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# CEO JOB SECURITY AND RISK-TAKING

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# CEO JOB SECURITY AND RISK-TAKING

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**Abstract**

We use the length of employment contracts to estimate CEO turnover probability and its effects on risk-taking. Protection against dismissal should encourage CEOs to pursue riskier projects. Indeed, we show that firms with lower CEO turnover probability exhibit higher return volatility, especially idiosyncratic risk. An increase in turnover probability of one standard deviation is associated with a volatility decline of 17 basis points. This reduction in risk is driven largely by a decrease in investment and is not associated with changes in compensation incentives or leverage.

Keywords: Risk-taking, gambling for resurrection, CEO contracts, CEO turnover.

JEL classifications: G34, J41, J63

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Dismissal is a serious threat to executives. It leads to the loss of current employment, to reduced future career options (Brickley et al. (1999)) and, sometimes, to loss of unvested equity-based compensation (Dahiya and Yermack (2008)). As public demand for increased managerial responsibility has grown over the last three decades, the risk of CEO turnover has risen substantially: the incidence of CEO turnover increased from 13% during 1992—1997 to 17% during 1998—2005 (Kaplan and Minton, 2012). It is therefore important to document the effects of turnover risk on managerial incentives. Yet theoretical predictions concerning this topic are ambiguous, and empirical measurement is complicated by the endogeneity of turnover with respect to performance. This paper assesses the direction (and magnitude) of the effect of turnover risk on risk-taking. In order to circumvent the endogeneity problem, we use the variation in turnover probability that results from ex-ante contract length.

Human capital risk leads managers to value risky projects differently than do shareholders or the board. Low profitability due to the up-front costs of projects with uncertain future cash flows can be hard to distinguish from low profitability due to lack of effort or ability. As a result, managers for whom job security concerns predominate have an incentive to take less risk than is optimal for the firm. This argument, first advanced by Holmstrom (1982), has generated a large theoretical literature on complications and potential remedies, starting with Holmstrom and Ricart i Costa (1986).

However, Iossa and Rey (2013) and Bebchuk and Stole (1993) point out that the direction of the risk distortion depends on the information structure. Managers with greater career concerns (for instance, when renegotiation is imminent) should overinvest if investment sends a positive signal—for example, if the costs of that investment are not observable before contract expiration or if investment can be interpreted as exerting effort. Another motivation for greater risk-taking in the presence of turnover risk is the “gambling for resurrection” dynamic described in the mutual fund literature (e.g., Chevalier and Ellison,

1997). There it is argued that the reward—reappointment in the case of the manager—is so valuable that the manager is willing to pursue negative NPV projects as long as their upside offers improved odds of that manager being retained.

Although a substantial empirical literature explores the relationship between executive compensation and risk-taking, there is not much empirical work that links CEO career concerns to firm risk. The extant literature exploring firm performance prior to CEO turnover is inconclusive: Gibbons and Murphy (1992) document a lower variance of stock returns but a higher variance of changes in shareholder wealth during the three years prior to turnover. Murphy and Zimmermann (1993) argue that most observed changes in a firm's pre-turnover performance are more likely the cause rather the effect of greater turnover risk. It is therefore difficult to establish a causal effect of career concerns on risk-taking.

In this paper, the length of employment contracts delivers ex-ante determined variation in turnover probability across time. Many CEOs of US firms operate under fixed-term employment agreements. Dismissal before the contractual termination date is costly and can lead to litigation. More importantly, firms are likely to set contract lengths according to their horizons for planning and personnel review. Because the remaining contract length decreases with time (and changes upon renewal), we can track the behavior of a given CEO under the same contract, as the horizon changes. Based on 3,954 of these contracts, we find that contractual protection matter for turnover risk. Using a hazard model, we estimate the likelihood of turnover as a function of the CEO's contract horizon and tenure. Being one year closer to the contract's expiration date translates into a 21% higher probability of termination, controlling for tenure.

One potential concern is that the contract length may be decided upon in conjunction with investment plans. Yet, we show empirically that investment cycles neither coincide with risk outcomes nor explain the observed relation between risk and turnover probability. To

ensure that contract length does not reflect investment plans that are not part of our investment cycle measure, we exploit the "sticky" nature of contract cycles (Hall 1999; Shue and Townsend, 2013) and use previous contracts to predict the length of the next contract. The prediction is thus based only on past information and is not affected by future investment plans. Using previous contracts to estimate turnover risk—while controlling for investment cycles—match the results using actual contracts.

A second concern is that the contract length variable delivers exogenously timed but imprecise changes in turnover risk. That is, contract length gives us a good estimate of turnover risk in the case of a distant expiration date, but becomes less precise as election days come closer and performance-related measures become a more important aspect of evaluations. Using prior performance to predict turnover risk yields results similar to the results using contract length.

Following the literature (e.g., Guay, 1999; Cohen et al., 2000; Hayes et al., 2012; Gormley et al., 2013; Shue and Townsend, 2013), we use realized stock return volatility as our primary measure of risk-taking. We find a significant negative relationship between turnover probability and risk-taking so defined. A one-standard-deviation increase in the likelihood of CEO turnover is associated with a 17-basis-point decrease in volatility. Since this relation might not be linear, we split firms into quantiles of high and low turnover risk. We discover no evidence of gambling for resurrection in either the high-risk or the medium-risk quantiles. At the end of the CEO's contract, speculation about possible re-appointment (or successors) may increase return volatility. Such effects may bias our results downwards.

We proceed to show that the negative relation between turnover likelihood and volatility is primarily driven by idiosyncratic rather than systematic risk. An increase in turnover probability of 10 percentage points is associated with a decrease in idiosyncratic risk of 0.6 percentage points, and there is no significant relation between turnover risk and market

beta. We also find that this reduced volatility coincides with decreases in investment but not in leverage. Finally, we show that turnover risk has little effect on stock returns or accounting performance. These findings, too, are not consistent with gambling for resurrection.

Throughout the analysis, we control for executive—firm fixed effects. In other words, we hold the CEO—firm pair constant and exploit the variation in turnover risk throughout the CEO's tenure. One may be concerned that the remaining time under the contract is correlated with the CEO's tenure at the firm. However, contracts get renewed and their length reset and changed during the renewal. Our results hold when we only use the subsample of CEOs under renewed contracts. Not all CEOs sign fixed-term employment contracts. We control for selection into such contracts using a Heckman (1979) selection model based on variation in employment law across states. Our findings are also robust to controlling separately for firm fixed and executive fixed effects and hold also when we control explicitly for age or tenure groups, as well as time-varying compensation elements.

Our analysis makes several contributions to the existing literature. First, the paper contributes to the literature on CEO turnover. The debate in this area has focused on how CEO turnover is related to firm performance and corporate governance. We introduce a predictor of CEO turnover that not only improves the precision the turnover probability estimation, but also has distinct advantages. Contractual terms establish a turnover timing structure ex-ante, independent of performance. This enables empirical researchers to isolate the causal effects of turnover risk.

Second, our work adds to the literature on risk-taking incentives by establishing an empirical link between career concerns and stock volatility. Such a link has been assumed by the theoretical literature as far back as Fama (1980) and Holmstrom (1982), but despite the theoretical interest, empirical evidence linking career concerns and risk-taking is sparse. A notable exception is Gormley and Matsa (2011), which uses risk arising from large, left-tail

events as shocks to job security. They find that mangers respond to these risks by acquiring unrelated businesses with high cash flows in an attempt to limit their downside. A related branch of empirical literature, starting with Chevalier and Ellison (1997 and 1999), establishes a link between the career concerns of mutual fund managers and the risks that they take. However, incentives of fund managers differ from the ones of CEOs as funds are in competition to be ranked as top performers, while firms compete for investors by generating higher absolute returns (irrespective of between-firm rankings).

Third, there are only few empirical studies of CEO employment contracts. Schwab and Thomas (2005) describe a sample of 375 contracts from a legal perspective. Gillan et al. (2009) report that many CEOs operate without an explicit contract. These authors study, the choice between explicit and implicit contracts. We build on their work by describing the effect of contract horizon on career outcomes, risk-taking and performance.

## 1. DATA

### 1.1. *Contracts*

The Securities Exchange Act of 1934, Regulation S-K, Item 402 requires the disclosure of terms of employment contracts and agreements between US registrants and named executive officers. Following Schwab and Thomas (2005) and Gillan et al. (2009), we collect explicit contracts from SEC filing exhibits and, when possible, from The Corporate Library. For all S&P 1500 firms that do not file an explicit contract, we read all proxy filings and 10ks to obtain summaries of contract terms. Some executives sign at-will employment agreements that include compensation and severance clauses, but do not specify any employment period. These are not included in the sample. We exclude agreements that have not yet been valid (e.g., applicable following a change in control) and offers that have been rejected. We obtain separation dates from ExecuComp, Risk Metrics, or BoardEx and exclude contracts for which it is unclear whether the CEO is still in office or when he left. For 81 renewals in 1994 and

1995 we use the renewal agreement to obtain the characteristics of the original contracts that were not filed electronically.

The procedure yields data for 3,954 employment fixed-term contracts for 2,964 CEOs by 2,901 firms entered between 1992 and 2008. Table 1 reports descriptive statistics. Accounting data are reported for the year prior to the start of the contract.

TABLE 1 HERE

Panel A of Table 1 reports the number of and average length (in years) of contracts per start year. The number of contracts ranges from 133 in 1995 to 349 in 2006, increasing over time. Contract length decreases steadily over time, from 3.77 in 1995 to 2.78 in 2008. This decline has paralleled increasing public pressure to increase accountability and decrease job security (and entrenchment) of CEOs. This movement has not been confined to the US. In the United Kingdom, CEO contract periods have decreased even more dramatically. While the average contract in 1992/93 lasted three years (Conyon, 1994), most UK companies have moved to one year contracts by 2011 (BIS, 2011).

Panel B provides a list of the number of contracts by their length. Most contracts are less than six years long, with a mode of three (1,515 contracts), followed by two-year (741) and five-year contracts (551). Of the 39 contracts that are longer than ten years, 12 are explicitly linked to the executive's retirement age. In total, 28 contracts in our sample are explicitly linked to age. As Jenter and Lewellen (2011) document, this typically happens at the age of 65 (23 contracts) or around. Most of the 64 contracts with duration below one year are renewals effective until the end of the respective calendar year (38 contracts); the remaining 26 contracts are for interim CEOs. Evergreens, contracts that are automatically renewed every day or month to retain the same contract length, are not frequent, with a total of 73 contracts. We list the percentage of a specific length out of all contracts of the (sub-) sample underneath the number. The distributions for first contracts and renewed contracts are

quite similar to each other. Upon renewal, CEOs tend to receive more evergreen contracts and longer contracts, but also extremely short ones.

