversified M&A	-0.209** (0.103)	-0.197** (0.099)	-0.214** (0.108)	-0.199* (0.104)
Herfindahl Index	0.127 (0.226)	0.142 (0.230)	0.155 (0.227)	0.163 (0.230)
Target ROA	-0.350* (0.182)	-0.337* (0.182)	-0.361* (0.185)	-0.353* (0.183)
Target firm's Q	-0.032 (0.023)	-0.032 (0.023)	-0.036 (0.024)	-0.034 (0.024)
Target prior year return	-0.034 (0.031)	-0.030 (0.033)	-0.035 (0.033)	-0.031 (0.035)
Inverse Mills Ratio			-0.095 (0.310)	-0.013 (0.314)
Constant	-0.310 (2.472)	0.081 (2.307)	0.148 (2.828)	0.506 (2.666)
R^2	0.240	0.237	0.216	0.211
Observations	639	639	624	624
Ind. and Yr. Fixed Effects	Yes	Yes	Yes	Yes

Table 6. Univariate Analysis of CEO Compensation Duration and post-M&A Long-run Operating Performance

This table reports change in industry-adjusted abnormal ROA of the combined firms from the year preceding M&A completion (t-1) to three years after M&A completion (t+3). The ROA of the combined firm is adjusted for median industry ROA from the same Fama-French 48 industry as the merged firms. The industry-adjusted abnormal ROA is measured as the difference between the combined firm's industry-adjusted ROA and that of characteristic matched peer firm. The matched firm must remain public within the five year window; not involved in M&A over the past three years; have firm market value within the range of 90% to 110% of that of the combined firm; and have the closest ROA to that of the combined firm in the pre-M&A year. Columns (1) to (6) report mean and median change in industry-adjusted abnormal ROA for the long and short acquirer CEO pay duration subsample, respectively. Columns (7) and (8) report the difference in mean (median) between long and short pay duration subsample. P-values from t-test (Wilcoxon Signed-rank test) is reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

	Long Duration			Short Duration			Long - Short	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Δ in ROA	Obs.	Mean	Median	Obs.	Mean	Median	Dif. in Mean	Dif. in Median
t=-1 to t=1	289	-1.34% ** (0.04)	-1.53% *** (0.00)	203	-1.12% * (0.06)	-1.58% *** (0.01)	-0.22% (0.81)	0.05% (0.48)
t=-1 to t=2	280	-2.24% *** (0.00)	-2.21% *** (0.00)	186	0.05% (0.94)	-0.45% (0.71)	-2.30% *** (0.00)	-1.76% *** (0.00)
t=-1 to t=3	265	-2.55% *** (0.00)	-2.09% *** (0.00)	175	0.02% (0.98)	0.72% (0.50)	-2.57% ** (0.02)	-2.81% *** (0.00)

Table 7. CEO Compensation Duration and post-M&A Long-run Operating Performance

This table presents results from regressions of post-M&A long-run operating performance on CEO compensation duration and portfolio duration. The dependent variable is change in industry-adjusted abnormal ROA of the combined firm from three years after M&A completion (t +3) to the year before M&A completion (t-1). Columns (1) and (2) present results from baseline OLS regressions. Columns (3) and (4) present second stage results from the Heckman selection model. All firm- and CEO-level explanatory variables are measured at the end of the fiscal year before M&A announcement. See detailed variable definition in Appendix A. Heteroscedasticity-robust standard errors clustered by firms are reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

