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The Role of Deferred Pay in Retaining Managerial Talent

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Abstract

We examine the role of deferred vesting of stock and option grants in reducing executive turnover. To the extent an executive forfeits all unvested stock and option grants if she leaves the firm, deferred vesting will increase the cost (to the executive) of early exit. Using pay *Duration* proposed in Gopalan, et al., (forthcoming) as a measure of the length of managerial pay, we find that CEOs and non-CEO executives with longer pay *Duration* are less likely to leave the firm voluntarily. Employing the vesting of a large prior-year stock/option grant as an instrument for *Duration*, we find the effect to be causal. CEOs with longer pay *Duration* are also less likely to experience a forced turnover and the sensitivity of forced CEO turnover to firm performance is significantly lower in firms that offer longer duration pay. Overall, our study highlights a strong link between compensation design and turnover for top executives.

JEL classification: G30, G34

Keywords: Executive compensation, pay duration, talent retention, management turnover

1. Introduction

Retaining and motivating talented executives is a key ingredient for firms to create shareholder value. This is especially the case for human capital-intensive firms where value creation requires executives to acquire and develop firm-specific knowledge. Frequent turnover among executives will not only result in loss of valuable firm-specific knowledge but will also affect the incentives of the executive to acquire the knowledge in the first place. Understanding this, in practice, firms use a number of implicit and explicit contractual features to retain talented executives. The recent controversy about information technology firms colluding in their hiring practices to limit poaching talent from each other highlights the extent to which firms are willing to go to retain talent.[1] Chief among the explicit (and legal!) contractual provisions employed by firms to retain talent is deferred pay. To the extent an executive forfeits all deferred pay if she leaves the firm, deferring pay will increase the cost (to the executive) of early exit.

Despite its importance, the effectiveness of deferred pay in helping firms retain talent has received limited research attention. This is mainly because of lack of data on the extent of deferred pay. In this paper, we use information on the vesting provisions of stock and option grants for a sample of S&P 1500 firms to study the role of deferred stock and option grants (deferred pay from now on) in executive turnover. Our analysis also helps us understand the importance of executive talent and firm-specific knowledge for both the design of deferred pay and executive turnover.

[1] See Wall Street Journal articles titled "Ebay settles recruiting allegations" dated May 1, 2014 and "Tech companies agree to settle wage suit" dated April 24, 2014.

Specifically, we study the effectiveness of deferred pay in helping firms retain the top five highest paid executives of the firm. We focus on the top five executives because of availability of detailed data on deferred pay and also because the highest paid executives are likely to be among the most valuable employees of the firm and their retention should be of utmost importance to the firm.

A typical compensation package for a top executive includes both a cash (salary and bonus) and a stock component (restricted stock and stock options). Firms typically defer the stock component of pay. Every stock and option grant is associated with a vesting schedule and the manager is not allowed to exercise or sell (or hedge) the grant until it vests. A manager who voluntarily or involuntarily leaves the firm typically forfeits all the unvested grants. The retention incentives provided by a stock or option grant depends both on the size of the grant and the length of the remaining vesting schedule. All else equal, a larger grant and one with a longer vesting schedule will provide greater retention incentives. To capture these twin effects, we employ the measure of executive pay duration (*Duration*), introduced by Gopalan et. al., (forthcoming), to quantify the extent of long-term retention incentives provided by an incentive contract. *Duration* is the weighted average of the vesting periods of all four components of pay (salary, bonus, restricted stock, and stock options), with each component's weight being

the fraction of that component in the executive's total compensation.[2] In our empirical analysis, we estimate the effect of *Duration* on the probability of an executive turnover.[3]

We begin our empirical analysis by estimating the relation between pay *Duration* and the likelihood of voluntary executive turnover. We classify a CEO turnover as involuntary following the criteria in Parrino (1997) complemented by two of our own. We reclassify an involuntary turnover according to Parrino (1997) as voluntary if the CEO's employment record, obtained from Boardex and Marquis Who's Who publications, suggests that the CEO takes a comparable position elsewhere, or if the press reports announcing the turnover convincingly explain that the departure is due to previously undisclosed personal or business reason that is unrelated to the firm's activities. All the CEO turnovers not classified as forced or due to mandatory or planned retirements are classified as voluntary. We identify turnover of other senior executives using ExecuComp and BoardEx. We classify a non-CEO senior executive turnover as voluntary if it is not due to retirement, health reasons and if we are able to identify the executive's new employment from ExecuComp or BoardEx. We call such voluntary turnovers as executives "jumping ship".

We expect a longer pay *Duration* to reduce the likelihood of a voluntary turnover because any outside opportunity should be sufficiently valuable to the executive so as

[2] The vesting periods of cash and bonus are zero, and thus the magnitude of the calculated pay duration depends on the vesting periods of stock options and restricted stocks, and their relative weights in the total compensation.

[3] In constructing *Duration*, we do not include any vesting provisions embedded in the pension provisions of the firm. To this extent, *Duration* may be a noisy measure of the extent of deferred pay. We discuss this further in Section 3.2.

to compensate for the lost unvested pay. Consistent with this conjecture, we find that senior executives with longer pay *Duration* are less likely to voluntarily leave the firm. This is true both for CEOs and for other senior executives. The effects we document are economically very large. We find that a one standard deviation increase in *Duration* (an increase by 0.97 years) is associated with a 58% decrease in the likelihood of a voluntary CEO turnover in a given year. For other senior executives, we find that a one standard deviation increase in *Duration* (an increase by 0.88 years) is associated with a 150% reduction in the probability of an executive jumping ship. We find that the link between pay duration and executive turnover becomes stronger when we complement our measure of pay duration by including unvested stock and option grants from prior years (*Duration-2*).

A negative correlation between *Duration* (or *Duration-2*) and voluntary executive turnover may not imply a causal effect of deferred pay on turnover. Firm-level and executive-level omitted variables can bias the coefficient. The important firm-level omitted variable that may affect both *Duration* and the likelihood of executive turnover is the importance of firm-specific knowledge. All else equal, in situations where firm-specific knowledge is more important, firms are likely to offer longer *Duration* pay and executives of such firms may also remain longer with the firm because of the difficulty of applying their (firm-specific) knowledge elsewhere. The important executive-level omitted variable is executive talent. All else equal, executives perceived to be more

talented by the board will obtain longer duration pay and such executives may also remain longer with the firm, given their favorable internal perception.[4]

To overcome this endogeneity issue, we implement an IV regression where we instrument for *Duration-2*. Our instrument identifies years in which a large prior-year stock or option grant vests (*Large vesting*) so that the executive's overall pay duration decreases. To ensure our instrument is truly exogenous, we focus on grants that were granted more than two years prior. A similar instrument is used by Edmans, Fang and Lewellen (2014) to study the effect of stock vesting schedules on managerial myopia. We use these vesting episodes as instances that shock pay duration and estimate its effect on executive turnover. To the extent that these grants were awarded in the distant past, their vesting is unlikely to be correlated with (time-varying) firm and executive-level omitted variables. In the IV specification, we control for all time invariant firm-specific factors by including firm fixed effects. Our IV results corroborate our OLS estimates and indicate a causal effect of *Duration* on executive turnover. We find our IV estimates to be larger than the OLS estimates. The relationship between stock and option vesting and executive turnover that we uncover may also help explain why such episodes are associated with managerial myopia (Edmans, Fang, and Lewellen 2014).

In our next set of tests, we estimate the effect of pay duration on the likelihood of involuntary executive turnover. To the extent that the decision to remove a CEO is

[4] Since neither firm-specific knowledge nor executive talent is observable, we implicitly use these terms as a catch-all for all firm-specific and executive-specific factors that may both increase pay duration and decrease the likelihood of a voluntary turnover.

taken by the board in the shareholders' best interest, one does not expect a causal relationship between *Duration* and the likelihood of forced turnover. The board should not be concerned with the executive losing (or not losing) her unvested stock/option grants when deciding to remove her. On the other hand, there are three non-mutually exclusive reasons why *Duration* and forced executive turnover may be negatively correlated. The negative correlation may arise due to the two omitted variables mentioned before, executive talent and the importance of firm-specific knowledge. Whenever an executive is perceived to be talented or firm-specific knowledge is more important, not only will the board offer a longer *Duration* pay ex ante, but will also be reluctant to fire such an executive. *Duration* and forced executive turnover may also be negatively related due to poor firm-level corporate governance. To the extent the executive forfeits unvested pay when being forced out, boards (that act in the executive's best interest) may be reluctant to fire an executive with long-duration pay. We perform tests to understand the validity of these three reasons.

We find that CEOs (and non-CEO executives) are less likely to experience an involuntary turnover if they have a longer *Duration* pay. The effect of *Duration* on involuntary turnover is also economically significant. A one standard deviation increase in *Duration* is associated with a 57.5% (60.3%) decrease in the likelihood of an involuntary CEO (senior executive) turnover.

To the extent executive talent is time invariant, we expect time-invariant executive-specific factors to proxy for executive talent. To isolate the effect of CEO talent on the

relationship between pay duration and forced CEO turnover, we repeat our baseline estimation after including CEO fixed effects. We find that the inclusion of CEO fixed effects marginally reduces the size of the coefficient on *Duration* but significantly increases the standard errors and hence the coefficient becomes insignificant. This is consistent with time-invariant executive-level factors having an effect on the relation between *Duration* and forced CEO turnover (Graham et al. 2011). In additional tests looking at time-invariant executive factors, we find that an executive's pay duration in prior employment (*Prior duration*) is negatively related to the likelihood of a forced turnover. This offers further support for the effect of time-invariant executive-level factors on the duration-forced turnover relationship.