Employment contracts are typically governed by the law of the state where the employee works. In the case of the CEO, this is usually the state of the headquarter (and casual observation of the contracts confirms this hypothesis). Panel C provides the number of contracts by headquarter state for the 15 states with the largest number of contracts in the sample, obtained from the filing. Most firms are based in California, followed by New York and Texas. This is similar to the overall distribution of firms within the COMPUSTAT database.

1.2. *Sample selection issues*

It is important to point out that while most companies disclose the length of their CEO's employment contract, some may omit disclosure even though their CEO is subject to a fixed-term contract. To put the number of contracts in this sample into perspective: Gillan et al (2009) survey all S&P500 firms in 2000 on their CEO employment terms and find that 255, or 45%, of the CEOs had employment contracts. Our sample contains 236 contracts that were in place in 2000 with S&P 500 firms: 19, or 3.8%, are missing. Because S&P 500 firms are larger, they are likely to have better disclosure quality: the number of omitted contracts may be bigger for the rest of the sample.

Panel D of Table 1 reports summary information for the year before the contract start. The sample firms have a mean firm size in terms of book assets of $1,756 million. Return on assets (ROA) averages 2% for the sample, the market-to-book ratio 2.62. Lang and Lundholm (1993) find that larger and better performing firms get better disclosure quality ratings by the Association for Investment Management and Research (AIMR). If the sample was biased towards firms with better reporting standards, it would contain larger and more profitable firms. This is not the case: a comparison with COMPUSTAT firms with no contract reveals

that these firms are larger and more profitable, with mean assets of $2,621 million and mean ROA of 7.1%. This also suggests that the sample bias within smaller firms may not be more accentuated. Industry adjusted (Brown and Hillegeist, 2007) AIMR scores in 1994 and 1995 (the last rankings before they were discontinued) were higher for firms that did not disclose a contract (100% vs. 93% for those that did). The sample firms also have a greater frequency of restatements (4.7%, vs. 4.5% for firms with no disclosed contract). Overall, these numbers do not suggest that firms outside the sample actually have a contract, but do not disclose it because of their lower disclosure standards. We will revisit this question in the next section.

1.3. *Descriptive statistics*

Table 2 reports summary statistics for the firm-years under the fixed-term contracts described above. These constitute the sample for our subsequent analysis. The mean firm in our sample has assets of $1.8 million, an ROA of 3.8%, annual stock returns of 2.5%, a market-to-book ratio of 2.7 and leverage of 21%. We use three measures of risk: volatility, beta, and idiosyncratic risk. Volatility is the Standard deviation of daily stock returns. Beta is the coefficient on the excess market returns when we regress daily stock returns in excess of the risk-free rate, and idiosyncratic risk is the standard deviation of the residuals of that regression. We report volatility and idiosyncratic risk in percentage points. The mean volatility is 3%, the mean beta 0.95 and the mean idiosyncratic risk 0.11. Our sample firms on average spend 7% of their assets value on R&D and 5% on CAPEX, and 20% of the sample observations are firms that operate in the banking or insurance industry.

TABLE 2 HERE

Finally, we report descriptive statistics of CEO and corporate governance characteristics. The mean CEO is 54 years old, and 32% are under renewed contracts. He owns 0.76% of his company's stock, receives compensation of 5.2 million (TDC1, inflation adjusted to 2000 value), of which 41% is equity-based. Ninety percent of his option holdings

are unrestricted. The average Gompers et al. (2003) index is 9.15, 52% of CEOs also hold the Chairman position, and 33% of all board members are insiders.

## 2. EMPIRICAL STRATEGY

### 2.1. *Contract length and turnover risk*

In a fixed-term employment contract, the firm commits to paying compensation for a certain number of years; this remains valid after possible premature termination. As an immediate consequence, the cost of termination is increasing in the numbers of years remaining under the contract. Upon early termination, the executive is typically entitled to a multiple of the base salary and the minimum bonus, but this sum can be augmented contractually. As an example, take John Mack's 2005 five-year contract with Morgan Stanley:

*If, during the Employment Period, the Company shall terminate the Executive's employment other than for Cause, death or Disability or the Executive shall terminate employment for Good Reason: (i) the Company shall pay to the Executive in a lump-sum cash payment as soon as practicable after the Date of Termination the aggregate of the following amounts:*

*…an amount equal to the product of (1) the Executive's Total Compensation for the most recently completed fiscal year and (2) the greater of (x) a fraction, the numerator of which is the number of days from the Date of Termination through the fifth anniversary of the Effective Date, and the denominator of which is 365 and (y) 1.[…]*[1]

Hence, in Mr. Mack's case, the cost of dismissal prior to contract expiration is the product of his total compensation and the number of years remaining until the contractual termination date. The total compensation of Mr. Mack was $45 million in 2006, the first year of his employment contract, and so severance pay for termination in 2006 would have

[1] Morgan Stanley, Form 8K, filed September 22, 2005, Exhibit 10.

exceeded $182 million. Assuming that compensation remains at this level, severance pay in 2009 would have been $45 million, which is $137 million less.[2]

Morgan Stanley's operating income in 2009 was over $1 billion. While $137 million is a non-trivial amount, it seems less so compared with the firm value a CEO can destroy. Also, fixed-term contracts are renewable, typically with a 30 day notice period before the expiration date. If renewal happens always and automatically, contracts should have no effect. However, contracts may matter over and above the strictly legal consequences of breach on severance pay. Firms may hire a CEO to accomplish a specified task (e.g., turn around an unprofitable unit) for a specified time (Anderson et al., 2013). Whether he will be needed for another task is to be decided at the end of the first one. The time pattern of separations may then reflect how well both parties were able to estimate the time needed. The contractual employment horizon can also serve as a signal of commitment: it shows a mutual understanding between the CEO and the board on the CEO's evaluation period. For example, some investment projects can be initially unpopular and take time to become profitable. A long evaluation period allows the CEO to work without an immediate threat of dismissal. It can therefore prolong the CEO's decision horizon.

2.3. *Estimating turnover risk*

We estimate turnover with proportional hazard models of the general form

$$\lambda\,(\mathrm{t},\mathbf{X}) = \lambda_0(\mathrm{t})\mathrm{e}^{\beta'\mathbf{x}}$$

where λ(t) represents the probability that the CEO departs in year t, conditional on having remained in office until year t. $\lambda_0(\mathrm{t})$ is the baseline hazard, and **X** is a matrix containing the variables that predict CEO turnover. We use two models for the baseline hazard: a Cox partial likelihood model (Cox (1972)), which does not specify a functional form for $\lambda_0(\mathrm{t})$, and a Weibull specification, which defines

[2] For details on severance pay, see Rusticus (2006), Rau and Xu (2009) or Goldman and Huang (2010).

$$\lambda_0(t) = \lambda \alpha t^{\alpha-1}$$

In our baseline specification, we predict turnover using the number of years remaining under the contract. Because contracts are signed prior to observing performance, this estimate is unrelated to the actual performance and volatility under the contract. We also include industry and year fixed effects to capture fluctuations in the economy, and factors that vary across industries, such as the degree of competition, or the supply of CEOs.

Towards the end of the contract, executives have accumulated performance history relevant for the turnover decision. A CEO with a good track record may not face turnover risk at the end of the contract, contrary to the predictions of the contract-only specification. Therefore, we compare the baseline specification to one that specifically takes endogenous performance into account based on Jenter and Lewellen (2010). They estimate CEO turnover as a function of B/M, size, profitability, whether the firm pays dividends, and tenure performance. Tenure performance is defined as the cumulative stock return over the preceding 5 years or since the CEO started her tenure, whichever is more recent.[3] Finally, in a third model, we use all of the variables to gauge the importance of contracts relative to other factors.

Table 3, Panel A summarizes the results of the estimated hazard models of CEO turnover. Column 1 shows a Cox proportional hazard model that predicts CEO turnover using calendar year FE and the number of years remaining on the CEO's contract. CEOs with more time remaining under their contract are significantly less likely to leave the firm. Each additional year on the CEO's contract decreases turnover likelihood by 20.5 percentage points. Column 2 shows that CEOs of large firms are more likely to be dismissed, whereas CEOs with higher past accounting performance and higher past stock returns are less likely to be dismissed, holding other factors constant.

[3] Instead of using cumulative industry-adjusted returns, we use cumulative raw returns, and include industry fixed effects. Gormley and Matsa (2014) show that fixed effects are the correct method to account for industry heterogeneity in this setting.

Finally, in Column 3 we use both the number of years remaining on the CEO's contract and all the variables from column 2. Importantly, we find that the sign of remaining years remains negative, it is highly significant (t=–10.98), and its absolute value *increases* if we control for the variables commonly used in the CEO turnover literature. The coefficient estimate of 0.7683 suggests that each additional year on the CEO's contract renders it 23% less likely that she leaves in a given year. The sign, significance, and magnitude of the other coefficients is similar to what we estimate in column 2. We use the estimated hazard rates from columns 1-3 in the subsequent analysis shown in Tables 5-8, and call this estimate "turnover probability".

TABLE 3 HERE

Columns 3-6 of Panel A report Weibull specifications, which allow for duration dependence in CEO turnover. The coefficient estimates are very similar to those obtained in the Cox proportional hazard models, and highly statistically significant. In addition to the coefficient estimate we report the shape parameter $\alpha$ for the estimated Weibull models. The parameter $\alpha$ is significantly different from 1 only in column 6, at the 10% level: we cannot reject the null that the distribution exhibits no duration dependence. We conclude that both Cox and Weibull hazard model specifications show that the number of years remaining on the CEO's contract predicts CEO turnover.

The majority of the literature on CEO turnover uses logit (e.g. Denis et al. (1997), Mikkelson and Partch (1997), Perry (1999), Huson et al. (2001)) or probit (Jenter and Lewellen (2010)) regressions to model CEO turnover. To ensure that our results are not driven by our empirical specification, we also estimate logit and probit models on firm-year observations, using a dummy equal to one if the CEO leaves in a given firm-year. Panel B of Table 2 shows the results of these probit and logit regression models of CEO turnover. The results are similar to those of the hazard models. CEOs with a high number of years

remaining on their contract are less likely to leave the firm. Overall, we conclude that our choice of empirical model does not affect our conclusion that CEO trading predicts turnover. The number of years remaining on the CEO's contract predicts CEO turnover. This effect is highly statistically significant in all of our models.