	OLS		Heckman	
	(1)	(2)	(3)	(4)
Compensation curation	-1.193*** (0.457)		-0.812* (0.441)	
Portfolio duration		-2.216** (0.910)		-1.666* (0.857)
CEO overconfidence	-1.207 (0.913)	-2.138** (0.902)	-0.458 (0.895)	-1.123 (0.879)
Log(asset)	-0.052 (0.335)	-0.135 (0.337)	0.014 (0.328)	-0.021 (0.335)
Prior year return	-0.288 (0.792)	-0.448 (0.790)	0.490 (0.784)	0.418 (0.787)
Sale growth	-4.895** (2.071)	-5.356** (2.139)	-3.721* (1.899)	-3.917** (1.960)
Long-term assets	-1.053 (2.130)	-0.443 (2.126)	-1.702 (2.052)	-1.224 (2.037)
Cash flow	-5.148 (3.509)	-5.759 (3.530)	-4.677 (3.337)	-5.235 (3.353)
Stock volatility	-1.690 (3.078)	-1.760 (3.080)	-0.747 (2.982)	-0.544 (3.018)
Relative deal size	1.100 (1.701)	1.405 (1.714)	-0.537 (1.414)	-0.255 (1.416)
All cash	0.809 (0.957)	0.671 (0.953)	0.998 (0.930)	0.937 (0.929)
Hostile	1.129 (2.505)	1.108 (2.372)	0.812 (2.460)	0.912 (2.438)
Tender	0.101 (1.057)	0.489 (1.078)	0.544 (1.062)	0.894 (1.094)
Diversified M&A	1.386* (0.823)	1.539* (0.800)	0.947 (0.798)	1.066 (0.773)
Herfindahl Index	2.391 (2.060)	1.671 (2.053)	1.931 (1.986)	1.285 (1.974)
Inverse Mills Ratio			6.518*** (2.033)	6.996*** (2.060)
Constant	3.062 (4.356)	2.788 (4.368)	-7.896 (5.535)	-9.102 (5.750)
R^2	0.162	0.164	0.198	0.202
Observations	500	500	500	500
Year Fixed Effects	Yes	Yes	Yes	Yes

Table 8. Univariate Analysis of CEO Compensation Duration and post-M&A Long-Run Stock Performance

This table reports post-M&A buy-and-hold abnormal returns (BHARs) of acquiring firms in above and below median CEO compensation duration groups. The groups are sorted based on acquirer CEO compensation duration in fiscal year prior to M&A announcement. BHARs are measured as the difference of buy-and-hold returns between acquiring firms and their characteristic matched firms. The matched firm must not be involved in M&A over the past three years; has market value within the range of 70%-130% of the acquirer's market value measured 11 days prior to M&A announcement date; and has the closest market to book value to that of the acquirer at the end of pre-M&A fiscal year. We estimate BHARs over 12-, 24- and 36-month holding periods after M&A announcements. Columns (1) to (6) present mean/median BHARs of acquiring firms with long and short pay duration CEOs. Columns (7) to (8) report the differences in mean/median BHARs between the two groups. P-values from t-test/Wilcoxon Signed-rank test are reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

	Long Compensation Duration			Short Compensation Duration			Long - Short	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Obs	Mean	Median	Obs	Mean	Median	Dif Mean	Dif Median
[0,12]	603	-2.00%	-3.03%***	603	1.51%	1.78%	-3.51%	-4.81%**
		(0.32)	(0.12)		(0.43)	(0.24)	(0.20)	(0.04)
[0,24]	592	-9.33%***	-5.70%***	581	-1.41%	-1.34%	-7.92%**	-4.36%*
		(0.00)	(0.00)		(0.60)	(0.86)	(0.03)	(0.06)
[0,36]	577	-13.74%***	-14.61%***	553	-5.58%	-4.76%	-8.16%*	-9.85%***
		(0.00)	(0.00)		(0.11)	(0.27)	(0.09)	(0.00)

Table 9. CEO Compensation Duration and post-M&A Long-Run Stock Performance

This table presents results from regressions of post-M&A long run abnormal return on CEO compensation duration and portfolio duration. Columns (1) and (2) present OLS regression results of 24-month post-M&A buy-and-hold abnormal returns (BHARs), and Columns (5) and (6) present results of 36-month BHARs. Columns (3), (4), (7), and (8) report the second stage results from the Heckman selection model for 24- and 36-month post-M&A BHARs, respectively. See detailed variable definition in Appendix A. Heteroscedasticity-robust standard errors clustered by firms are reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