To isolate the effect of the importance of firm-specific knowledge on the relationship between pay duration and forced executive turnover, we perform two sets of tests. First, we repeat our baseline estimation after including firm fixed effects. To the extent that the importance of firm-specific knowledge is time-invariant, firm fixed effects should capture it. Surprisingly, we find that inclusion of firm fixed effects does not significantly affect the size of the coefficient on *Duration* as compared to the OLS estimate, where we include industry fixed effects. This highlights that time-invariant firm-specific factors do not appear to have a significant effect on the relation between *Duration* and forced CEO turnover.

The importance of firm-specific knowledge could be time varying. In situations where firm-specific knowledge is important, firms are likely to offer longer *Duration*

pay for *all* the top executives of the firm. The average duration of the other senior executives in the firm in any year could therefore measure the importance of firm-specific knowledge for that firm during that year. Consistent with the importance of firm-specific knowledge, we find that CEOs are less likely to experience forced turnover if the firm offers higher average duration pay to the other senior executives in the firm.[5]

To estimate the extent to which the negative association between pay duration and forced executive turnover is due to poor firm-level corporate governance, we repeat our tests after including an interaction term between *Independent*, a dummy variable that identifies firms with above-median fraction of independent directors in the board and *Duration*. We find that the coefficient on the interaction term is negative and significant. Thus, the negative relation between *Duration* and forced CEO turnover is stronger in the subsample of firms with more independent boards. This suggests that poor corporate governance is unlikely to account for the negative association between pay duration and forced turnover.

An interesting puzzle in the empirical corporate governance literature is the low sensitivity of forced CEO turnover to firm performance. That is, CEOs are not fired immediately on poor stock performance. Taylor (2010) uses a structural model to argue that the low correlation may be due to firms facing switching costs when they replace CEOs. To the extent that *Duration* captures these switching costs, one would expect executives with longer *Duration* to have a lower performance-turnover sensitivity. Our

[5] The average duration of the other executives could proxy for factors other than the importance of firm-specific knowledge. To this extent, we do not interpret this evidence as causal.

results support this conjecture. We find that the forced turnover of CEOs with above-median *Duration* is not sensitive to stock return. On the other hand, for CEOs with below-median *Duration*, turnover is very sensitive to stock return.

In our final set of tests, we look at the choice between an insider versus an outside to replace the firm's CEO. Consistent with longer pay duration indicating the importance of firm-specific knowledge, we find that firms that offer a longer-duration pay contract to their executives are more likely to recruit an insider to replace the CEO. Hiring CEOs from inside the firm, in turn, also help retain insiders and motivate them to invest in the acquisition of firm-specific knowledge.

Our paper makes a number of contributions to the empirical compensation literature. We are the first to use detailed information on vesting schedules to estimate the effect of deferred pay on executive turnover. Prior research that looks at the link between compensation and turnover relate the level of stock-based pay to managerial turnover (e.g., Balsam and Miharjo 2007; Fee and Hadlock 2003; Hasenhuttl and Harrison 2002; Mehran and Yermack 1997). In comparison, our duration measure, which accounts for both the level and the vesting period of stock-based pay, better captures the cost that managers incur when they leave the firm and reveals the firm's retention intention. Our detailed vesting data also allow us to design sharper tests to estimate the causal effect of deferred pay on turnover.

Our paper also contributes to the literature that studies the performance-turnover sensitivity of CEOs. Prior literature shows that, in contrast to what economic theories

predict, the sensitivity of forced CEO turnover to firm performance is rather modest (e.g., Coughlan and Schmidt 1985; Denis, Denis, and Sarin, 1997; Huson, Parrino, and Starks 2001; Warner, Watts, and Wruck 1988; Weisbach 1988). We find that pay *Duration* has an important moderating role on the performance-turnover relationship. This suggests that the switching costs in replacing talented executives may go towards explaining the weak performance- turnover relationship.

The rest of this paper is organized as follows. Section 2 develops testable hypotheses. Section 3 describes the sample and variables used in the empirical tests. Section 4 presents our main analysis on pay duration and executive turnover. Section 5 concludes. Definitions of other variables appear in Appendix B.

2. Hypotheses Development

In this section, we outline the hypotheses that have predictions for our setting. Firms often defer pay to retain valuable talent. Deferring pay will also enable the firms to provide incentives for the executives to invest in firm-specific knowledge. Lately, the preferred mode for firms to defer pay is to award a large part of the executive's annual compensation in the form of restricted stock and stock options and to get these awards to vest over a long period. The awards are structured such that the executive will forfeit the unvested portion of the grant if she leaves the firm. This increases the cost to the executive of leaving the firm. Any organization that wants to hire the executive has to compensate for the loss resulting from the forfeiture of unvested options and restricted stocks. This would predict that the amount and vesting schedule of option and stock

grants will affect the executive's likelihood of voluntarily leaving the firm. To test this prediction, we employ the measure of pay duration developed in Gopalan et al. (forthcoming). The advantage of the duration measure is that it takes into account both the amount of unvested grants and their remaining vesting schedule. This leads to our first hypothesis.

Hypothesis 1: Managers with longer pay durations are less likely to leave the firm voluntarily.

To the extent that long pay duration indicates the importance of firm-specific knowledge or/and the perceived managerial talent, the boards of such firms may be more reluctant to fire such executives and choose to wait longer before reaching the firing decision even following poor firm performance. This would predict that executives with longer pay duration are less likely to be forced out. This forms our second hypothesis.

Hypothesis 2: Managers with longer pay duration are less likely to experience involuntary turnover.

If, consistent with *Hypothesis 2*, boards are less likely to force out executives with longer pay duration, it could be due alternatively to poor corporate governance. That is, a captured board (that acts in the interest of executives instead of shareholders) may be reluctant to force out executives, who otherwise would have had to forfeit all unvested pay if being forced out. We examine these different explanations underlying *Hypothesis 2* in our empirical analysis later.

An important puzzle in the corporate governance literature is the low explanatory power (in economic magnitude) of stock performance on forced CEO turnover. That is, CEOs are not significantly more likely to be fired following poor stock performance. Taylor (2010) uses a structural model to argue that the low turnover-performance correlation may be due to firms facing switching costs when they replace CEOs. One possible source of switching cost may be the loss of firm-specific knowledge from the departing CEO. That may explain why boards have greater forbearance in tolerating poor performance and wait longer before the turnover decision in some firms. To the extent that pay duration is longer in situations where firm-specific knowledge is more important (see *Hypothesis 1*), we expect the correlation between firm performance and forced CEO turnover to be especially low in the subsample of executives with long pay duration. This forms our next hypothesis.

Hypothesis 3: The sensitivity of forced turnover to firm performance should be lower for CEOs with longer pay duration.

To the extent that firms offer longer-pay duration in situations where firm-specific knowledge is more important, it has implications for the firm's choice between an insider versus an outsider for the new CEO, conditional on CEO succession. To the extent that an insider has better firm-specific knowledge, we expect firms that on average offer longer-pay duration to be more likely to hire an internal candidate. Hiring CEOs from inside the firm, in turn, also motivate talented insiders' investment in the

acquisition of firm-specific knowledge and help retain them. This leads to our final hypothesis:

Hypothesis 4: Firms that on average offer longer duration pay contracts to their executives are more likely to hire an internal candidate as a CEO.

3. Data and Variables

3.1. Data and sample

We obtain the data for our analysis from six sources: Equilar Consultants, Execucomp, Riskmetrics, Thomson Reuters Institutional Holdings (13f) database, the Center for Research in Security Prices (CRSP), and Compustat.

- We identify executive turnovers from ExecuComp and use news reports, Boardex and other public sources to classify the turnover as voluntary or involuntary.
- Data on the vesting schedules of restricted stock and stock options are obtained from Equilar Consultants (hereafter, Equilar). Similar to S&P (provider of ExecuComp), Equilar collects compensation data from firms' proxy statements. We obtain details of all stock and option grants to all named executives covered by Equilar for the years 2006-2009. Equilar also provides the grant date and the present value of the grants as reported in the proxy statements. Equilar also identifies if the size or the vesting schedule of the grant is linked to firm performance.

- We obtain data on other components of executive pay, such as salary and bonus, from ExecuComp. We carefully hand-match Equilar and ExecuComp using firm tickers and executive names. Since prior studies on executive compensation predominantly use ExecuComp, we ensure comparability of Equilar and ExecuComp by making sure the total number of options granted during the year for each executive in our sample is the same across the two data sets.[6]
- We obtain data on the composition of the Board of Directors from RiskMetrics and whenever needed, supplement it with data from Boardex. Our data on block holders is from Thomson Reuters Institutional Holdings (13f) database.
- We complement the compensation and board data with stock returns from CRSP and firm accounting data from Compustat.

Our final sample consists of the executives covered by both Equilar and ExecuComp for the time period 2006-2009. This results in 6,127 firm-years involving 1,803 firms, 2,406 CEOs and 6,974 other senior executives.

3.2. Key variables

3.2.1. Pay duration

We follow Gopalan et al. (forthcoming) to construct our measure of pay duration ("*Duration*"). To construct this measure, we use data on annual stock and option grants.

[6] We drop 2,470 executive-year observations for which we cannot match the number of option grants across Equilar and ExecuComp. This amounts to 9.3% of the total executive-year observations in our sample.