2.4. *Selection into the sample*

To control for the selection bias arising from this non-random exclusion, we follow the approach of Heckman (1979) and use the choice regression described below to compute the Mills ratio. We use a state law characteristic for the identifying restriction: the at-will exception rule of good faith and fair dealing (henceforth "exception rule"). This state-wide rule prohibits terminations made in bad faith or motivated by malice.[4] This rule protects rank-and-file employees with shorter contracts or without contracts, which makes such forms of employment more attractive. The ensuing popularity of shorter contracts makes it difficult for executives to negotiate longer contracts for themselves. The direct judicial consequences of the rule to CEOs are likely to be limited, however, since they are protected by individual contracts. The listing of these so-called at-will exceptions is reported in appendix A.1 as in Walsh and Schwarz (1996) and Muhl (2001). In most states, the rules were adopted between 1960 and 1980 (before the start of our sample), following debates that were driven by political sentiment of that time as well as the particularities of isolated precedent cases. Panel D of Table 1 provides a breakdown of the sample by state (for the 15 states with the most observations). The sample composition is comparable to the overall COMPUSTAT distribution and provides a mixture of states with more and less patents as well as both states with and without the exception.

To identify firms that fail to disclose their CEO contracts, we use determinants of disclosure quality: firm size, the number of equity issuances, and the standard deviation of

[4] There are two other exceptions that are less relevant for us. Under the public policy exception, dismissal is not allowed if it violates the state's public policy or a statute. Under the implied contract exception, an employee can dispute his/her dismissal if he/she can prove the existence of an implicit (i.e., not written) contract.

analyst forecasts. Lang and Lundholm (1993) and Brown and Hillegeist (2007) show that these variables affect the disclosure quality as measured by the discontinued *AIMR*. The listed determinants being rather generic firm characteristics, we also include a variable that indicates whether the firm has made any restatements in the relevant year, as reported by *Audit Dynamics*.

We follow Gillan et al. (2009) in their choice of other determinants of long-term contracts. They argue that risk should be relevant for the contract length: riskier firms have to renegotiate contracts more often. We use their estimates of industry risk: homogeneity of stock returns, median sales volatility, and the survival rate per year. Furthermore, CEO and board characteristics should affect the negotiation. In particular, there is less uncertainty about incumbent CEOs, especially when they have been in their position for a long time. A similar argument can be made for older CEOs that have a longer track record in general. We control for incumbent CEOs, age, tenure, and use the governance index of Gompers et al (2003) to control for the power of the board. To ensure that geographical effects are due to the at-will exceptions and not to other legal differences across states, we control for other geographical indices such as the anti-takeover index (for the state of incorporation) of Bertrand and Mullainathan (1999) and the anti-competition enforceability index of Garmaise (2011). All regressions contain industry and year fixed effects to control for exogenous shocks to the labor market.

TABLE 4 HERE

Table 4 reports the multivariate results. Column 1 shows the results of a probit specification that predicts the choice to enter a fixed-term contract with all the above mentioned variables. Column 2 uses the variables that are found to be significantly related to contract choice in column 1 to predict the choice to enter a fixed contract. This regression is used to compute inverse Mills ratios for the regressions reported in the next section.

First, states with the exception rule are significantly less likely to issue fixed-term contracts, consistent with the findings of Miles (2000). Of the other two geography variables, anti-takeover laws are significantly related to fixed-term contracts and the Garmaise index only marginally so. CEOs are more likely to enter fixed-term and longer contracts if anti-takeover laws apply, consistent with a complementary nature of external and internal governance (Cremers and Nair, 2005).

We find little evidence that firms with lower disclosure quality are less likely to *disclose* a contract. To the defence of the disclosure bias hypothesis, firms with a higher number of equity issuances are more likely to be in the sample. These firms have more disclosure duties. However, smaller firms and firms with more earnings restatements are less likely to be in the sample of CEOs with a (disclosed) fixed-term contract. The fact that these variables are related to the incidence of a contract as well as the length indicates that they measure firm characteristics unrelated to disclosure. The standard deviation of analyst forecasts is not significantly related to contract choice, which further suggests that information asymmetry is of little relevance to sample selection.

Industry homogeneity is associated with fewer contracts. In homogenous industries, both the CEO and the firm have more outside options, which makes a contract less important. The industry risk variables are not significantly related to the contract choice. Incumbent CEOs are more likely to receive a fixed-term contract. Older CEOs and CEOs with a longer tenure are more likely to have no contract, perhaps because firms are less uncertain about their potential. The Gompers et al. (2003) governance index is positively associated with contracts. This measure is lower for firms with high shareholder orientation. The positive association suggests that boards with less bargaining power are more likely to sign fixed-term contracts.

## 3. RESULTS

This section documents the relationship between the CEO's turnover risk and risk-taking. We begin with our main analysis on stock return volatility. Subsequently, we analyze different forms of volatility, potential sources of risk, and the heterogeneity of the relationship.

### 3.1. *Stock return volatility*

In this section we explore the effect of an increase in turnover risk on stock return volatility, our primary measure of risk-taking. We begin by estimating the turnover risk using contract terms. As described in Section 2, the sample is restricted to executives on fixed-term contracts. We control for selection into this sample using the inverse Mills ratio from the regression described in the previous section. Firms as well as executives differ in their capacity and preference for risk. We control for unobserved firm and executive heterogeneity using firm-executive fixed effects. Because turnover probability is an estimated regressor (Murphy and Topel (1985)), we use bootstrapped standard errors, clustered at the firm level in all our regressions (Kayhan and Titman (2007), Petersen (2009)).[5]

TABLE 5 HERE

Column 1 in Panel A of Table 5 shows that the predicted turnover probability is strongly correlated with volatility. Lower CEO turnover risk is associated with more volatility. The result in column 1 implies that increasing the odds of turnover by one standard deviation corresponds to a 17-basis-point decrease in return volatility. The 17 basis points correspond to 10% of one standard deviation of return volatility.

In column 2, we use the predicted turnover probability generated following Jenter and Lewellen (2013), taking performance into account. This reduces our sample from 9,030 observations to 6,709, because of missing data items. Our results are qualitatively unaffected: higher CEO turnover risk is associated with significantly lower volatility. The economic

[5] The robustness of these bootstrapped standard errors, used by Kayhan and Titman (2007), is similar, or potentially superior to the clustered standard errors (computed without bootstrapping) suggested by Petersen (2009).

effect is reduced by a factor of one fifth, from a 17-basis-point decrease to a 3.5-basis point decrease. We obtain similar estimates in column 3, where we use both contract information and the variables suggested by the literature to predict CEO turnover.

In column 4, we explore the possibility that the relation between turnover risk and volatility is nonlinear. In particular, CEOs with very high or low turnover probability may not feel compelled to gamble for resurrection, while CEOs with medium-high turnover risk may. We regress volatility on dummy variables for CEOs with turnover probability in the lowest (low), highest (high) quintile, and in the third and fourth (medium) quintile. That is, our baseline comparison group is the second quintile, the group of CEOs that has comparably little to fear, but is also not the most protected. We find the same pattern in a variety of other classifications: this issue is discussed further in section 3.6. We find no evidence for gambling for resurrection. On contrary, CEOs with high turnover probability reduce risk the most, with a volatility that is lower by 48 basis points. Low turnover probability is not significantly related to volatility. Medium turnover probability related to 10 basis points less volatility, a quarter of the coefficient for the high risk category. This confirms our results from columns 1 and 2: neither CEOs with medium turnover probability nor those with high turnover probability take more risk than those with low turnover probability.

To further examine whether CEOs gamble for resurrection, in column 5 we regress volatility on a dummy for election years. We find that in an election year, the average CEO reduces volatility by 8 basis points. Speculation about successions may increase stock volatility in the election year. Therefore, the real incentive effect may be even higher.

Contract horizon is strongly correlated with tenure, and volatility may also be. Pan, Wang and Weisbach (2013b) argue that the stock market needs to learn about the match between firms and new CEOs, leading to additional volatility in the first years of a CEO on the job. Bushman, Dai and Wang (2010) argue that uncertainty about the CEO's talent leads

to higher risk of turnover. To make sure that our results are not driven by tenure and, specifically, new CEOs, we repeat the analysis of column 1 with only CEOs under a renewed contract. The results in column 6 are weaker than those in column 1, with a coefficient of -0.58, but still significant at the 1% level. This confirms that the finding of Pan et al. (2013b) is relevant in our sample, but also confirms the relation between turnover risk and volatility over and above this effect.

### 3.2. *Composition of volatility*

In Panel B and C, we decompose volatility to examine whether the effect of turnover risk is stronger for idiosyncratic or systematic risk, and repeat the regressions discussed in the previous section using these dependent variables. Chevalier and Ellison (1999), in the context of mutual funds, argue that young managers with a more recent track record have an incentive to herd: if they do not perform well, then at least they do so at a time when other candidates for their job are likely to perform equally poorly. Although mutual funds differ from other firms along several dimensions, we are interested in whether this basic intuition applies equally to CEOs: whether CEOs gamble for their re-election. The CEO can reduce systematic risk without taking on or cancelling investment projects, for example by a reduction in hedging activities, while idiosyncratic risk requires investment opportunities. Therefore, CEOs who try to gamble before elections are more likely to increase systematic risk, possibly in contrast to CEOs who take risk because they feel protected from turnover.

Panel B shows that the negative relation between volatility and turnover risk is driven by idiosyncratic risk. A one-standard-deviation increase in turnover risk corresponds to a 1.3-basis-point decrease in idiosyncratic risk (10% of one standard deviation of idiosyncratic risk). The magnitudes of all other coefficients are also considerably smaller than the coefficients for volatility. The only remarkable difference is shown in column 4: CEOs with

low turnover risk take significantly more idiosyncratic risk. Panel C shows that an increase in turnover risk is associated with no or very minor reductions in systematic risk.

### 3.3. *Sources of risk*

Managers can increase either operational or financial risk. In this section, we explore two possible specific channels that can drive the change in equity volatility: capital investment and financial leverage. Operationally risky decisions may take other forms than investment, for example via hiring specific managers or shifting resources between business units. Empirically, however, such actions are harder to observe. Capital investment, albeit not necessarily risky, is not only easier to measure, but also the channel through which theoretical papers typically describe risk-taking decisions. Panel A of Table 6 reports that turnover risk is negatively associated with capital expenditures (normalized by the value of assets in the previous period). Increasing the odds of turnover by one standard deviation corresponds to a decrease of 0.8 basis points in capital expenditures, or 5% of one standard deviation. This is consistent with the argument that CEOs are more likely to take risky investments if they are protected from turnover risk. Similarly to our results on total and idiosyncratic volatility, the effect persists if we estimate turnover probability using only the variables suggested by the literature, or if we use them in addition to contract terms.

TABLE 6 HERE

Panel B shows that the relation between turnover risk and financial leverage is mixed. On the one hand, in columns 1, 4, and 5 we find no significant correlation between turnover risk and leverage. On the other hand, in columns 2 and 3 we find that higher turnover risk is associated with an increase in leverage. However, the economic significance of this effect is rather small: a one-standard-deviation increase in turnover risk corresponds to an increase of 0.0034 in leverage, which is 0.94% of the standard deviation of leverage. We find similar

results using book leverage and the level of debt (in logarithms). Overall, the effect of turnover risk on leverage is small and hence unlikely to indicate gambling for resurrection.