	24-month BHAR				36-month BHAR			
	OLS		Heckman		OLS		Heckman	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Compensation duration	-5.465*		-5.928**		-5.624		-6.080*	
	(2.928)		(3.000)		(3.421)		(3.535)	
Portfolio duration		-9.858*		-10.328*		-6.603		-6.828
		(5.218)		(5.301)		(6.546)		(6.637)
CEO overconfidence	-1.639	-5.276	-2.910	-6.460	-3.017	-5.786	-3.828	-6.441
	(4.551)	(4.831)	(4.644)	(4.964)	(5.933)	(6.090)	(6.048)	(6.254)
Prior year return	-8.384**	-8.221**	-9.544**	-9.145**	-7.417*	-7.264*	-8.073*	-7.668*
	(3.676)	(3.670)	(3.852)	(3.843)	(4.282)	(4.329)	(4.376)	(4.416)
ROA	-5.254	-2.202	-12.516	-6.869	-25.428	-21.896	-31.528	-25.372
	(26.753)	(26.677)	(29.602)	(29.431)	(34.582)	(34.728)	(37.750)	(37.714)
ROE	13.685	11.833	13.191	11.069	35.616**	33.645**	35.779**	33.535**
	(13.014)	(13.287)	(13.057)	(13.323)	(15.319)	(15.539)	(15.505)	(15.712)
Sale growth	-7.138	-8.202	-10.251	-10.743	-8.168	-8.774	-10.755	-10.714
	(6.984)	(6.750)	(7.123)	(6.987)	(7.481)	(7.413)	(8.099)	(8.066)
Log(sales)	3.650	3.216	3.325	2.987	3.824	3.227	3.510	3.003
	(2.243)	(2.104)	(2.314)	(2.170)	(2.876)	(2.801)	(2.957)	(2.887)
Stock volatility	-20.609	-18.537	-18.706	-16.979	-19.549	-17.979	-18.463	-17.200
	(14.810)	(14.791)	(15.068)	(15.001)	(20.357)	(20.448)	(20.542)	(20.593)
Cash flow	13.021**	11.780**	14.976**	13.138**	13.623*	12.546*	15.274*	13.603*
	(5.821)	(5.805)	(6.584)	(6.525)	(7.233)	(7.314)	(8.075)	(8.099)
Firm age	-9.943**	-9.088*	-8.919*	-8.403*	-9.197	-8.414	-8.437	-7.994
	(4.868)	(4.787)	(4.958)	(4.869)	(6.185)	(6.244)	(6.345)	(6.401)
CEO share holdings	-0.880	-1.063*	-0.784	-97.552*	-1.585*	-1.629**	-1.523*	-1.571*
	(0.056)	(0.549)	(0.561)	(55.238)	(0.816)	(0.826)	(0.826)	(0.833)
Annual compensation	1.120*	1.006	1.158*	1.022	1.173	1.020	1.225	1.048
	(0.656)	(0.619)	(0.700)	(0.657)	(0.763)	(0.724)	(0.813)	(0.768)
Relative deal size	-8.060	-5.921	-6.421	-4.537	4.868	6.354	5.769	6.987
	(8.929)	(8.932)	(9.073)	(9.102)	(13.234)	(13.294)	(13.354)	(13.424)
Hostile	7.073	7.305	6.209	6.607	3.377	3.123	2.728	2.644
	(12.549)	(12.075)	(12.371)	(11.894)	(16.016)	(15.809)	(15.862)	(15.661)

(Continued.)

Table 9 Continued.