Specifically, it is the weighted average of the lengths of the vesting periods of the four pay components (i.e., salary, bonus, restricted stocks, and stock options), with the weight for each component being the fraction of that component in the executive's total compensation. If the stocks and options are granted with a cliff vesting schedule, we calculate pay duration as:

$$Duration = \frac{(Salary + Bonus) \times 0 + \sum_{si=1}^{S} Stock_{si} \times t_{si} + \sum_{oi=1}^{O} Option_{oi} \times t_{oi}}{Salary + Bonus + \sum_{si=1}^{S} Stock_{si} + \sum_{oi=1}^{O} Option_{oi}},$$

where $Salary$ and $Bonus$ are the dollar values of salary and bonus as of the year end. Since salary and bonus are paid out in full by the end of the year they have a vesting period of zero in the above formula. $Stock_{si}$ and $Option_{oi}$ are the dollar value of restricted stock grant *si* and stock option grant *oi*, which have a final vesting period of t_{si} and t_{oi} years, respectively. The value of a restricted stock grant is estimated as the product of the stock price on the grant date and the number of stocks granted, while the value of a stock option grant is estimated using Black-Scholes option pricing model by Equilar. *S* and *O*, respectively, are the total number of stock and option grants to the executive in a year. If the stock and option grants vest equally over the vesting periods (graded vesting schedule), t_{si} (t_{oi}) is replaced with $\frac{t_{si}+1}{2}$ ($\frac{t_{oi}+1}{2}$).

Our baseline measure of pay duration does not include grants from prior years. To account for such grants, we construct an alternative measure ("*Duration-2*") by expanding the estimation to include all unvested stock and option grants from prior years. Specifically, *Duration-2* is calculated as:

$$Duration-2=\frac{(Salary+Bonus)\times 0+\sum_{si=1}^{\hat{S}} Stock_{si}\times t_{si}+\sum_{oi=1}^{\hat{O}} Option_{oi}\times t_{oi}}{Salary+Bonus+\sum_{si=1}^{\hat{S}} Stock_{si}+\sum_{oi=1}^{\hat{O}} Option_{oi}},$$

where $\hat{S}$ is the sum of the number of stock grants during the year and the number of unvested stock grants from prior years. For an unvested stock grant *si*, t_{si} is the remaining time to final vesting. Similarly, $\hat{O}$ is the sum of the number of option grants during the year and the number of unvested option grants from prior years, and for an unvested option grant *oi*, t_{oi} is the remaining time to final vesting. As before, if the stock and option grants vest equally over the vesting periods (graded vesting schedule), t_{si} (t_{oi}) is replaced with $\frac{t_{si}+1}{2}$ ($\frac{t_{oi}+1}{2}$). More details on the construction of *Duration-2* are provided in Appendix A.

Our measure of duration does have a limitation as a proxy for the extent of deferred pay. We do not include severance and post-retirement benefits that may be important for providing long-term incentives. The main reason for this exclusion is the difficulty in obtaining the vesting schedules of these benefits. To the extent that the retirement benefits are in the form of a defined contribution retirement account and to the extent that the executive has spent sufficient time with the firm, the retirement account is likely to have vested fully and is unlikely to prove problematic. Furthermore, our subsequent empirical analysis shows that our measure of pay duration is significantly associated with the likelihood of voluntary turnover.

3.2.2 Management turnover

In this section, we describe the methodology we employ to identify turnover of a named executive of the firm for whom we can obtain pay data from the firm's proxy statements. We start by identifying changes in executive designations as documented in ExecuComp.[7] We then search Factiva, LexisNexis, and Boardex for news reports coincident with the change in designation to identify the causes for the change. From our list of potential turnovers, we drop instances that are due to misclassification in ExecuComp, takeovers or spinoffs, interim positions, sudden death of the manager and mandatory or planned retirement. Our final sample includes 1081 management turnovers, of which 239 involve a CEO.

For turnovers involving a CEO, we start with using the criteria in Parrino (1997) to classify the turnover as voluntary or involuntary. All turnovers for which the press reports that the CEO is fired, is forced out, or departs due to difference of opinion or unspecified policy differences with the Board, are classified as forced. Of the remaining turnovers, if the departing CEO is under age 60, it is classified as forced if either (1) the reported reason for the departure does not involve death, poor health, or acceptance of another position elsewhere or within the firm (including the chairmanship of the board)[8], or (2) the CEO is reported to be retiring but there is no announcement about the retirement made at least two months prior to the departure. We then complement these

[7] The earlier literature identifies the samples of CEO turnovers using Forbes annual compensation surveys (e.g., Borokhovich, Parrino, and Trapani 1996; Huson, Malatesta, and Parrino 2004; Huson, Parrino, and Stark 2001; Parrino 1997). More recent studies (e.g., Jenter and Kanaan forthcoming) use the changes in the CEO position in ExecuComp to classify CEO turnovers.

[8] In case of health being a reported reason for the departure, we track backward the press reports about the CEO's health status, and ensure that the departure is indeed due to the health problem. Otherwise, we still treat the departure as being forced.

criteria with two of our own. We reclassify a forced turnover (identified using the steps described above) as voluntary if either (1) the CEO's employment record, obtained from Boardex and Marquis Who's Who publications, suggests that the CEO obtained a comparable position elsewhere, or (2) the press reports convincingly explain that the departure is due to previously undisclosed personal or business reasons that are unrelated to the firm's activities. All the CEO turnovers not classified as forced or due to mandatory or planned retirements are classified as voluntary.[9]

For some of our tests, we classify a new CEO as being external/internal to the firm if she has been with the firm for no more/more than a year before the succession. We do this by relying on ExecuComp and Boardex for information on a manager's career path, supplemented by Marquis Who's Who publications, Bloomberg Businessweek, and Standard & Poor's register of corporations, directors, and executives.

For turnovers involving other senior executives, there are fewer detailed press reports about the circumstances involving their departure. Hence, it is difficult to employ the same criteria as those for CEOs to distinguish between forced and voluntary turnovers. We thus employ an alternative classification. We first try to identify if a departing executive takes up a position in a new firm. Specifically, we classify an executive turnover as "jump-ship" (employing the terminology in Fee and Hadlock (2003)) either if (1) the press reports that the executive is leaving to join another firm, or

[9] Among CEOs who depart voluntarily in our sample, 27 join other firms as CEOs. Given the small number of them, we do not conduct a separate analysis of them from the overall group of voluntary turnovers.

(2) the employment record of the executive as obtained from Boardex and Marquis Who's Who publications indicates that the executive took up a position in a new firm within three months of departure from the old firm and there is no convincing evidence in the press that the executive was ousted by the old firm. All other senior executive turnovers except those involving mandatory retirements are classified as involuntary.

Given the paucity of information about non-CEO executive turnovers, we are likely to classify some voluntary executive turnovers as involuntary. This is unlikely to be a problem for us because our primary interest is in understanding how pay duration affects the probability of a voluntary executive turnover. Moreover, *Hypotheses 1 & 2* predict that pay duration is negatively correlated with both voluntary and involuntary executive turnover.

3.3. Summary statistics

Table 1 presents summary statistics of the key variables we use in our analysis. All variables are winsorized at the 1% and 99% level to mitigate the potential impact of outliers. Detailed definitions of these variables (except pay duration and management turnover that are discussed earlier) are provided in Appendix B. Panel A summarizes the data for CEOs while Panel B summarizes the data for non-CEOs. From Panel A, we find that the average *Duration* (*Duration-2*) for CEOs in our sample is 1.45 (1.48) years, consistent with the numbers in Gopalan et al. (forthcoming). We find that the average CEO is 54.87 years old, has spent 7.48 years in her current position and has about 0.13%

of the firm's equity. We also find that about 51% of the CEOs in our sample are also the Chairman of their board as seen from the mean value of *Duality*.

From Panel B, we find that the mean value of *Duration* (*Duration-2*) for non-CEOs in our sample is 1.26 (1.29) years. The non-CEOs have an average age of 50.39 years and have spent 14.84 years in the firm. Note that while *Tenure* for CEOs indicates the number of years the executive has been the CEO, for non-CEOs, *Tenure* refers to the number of years the executive has been with the firm.

In Panel C, we present the summary statistics of the characteristics of the firms in our sample. We use industry adjusted stock return (*Ind. adj. stock return*), which is the difference between the annual return on the firm's stock and the average stock return of firms in the same industry defined at the two-digit SIC code level as our main measure of firm performance.[10] We find that, on average, firms in our sample outperform the industry as seen from the mean value of *Ind. adj. stock return* of 0.03%. The average *Volatility* of the firms in our sample is 42%. The firms in our sample are on average large, as seen from the mean value of *Firm size,* of 7.75. In comparison, the average value for all firms in Compustat during the same sample period is 5.47. The firms in our sample have valuable growth opportunities as seen from the average value of *Market to book* ratio of 1.71. The average *Leverage* of our sample firms is 23%, and on average, they

[10] Our main findings hold for alternative measures of firm performance, namely, two year industry adjusted stock returns, industry adjusted returns using Fama-French 49 industry classification and industry adjusted performance measure used by Jenter and Kanaan (forthcoming). The latter is estimated as the annualized residual obtained from regressing the monthly return on the firm's stock on the return of the value weighted index of all firms in the same industry.

spend about 2.4% of the book value of total assets on R&D as seen from the mean value of *R&D/Asset*.

In Table 2, we conduct a set of univariate tests on the different turnovers in our sample. In Panel A, we classify the CEO years in our sample into those involving a voluntary turnover and those not involving a voluntary turnover, and provide the average CEO and firm characteristics. We have 125 voluntary CEO turnover events during our sample period. The average value of *Duration* of CEOs who voluntarily leave the firm is 1.07, significantly below the average value of *Duration* for CEOs who stay with the firm (1.46). We observe a similar pattern with *Duration-2*. This is consistent with *Hypothesis 1*. We also find that firm-years with a voluntary CEO turnover have lower industry adjusted stock return. CEOs who voluntarily leave their firm are younger, have shorter tenures and lower stock holding in their firm. In our regressions that explore the effect of *Duration* and *Duration-2* on voluntary CEO turnover, we include these variables as controls to ensure that they do not bias our conclusions.