3.4. *Performance*

Ex-ante, there is no reason for better performance in pre-defined election years. If executives gamble for resurrection, however, we may see evidence of tampering not only in terms of risk, but also in terms of performance. After all, boards are likely to base their renewal decisions on performance measures. To see whether this is true, we repeat the regressions described in the previous section with ROA and stock returns as dependent variables. We cannot use turnover risk from the regressions with performance variables (columns 2-3 of Table 3, Panel A), because this would induce a circularity in our estimation strategy. The results are reported in Table 7. We find no relationship between turnover risk and stock returns or return on assets.

TABLE 7 HERE

3.4. *Heterogeneity*

Thus far, we have reported a negative effect of turnover risk on volatility. In this section, we explore whether this effect varies with investment opportunities, governance, or by industry. Table 8, Panel A reports the results on turnover probability estimated using with contract terms; Panel B reports the results using quintiles of turnover probability.

Incentives to take more risk should be more valuable for firms that have more growth opportunities. In contrast, more mature, stable firms should be more concerned about overinvestment (Jensen, 1986). In columns 1 and 2 of Table 8, we divide the sample annually in quintiles of the market-to-book ratio and find significant results in the lowest and the highest quintile. The effect is significant in both subsamples. As expected, the effect is more pronounced – almost twice as large – in the quintile with the highest investment opportunities. The t-statistics show that the coefficients are significantly different between

firms with high and firms with low growth opportunities only in the highest quintile of turnover risk.

TABLE 8 HERE

One of the most important determinants of dismissals is corporate governance: the decision to renew or dismiss a CEO is made by the board. CEOs with more power should have less fear of dismissal and therefore their career concerns should matter less for risk-taking. In columns 3 and 4 of Table 8, we use a direct measure of CEO power to split the sample: whether the CEO also holds the position of Chairman of the Board. The coefficient on the continuous measure of turnover risk is significantly more negative for non-Chairman CEOs, consistent with the argument that these executives have less power and are therefore more sensitive to contractual turnover risk. The effects on the turnover risk quintiles are of similar sign and magnitude. Non-Chairman CEOs take more risk when they have a low probability of turnover, and take significantly less risk when their turnover probability is low. Again, we find no evidence of gambling for resurrection.

Edmans (2009) and Aghion et al. (2013) argue that blockholders and more specifically, institutional owners monitor CEOs and shield them from career risks if necessary. This gives CEOs a greater incentive to innovate, and they show empirically that firms with greater institutional ownership produce patents that subsequently have more citations. Indeed, firms with different levels of institutional ownership (low quintile in column 5 and high quintile in column 6) differ in their risk-taking incentives. The effect of the continuous measure of turnover probability is significant for both subsamples, but significantly more negative for low institutional ownership. Splitting the sample by quintiles of turnover risk, we see that the effect for low-institutional ownership firms is more

pronounced as a reduction in medium- and high-risk firms, while the effect for high-institutional ownership firms is concentrated in the lowest and highest quintiles.

Columns 7 and 8 analyze the relation between turnover risk and volatility separately for internally appointed and externally hired CEOs. The board has more information on internally appointed CEOs than on externally hired ones, rendering it easier to assess the performance of internally appointed CEOs. Consistent with this idea, we find that internally appointed CEOs respond less to turnover risk than externally hired CEOs, albeit not significantly on a conventional statistical level. The sign and the magnitude of the coefficient are similar to that of the baseline analysis for both groups. Neither externally nor internally appointed CEOs gamble for resurrection.

In columns 9 and 10, we restrict the sample to firms in financial or the oil and gas sector. Executives in the finance industry may have more opportunities to manipulate risk, for example with derivatives. Contrary to this argument, the coefficient of the continuous measure of turnover risk is not significant for firms in the finance industry. The only significant relation between volatility and turnover risk is concentrated in firm-years with medium turnover risk, which have with less volatility. In contrast, the coefficient estimated for the oil and gas industry is negative significant and of greater magnitude than in the baseline sample. For these executives, investment opportunities are arguably less cyclical because they can always decide between exploring fields themselves or acquiring explored fields (Gilje and Taillard, 2012). However, the results are not significant for the quantiles.

## 4. IDENTIFICATION AND ROBUSTNESS

The identification assumption central to the causal interpretation of our findings is that the cyclical variation in contract horizon is uncorrelated with unobservables that affect risk and are not captured by the firm-executive fixed effects. This can be true for cyclical variables

that determine both contract horizon and risk-taking. This section presents robustness checks that address these concerns, as well as those related to other potential omitted variables, especially related to executive compensation.

*4.1 Expansion plans*

Firms may hire the CEO for a specific task, such as the investment to a certain plant, expansion into a new market, or cost-cutting (Anderson et al., 2013). In such cases, the firm may choose a contract length equal to the planned duration of the project.[6] If our results were driven by such task-specific CEO hires, plans underlying the contract length must involve upfront risk-taking and little risk at the end. This is true for most expansive projects.

Although future plans of the firm are not directly observable, we can use historical information to extrapolate expansion cycles of a firm. While every cycle is different ex post, firms rely on detailed information and experience from past cycles in their strategic planning. If expansion cycles are the only consideration that determines the contract horizon, forecasted cycles should be equal to the contract horizon. Furthermore, expansion cycles should also lead to a risk-taking pattern similar to what we document, even in the absence of contracts.

We construct expansion cycles as the time elapsed between peaks in investment spending growth. We define peaks as years in which capital expenditures grow more than 25% compared to the previous year. Our results are similar when we use R&D expenses to define peaks. Table 9, Panel A shows descriptive statistics of our measures of investment cycles. The average CAPEX and R&D cycles are longer than the average CEO contract, at 3.89 and 4.18 years. The length of an investment cycle is persistent within firms: the standard deviation of cycle length within firms is 0.35 for CAPEX and 0.26 for R&D cycles. For each

[6] Anecdotal evidence shows that not all contract durations are matched to existing projects. Specifically, we identify five CEO turnover events due to sudden deaths in our fixed-term contracts sample. In all of these cases the successor received a contract with a length different from the remaining contract horizon of the deceased, and only one received a contract with the same initial contract length.

firm-year, we compute the number of years left until the end of the cycle. The average difference between this variable and the number of remaining years on the contract is 0.92 (0.98 using the most recent cycle and 0.97 using R&D to compute the cycle).

TABLE 9 HERE

In Panel B of Table 9, we repeat our baseline regressions using the expansion cycle together with the turnover risk measure computed using the actual contract horizon. Columns 1-3 of Panel B show that after controlling for investment cycles our measure of career concerns remains negative and highly significant. In contrast, the timing of investment cycles is not significantly correlated with volatility in any of the specifications. If expansion cycles were driving our results, they should explain risk, and the career concerns measure should not: this alternative interpretation is not supported by the data. The results in Table 9 suggest that ex-ante expansion plans cannot explain the effect of contract horizon on risk-taking.

Because our expansion cycle predictions are based on historical, and industry-wide data, they may still not capture novel, firm-specific expansion plans that are reflected in the actual contract horizon. To address this concern, we predict contract length using the length of *previous* contracts, an approach that has been used in the compensation literature to predict option grant cycles (Shue and Townsend, 2013). There are several reasons past contract length can predict future contract length: firms may re-use past contracts, repeat evaluation cycles, or attract CEOs with similar preferences. Anecdotal evidence by Chief HR officers suggests that contract negotiations often use the previous contract as reference point. To isolate such information, we replace contract length with the length of previous contracts by the same firm.

We compute historical contract length in three ways: using the most recent, the two most recent, and the three most recent fixed-term contracts prior to the current contract. We

then replace the actual contract length with this historical contract length for all firms for which we observe at least one previous contract, in the year after the previous contract ends. We apply this procedure to all firms, regardless of the actual contract length and regardless of whether the new contract actually has a fixed term. The resulting contract length is comparable to the baseline sample, with a mean of three years. It is sticky within firms, with a standard deviation of 0.23 (0.13 and 0.09, respectively, for the two- and three-year averages). We then use this predicted contract length to compute the number of years until expiration. The average difference between this measure and the actual contract horizon is 0.61 years.

Thereafter, instead of using the number of years remaining on the CEO's actual contract we use the number of years that *would remain* on the contract if the contract length were equal to the historic value. First, we repeat the first stage of our analysis: we use this modified measure of remaining years to predict CEO turnover. Panel C of Table 9 shows the estimates from a Cox hazard model estimated analogously to the model in Column 1 of Table 3. Our results indicate that one additional year remaining on the CEO's contract is associated with a 4% decrease in the probability of dismissal. Although this is considerably smaller than the estimates in Table 3, it is significant at the 10% level in the first specification and is economically meaningful, as the unconditional turnover probability in this sample of historic contract length is 15.75%. The coefficients of contract length using the previous two or three contracts are not significant.[7]

In Panel C, we regress volatility on turnover risk (estimated using the historical contract length) as well as the expansion cycle. In this regression, the estimation of turnover

[7] There are several reasons that the estimate could be less precise. First, the size of our historic sample is smaller than the baseline sample. Second, while replacing our measure of years remaining on the actual contract with one based on past contracts eliminates any information that is forward-looking, such as future expansion plans, it also eliminates all other information arriving during the historic contract. For instance, if a firm replaced their head of HR because of the death of retirement of the incumbent, we would predict that the new head of HR would also offer a contract of the same length, which inherently adds noise to our estimates.

risk using previous contracts eliminates any forward-looking information from the turnover risk measure. The historical contract length may well be driven by information about the investment cycle relevant for the historical contract horizon. We add the expansion cycle measure to control for this. Despite the small sample size, we find a negative and consistently significant coefficient estimate for the turnover risk estimated based the previous contracts, even after controlling for the investment cycles. This shows that our results are not likely to be driven by firm-specific expansion plans that affect both contract terms and return volatility.

*4.2 Business cycles*

Another reason for risk-related cyclicality can be business cycles or product cycles. However, when adapting to the business cycle, firms are likely to set contract length in a way that would produce the opposite of our results: contracts should end when industry risk is high and not when it is low. Moreover, industry cycles are difficult to predict accurately and therefore unlikely to cause the precise pattern that we document.

We nevertheless test this explanation in using the industry-wide contract horizon as a forward-looking measure for the industry cycle. We compute three variants of this measure: the average length of all contracts that are valid in a given year and industry; the average number of years remaining under all such contracts; and the average length of all new contracts closed in a given year and industry. The latter measure captures new information about the business cycles that were not available to firms at the time when the older contracts were signed. It results in an average contract length of 3.1 years, comparable to the baseline sample. Using all contracts including old ones results in an average industry “horizon” of 4.1 years. The variation of these measures is with 0.96 (all) and 0.81 (new contracts) much larger than the previously described measures of investment cycles and previous contracts. The

average difference between industry horizon and actual contract horizon is 1.25 years.The difference is smaller when we use only new contracts (0.60) and close to zero when we use the number of years remaining.