Tender	-11.743*	-10.767*	-11.409*	-10.510	-8.337	-7.416	-8.070	-7.197
	(6.428)	(6.463)	(6.409)	(6.450)	(7.485)	(7.487)	(7.488)	(7.491)
All cash	6.791	6.883	6.750	6.910	6.515	6.567	6.256	6.378
	(5.070)	(5.085)	(5.099)	(5.116)	(6.594)	(6.661)	(6.616)	(6.689)
Public target	5.701	5.262	5.413	5.098	-1.189	-1.536	-1.355	-1.581
	(4.873)	(4.873)	(4.893)	(4.897)	(6.312)	(6.320)	(6.365)	(6.373)
Diversified M&A	-5.500	-4.909	-6.046	-5.423	-3.196	-2.798	-3.470	-3.041
	(4.674)	(4.592)	(4.687)	(4.599)	(6.124)	(6.077)	(6.153)	(6.103)
Herfindahl Index	4.121	0.938	7.393	3.871	-2.564	-5.035	-0.307	-3.189
	(15.620)	(15.463)	(15.988)	(15.822)	(19.425)	(19.490)	(19.633)	(19.691)
Inverse Mills Ratio			-18.467	-14.218			-13.088	-8.761
			(13.506)	(13.346)			(16.751)	(16.610)
Constant	12.012	9.812	39.707	30.393	10.693	7.723	31.744	21.401
	(20.163)	(20.202)	(31.004)	(30.767)	(27.950)	(27.914)	(40.042)	(39.777)
R^2	0.108	0.109	0.110	0.111	0.106	0.105	0.106	0.104
Observations	1,069	1,069	1,061	1,061	1,069	1,069	1,061	1,061
Ind. and Yr. Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 10. Robustness Tests: 2SLS IV Regressions

This table presents robustness tests on the relation between M&A performance and CEO compensation duration using 2SLS IV regression model. The instrument variable is median CEO pay duration from firms within the same Metropolitan Statistical Areas (MSA). Columns (1), (3) and (5) report the first regression stage results. Columns (2), (4), and (6) report second stage results on acquirer cumulative abnormal returns over a three-day event window around M&A announcements, change in industry-adjusted abnormal ROA of the combined firm from three years after M&A completion (t +3) to the year before M&A completion (t-1), and 24-month post-M&A buy-and-hold abnormal returns (BHARs), respectively. To preserve space, we only present coefficients on the instrument variable in the first stage and coefficients on the predicted CEO pay duration in the second stage. The regression control variables are the same as those presented in Table 5, 7, and 9 respectively. See detailed variable definition in Appendix A. Heteroscedasticity-robust standard errors clustered by firms are reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

	1 st Stage	2 nd Stage	1 st Stage	2 nd Stage	1 st Stage	2 nd Stage
	Comp	Three-Day CAR	Comp	Δ in industry-adjusted	Comp	24-month post-M&A
	Duration	around M&As	Duration	abnormal ROA	Duration	BHAR
	(1)	(2)	(3)	(4)	(5)	(6)
MSA Median Comp Duration	0.582*** (0.087)		0.719*** (0.103)		0.623*** (0.089)	
Predicted Comp Duration		-1.775* (1.063)		-2.693** (1.353)		-27.626*** (10.594)
Observations	1,036	1,036	483	483	1,040	1,040
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Ind. and Yr. fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
<i>First-Stage F-Statistic</i>	44.33***		52.05***		49.25***	
<i>Anderson-Rubin Wald F-Statistic</i>	2.79*		2.94*		3.25**	
<i>Kleibergen-Paap rk LM statistic</i>		25.34***		36.17***		33.71***
<i>Cragg-Donald Wald F statistic</i>		54.26		29.65		58.78