In Panel B, we classify the non-CEO executive years in our sample into those before a non-CEO executive jumps ship and others, and present the average executive and firm characteristics.[11] We have 289 instances where a non-CEO executive leaves the firm for another firm. We find that the average value of *Duration* (*Duration-2*) of non-CEO executives who "jump-ship", 0.41 (0.46), is significantly below the average value for non-CEO executives who stay with the firm, 1.21 (1.31). This again is consistent with

[11] We focus on the year before the executive jumps ship because executive pay information is usually not available in the proxy statements if the executive leaves in the middle of a year.

Hypothesis 1. We also find that firm-years before a non-CEO executive "jumps-ship" have lower industry adjusted stock return. Non-CEO executives who voluntarily leave their firm are younger and non-surprisingly have shorter tenures with their firm.

In Panel C, we divide our sample into firm-years before a forced CEO turnover and other firm-years, and present the average CEO and firm characteristics. We have 114 forced CEO turnover events during our sample period. We find that while the average *Duration* (*Duration-2*) of CEOs who are forced out of their firms is 0.87 (0.87), it is significantly below the average value for CEOs who stay with the firm, 1.47 (1.50). This is consistent with *Hypothesis 2*. We also find that firm-years with a forced CEO turnover have lower *Ind. adj. stock return*. CEOs who are forced to leave their firm are also younger, have shorter tenures and lower stock holding in their firm, and are less likely to be the Chairman of their Board. In our regressions exploring the effect of *Duration* on forced CEO turnover, we include these variables as controls to ensure that they do not bias our conclusions.

Finally, in Panel D, we compare non-CEO executive-years before those involving an involuntary turnover to all others. We have 553 non-CEO turnover events in our sample that we classify as involuntary. We find that while the average value of *Duration* (*Duration-2*) of non-CEO executives who involuntarily leave the firm is 0.79 (0.80), it is significantly below the average value for non-CEO executives who stay with the firm, 1.21 (1.31). This again is consistent with *Hypothesis 2*. We also find that executive-years

with an involuntary turnover have lower *Ind. adj. stock return*. Non-CEO executives who involuntarily leave their firm are younger and have shorter tenures with their firm.

To summarize, our univariate evidence indicates that executives (both CEOs and non-CEOs) with longer pay duration are less likely to leave their firms. This evidence is consistent with both *Hypotheses 1 & 2*.

4. Main Analysis of Pay Duration and Turnover

In this section, we conduct multivariate tests of the effect of pay duration on executive turnover. We first discuss the tests that study voluntary turnovers, which are followed by those that look at involuntary turnovers.

4.1. Pay duration and voluntary turnover

4.1.1. Baseline analysis

In Table 3, we test *Hypothesis 1* by relating CEO pay *Duration* to the likelihood of voluntary turnover. Following prior literature (e.g., Hazarika, Karpoff, and Nahata 2012; Jenter and Kanaan forthcoming), we first employ the Cox proportional hazard model (Cox 1972) to conduct our test: [12]

$$\lambda(t|X) = \lambda_0(\beta_0 I * t)\exp(\beta' X).$$

The dependent variable in the model is whether there is a voluntary CEO turnover at the time of a year. The hazard model accounts for both the occurrence and timing of

[12] We repeat all the analyses using a Logit model and find that the results, not reported for brevity, are robust.

turnover and allows for the inclusion of time-varying co-variates. We allow baseline hazards to vary across industries to capture the difference in turnover patterns in different industries. Our key independent variable is *Duration*, and *Hypothesis 1* predicts that it has a negative coefficient. We also include as controls a number of firm and CEO characteristics that prior literature has shown to affect the probability of CEO turnover. The firm characteristics we include are *Ind. adj. stock return*, *Firm size*, *Volatility* and *Block holder*. The last variable is a dummy variable that identifies the presence of a block holder with more than 5% shareholding in the firm. The set of CEO characteristics we include are *Tenure*, *Age*, *Stock holding*, and *Duality*. In all regressions, we also include year fixed effects, and the standard errors we estimate are robust to heteroskedasticity and clustered at the three-digit SIC code industry level.

The results from Column (1) of Table 3 show that the coefficient on *Duration* is negative and significant. This indicates that a CEO with longer pay duration is less likely to leave the firm voluntarily. From the coefficient on the control variables, we find that older CEOs and CEOs who have higher equity ownership in the firm are less likely to leave the firm voluntarily. In Column (2), we repeat our estimates employing a linear probability model. We do this for two reasons. First, employing the linear probability model helps us estimate the economic significance of our results more easily and in an intuitive manner. Second, with the linear probability model, we can control for firm fixed effects. The inclusion of firm fixed effects ensures that we control for all time-invariant firm characteristics. We are unable to include firm fixed effects in the non-

linear COX hazard model because of the incidental parameters problem (Neyman and Scott 1948). Our results in Column (2) are consistent with those in Column (1) and show that CEOs with longer duration pay are less likely to voluntarily leave their firm. Our findings are also economically significant. The negative coefficient on *Duration* in Column (2) implies that a one standard deviation increase in *Duration* (0.97) results in a decrease in the annual probability of a voluntary CEO turnover by 1.16%. In comparison, the unconditional probability of a voluntary CEO turnover any year in our sample is 2.0% with a standard deviation of 14.1%. Thus, a one standard deviation increase in *Duration* is associated with a 58% decrease in the likelihood of a voluntary CEO turnover as compared to the sample mean or a 8.2% decrease in the standard deviation of the voluntary CEO turnover probability.

In Columns (3)-(4), we estimate the effect of pay duration on the likelihood of a non-CEO executive jumping ship. In Column (3), we employ the COX model with the dependent variable being the indicator of a senior executive jumping ship at the time of a year. Apart from the usual set of controls, we also control for incidences of CEO turnover during the previous two years (*CEO Turnover*) and for incidences when there is an external hire in replacing the departing CEO during the previous two years (*External hire*). We do this to ensure that executive turnovers, which may result from a change in the top management of the firm, do not affect the coefficient on *Duration*.

The result in Column (3) shows that the coefficient on *Duration* is negative and statistically significant. This highlights that a longer pay duration lowers the likelihood

of a senior executive jumping ship. We also find that senior executives of larger firms (positive coefficient on *Firm size*), those with shorter tenure (negative coefficient on *Ln(Tenure)*), and younger executives (negative coefficient on *Age*) are more likely to jump ship. Also, the likelihood of an executive jumping ship does not appear to be associated with firm performance. Column (4) presents the result of the linear probability model with time and firm fixed effects. Here again, we find that the coefficient on *Duration* is negative and significant. Our estimates are also economically significant. The coefficient on *Duration* in Column (4) implies that a one standard deviation increase in *Duration* (0.88) is associated with a 2.4% reduction in the probability of an executive jumping ship. In comparison, the unconditional probability of an executive jumping ship in our sample is 1.6% with a standard deviation of 12.6%. Thus, our estimates are extremely significant.

In Table 4, we repeat our tests in Table 3 with our alternative measure of pay duration that includes all the unvested stock and option grants from prior years. In this sense, it is a more comprehensive measure of all outstanding deferred pay from stock and option grants. We find that the coefficient on *Duration-2* is negative and significant in all the columns. The economic significance of the result is comparable to those in Table 3. The coefficient in Column (2) (Column (4)) implies that a one standard deviation increase in *Duration-2* that is 0.86 years (0.80 years) is associated with a 1.29% (2.48%) reduction in the probability of a voluntary CEO turnover (non-CEO executive jumping ship). Thus, our results are robust to the alternative measure of pay duration.

4.1.2. Test of causality

The negative correlation between *Duration* (or *Duration*-2) and voluntary executive turnover, documented in Tables 3 and 4, may be subject to an omitted variable bias, and thus may not necessarily imply a causal effect of deferred pay on turnover. The important firm- and executive-level omitted variable that may affect both pay duration and the likelihood of executive turnover are the importance of firm-specific knowledge and perception of executive talent by the board, respectively. Specifically, as discussed earlier, firms where firm-specific knowledge is valuable may offer longer duration pay to incentivize executives' investment in such knowledge. To the extent such firm-specific knowledge is less valuable outside the firm, executives of such firms may have less valuable outside options and hence may stay longer with the firm. Similarly, all else equal, boards may grant longer duration pay to executives who they perceive to be more talented. Given the favorable internal perception, such executives may also find it optimal to remain with the firm.

We implement a two-stage instrumental variable regression to examine the causal effect of pay duration on voluntary turnover. Our strategy is to identify executive-years in which a large prior-year stock or option grant vests (*Large vesting*). We use these lumpy vesting episodes as instances that significantly reduce an executive's pay duration, and estimate its effect on executive voluntary turnover. To circumvent the endogeneity of stock/option grant, we focus on grants that were awarded more than two years ago. To the extent that these grants were awarded in the distant past, their

vesting is unlikely to be correlated with time-varying firm- and executive-level omitted variables and executive voluntary turnover. Edmans, Fang and Lewellen (2014) use a similar instrument to study the effect of stock vesting schedules on managerial myopia as reflected in corporate investment decisions.

Our identifying assumption in this test is two-fold. First, we assume *Large vesting* will be correlated with *Duration-2*. This is mechanical because *Duration-2* includes prior year grants in its calculation. Vesting of a large stock or option grant during a year is likely to reduce *Duration-2*.[13] The second identifying assumption is the exclusion restriction which assumes that *Large vesting* is correlated with voluntary turnover only to the extent it affects *Duration-2*. We believe this is reasonable because, a) *Duration-2* adequately captures the effect of *Large vesting* on the amount and length of deferred pay; b) since we focus on the vesting of grants that are more than two years old, the vesting is unlikely to be correlated with time-varying firm and executive specific factors.