We then estimate volatility with this industry cycle measure, together with our baseline measure of turnover risk (Panel B) or the turnover risk estimated with historical contracts (Panel C). Industry cycles do not change our main results: the coefficient of turnover risk remains negative and highly significant.

*4.3 Controlling for other firm and CEO characteristics*

In this section, we control directly for firm and CEO characteristics that are observable and have been shown to affect both contract horizon and risk-taking.

**Compensation.** Starting with Holmstrom (1982), the literature has argued that firms need to provide compensation packages that incentivize risk taking to offset the effect of turnover risk. Several papers provide evidence that compensation such as options is indeed able to induce risk-taking (e.g., Agrawal and Mandelker, 1987; DeFusco et al., 1990; Guay, 1999; Cohen et al., 2000; Coles et al., 2006; Shue and Townsend, 2013; Chava and Purnandam, 2010; Gormley et al., 2013). It is therefore possible that our results are driven not by turnover risk, but instead by compensation packages that vary across time.

To disentangle effects of career concerns and compensation, we add three control variables capturing the amount and nature of equity-based compensation to our main regression: the level of compensation (log of TDC1, the sum of cash compensation and equity compensation granted in that year); and the stock price sensitivity of the CEO's unvested and vested portfolio of stock and options, computed using the Core and Guay

(2002) methodology. We obtain these variables from *ExecuComp*, which only provides data for a fraction of our sample (4,730 observations).

TABLE 10 HERE

The results are documented in column 1 of Table 10. Controlling for compensation reduces the magnitude of the coefficient on turnover probability from -0.74 to -0.59, but not the statistical significance. The reduction in magnitude is partly due to the restricted availability of ExecuComp data: when we repeat our baseline regression on the ExecuComp sample, the coefficient is reduced to -0.60 (column 2). Out of the compensation variables, only the stock price sensitivity of unvested equity grants is significantly related to volatility, albeit the coefficient is quite small, and it is significant only at the 10% level. Overall, we find that compensation cannot explain our baseline results; in fact, it has little to no correlation with risk once we control for career concerns.

**Tenure and age.** Intuitively, it seems unlikely that the CEO adapts the length of her contract to a personal risk-taking cycle rather than adapting personal decisions to his career concerns. Even if we did have personal data on the CEO's family, it is impossible for an outsider to reconstruct her private plans. However, the CEO's age and tenure can give us a rough indication of her place in the life cycle and career, and they may affect risk-taking in their own right. For example, Yim (2013) shows that young CEOs make more acquisitions, and Pan et al. (2013a) document a tenure-based investment cycles in which CEOs increase investment as they spend more time at the firm. Because age and tenure are collinear with contract horizon for a given CEO-firm-contract, we use dummy variables for age and tenure groups. CEOs of ages below 55, 55-59, 60-64, and equal or above 65 are grouped together, as are CEOs with tenure below 3, 3-5, 6-8 and equal or above 9, following the tenure groups of Pan et al., 2013a.

The results are reported in columns 3 and 4 of Table 10. Controlling for age and tenure does not explain our results. The coefficients on turnover risk are significantly negative even after controlling for these variables. The coefficients on the age and tenure groups are consistent with the literature. Younger CEOs take more risk, similar to the more acquisitive young CEOs that Yim (2013) documents; newer CEOs are associated with greater volatility, consistent with learning about new CEOs that Pan et al. (2013b) document.

**Firm age.** The firm's history and position in its life cycle may also exhibit a predictable time trend. Firms may become less risky as they accumulate assets, equity, and expertise over time. We measure firm experience as the age of the firm measured as the log of the number of years from its date of incorporation. We obtain this number from Capital IQ. Where this number is missing, we use the number of years since the first appearance in COMPUSTAT. We report the results in column 5 of Table 10. Controlling for firm age does not explain our baseline results: the coefficient on turnover risk is still negative and significant. The coefficient on firm age is also significantly negative: stock returns of older firms are less volatile.

**Firm or executive fixed effects.** Finally, we replace the firm-executive fixed effects in our baseline regression with firm or executive fixed effects. This helps control for the effect of any unobservable and time-invariant firm or CEO characteristics. Column 6 in Table 10 reports results for the baseline regression, using firm instead of firm-executive fixed effects. Column 7 repeats the exercise using executive fixed effects. All results are qualitatively similar and of similar magnitude.

In summary, results in Table 10 suggest that controlling for compensation, CEO characteristics, firm experience, and time-invariant firm and CEO characteristics cannot explain away the effect of career concerns on risk documented in our baseline regressions.

*4.5 Other robustness checks*

**Actual turnover.** We verify in Table 11 that our results hold when we use the actual, observed career horizon of CEOs. To this end, we calculate the number of years until actual turnover (column 1) and a dummy for the last two years before turnover (column 2). Both measures are significantly correlated with risk in the same way as the anticipated turnover risk: for each additional year before turnover, volatility increases by 8 basis points. In the last two years, volatility is 34 basis points lower.

TABLE 11 HERE

**First year.** There are two reasons that including each CEO's first year in the sample could be problematic. First, the start date of CEOs rarely coincides with the fiscal year end. Therefore, the first fiscal year in which a CEO is present is likely to contain days under the former CEO. These data are likely to introduce noise into our estimation. Second, so far, we have considered all CEO transactions as voluntary, undertaken either because the CEO had private information, or because of their diversification or liquidity needs. However, firms impose a minimum level of stock ownership on CEOs (Core and Larcker (2002)). Especially if the CEO was hired from outside the firm, fulfilling these mandatory ownership requirements may lead to mechanical CEO purchases in the first year of their tenure.

In another robustness check, we discard all firm-years in which the CEO is in their first year (tenure equals 0). Doing so reduces our sample by 1,259 observations (22%). We then estimate the turnover probability excluding the respective first years of each CEO. The results are reported in column 5 of Table 10, and are stronger than the baseline regression.

**Deciles.** Throughout the analysis, we have used quintiles to classify turnover risk. Our results do not change for various quantile classifications (and also not if we assign only the fourth quintile as medium etc.). In column 8 of Table 10, we report the results using deciles of turnover risk. We classify the tenth decile as high, the first as low, and decile eight and nine

as medium. The results are similar to the baseline regression: CEOs with low turnover probability have a barely significant coefficient of -0.09, the ones with medium turnover probability a significant coefficient of -0.39, and the ones with high turnover probability the most negative and significant coefficient of -0.56.

## 5. CONCLUSION

We estimate the risk of dismissal for CEOs using data on contract terms. Longer contracts protect CEOs from turnover: the contractual horizon predicts the likelihood that an executive actually leaves office. CEOs with longer remaining contracts have a lower probability of termination. While contract terms provide an ex-ante predictor of turnover risk that is unlikely to be correlated to contemporaneous performance, insider trades help us form a more precise measure that takes all available information into account. Because executives have little incentive to invest into the company when their human capital risk is high, insider purchases and sales give us the executive's own assessment of her turnover probability.

The likelihood of CEO turnover affects risk-taking. Consistent with the predictions of career risk models, a higher probability of CEO turnover is associated with lower stock return volatility, particularly idiosyncratic volatility. We document a similar effect for capital expenditures, which suggests that much of the risk-taking is done via investment. In contrast, we do not find similar effects for financial leverage.

Chief executives are supervised by boards which are responsible for dismissal decisions and are likely to participate in greater investment or strategic decisions. Unless the board is uninformed or biased towards the CEO, it is likely to prevent apparently unproductive gambling for resurrection. Consistent with this argument, we find no evidence for increased risk-taking when turnover probability is high. Moreover, our results are more pronounced

when boards are dominated by outsiders, suggesting that informed boards actively discourage career-related risk-taking.

This paper is a first effort to document the effects of contract horizon. We hope that these preliminary results give some practical orientation to both the governance literature and the contract design praxis. Given the availability of new data, we are confident that future research will illuminate various other effects, interactions, and remedies for the phenomena described in the current paper. In particular, we hope that theorists are inspired to further explore the interactions between capital structure policies and career concerns.

Understanding the interaction between compensation and horizon is crucial for contract design. The analysis of this paper shows that contractual horizon is not a substitute for long-term compensation: in addition of setting a long-term horizon, it also provides the threat of abandoning all compensation. Whether and how long-term compensation and severance pay can dampen or accentuate some of the effects are promising questions for future research.

## References


Aghion, P., Van Reenen, J., and Zingales, L. 2013. Innovation and institutional ownership. American Economic Review 103: 277-304.

Agrawal, A., J. F. J., and Mandelker, G. N. 1992. The Post-merger performance of acquiring firms: a re-examination of an anomaly, *Journal of Finance* 47: 1605-1621.

Anderson, R., Bustamante, M. C., and Guibaud, S. 2013. Agency, firm growth and managerial turnover, Manuscript.

Antia, M., Pantzalis, C., and Park, J. C. 2010. CEO decision horizon and firm performance: an empirical investigation, *Journal of Corporate Finance* 16: 288-301.

Asker, J., Farre-Mensa, J., and Ljungqvist, A. 2011. Does the Stock Market Distort Investment Incentives? CEPR Discussion Paper No. DP7857.

Bebchuk, L. A., and Stole, L. A. 1993. Do short-term objectives lead to under- and overinvestment in long-term projects? *Journal of Finance* 48: 719-729.

Bertrand, M., and Mullainathan, S. 1999. Is there discretion in wage setting? A test using takeover legislation, *RAND Journal of Economics* 30: 535-554.

BIS. 2011. Executive Remuneration, Discussion paper, September 2011.

Bolton, P., Scheinkman, J., and Xiong, W. 2006. Executive compensation and short-termist behaviour in speculative markets, *Review of Economic Studies* 73: 577-610.

Brickley, J. A., Coles, J. L., and Linck, J. S. 1999. What happens to CEOs after they retire? New evidence on career concerns, horizon problems, and CEO incentives, *Journal of Financial Economics* 52: 341-377.

Brickley, J.A., 2003. Empirical research on CEO turnover and firm-performance: A discussion, Journal of Accounting and Economics 36, 227-233.

Brown, S., and Hillegeist, S. A. 2007. How disclosure quality affects the level of information asymmetry, *Review of Accounting Studies* 12: 443-477.

Campbell, J.Y., 1996. Understanding risk and return, Journal of Political Economy 101, 298-345.

Chava, S., and Purnanandam, A. 2010. CEOs versus CFOs: incentives and corporate policies, *Journal of Financial Economics* 97: 263–278.

Chevalier, J., Ellison, G., 1997. Risk taking by mutual funds as a response to incentives, Journal of Political Economy 105, 1176-1220.

Chevalier, J., Ellison, G., 1999. Career concerns of mutual fund managers, Quarterly Journal of Economics 114, 389-342.