Table 11. Robustness Tests: Propensity Score Matched Sample

This table presents robustness tests on the relation between M&A performance and CEO compensation duration using a propensity score matched sample. Panel A compares firm characteristics between acquirers with above median CEO compensation duration (treated) and the matched firms (control). Panel B reports the M&A performance regression results using the propensity score matched sample. Columns (1) to (3) report results on acquirer cumulative abnormal returns over a three-day event window around M&A announcements, change in industry-adjusted abnormal ROA of the combined firm from three years after M&A completion (t +3) to the year before M&A completion (t-1), and 24-month post-M&A buy-and-hold abnormal returns (BHARs), respectively. To preserve space, we only present coefficients on CEO pay duration. The regression control variables are the same as those presented in Table 5, 7, and 9 respectively. See detailed variable definition in Appendix A. Heteroscedasticity-robust standard errors clustered by firms are reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

<i>Panel A. Firm characteristic of treated and matched firms</i>					
	Obs. Treat	Mean. Control	Mean. Treat	Dif Mean	T-statistic
Log(asset)	394	8.363	8.382	-0.018	-0.161
Long term asset	394	0.376	0.385	-0.009	-0.562
R&D expense	394	0.040	0.036	0.004	1.059
Firm Q	394	3.009	2.770	0.239	0.762
Cash flow	394	0.003	0.011	-0.009	-0.232
Stock volatility	394	0.454	0.440	0.014	0.886
Sales volatility	394	0.440	0.414	0.025	0.304
Cash volatility	394	0.239	0.229	0.010	0.255
Leverage	394	0.200	0.210	-0.010	-0.906
Stock spread	394	0.139	0.140	-0.001	-0.099
Prior year returns	394	0.391	0.357	0.034	0.491

<i>Panel B. Multivariate regression results in matched samples</i>			
	Three-Day CAR around M&As	Δ in industry-adjusted abnormal ROA	24-month post- M&A BHAR
Compensation duration	-0.975*** (0.351)	-1.605* (0.838)	-4.886* (2.819)
R^2	0.167	0.233	0.171
Observations	668	152	744
Control Variables	Yes	Yes	Yes
Ind. and Yr. Fixed Effects	Yes	Yes	Yes

Table 12. Corporate Governance, CEO pay duration and M&A performance

This table presents regression results on the effect of corporate governance on the relation between acquirer CEO pay duration and M&A performance. To preserve space, we only present coefficients on acquirer CEO compensation duration, governance characteristics, and interaction terms. The regression control variables are the same as those presented in Table 5, 7, and 9 respectively. See detailed variable definition in Appendix A. Heteroscedasticity-robust standard errors clustered by firms are reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

	Three-Day CAR around M&As	Δ in industry-adjusted abnormal ROA	24-month post- M&A BHAR
	(1)	(2)	(3)
Compensation duration	-0.917* (0.528)	-1.947* (1.083)	-20.687*** (6.435)
CEO tenure	-0.067 (0.067)	-0.414*** (0.157)	-1.749** (0.860)
Compensation duration \times CEO tenure	0.049 (0.046)	0.182** (0.081)	0.717 (0.437)
Co-opted board	1.083 (1.778)	6.339** (2.944)	-4.335 (22.253)
Compensation duration \times Co-opted board	-0.151 (1.024)	-1.808 (1.669)	12.102 (11.097)
CEO duality	-0.123 (1.135)	0.007 (1.774)	-4.843 (10.834)
Compensation duration \times CEO duality	0.296 (0.565)	-0.020 (0.964)	-0.137 (5.565)
R^2	0.170	0.174	0.138
Observations	796	393	820
Control variables	Yes	Yes	Yes
Ind. and Yr. Fixed Effects	Yes	Yes	Yes

Table 13. Time-vesting vs. Performance-vesting Compensation Duration

This table presents results from regressions of performance on acquirer CEO time-vesting compensation duration performance-vesting duration. Columns (1) to (3) report results on acquirer cumulative abnormal returns over a three-day event window around M&A announcements, change in industry-adjusted abnormal ROA of the combined firm from three years after M&A completion (t +3) to the year before M&A completion (t-1), and 24-month post-M&A buy-and-hold abnormal returns (BHARs), respectively. To preserve space, we only present coefficients on CEO time-vesting and performance-vesting duration. The regression control variables are the same as those presented in Table 5, 7, and 9 respectively. See detailed variable definition in Appendix A. Heteroscedasticity-robust standard errors clustered by firms are reported in parentheses. *, ** and *** indicate the significant level at 10%, 5%, and 1% levels, respectively.