We present the results of this two-stage IV regression in Table 5. Given the consistent effect of pay duration on voluntary turnover for CEOs and non-CEO executives, as shown in Tables 3 and 4, and the expected identical marginal impact of *Large vesting* on pay duration across these two groups of executives, we pool CEOs and non-CEOs in this regression. Moreover, IV regression only allows the linear probability

[13] Note that vesting of a large grant will increase *Duration-2* only if the firm does replenish the vested stock and options with an equal sized grant with a longer vesting schedule. In our data, we find that the correlation between *Large vesting* and *Duration-2* is negative and significant. This is consistent with firms not replenishing a vested grant.

model to be employed here. In the first stage, we regress *Duration-2* on *Large vesting* and the set of control variables in Table 4, where *Large vesting* is defined as a dummy that equals one if the largest stock/option grant in prior years vests and zero otherwise. Consistent with our conjecture, we find that *Large vesting* results in a decrease in *Duration-2* and the effect is significant. We also find that *Large vesting* is a strong instrument as seen from the F-value for the first stage regression of 12.51.[14] More interestingly, the results of the second stage regression show that the coefficient on *Duration-2* remains negative and significant, consistent with the findings in Table 4. In Columns (3) and (4), we repeat the estimate after including firm fixed effects and again find that the coefficient on *Duration-2* is negative and significant.

In comparing Column (4) to Column (2), we find that the coefficient on *Duration-2* drops to a sixth after inclusion of firm fixed effects. This highlights the importance of unobserved, firm-level, time-invariant factors for executive turnover. The second interesting fact is when we compare the coefficient on *Duration-2* in Column (4) to those in Columns (2) and (4) of Table 4, we find that the coefficient in our IV specification is significantly larger than that in the OLS specification. Note that when we estimate with an OLS specification combining CEO and non-CEO voluntary turnover, we find that the coefficient on *Duration-2* is -0.049 and statistically significant. The larger coefficient in the IV specification as compared to that in the OLS specification indicates that

[14] Note that a F-value over 10 is typically considered the sign of a strong instrument (Cameron and Trivedi 2005).

unobserved omitted factors that affect both *Duration-2* and voluntary turnover are likely to be biasing the coefficient downward.

A possible reason for the negative bias is the presence of other factors that may bond an executive to the firm and reduce the likelihood of voluntary turnover. In the presence of such factors, firms may find it optimal to reduce the risk imposed on the executive and award pay with short vesting schedule. One such bonding mechanism could be if the executive is also one of the promoters. Such executives are unlikely to leave the firm voluntarily and in response, firms may award a low duration pay. Similarly, older executives with significant firm-specific skill may also be less likely to leave the firm voluntarily. For such executives as well, firms may find no need to award pay with long vesting schedule, especially if the executive's remaining time to retirement is short.

To summarize, consistent with *Hypothesis 1*, we find that the likelihood of a voluntary CEO turnover and that of a non-CEO executive jumping ship are lower when they have longer pay duration. And our further test suggests that the effect of pay duration on voluntary executive turnover is causal.

4.2. Pay duration and forced turnover

In Table 6, we analyze the effect of CEO pay duration on the likelihood of a forced CEO turnover. To the extent that a longer pay duration identifies firms with higher costs of changing CEOs, *Hypothesis 2* predicts that a CEO with longer pay duration is

less likely to experience a forced turnover. In Column (1), we present the results of estimating the Cox hazard model on forced CEO turnovers. Consistent with *Hypothesis 2,* the negative and significant coefficient on *Duration* shows that CEOs with longer pay duration are less likely to be forced out. We also find that firms with lower industry adjusted stock returns (negative coefficient on *Ind adj. stock return*) and firms with more volatile stock (positive coefficient on *Volatility*) are more likely to experience a forced CEO turnover. Also, CEOs of larger firms (positive coefficient on *Size*), younger CEOs (negative coefficient on *Age*) and those with lower shareholding (negative coefficient on *Shareholding*) are more likely to be forced out.

In Column (2), we repeat our estimates with a linear probability model and find consistent results as in Column (1). Our estimates are economically significant. The coefficient on *Duration* in Column (2) indicates that a one standard deviation increase in CEO pay duration (0.97) is associated with a 1.07% reduction in the probability of a forced CEO turnover. In comparison, the average probability of a forced CEO turnover in our sample is 1.86%. Another way to put the economic significance of the effect of *Duration* in context is to compare its effect to that of firm performance. The coefficient on *Ind adj. stock return* in Column (2) implies that a one standard deviation increase in *Ind adj. stock return* (0.33) is associated with a 0.76% reduction in the annual probability of a forced CEO turnover. Thus, the effect of pay duration is about 1.4 times that of firm performance.

Although the effect of pay duration on forced turnover is not expected to be causal, there are three potential explanations, outlined in Section 2, that might account for a negative correlation between pay duration and forced turnover. These are managerial talent, the importance of firm-specific knowledge, and weak corporate governance. In the subsequent tests, we explore the importance of these explanations for the observed negative correlation.

Boards may grant a longer duration pay to more talented CEOs and may also be more reluctant to fire such CEOs. To the extent managerial talent is time invariant, we follow prior literature and use managerial fixed effect to proxy for managerial talent (Bertrand and Schoar 2003) and repeat our tests in Column (3). Thus, the specification in column (3) includes CEO fixed effects in addition to industry and time fixed effects. Comparing the coefficient in column (3) to that in column (2), we find that inclusion of executive fixed effect has a marginal effect on the size of the coefficient on *Duration* but significantly increases the standard errors which results in the coefficient turning insignificant. This provides evidence consistent with manager fixed effects being important for the *Duration*-forced turnover relationship.

One disadvantage of using manager fixed effects to account for executive talent is that one does not have an average point estimate of the effect of talent. To get such an estimate in alternate tests (results are untabulated, but available upon request), we identify a set of CEOs for whom we can obtain pay duration in their prior employment, *Prior duration*. To the extent executive talent is time invariant and to the extent it affects

pay duration, we expect talented executives to obtain longer duration pay in their prior employment as well. To the extent executive talent affects the duration-turnover relationship, we expect a negative correlation between *Prior duration* and the likelihood of forced turnover. Consistent with CEO talent being an important explanation for the negative pay-duration-forced-turnover correlation, we find that the coefficient on *Prior duration* is negative and statistically significant.

Second, in firms where managers' firm-specific knowledge is more important, the board is likely to be more tolerant in its executive force-out decision in order to encourage executives' investment in acquiring firm-specific knowledge. There are two possible ways to isolate the effect of the importance of firm-specific knowledge in driving the forced turnover-duration relationship. Similar to using manager fixed effects to estimate the role of talent, one can use firm fixed effects to proxy for the importance of firm-specific knowledge and estimate its effect on the coefficient on *Duration*. We do this in column (4) and find that inclusion of firm fixed effects does not significantly affect the size of the coefficient on *Duration*. Thus, the negative correlation between *Duration* and forced CEO turnover in Column (2) appears mainly due to within-firm changes in *Duration* and forced CEO turnover.

Note that the small effect of firm fixed effects on the duration-forced CEO turnover relationship does not necessarily imply that investment in firm-specific knowledge is not important for the duration-forced CEO turnover relationship. The need for investment in firm-specific knowledge could be time varying and firm fixed effects are

unlikely to capture this. To isolate the effect of time-varying importance of firm-specific knowledge on the duration-forced turnover relationship, in unreported tests, we estimate the effect of *Average duration* on the likelihood of a forced CEO turnover. *Average duration* is the mean pay duration of all other senior executives in the firm in a given year. When firms want executives to invest in firm-specific knowledge, they are likely to offer long duration pay to *all* the top executives. We find that the coefficient on *Average duration* is negative and significant. This is consistent with the importance of firm-specific knowledge as an important channel that underlies the negative correlation between CEO pay duration and forced turnover. [15]

Third, we examine if the negative pay-duration-forced-turnover correlation may result from poor corporate governance. This can happen if a captured board (that acts in the interest of the CEO) is reluctant to fire a CEO with significant unvested stock and option grants as the CEO may lose the unvested grants. To test this, we use the fraction of independent directors on the firm's board as our proxy for board strength and corporate governance, and create a dummy variable, *Independent,* that takes a value one if the fraction of outsiders on a firm's board of directors is above the sample median in a given year. We then repeat our tests after including an interaction term between *Independent* and *Duration* to see if the negative effect of pay duration on the likelihood of forced CEO turnover is concentrated in firms with less independent boards. This would

15 We have *Prior Duration* for only a small fraction of our executives. This limits our ability to compare the relative importance of firm-specific knowledge and executive talent in affecting the Duration-forced turnover relationship by including both *Average duration* and *Prior duration* in the same specification. When we do so in unreported tests, we find that the coefficients on both variables are negative but insignificant.

imply a positive coefficient on the interaction term. We present the results in Table 7. In Column (1), we repeat the estimate from Column (1) of Table 6 (the Cox hazard model) which relates CEO pay duration to the likelihood of a forced turnover. In Column (2), we repeat this estimate after including *Independent* and an interaction term *Duration X Independent.* We find that the coefficient on the interaction term is negative and significant, which suggests that the correlation between pay duration and forced CEO turnover is stronger in firms with more independent boards. In the next two columns, we repeat the analysis with the linear probability model and find consistent results. This finding is inconsistent with poor corporate governance as an explanation for the negative duration-forced-turnover relation. Instead, combined with our findings about the other two explanations, it suggests that more independent boards are more likely to incorporate the considerations of CEO talent and the importance of firm-specific knowledge into their CEO force-out decisions.