Cohen, L., Malloy, C., Pomorski, L., 2011. Decoding inside information, Journal of Finance, forthcoming.

Coles, J. L., Daniel, N. D., and Naveen, L. 2006. Managerial incentives and risktaking, *Journal of Financial Economics* 79: 431–468.

Conyon, M. 1994. Tenure and contracts: the experience of UK CEOs, *Personnel Review* 23: 25-33.

Core, J., Guay, W., 2002. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. Journal of Accounting Research 40, 613-630.

Core, J., Larcker, D., 2002. Performance consequences of mandatory increases in executive stock ownership, Journal of Financial Economics 64, 317–340.

Coughlan, A. T., and Schmidt, R. M. 1985. Executive compensation, management turnover and firm performance, *Journal of Accounting and Economics* 7: 43-66.

Cox, D. R. 1972. Regression models and life tables, *Journal of the Royal Statistical Society*, Series B 34: 187-220.

Cremers, K. J. M., and Nair, V. B., 2005. Governance mechanisms and equity prices, *Journal of Finance* 60: 2859-2894.

Dahiya, S., and D. Yermack, 2008. You can't take it with you: Sunset provisions for equity compensation when managers retire, resign, or die, *Journal of Corporate Finance* 14: 499-511.

Dechow, P. M., and Richard G. Sloan. 1991. Executive incentives and the horizon problem, *Journal of Accounting and Economics* 14: 51-89.

DeFusco, R. A., Johnson, R. R., and Zorn, T. S. 1990. The effect of executive stock option plans on stockholders and bondholders, *Journal of Finance* 45: 617–627.

Denis, D. J., Denis, D. K., and Sarin, A. 1997. Ownership structure and top executive turnover, *Journal of Financial Economics* 45: 193-221.

Edmans, A. 2009. Blockholder trading, marketing efficiency, and managerial myopia, Journal of Finance 64: 2481-2513

Edmans, A. 2011. Short-term termination without deterring long-term investment: A theory of debt and buyouts, Journal of Financial Economics 102: 81-101.

Fama, E. 1980. Agency problems and the theory of the firm. *Journal of Political Economy* 88: 288-307.

Froot, K. A., Perold, A.F., and Stein, J. 1992. Shareholder trading practices and corporate investment horizons, *Journal of Applied Corporate Finance* 5: 42-58.

Garmaise, M. J. 2011. Ties that truly bind: non-competition agreements, executive compensation and firm investment, *Journal of Law, Economics & Organization* 27: 376-425.

Gibbons, R., and Murphy, K. J. 1992. Optimal incentive contracts in the presence of career concerns: theory and evidence, *Journal of Political Economy* 100: 468-505.

Gilje, E., and Taillard, J. P., 2012. Do public firms invest differently than private firm? Taking cues from the natural gas industry. Working paper, Boston College.

Gillan, S. L., Hartzell, J. C., and Parrino, R. 2009. Explicit vs. implicit contracts: evidence from CEO employment agreements, *Journal of Finance* 64: 1629-1655.

Gilson, S. C. 1989. Management turnover and financial distress, *Journal of Financial Economics* 25: 241-262.

Goldman, E., and Huang, P. 2010. Contractual versus actual severance pay following CEO departure, Manuscript.

Gompers, P. A., Ishii, j. L., and Metrick, A. 2003. Corporate governance and equity prices, *Quarterly Journal of Economics* 118: 107-155.

Gopalan, R., Milbourn, T. T., Song, F., and Thakor, A. V. 2010. The optimal duration of executive compensation: theory and evidence, Forthcoming, *Journal of Finance*.

Gormley, T. A., Matsa, D. A., and Milbourn, T. T. 2013. CEO compensation and corporate risk-taking: Evidence from a natural experiment, *Journal of Accounting and Economics*, Forthcoming.

Gormley, T. A., and Matsa D. A., 2011. Growing out of trouble? Corporate Responses to Liability Risk, *Review of Financial Studies* 24: 2781–2821

Gormley, T. A., and Matsa D. A., 2014. Common Errors: How to (and Not to) Control for Unobserved Heterogeneity, *Review of Financial Studies* 27: 617–666

Guay, W. R. 1999. The sensitivity of CEO wealth to equity risk: An analysis of the magnitude and determinants, *Journal of Financial Economics* 53: 43–71.

Hartzell, J. C. 2001. The impact of the likelihood of turnover on executive compensation, Manuscript.

Hayes, R. M., Lemmon, M., and Qiu, M. 2012. Stock options and managerial incentives for risk taking: Evidence from FAS 123R, *Journal of Financial Economics* 105: 174–190.

Heckman, J. J. 1979. Sample selection bias as a specification error, *Econometrica* 47: 153-161.

Holmstrom, B. 1982. Managerial incentive problems: a dynamic perspective. In Essays in Economics and Management in Honor of Lars Wahlbeck. Helsinki: Swedish School of Eocnomics. (Published in *Review of Economic Studies* (1999) 66: 169-182.)

Holmstrom, B., and Ricart i Costa, J., 1986. Managerial incentives and capital management. *Quarterly Journal of Economics* 101: 835-860.

Huang, J., Sialm, C., Zhang, H., 2011. Risk shifting and mutual fund performance. Review of Financial Studies 24, 2575-2616.

Huson, M. R., Parrino, R., and Starks, L. T. 2001. Internal monitoring mechanisms and CEO turnover: A long term perspective, *Journal of Finance* 56: 2265-2297.

Iossa, E., Rey, P., 2013. Building reputation for contract renewal: implications for performance dynamics and contract duration. Working paper, Toulouse.

Jagannathan, R., Wang, Z., 1996. The conditional CAPM and the cross-section of expected returns, Journal of Finance 51, 3-53.

Jenter, D., and Kanaan, F. 2010. CEO turnover and relative performance evaluation, *Journal of Finance*, forthcoming.

Jenter, D., and Lewellen, K. 2010. Performance-induced CEO turnover, Manuscript.

Jenter, D., and Lewellen, K. 2011. CEO preferences and acquisitions, NBER working paper.

Kaplan, S. N., and Minton, B. A. 2012. How has CEO turnover changed? *International Review of Finance* 12: 57-87.

Kedia, S., and Rajgopal, S. 2009. Neighborhood matters: The impact of location on broad based stock option plans, *Journal of Financial Economics* 92: 109-127.

Lang, M., and Lundholm, R. 1993. Cross-sectional determinants of analyst ratings of corporate disclosures, *Journal of Accounting Research* 31: 246-271.

Miles, T. J. 2000. Common law exceptions to employment at-will and U.S. labor markets, *Journal of Law and Economics, and Organization* 16: 74-101.

Mikkelson, W. H., and Partch, M. M. 1997. The decline of takeovers and disciplinary management turnover, *Journal of Financial Economics* 44: 205-228.

Muhl, C. J. 2001. The employment-at-will doctrine: three major exceptions, *Monthly Labor Review* 124: 3-11.

Murphy, K. J., and Zimmerman, J. L. 1993. Financial performance surrounding CEO turnover, *Journal of Accounting and Economics* 16: 273-315.

Ofek, E., Yermack, D., 2000. Taking stock: Equity-based compensation and the evolution of managerial ownership, Journal of Finance 55, 1367-84.

Pan, Y., Wang, T. Y., and Weisbach, M. S. 2013a. CEO investment cycles. NBER working paper.

Pan, Y., Wang, T. Y., and Weisbach, M. S. 2013b. Learning about CEO ability and stock return volatility. NBER working paper.

Parrino, R. 1997. CEO turnover and outside succession: A cross-sectional analysis. Journal of Financial Economics 46: 165-197.

Perry, T., 1999. Incentive compensation for outside directors and CEO turnover. Working Paper, Arizona State University.

Rau, R., and Xu, J. 2009. How do ex-ante severance pay contracts fit into optimal executive incentive schemes? Forthcoming, *Journal of Accounting Research*.

Rusticus, T. O. 2006. Executive severance agreements, Manuscript.

Schwab, S. J., and Thomas, R. T. 2005. What do CEOs bargain for? *Washington and Lee Law Review* 63: 231-70.

Shue, K., and Townsend, R. 2013. Swinging for the fences: executive reactions to quasi-random option grants. Working paper, Chicago Booth.

Von Thadden, E.-L. 1995. Long-term contracts, short-term investment and monitoring, Review of Economic Studies 62: 557-575.

Walsh, D. J., and Schwarz, J. L. 1996. State common law wrongful discharge doctrines: up-date, refinement, and rationales, *American Business Law Journal* 33: 645-689.

Weisbach, M. S. 1988. Outside directors and CEO turnover, *Journal of Financial Economics* 20: 431-460.

Yim, S. 2013. The acquisitiveness of youth: CEO age and acquisition behavior. *Journal of financial economics*: 108, 250-273.

# Table 1
# Summary statistics (start of the contract)

Panel A: Number and length of contracts per year

| Year | Before 1995 | 1995 | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of contracts | 126 | 133 | 184 | 313 | 262 | 262 | 259 | 278 | 282 | 275 | 344 | 330 | 349 | 325 | 232 | 3954 |
| Average contract length | 4.23 | 3.77 | 3.72 | 3.47 | 3.21 | 3.44 | 3.45 | 3.30 | 3.24 | 3.15 | 3.30 | 3.13 | 3.06 | 2.93 | 2.78 | 3.28 |

Panel B: Contract length

| Length (years) | <1 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | >10 | Evergreens |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| All fixed-term | 64 | 416 | 741 | 1515 | 410 | 551 | 92 | 55 | 22 | 25 | 23 | 39 | 73 |
| | 2% | 11% | 19% | 38% | 10% | 14% | 2% | 1% | 1% | 1% | 1% | 1% | 2% |
| First contract | 26 | 282 | 506 | 1132 | 266 | 394 | 55 | 32 | 7 | 10 | 14 | 11 | 19 |
| | 1% | 10% | 19% | 41% | 10% | 14% | 2% | 1% | 0% | 0% | 1% | 0% | 1% |
| Renewals | 38 | 134 | 235 | 383 | 144 | 157 | 37 | 23 | 15 | 15 | 9 | 28 | 54 |
| | 3% | 11% | 19% | 31% | 12% | 13% | 3% | 2% | 1% | 1% | 1% | 2% | 4% |

Panel C: Number of contracts by state (15 states with the largest number of contracts)

| State | CA | NY | TX | FL | NJ | PA | IL | MA | OH | VA | GA | MN | CT | CO | MD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Number of contracts | 528 | 440 | 331 | 213 | 213 | 214 | 163 | 157 | 161 | 119 | 110 | 95 | 112 | 85 | 93 |
| Average contract length | 3.33 | 3.40 | 3.15 | 3.60 | 3.28 | 3.15 | 3.14 | 3.17 | 3.33 | 3.28 | 3.34 | 2.86 | 3.35 | 3.37 | 3.50 |
| Sample distribution | 13% | 11% | 8% | 5% | 5% | 5% | 4% | 4% | 4% | 3% | 3% | 2% | 3% | 2% | 2% |
| COMPUSTAT distributio | 14% | 10% | 7% | 5% | 4% | 3% | 5% | 4% | 2% | 2% | 2% | 2% | 2% | 3% | 2% |

Panel D: Average firm and industry characteristics by contract

| | | W/O Contract | Fixed-term Contract | Fixed-term 1 year | 2 year | 3 year | 4 year | 5 year |
|---|---|---|---|---|---|---|---|---|
| Firm | Assets ($ millions) | 2,621 | 1,756 | 2,082 | 1,757 | 2,046 | 1,811 | 2,361 |
| | ROA | 7.1% | 1.6% | -1.7% | -0.3% | 0.8% | 2.4% | 2.8% |
| | Market-to-book | 2.71 | 2.62 | 2.58 | 2.59 | 2.45 | 2.81 | 2.58 |
| Disclosure | AIMR | 100% | 93% | 74% | 90% | 86% | 97% | 95% |
| quality | Restatement | 4.5% | 4.7% | 7.0% | 4.1% | 5.2% | 3.8% | 3.9% |
| Industry | Industry survival rate | 96% | 99% | 97% | 98% | 98% | 99% | 100% |
| | Industry sales volatility | 8% | 8% | 8% | 8% | 8% | 8% | 8% |
| | Industry homogeneity | 41% | 32% | 32% | 31% | 29% | 31% | 37% |

This table presents descriptive statistics. Accounting numbers are measured at the fiscal year that ends before the contract start date. Variables are defined in appendix A.2.