	Three-Day CAR around M&As	Δ in industry-adjusted abnormal ROA	24-month post-M&A BHAR
	(1)	(2)	(3)
Time-vesting Duration	-0.369* (0.215)	-0.938*** (0.346)	-3.186* (1.898)
Performance-vesting Duration	0.023 (0.146)	0.116 (0.263)	-1.243 (1.461)
R^2	0.118	0.222	0.107
Observations	1,067	483	1,069
Control variables	Yes	Yes	Yes
Ind. and Yr. Fixed Effects	Yes	Yes	Yes

Figure 1: Distribution of various compensation grants by year

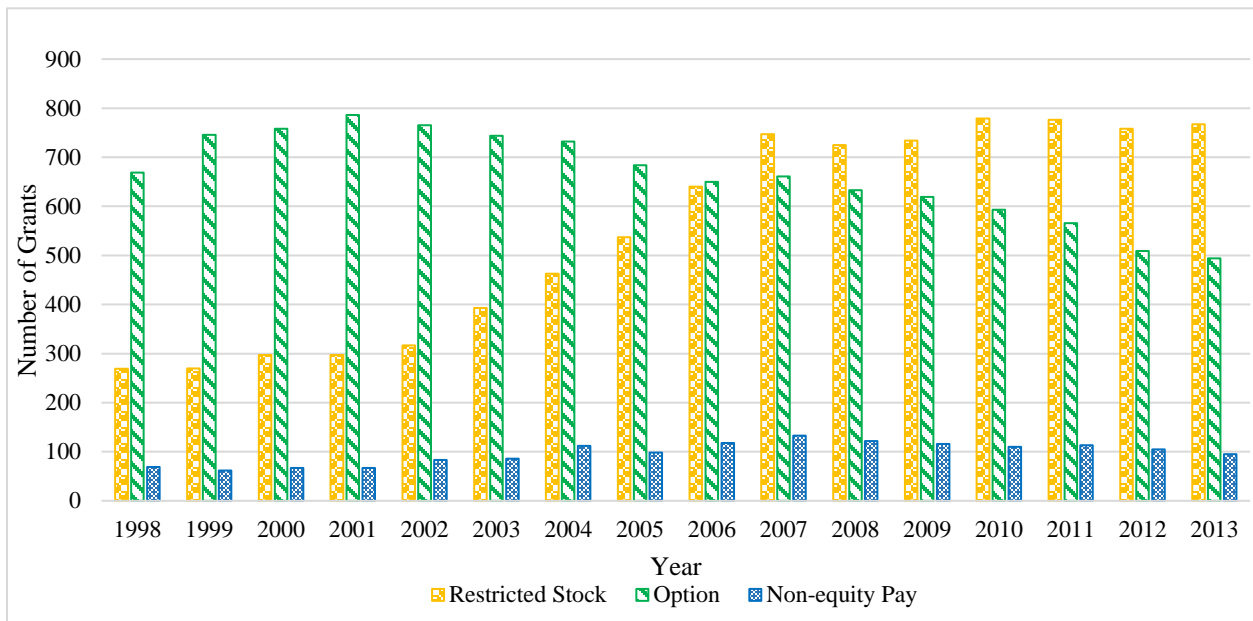
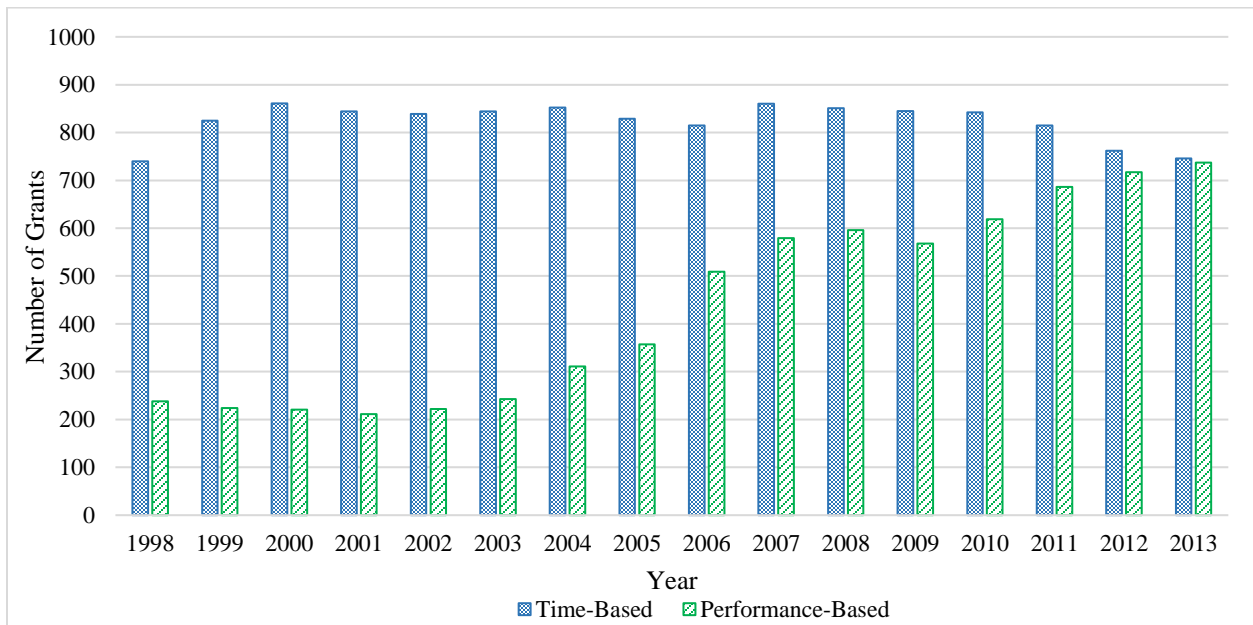