We also analyze the effect of pay duration on the likelihood of involuntary turnover for non-CEO senior executives. As mentioned before, due to the paucity of details on non-CEO turnovers from public sources, we classify non-CEO turnovers that do not involve the executive retirement or the executive jumping ship to another firm as being involuntary. Note that this classification is bound to be noisy, and this set of turnovers could also include some voluntary turnovers. This is not a serious problem for us qualitatively, because we expect *Duration* to lower the likelihood of both voluntary and involuntary turnovers according to *Hypotheses 1 & 2*. The caveat is with the precision of

the estimate of the pay duration sensitivity of non-CEO executives' involuntary turnover. To this end, we choose to not tabulate the results of our analysis in this part (available upon request). The untabulated results strongly support *Hypothesis 2*. They show that non-CEO executives with longer pay duration are less likely to experience an involuntary turnover. Also, the estimates of the effect of pay duration are highly significant in economical magnitudes. The coefficient estimated from the linear probability model implies that a one standard deviation increase in *Duration* (0.88) is associated with a 1.85% decrease in the probability of an involuntary executive turnover. In comparison, the average probability of an involuntary executive turnover in our sample is 3.07%.

Overall, our findings are consistent with *Hypothesis 2* that executives with longer pay duration are less likely to experience an involuntary turnover. And this negative duration-turnover association is not due to poor corporate governance, but can be explained by the importance of firm-specific knowledge and managerial talent, both of which are positively related to pay duration and negatively related to forced turnover.

4.3. Pay duration and performance-sensitivity of forced turnover

To test *Hypothesis 3*, we estimate how pay duration affects the sensitivity of forced CEO turnover to firm performance in Table 8. In Column (1), we repeat the estimate from Column (1) of Table 6 which relates CEO pay duration to the likelihood of a forced turnover. In Column (2), we repeat the estimation of the Cox hazard model after including an interaction term *Duration X Ind. adj. stock return.* We find that the

coefficient on the interaction term is positive and significant. This indicates that, for CEOs with longer duration pay, the likelihood of a forced turnover is less sensitive to stock returns. In Column (3), we repeat the estimates with a linear probability model and again find that the coefficient on the interaction term is positive and significant. In Column (4), we repeat our estimates with firm (in addition to time) fixed effects and obtain similar results.

Since our duration measure is a continuous variable, it is difficult to interpret the economic significance of the coefficient on the interaction term. To get a better sense of the economic significance, in Column (5), we repeat our estimation after replacing *Duration* with a dummy variable, *High duration,* that takes a value one for the CEOs whose pay duration is above the sample median for that year. The coefficient on *Ind. adj. stock return* is an estimate of the sensitivity of forced CEO turnover to stock returns for a CEO with below the sample median pay duration, while the sum of the coefficients on *Ind. adj. stock return* and *Duration* X *Ind. adj. stock return* is an estimate of the sensitivity of forced CEO turnover to stock returns for a CEO with above the sample median pay duration. Our estimates show that the coefficient on *Ind. adj. stock return* is -.038. This is twice the estimate in Column (3). It indicates that forced CEO turnover is twice as sensitive to stock returns for CEOs with below the sample median pay duration as compared to the sample average sensitivity. We also find that the coefficient on the interaction term is .034. And in unreported tests, we find that we cannot reject the null that the sum of the coefficients on *Ind. adj. stock return* and the interaction term *Duration*

X Ind. adj. stock return is equal to 0. This indicates that in our sample, forced CEO turnover is not sensitive to stock performance for CEOs with above the sample median pay duration. That is, all the sensitivity to stock returns found in Column (3) is driven by CEOs with below the sample median pay duration.

Our finding is consistent with perceived switching costs affecting the turnover-performance sensitivity (Taylor (2010)). Specifically, higher perceived switching cost may explain the board's greater forbearance in tolerating poor firm performance and waiting longer before firing the CEO. Possible sources of switching costs could be the loss of firm-specific knowledge and high perceived managerial talent. Our results of the lower performance-turnover sensitivity among CEOs with high duration pay is consistent with pay duration capturing both the importance of firm-specific knowledge and managerial talent.

4.4. Pay duration and internal CEO hiring

In this section, we perform tests of *Hypothesis 4* that has predictions on whether a firm will select an internal or external candidate as the replacement CEO. To the extent that the average duration of the top executives of a firm is a proxy for the importance of firm-specific knowledge in the firm, we expect firms that offer longer average pay duration to their top executives to be more likely to hire an internal candidate to replace the CEO. On the other hand, internal hiring is also an important means of talent retention because insiders would have stronger incentives in investing in acquiring firm-specific knowledge. In Table 9, we estimate a linear probability model where the

dependent variable is *External*, a dummy variable that identifies firms that select an external candidate as the replacement CEO. Our main independent variable is *Average duration*, the average pay duration of all senior executives (except the departing CEO) of the firm included in ExecuComp. We include as a control variable, *Forced turnover*, a dummy variable that identifies if the departing CEO was forced out. We include this variable because prior research shows that firms are more likely to hire an outsider if the predecessor was forced out (e.g., Parrino 1997). We also include *Ind. adj. stock return*, *Volatility*, *Firm size*, and *Block holder* as additional control variables.

The result in Column (1) of Table 9, estimated with industry and year fixed effects, shows that firms are less likely to hire an external candidate if the senior executives in the firm have longer pay duration. This finding is robust after including other control variables in the regression, as shown in Column (2). One concern with our estimates is that they could be biased by the quality of the internal candidate who is chosen to be the CEO. Firms that have a better quality internal candidate are likely to offer her a contract with longer pay duration and also select her to be the replacement CEO. To address this concern, we repeat our tests by calculating *Average duration* after excluding the pay duration of the internal candidate who becomes the replacement CEO. In untabulted results, we again find that firms that offer longer duration pay contracts to their senior executives are less likely to hire an external candidate.

To the extent that the importance of firm-specific knowledge is common across firms in an industry, we expect firms in industries with higher pay duration to be more likely

to hire an internal candidate to replace their CEO. We test this in Column (3) after replacing *Average duration* in Column (1) with *Industry duration*, which is defined as the average pay duration of CEOs in the industry (defined based on three-digit SIC codes).[16] We find that firms from industries with higher average pay duration are more likely to hire an internal candidate, as seen from the negative and significant coefficient on *Industry duration*. In Column (4), the coefficient on *Industry duration* remains negative but becomes insignificant after including other control variables. The impact of *Industry duration* appears to be encapsulated by that of the variations of firm characteristics across industries.

As a summary, we document that firms are more likely to choose an insider as their new CEO if other senior executives have been granted pay with longer duration. It is consistent with the firm-specific knowledge being an important consideration in firms' CEO succession decision.

5. Conclusions

We argue that deferred pay enables firms to retain managerial talent. Firms typically defer the stock component of pay. The forfeiture of all unvested stock pay upon executive turnover, voluntarily or involuntarily, increases the cost of managerial departure. Using the duration measure of executive compensation, introduced by Gopalan, et al. (forthcoming), that captures both the magnitude and the vesting length of stock pay, we find that there is a negative causal effect of pay duration on voluntary

[16] In this test, only year fixed effect is included.

executive turnover. We also find that pay duration is negatively correlated with involuntary executive turnover, the sensitivity of involuntary turnover to firm performance, and the likelihood of external hiring in CEO succession. These findings are consistent with a significant role of the importance of firm-specific knowledge and managerial talent that underlie both the design of pay duration and executive turnover decisions in firms.

Our study suggests that firms' compensation policy and management turnover decisions are interlinked. It highlights the effectiveness of explicit compensation contract in talent retention, which has received little attention in the prior literature on managerial compensation. We leave it for future research to explore potentially interesting implications of the joint roles of managerial compensation contract – incentive provision and talent retention – on firms' financial policies and corporate decisions.

Appendix A: Construction of the alternative duration measure – *Duration-2*

Duration-2 augments the baseline duration measure *Duration* by including all grants awarded in prior years. Among them, all vested stocks and stock options awarded in prior years are assigned a vest period of 0; detailed vesting schedule of all unvested grants that were awarded during 2006-2009 is obtained from Equilar; for all unvested grants that were awarded prior to 2006, we need to estimate their vesting schedule using the detailed information provided in ExecuComp on the total outstanding unvested stocks and stock options as of each year end. The procedure of estimating the vesting schedule of unvested pre-2006 grants is described as follows.

For stock options, we first isolate the unvested pre-2006 grants by subtracting the unvested post-2006 grants (aggregated from Equilar) from the total outstanding unvested grants obtained from ExecuComp. To do so, we need to merge Equlilar and ExecuComp using executive identity, year, exercise price, and expiration date. We then use the year-on-year change in the total unvested pre-2006 grants to gauge their vesting schedule with the assumption that these grants vest at the end of 2011. For restricted stocks, we do not need such an assumption since there is no expiration date or exercise price for restricted stocks. And we follow the same procedure in the estimation of their vesting schedule except that we merge Equilar and ExecuComp using executive identity and year only.