**Table 2**
**Summary statistics (years under contract)**

| | | N | Mean | Median | Standard deviation | Min | Max |
|---|---|---|---|---|---|---|---|
| Firm | Assets ($ millions) | 13184 | 1,762.19 | 539.88 | 2,616.94 | 1.98 | 8,548.90 |
| | ROA | 12893 | 3.8% | 6.5% | 18.8% | -120.3% | 34.8% |
| | Annual stock returns | 10508 | 2.5% | 1.5% | 12.3% | -28.9% | 45.0% |
| | Market-to-book | 12587 | 2.70 | 2.09 | 2.01 | 0.36 | 8.29 |
| | Leverage | 13181 | 20.5% | 23.3% | 35.6% | -78.1% | 134.3% |
| | Volatility | 11918 | 3.10 | 2.63 | 1.74 | 0.95 | 9.69 |
| | Beta | 11887 | 0.95 | 0.95 | 0.59 | -0.59 | 2.65 |
| | Idiosyncratic risk | 11885 | 0.11 | 0.06 | 0.14 | 0.01 | 0.86 |
| | R&D/assets | 11992 | 6.7% | 4.0% | 9.6% | 0.0% | 60.1% |
| | CAPEX/assets | 13618 | 4.9% | 0.0% | 14.5% | 0.0% | 127.3% |
| | Finance industry | 13618 | 19.8% | 0.0% | 39.8% | 0.0% | 100.0% |
| CEO/ | Age | 13596 | 53.99 | 54.00 | 8.48 | 25.00 | 99.00 |
| Governance | Renewal | 13618 | 31.5% | 0.0% | 46.5% | 0.0% | 100.0% |
| | Percent CEO ownership | 13618 | 0.76 | - | 3.19 | - | 51.64 |
| | Percent CEO voting power | 13618 | 0.91 | - | 5.05 | - | 100.00 |
| | Total compensation (2000 $, tds) | 6403 | 5,239.08 | 2,510.95 | 10,459.99 | - | 245,016.90 |
| | Incentive to total compensation | 13618 | 0.41 | 0.43 | 0.36 | - 10.07 | 1.00 |
| | Percent unexercisable | 13618 | 0.10 | - | 0.22 | - | 2.12 |
| | Governance index | 5334 | 9.15 | 9.00 | 2.66 | 1.00 | 18.00 |
| | Chairman and CEO | 13618 | 52% | 100% | 50% | 0% | 100% |
| | Exception rule | 11817 | 25% | 0% | 43% | 0% | 100% |

This table presents descriptive statistics. A CEO is a net buyer in a calendar year if she buys more stock than she sells, and a net seller if she sells more stock than she buys.

**Table 3**
**Turnover risk**

| | Panel A: Hazard models of CEO turnover | | | | | |
|---|---|---|---|---|---|---|
| | Cox | Cox | Cox | Weibull | Weibull | Weibull |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Remaining years | 0.7946*** | | 0.7683*** | 0.7960*** | | 0.7698*** |
| | (0.022) | | (0.025) | (0.022) | | (0.025) |
| Dividend | | 0.9044 | 0.9084 | | 0.8958 | 0.8974 |
| | | (0.102) | (0.103) | | (0.102) | (0.102) |
| B/M | | 1.0561 | 1.0381 | | 1.0518 | 1.0331 |
| | | (0.068) | (0.071) | | (0.069) | (0.073) |
| Ln(assets) | | 1.0840** | 1.0965*** | | 1.0967*** | 1.1102*** |
| | | (0.037) | (0.037) | | (0.038) | (0.038) |
| ROA | | 0.4000*** | 0.4292*** | | 0.3629*** | 0.3954*** |
| | | (0.109) | (0.118) | | (0.099) | (0.108) |
| Tenure performance | | 0.7869*** | 0.7927*** | | 0.7733*** | 0.7793*** |
| | | (0.061) | (0.061) | | (0.062) | (0.062) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| α | | | | 1.042 | 1.0541 | 1.0603* |
| N | 9,030 | 6,709 | 6,709 | 9,030 | 6,709 | 6,709 |

| | Panel B: Dichotomous regressions of CEO turnover | | | | | |
|---|---|---|---|---|---|---|
| | Logit | Logit | Logit | Probit | Probit | Probit |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Remaining years | -0.2659*** | | -0.3091*** | -0.1242*** | | -0.1463*** |
| | (0.031) | | (0.036) | (0.014) | | (0.017) |
| Dividend | | -0.1283 | -0.0982 | | -0.0608 | -0.0517 |
| | | (0.116) | (0.118) | | (0.058) | (0.059) |
| B/M | | 0.0906 | 0.0861 | | 0.0466 | 0.0433 |
| | | (0.065) | (0.065) | | (0.036) | (0.036) |
| Ln(assets) | | 0.0402 | 0.0430 | | 0.0222 | 0.0244 |
| | | (0.035) | (0.036) | | (0.018) | (0.018) |
| ROA | | -0.4252 | -0.3993 | | -0.2320 | -0.2320 |
| | | (0.301) | (0.304) | | (0.155) | (0.156) |
| Tenure performance | | -0.1502** | -0.1437** | | -0.0649** | -0.0614** |
| | | (0.069) | (0.069) | | (0.031) | (0.031) |
| Tenure | -0.0188** | -0.0236*** | -0.0264*** | -0.0091** | -0.0111*** | -0.0118*** |
| | (0.008) | (0.009) | (0.009) | (0.004) | (0.004) | (0.004) |
| Year FE | Yes | Yes | Yes | Yes | Yes | Yes |
| Industry FE | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 9,030 | 6,709 | 6,709 | 9,030 | 6,709 | 6,709 |

This table presents presents the results of hazard model estimations, reporting hazard ratios for CEO turnover and standard errors underneath. Standard errors are clustered at the firm level. Asterisks indicate that the estimates are significantly different from zero at the *** 1% level, ** 5% level, * 10% level.

**Table 4**
**Choice of contract type**

| | | Dependent variable: Fixed-term contract | |
|---|---|---|---|
| | | (1) | (2) |
| Geography | Exception rule | -0.248*** | -0.240*** |
| | | (0.01) | (0.01) |
| | Anti-takeover | 0.108*** | 0.102*** |
| | | (0.01) | (0.01) |
| | Garmaise | -0.004* | |
| | | (0.003) | |
| Disclosure quality | Assets | -0.275*** | -0.275*** |
| | | (0.02) | (0.02) |
| | Restatement | 0.175*** | 0.176*** |
| | | (0.05) | (0.05) |
| | Log number of SEOs | 0.581*** | 0.574*** |
| | | (0.01) | (0.01) |
| | Analyst forecast STD | -0.001 | |
| | | (0.0005) | |
| Risk | Industry homogeneity | 0.788** | -1.353*** |
| | | (0.34) | (0.23) |
| | Industry sales volatility | 0.041 | |
| | | (0.14) | |
| | Industry survival rate | 0.191 | |
| | | (0.34) | |
| Governance | Former CEO | 0.317*** | 0.317*** |
| | | (0.09) | (0.09) |
| | Age | -0.006*** | -0.006*** |
| | | (0.002) | (0.002) |
| | Tenure | -0.040*** | -0.040*** |
| | | (0.003) | (0.003) |
| | Governance index | 0.110*** | 0.110*** |
| | | (0.007) | (0.007) |
| Fixed effects | Industry | Yes | Yes |
| | Year | Yes | Yes |
| Constant | | -3.157*** | -2.937*** |
| | | (0.36) | (0.18) |
| *N* | | 32,268 | 32,268 |

This table presents marginal effects from Probit regressions and standard errors (in parentheses) that are heteroskedasticity robust and clustered by year. All variables are measured in the last fiscal year ending before the start date of the contract. Asterisks indicate that the estimates are significantly different from zero at the *** 1% level, ** 5% level, * 10% level.