Figure 2. Distribution of time-vesting and performance-vesting grants to CEOs by year



Appendix A. Variable Definition

Variables	Definition	Data Source
All Cash	Taking value one if the M&A transaction is paid with all cash	SDC
Annual Compensation	The ratio of CEO total pay (TDC1) on total book value of assets at the end of fiscal year	Execucomp, Compustat
Bonus (\$ thousand)	The executive's annual bonus value reported	Execucomp
Cash flow	The cash flow from operations to lagged total assets. The cash flow from operation is the difference between EBIT and the change of net working capital	Compustat
Cash volatility	The standard deviation of the ratio of cash flows over lagged total assets over the previous five years	Compustat
CEO age (years)	The executives' ages in the given year	Execucomp
CEO duality	Indicator variables that equals 1 if a CEO is also the chairman of board in the given year.	RiskMetrics
CEO overconfidence	Indicator variable that equals 1 if a CEO who has options more than 100% in-the-money in the fifth year during their sample tenure.	Execucomp
CEO tenure (years)	Number of years served as CEO, if firm missing CEO tenure in a year, we replace it with the median of the CEO tenure in the given year.	Execucomp
CEO share holdings (%)	The executives' share ownership as a % of total shares outstanding	Execucomp
Compensation duration (years)	Executive compensation duration calculated using both equity and non-equity grants during the year	Incentive Lab
Co-opted board	The number of directors appointed after the CEO assumed office divided by the board size	Lalitha Naveen's website
Deal Size	The value of acquisition reported in million	SDC
Diversified M&A	Taking value one if the acquirer and targets belong to the same four-digit SIC industry categories.	SDC
Firm age	The number of years that firms are listed in Compustat	Compustat
Firm's Q	The ratio of the market value of total assets over the book value of total assets	Compustat
Herfindahl Index	The sum of the squared market share of each firm competing in each Fama-French 48 industry.	Compustat
Hostile	Taking value one if the M&A transaction is hostile	SDC
Leverage	The ratio of the sum of long-term (dltt) and short-term debt (dlc) to the book value of assets	Compustat
Long-term asset	The ratio of fixed assets (ppent) to the book value of assets	Compustat
Long-term non-equity duration	Executive compensation duration calculated only with non-equity based plans during the year	Incentive lab
Log (Assets)	The logarithm of the total book value of asset at the end of the fiscal year	Compustat
Log (Sales)	The logarithm of the total revenue at the end of the fiscal year	Compustat
Option duration (years)	Executive compensation duration calculated only with option-based plans during the year	Incentive Lab
Options (\$ thousand)	The Black-Scholes value of the options granted to the executives during the year, following Coles, Naveen, and Daniels (2006)	Execucomp