Appendix B: Definitions of other variables

Age	Age of the executive (in years)
Block holder	Indicator variable: Takes a value of one if there is at least one institution holding more than 5% of the firm's outstanding stocks.
Duality	Indicator variable: Takes a value of one if the CEO is also the chairperson, and 0 otherwise.
External hire	Indicator variable: Takes a value of one if an outsider hired is hired as a CEO.
Firm size	Natural log of the total assets of the firm.
High duration	Indicator variable: Takes a value of one if the pay duration of the executive is above the sample median.
Ind adj. stock return	Firm's annual stock return from the previous year net of the mean industry stock return.
Independent	Indicator variable: Takes a value of one if the fraction of outsiders on the firm's Board of Directors is above the median in a given year. Any director who is an employee of the firm or has some affiliation with the firm is classified as an insider.
Leverage	It is the sum of long-term debt and debt in current liabilities divided by total assets.
Market to book	The ratio of market value of total assets to book value of total assets
R&D/Asset	It is the ratio of research and development expenditure over the book value of total assets. Missing values are replaced with zero.
Stock holding	The fraction of outstanding shares owned by the executive.
Tenure	Number of years an executive has been in office.
Volatility	Standard deviation of the firm's stock return over the 12 months

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Table 1
Summary Statistics

This table presents descriptive statistics of our sample. Panels A and B present characteristics of CEOs and other executives, respectively. Panel C presents firm characteristics. *Duration* and *Duration-2* are measures of executive pay duration discussed in Section 3.2. All other variables are defined in Appendix B.

PANEL A: CEOs

	N	Mean	SD	P25	Median	P75
Duration	6127	1.455	0.969	0.637	1.658	2.134
Duration-2	6100	1.487	0.858	0.947	1.624	2.040
Age	6127	54.865	7.194	50	55	60
Tenure	6127	7.481	7.096	2.499	5.419	10
Stock holding	6127	12.724	23.884	0.71	2.911	10.381
Duality	6127	0.514	0.5	0	1	1

PANEL B: Other executives

	N	Mean	SD	P25	Median	P75
Duration	18005	1.259	0.882	0.491	1.377	1.891
Duration-2	17979	1.291	0.804	0.722	1.397	1.826
Age	18005	51.101	7.358	46	51	56
Tenure	18005	14.873	11.707	6	12	22
Stock holding	18005	3.31	14.956	0.11	0.495	1.456

Panel C: Firm characteristics

	N	Mean	SD	P25	Median	P75
Ind adj. stock return	6127	0.03	0.328	-0.172	-0.003	0.184
Volatility	6127	0.42	0.228	0.26	0.361	0.509
Firm size	6127	7.745	1.747	6.489	7.622	8.894
Market to book	6108	1.706	0.99	1.073	1.367	1.967
Leverage	6104	0.226	0.196	0.058	0.197	0.341
R&D/Asset	6125	0.024	0.047	0	0	0.024

Table 2
Univariate Evidence on Pay Duration and Turnover

This table presents univariate evidence on pay duration and turnover. Panels A through D pertain to subsamples of voluntary CEO turnover, senior executives jump-ships, forced CEO turnover, and involuntary executive turnovers, respectively. *Duration* and *Duration-2* are measures of executive pay duration discussed in Section 3.2. All other variables are defined in Appendix B. In each panel, the sample is further segmented into two groups of turnover vs non-turnover years. T-test is conducted on the difference between the two groups, which is reported in the last column. *, **, and *** indicate significance at 10%, 5% and 1%, respectively.

PANEL A: Voluntary CEO Turnover

	Turnover years		Non-turnover years		
	N	Mean	N	Mean	Difference
Duration	125	1.066	6002	1.463	-0.397***
Duration-2	124	1.077	5976	1.496	-0.419***
Ind adj. stock return	125	-0.044	6002	0.031	-0.075**
Age	125	52.744	6002	54.909	-2.165***
Tenure	125	6.661	6002	7.499	-0.838
Stock holding	125	6.661	6002	12.851	-6.19***
Duality	125	0.464	6002	0.515	-0.051

PANEL B: Executives jumping ship

	Turnover years		Non-turnover years		
	N	Mean	N	Mean	Difference
Duration	289	0.413	17716	1.273	-0.86***
Duration-2	289	0.461	17690	1.310	-0.844***
Ind adj. stock return	289	-0.009	17716	0.041	-0.05**
Age	289	49.197	17716	51.132	-1.935***
Tenure	289	12.014	17716	14.92	-2.906***

PANEL C: Forced CEO turnover

	Turnover years		Non-turnover years		
	N	Mean	N	Mean	Difference
Duration	114	0.869	6013	1.466	-0.597***
Duration-2	113	0.869	5987	1.499	-0.630***
Ind adj. stock return	114	-0.18	6013	0.034	-0.214***
Age	114	51.579	6013	54.927	-3.348***
Tenure	114	5.001	6013	7.528	-2.527***
Stock holding	114	6.614	6013	12.84	-6.226***
Duality	114	0.307	6013	0.518	-0.211***

PANEL D: Involuntary turnover of other executives

	Turnover years		Non-turnover years		
	N	Mean	N	Mean	Difference
Duration	553	0.794	17452	1.274	-0.48***
Duration-2	552	0.802	17427	1.307	-0.505***
Ind adj. stock return	553	-0.142	17452	0.046	-0.188***
Age	553	48.915	17452	51.17	-2.255***
Tenure	553	12.221	17452	14.957	-2.736***

Table 3
Pay Duration and Voluntary Turnover

This table presents coefficient estimates from Cox proportional hazard model and linear probability model that examine the likelihood of voluntary executive turnovers. Time-to-turnover is right censored. *Duration* is the baseline measure of executive pay duration discussed in Section 3.2. Other explanatory variables are defined in Appendix B. Robust standard errors are clustered by three-digit SIC industry and are reported in parentheses. *, **, and *** indicate significance at 10%, 5% and 1% respectively.

	Voluntary CEO turnover		Voluntary executive turnover	
	(1)	(2)	(3)	(4)
	Cox	OLS	Cox	OLS
Duration	-0.604***	-0.012***	-1.518***	-0.027***
	(0.118)	(0.004)	(0.121)	(0.003)
Ind adj. stock return	-0.429	-0.011	0.083	0.002
	(0.283)	(0.007)	(0.137)	(0.003)
Volatility	-0.307	-0.012	-0.493	-0.016
	(0.780)	(0.022)	(0.455)	(0.010)
Firm size	-0.017	-0.010	0.187***	0.002
	(0.065)	(0.012)	(0.054)	(0.006)
Block holder	-0.121	0.002	-0.237	0.007
	(0.206)	(0.011)	(0.177)	(0.005)
Ln(Tenure)	-0.093	0.037***	-0.185***	-0.002
	(0.158)	(0.008)	(0.063)	(0.002)
Age	-0.034**	-0.001	-0.028***	-0.000**
	(0.013)	(0.001)	(0.007)	(0.000)
Stock holding	-0.023***	-0.000		
	(0.008)	(0.000)		
Duality	0.303	0.008		
	(0.249)	(0.014)		
CEO turnover			0.254	0.005
			(0.216)	(0.006)
External hire			-0.110	-0.011
			(0.371)	(0.011)
Constant		0.125		0.048
		(0.106)		(0.047)
Observations	6113	6127	17986	18005
Adjusted R^2		-0.015		0.053
Pseudo R^2	0.060		0.174	
Fixed effects	Time & Industry	Time & Firm	Time & Industry	Time & Firm

Table 4
Pay Duration and Voluntary Turnover – Alternate Duration Measure

This table presents coefficient estimates from Cox proportional hazard model and linear probability model that examine the likelihood of voluntary executive turnovers. Time-to-turnover is right censored. *Duration-2* is the alternative measure of executive pay duration discussed in Section 3.2. Other explanatory variables are defined in Appendix B. Robust standard errors are clustered by three-digit SIC industry and are reported in parentheses. *, **, and *** indicate significance at 10%, 5% and 1% respectively.

	Voluntary CEO turnover		Voluntary executive turnover	
	(1)	(2)	(3)	(4)
	Cox	OLS	Cox	OLS
Duration-2	-0.841***	-0.015***	-1.670***	-0.031***
	(0.152)	(0.005)	(0.119)	(0.003)
Ind adj. stock return	-0.444	-0.012	0.131	0.002
	(0.286)	(0.007)	(0.135)	(0.003)
Volatility	-0.555	-0.012	-0.522	-0.015
	(0.823)	(0.022)	(0.447)	(0.010)
Firm size	-0.006	-0.010	0.199***	0.002
	(0.061)	(0.012)	(0.053)	(0.006)
Block holder	-0.112	0.002	-0.203	0.008*
	(0.204)	(0.011)	(0.183)	(0.005)
Ln(Tenure)	-0.102	0.037***	-0.168***	-0.002
	(0.153)	(0.008)	(0.063)	(0.002)
Age	-0.035**	-0.001	-0.026***	-0.000**
	(0.014)	(0.001)	(0.007)	(0.000)
Stock holding	-0.024***	-0.000		
	(0.008)	(0.000)		
Duality	0.326	0.008		
	(0.252)	(0.014)		
CEO turnover			0.240	0.005
			(0.225)	(0.006)
External hire			-0.156	-0.010
			(0.417)	(0.012)
Constant		0.128		0.056
		(0.108)		(0.047)
Observations	6086	6100	17960	17979
Adjusted R^2		-0.016		0.056
Pseudo R^2	0.072		0.185	
Fixed effects	Time & Industry	Time & Firm	Time & Industry	Time & Firm

Table 5
Pay Duration and voluntary turnover – IV estimation

This table presents the results of a two-stage instrument variable regression that regress voluntary turnover of CEOs and non-CEO executives on instrumented *Duration-2*. In the first stage regression, *Duration-2* is regressed on *Large vesting*, an indicator variable that takes a value of one if the largest stock and option grants from prior years (at least two years prior) vest, and other explanatory variables. *Duration-2* is the alternative measure of executive pay duration discussed in Section 3.2. Other explanatory variables are defined in Appendix B. Robust standard errors are clustered by firm and are reported in parentheses. *, **, and *** indicate significance at 10%, 5% and 1% respectively.