Continued

Appendix A continued.

Performance-vesting duration	Executive compensation duration calculated only with performance-vesting plans during the year	Incentive Lab
Portfolio duration (years)	Executive compensation duration calculated using vested and unvested holdings in executive portfolio	Incentive Lab
Prior year returns	The cumulative buy and hold return in the fiscal year	CRSP
Public target	Taking value one if the target is a public firm	SDC
R&D expense	Firm's R&D expense to the book value of assets. R&D expense is assumed as zero if missing.	Compustat
Relative deal size	The ratio of acquisition value over the market value of acquirer at the end of fiscal year before the announcement date	SDC
Restricted Stock (\$ thousand)	The value of restricted stock granted to the executives during the year	Execucomp
ROA	The ratio of operating income before interest, depreciation, and tax (oibdp) to the book value of asset	Compustat
ROE	The ratio of operating income before interest, depreciation, and tax (oibdp) to the book value of equity	Compustat
Sales growth	The firm's annual sale growth	Compustat
Sales volatility	The Standard deviation of the firms' annual sales growth over the previous five years	Compustat
Salary (\$ thousand)	The executives' annual salaries	Execucomp
Stock duration (years)	Executive compensation duration calculated only with stock-based plans during the year	Incentive Lab
Stock spread(%)	The average daily stock bid-ask spread in the fiscal year	CRSP
Stock volatility	The stock return volatility calculated as annualized volatility of daily stock returns during the previous year	Compustat
Tender	Taking value one if the transaction is a tender offer	SDC
Time-vesting Duration	Executive compensation duration calculated only with time-vesting plans during the year	Incentive Lab
Total Assets (\$ million)	The total book value of asset at the end of the fiscal year	Compustat
Total Compensation (\$ thousand)	The TDC1 reported in Execucomp as the sum of salary, bonus, other annual compensation, long-term incentive payouts, other cash payouts and total value of restricted stock option awards	Execucomp
Total Sales (\$ million)	The total revenue at the end of the fiscal year	Compustat

Appendix B. CEO Compensation Duration Distribution

Vesting Period (years)	Restricted Stock		Options		Cash-Long	
	Frequency	Percent (%)	Frequency	Percent (%)	Frequency	Percent (%)
0	66	0.44%	39	0.24%	121	6.54%
1	1911	12.66%	1736	10.85%	162	8.76%
2	2514	16.65%	4960	31.01%	1421	76.85%
3	8904	58.99%	8303	51.91%	97	5.25%
4	951	6.30%	423	2.64%	45	2.43%
5	601	3.98%	312	1.95%	3	0.16%
>5 but <=10	146	0.97%	221	1.38%		
>10	2	0.01%	2	0.01%		