	Voluntary turnover (CEOs and non-CEOs combined)			
	(1)	(2)	(3)	(4)
	Stage 1	Stage 2	Stage 1	Stage 2
Large vesting	-0.025***		-0.162***	
	(0.013)		(0.011)	
Duration-2		-1.336*		-0.219***
		(0.686)		(0.021)
Ind adj. stock return	0.124***	0.160*	-0.022	-0.006
	(0.015)	(0.088)	(0.015)	(0.004)
Volatility	-0.567***	-0.755*	-0.123***	-0.043***
	(0.039)	(0.393)	(0.042)	(0.012)
Firm size	0.162***	0.216*	-0.014	-0.004
	(0.004)	(0.111)	(0.023)	(0.006)
Block holder	0.159***	0.205*	0.035	0.014**
	(0.014)	(0.110)	(0.022)	(0.006)
Ln(Tenure)	-0.047***	-0.067**	-0.069***	-0.016***
	(0.005)	(0.033)	(0.005)	(0.002)
Age	-0.007***	-0.009**	-0.003***	-0.001***
	(0.001)	(0.005)	(0.001)	(0.000)
Constant	0.674***	0.949**	1.871***	0.439***
	(0.053)	(0.470)	(0.178)	(0.064)
Observations	24079		24079	
F-statistic	12.51		9.51	
Fixed effects	Time & Industry		Time & Firm	

Table 6

Pay Duration and forced CEO turnover

This table presents coefficient estimates from Cox proportional hazard model and linear probability model that examine the likelihood of forced CEO turnover. Time-to-turnover is right censored. *Duration* is the baseline measure of executive pay duration discussed in Section 3.2. Other explanatory variables are defined in Appendix B. Robust standard errors are clustered by three-digit SIC industry and are reported in parentheses. *, **, and *** indicate significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)
	Cox	OLS	OLS	OLS
Duration	-0.662***	-0.011***	-0.010	-0.012**
	(0.132)	(0.003)	(0.006)	(0.005)
Ind adj. stock return	-1.251***	-0.023***	-0.010	-0.014*
	(0.417)	(0.006)	(0.007)	(0.008)
Volatility	1.960**	0.053***	0.055*	0.049*
	(0.773)	(0.018)	(0.033)	(0.026)
Firm size	0.191***	0.004***	-0.022**	-0.003
	(0.067)	(0.001)	(0.010)	(0.010)
Block holder	0.299	0.003	-0.003	0.004
	(0.264)	(0.004)	(0.006)	(0.006)
Ln(Tenure)	-0.064	0.003	-0.017	0.054***
	(0.168)	(0.003)	(0.015)	(0.011)
Age	-0.047***	-0.001***	0.010**	-0.004**
	(0.017)	(0.000)	(0.005)	(0.002)
Stock holding	-0.016**	-0.000**	-0.000	-0.000
	(0.008)	(0.000)	(0.000)	(0.000)
Duality	-0.184	-0.005	-0.014	-0.020
	(0.255)	(0.004)	(0.010)	(0.013)
Constant		0.044*	-0.328	0.163
		(0.025)	(0.268)	(0.121)
Observations	6113	6127	6127	6127
Adjusted R^2		0.030	0.355	-0.002
Pseudo R^2	0.118			
Fixed effects	Time & Industry	Time & Industry	Time, Industry & CEO	Time, Industry & Firm

Table 7
Pay Duration and Forced CEO Turnover: Variation with Corporate Governance

This table presents coefficient estimates from Cox proportional hazard model and linear probability model that examine the likelihood of forced CEO turnover. Time-to-turnover is right censored. *Duration* is the baseline measure of executive pay duration discussed in Section 3.2. *Independent* is an indicator variable that takes a value of one if the fraction of outsiders on the firm's board of directors is above the sample median in a given year. Other explanatory variables are defined in Appendix B. Robust standard errors are clustered by three-digit SIC industry and are reported in parentheses. *, **, and *** indicate significance at 10%, 5% and 1% respectively

	(1)	(2)	(3)	(4)
	COX		Linear probability model	
Duration	-0.662***	-0.351*	-0.011***	-0.005
	(0.132)	(0.201)	(0.003)	(0.003)
Ind adj. stock return	-1.251***	-1.299***	-0.023***	-0.022***
	(0.417)	(0.496)	(0.006)	(0.006)
Independent		-0.034		0.007
		(0.228)		(0.004)
Independent X Duration		-0.655***		-0.017***
		(0.250)		(0.005)
Volatility	1.960**	1.714*	0.053***	0.041**
	(0.773)	(1.015)	(0.018)	(0.019)
Firm size	0.191***	0.204**	0.004***	0.004**
	(0.067)	(0.084)	(0.001)	(0.002)
Block holder	0.299	0.410	0.003	0.006
	(0.264)	(0.340)	(0.004)	(0.004)
Ln(Tenure)	-0.064	0.056	0.003	0.005
	(0.168)	(0.170)	(0.003)	(0.003)
Age	-0.047***	-0.054***	-0.001***	-0.001***
	(0.017)	(0.016)	(0.000)	(0.000)
Stock holding	-0.016**	-0.010	-0.000**	-0.000
	(0.008)	(0.007)	(0.000)	(0.000)
Duality	-0.184	-0.185	-0.005	-0.005
	(0.255)	(0.261)	(0.004)	(0.005)
Constant			0.044*	0.031
			(0.025)	(0.028)
Observations	6113	5304	6127	5316
Adjusted R^2			0.030	0.029
Pseudo R^2	0.118	0.121		
Fixed effects	Time & Industry	Time & Industry	Time & Industry	Time & Industry

Table 8
Pay Duration and the Sensitivity of Forced CEO Turnover to Firm Performance

This table presents coefficient estimates from Cox proportional hazard model and linear probability model that examine the likelihood of forced CEO turnover. Time-to-turnover is right censored. *Duration* is the baseline measure of executive pay duration discussed in Section 3.2. *High duration* is a dummy variable that takes the value of one if *Duration* is above the sample median in a given year. Other explanatory variables are defined in Appendix B. Robust standard errors are clustered by three-digit SIC industry and are reported in parentheses. *, **, and *** indicate significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)	(5)
	COX		Linear probability model		
Duration	-0.662***	-0.574***	-0.011***	-0.012**	
	(0.132)	(0.130)	(0.003)	(0.005)	
Ind adj. stock return	-1.251***	-0.977**	-0.019***	-0.013	-0.038***
	(0.417)	(0.397)	(0.005)	(0.008)	(0.011)
Duration X Ind. adj. return		0.571**	0.025***	0.018*	
		(0.263)	(0.007)	(0.010)	
High duration					-0.019***
					(0.005)
High duration X Ind. adj. stock return					0.034***
					(0.013)
Volatility	1.960**	1.888**	0.050***	0.050*	0.053***
	(0.773)	(0.771)	(0.018)	(0.026)	(0.018)
Firm size	0.191***	0.192***	0.004***	-0.003	0.003***
	(0.067)	(0.068)	(0.001)	(0.010)	(0.001)
Block holder	0.299	0.321	0.003	0.005	0.002
	(0.264)	(0.269)	(0.004)	(0.006)	(0.004)
Ln(Tenure)	-0.064	-0.069	0.003	0.053***	0.003
	(0.168)	(0.172)	(0.003)	(0.011)	(0.003)
Age	-0.047***	-0.046***	-0.001***	-0.004**	-0.001***
	(0.017)	(0.017)	(0.000)	(0.002)	(0.000)
Stock holding	-0.016**	-0.016*	-0.000**	-0.000	-0.000**
	(0.008)	(0.008)	(0.000)	(0.000)	(0.000)
Duality	-0.184	-0.188	-0.005	-0.020	-0.006
	(0.255)	(0.256)	(0.004)	(0.013)	(0.004)
Constant			0.041	0.158	0.037
			(0.025)	(0.124)	(0.025)
Observations	6113	6113	6127	6127	6127
Adjusted R^2			0.033	-0.000	0.029
Pseudo R^2	0.118	0.121			
Fixed Effects	Time & Industry		Time & Industry	Time & Firm	Time & Industry

Table 9
Effect of Pay Duration of Other Senior Executives on CEO Succession Decision

This table presents the results of a linear probability model that examine the likelihood of outside CEO succession following CEO turnover. The dependent variable takes a value of one if the newly appointed CEO has been with the firm for less than a year prior to the appointment and zero otherwise. *Average duration* is the average pay duration of other top executives than the departing CEO in the firm included in ExecuComp. *Industry avg. duration* is the average pay duration of CEOs from the same industry. Other explanatory variables are defined in Appendix B. Robust standard errors are clustered by clustered by three-digit SIC industry and are reported in parentheses. *, **, and *** indicate significance at 10%, 5% and 1% respectively.

	(1)	(2)	(3)	(4)
	Probability of an external hire			
Average. duration	-0.12***	-0.08*		
	(0.04)	(0.04)		
Industry avg. duration			-0.10*	-0.05
			(0.06)	(0.06)
Ind adj. stock return		-0.11		-0.16**
		(0.10)		(0.07)
Volatility		0.16		0.12
		(0.40)		(0.20)
Firm size		-0.03		-0.05***
		(0.03)		(0.01)
Block holder		-0.15*		-0.11*
		(0.08)		(0.06)
Constant	0.55***	0.81**	0.57***	0.90***
	(0.06)	(0.34)	(0.08)	(0.20)
Observations	429	429	437	437
Adjusted R^2	0.06	0.08	0.01	0.05
Fixed effect	Time and Industry		Time	