**Table 5**
**Risk**

| Panel A: Volatility | | | | | | |
|---|---|---|---|---|---|---|
| Sample | All | All | All | All | All | Renewed |
| Turnover estimation | Cox | Cox | Cox | Cox | None | Cox |
| Predictor | Contract | Performance | Contract and performance | Contract | | Contract |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Turnover probability | -0.741*** | -0.152*** | -0.131*** | | | -0.576*** |
| | (0.097) | (0.028) | (0.023) | | | (0.125) |
| Low turnover probability | | | | 0.064 | | |
| | | | | (0.054) | | |
| Medium turnover probability | | | | -0.106** | | |
| | | | | (0.043) | | |
| High turnover probability | | | | -0.479*** | | |
| | | | | (0.056) | | |
| Election year | | | | | -0.083** | |
| | | | | | (0.034) | |
| Mills | 6.664*** | 5.525*** | 5.468*** | 6.665*** | 6.645*** | |
| | (1.28) | (0.014) | (0.024) | (1.16) | (1.111) | |
| Constant | 1.220*** | 1.595*** | 1.495*** | 1.060*** | 0.918** | 2.939*** |
| | (0.415) | (0.058) | (0.049) | (0.379) | (0.36) | (0.062) |
| Firm-executive F.E. | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 66% | 64% | 66% | 65% | 66% | 64% |
| N | 8,901 | 6,709 | 6,709 | 8,901 | 8,901 | 4,045 |
| Panel B: Idiosyncratic risk | | | | | | |
| Turnover probability | -0.057*** | -0.007*** | -0.007*** | | | -0.033*** |
| | (0.008) | (0.002) | (0.002) | | | (0.008) |
| Low turnover probability | | | | 0.008* | | |
| | | | | (0.005) | | |
| Medium turnover probability | | | | -0.008* | | |
| | | | | (0.004) | | |
| High turnover probability | | | | -0.031*** | | |
| | | | | (0.005) | | |
| Election year | | | | | -0.008** | |
| | | | | | (0.003) | |
| Mills | 0.327*** | 0.236*** | 0.233*** | 0.331*** | 0.331*** | |
| | (0.105) | (0.001) | (0.002) | (0.093) | (0.095) | |
| Constant | 0.025 | 0.046*** | 0.041*** | 0.011 | 0.001 | 0.088*** |
| | (0.034) | (0.034) | (0.005) | (0.03) | (0.031) | (0.004) |
| Firm-executive F.E. | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 61% | 61% | 58% | 58% | 60% | 58% |
| N | 8,901 | 6,709 | 6,709 | 8,901 | 8,901 | 4,045 |

| Panel C: Beta | | | | | | |
|---|---|---|---|---|---|---|
| Sample | All | All | All | All | All | Renewed |
| Turnover estimation | Cox | Cox | Cox | Cox | None | Cox |
| Predictor | Contract | Performance | Contract and performance | Contract | | Contract |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Turnover probability | 0.000 | -0.000** | -0.000* | | | 0 |
| | (0.0004) | (0.0001) | (0.00009) | | | (0.001) |
| Low turnover probability | | | | 0.00000 | | |
| | | | | (0.00023) | | |
| Medium turnover probability | | | | 0.00000 | | |
| | | | | (0.00018) | | |
| High turnover probability | | | | 0.0000 | | |
| | | | | (0.00024) | | |
| Election year | | | | | 0.00000 | |
| | | | | | (0.00017) | |
| Mills | 0.027 | 0.052*** | 0.052*** | 0.027 | 0.027 | |
| | (0.031) | (0.00005) | (0.00009) | (0.029) | (0.03) | |
| Constant | 0 | -0.007*** | -0.007*** | 0.001 | 0.001 | 0.011*** |
| | (0.01) | (0.00021) | (0.00018) | (0.01) | (0.01) | (0.00025) |
| Firm-executive F.E. | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 37% | 38% | 39% | 36% | 37% | 32% |
| *N* | 9,030 | 6,709 | 6,709 | 9,030 | 9,030 | 4,030 |

This table present the results of OLS regressions, reporting coefficients and standard errors underneath that are bootstrapped using 1999 replications. The dependent variables are as reported in the Panel title. Asterisks indicate that the estimates are significantly different from zero at the *** 1% level, ** 5% level, * 10% level.

**Table 6**
**Other outcomes**

| Panel A: Investment | | | | | |
|---|---|---|---|---|---|
| Sample | All | All | All | All | All |
| Turnover estimation | Cox | Cox | Cox | Cox | None |
| Predictor | Contract | Performance | Contract and performance | Contract | |
| | (1) | (2) | (3) | (4) | (5) |
| Turnover probability | -0.033*** | -0.008*** | -0.007*** | | |
| | (0.006) | (0.001) | (0.001) | | |
| Low turnover probability | | | | 0.007** | |
| | | | | (0.003) | |
| Medium turnover probability | | | | -0.008*** | |
| | | | | (0.003) | |
| High turnover probability | | | | -0.013*** | |
| | | | | (0.004) | |
| Election year | | | | | -0.005** |
| | | | | | (0.002) |
| Mills | 0.021 | -0.010*** | -0.013*** | 0.033 | 0.028 |
| | (0.223) | (0.001) | (0.001) | (0.221) | (0.227) |
| Constant | 0.076 | 0.081*** | | 0.061 | 0.059 |
| | (0.073) | (0.003) | | (0.072) | (0.074) |
| Firm-executive F.E. | Yes | Yes | | Yes | Yes |
| R-squared | 53% | 60% | 62% | 51% | 53% |
| *N* | 9,304 | 8,790 | 7,792 | 10,469 | 9,304 |
| Panel B: Leverage | | | | | |
| Turnover probability | 0.02 | 0.015*** | 0.010*** | | |
| | (0.012) | (0.004) | (0.003) | | |
| Low turnover probability | | | | -0.011 | |
| | | | | (0.007) | |
| Medium turnover probability | | | | -0.003 | |
| | | | | (0.005) | |
| High turnover probability | | | | 0.002 | |
| | | | | (0.007) | |
| Election year | | | | | 0.003 |
| | | | | | (0.004) |
| Mills | 0.331** | 0.580*** | 0.331** | 0.332** | 0.329** |
| | (0.145) | (0.002) | (0.145) | (0.133) | (0.144) |
| Constant | 0.047 | -0.055*** | 0.047 | 0.056 | 0.142*** |
| | (0.048) | (0.009) | (0.048) | (0.047) | (0.007) |
| Firm-executive F.E. | Yes | Yes | Yes | Yes | Yes |
| R-squared | 75% | 76% | 75% | 74% | 75% |
| *N* | 9,030 | 6,709 | 6,709 | 11,032 | 9,846 |

This table present the results of OLS regressions, reporting coefficients and standard errors underneath that are bootstrapped using 1999 replications. The dependent variables are as reported in the Panel title. Asterisks indicate that the estimates are significantly different from zero at the *** 1% level, ** 5% level, * 10% level.

**Table 7**
**Performance**

| Panel A: ROA | | | |
|---|---|---|---|
| Sample | All | All | All |
| Turnover estimation | Cox | Cox | None |
| Predictor | Contract | Contract | |
| | (1) | (2) | (3) |
| Turnover probability | 0.013 | | |
| | (0.137) | | |
| Low turnover probability | | -0.004 | |
| | | (0.004) | |
| Medium turnover probability | | -0.001 | |
| | | (0.004) | |
| High turnover probability | | 0.001 | |
| | | (0.005) | |
| Election year | | | 0.001 |
| | | | (0.004) |
| Mills | -0.323** | -0.322** | -0.324** |
| | (0.009) | (0.136) | (0.141) |
| Constant | 0.145*** | 0.145*** | 0.151*** |
| | (0.045) | (0.044) | (0.046) |
| Firm-executive F.E. | Yes | Yes | Yes |
| R-squared | 74% | 72% | 74% |
| N | 9,030 | 9,030 | 9,030 |

| Panel B: Stock returns | | | |
|---|---|---|---|
| Turnover probability | 0.015 | | |
| | (0.434) | | |
| Low turnover probability | | -0.003 | |
| | | (0.006) | |
| Medium turnover probability | | 0.004 | |
| | | (0.005) | |
| High turnover probability | | -0.006 | |
| | | (0.007) | |
| Election year | | | 0.004 |
| | | | (0.005) |
| Mills | 0.027 | 0.019 | 0.022 |
| | (0.434) | (0.435) | (0) |
| Constant | 0.009 | 0.018 | 0.016 |
| | (0.141) | (0.139) | (0.141) |
| Firm-executive F.E. | Yes | Yes | Yes |
| R-squared | 6% | 4% | 6% |
| N | 8,375 | 8,375 | 8,375 |

This table present the results of OLS regressions, reporting coefficients and standard errors underneath that are bootstrapped using 1999 replications. The dependent variables are as reported in the Panel title. Asterisks indicate that the estimates are significantly different from zero at the *** 1% level, ** 5% level, * 10% level.

**Table 8**
**Heterogeneity**

| | Q | | Chairman-CEO | | Institutional ownership | | Internal CEO | | Industry | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Lowest quintile | Highest quintile | Yes | No | Lowest quintile | Highest quintile | Internal CEO | External CEO | Finance | Oil |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| **Panel A: Turnover probability** | | | | | | | | | | |
| Turnover probability | -0.6707*** | -1.1981*** | -0.5404*** | -0.8373*** | -0.8938*** | -0.6232*** | -0.6861*** | -0.8156*** | -0.2284 | -0.7030** |
| | (0.236) | (0.234) | (0.097) | (0.126) | (0.159) | (0.189) | (0.119) | (0.195) | (0.14) | (0.275) |
| t-test of difference | -1.59 | | 2.87 | | 3.37 | | -0.57 | | | |
| Constant | 3.691*** | 4.167*** | 3.177*** | 3.475*** | 3.593*** | 2.942*** | 3.331*** | 3.641*** | 2.997*** | 3.553*** |
| | (0.126) | (0.133) | (0.066) | (0.077) | (0.1) | (0.099) | (0.068) | (0.127) | (0.093) | (0.074) |
| Firm-executive F.E. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 68% | 66% | 70% | 64% | 66% | 54% | 65% | 68% | 79% | 72% |
| **Panel B: Turnover risk quantiles** | | | | | | | | | | |
| | (3) | (4) | (7) | (8) | (9) | (10) | (9) | (10) | (11) | (12) |
| Low turnover probability | 0.0079 | -0.0633 | -0.036 | 0.2284*** | 0.0303 | 0.0344 | 0.0829 | 0.1448 | 0.0766 | 0.1363 |
| | (0.114) | (0.121) | (0.052) | (0.079) | (0.092) | (0.086) | (0.051) | (0.137) | (0.068) | (0.199) |
| t-test of difference | -0.43 | | 2.79 | | 0.03 | | 0.42 | | | |
| Medium turnover probability | -0.3012*** | -0.1901* | -0.1504*** | -0.0646 | -0.1757*** | -0.0721 | -0.1270*** | -0.2473*** | -0.1204** | -0.2021 |
| | (0.092) | (0.104) | (0.048) | (0.054) | (0.063) | (0.071) | (0.043) | (0.085) | (0.055) | (0.158) |
| t-test of difference | 0.80 | | 1.18 | | 1.10 | | -1.26 | | | |
| High turnover probability | -0.3955*** | -0.8442*** | -0.4708*** | -0.3766*** | -0.5371*** | -0.4490*** | -0.4177*** | -0.4240*** | -0.0764 | -0.3137 |
| | (0.126) | (0.13) | (0.059) | (0.068) | (0.08) | (0.097) | (0.061) | (0.099) | (0.071) | (0.197) |
| t-test of difference | -6.84 | | 1.04 | | 0.70 | | -0.05 | | | |
| Constant | 3.662*** | 3.959*** | 3.172*** | 3.208*** | 3.407*** | 2.781*** | 3.208*** | 3.502*** | 2.183*** | 3.100*** |
| | (0.089) | (0.095) | (0.052) | (0.054) | (0.064) | (0.067) | (0.049) | (0.084) | (0.06) | (0.186) |
| Firm-executive F.E. | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 68% | 66% | 70% | 64% | 66% | 54% | 64% | 63% | 55% | 69% |
| N | 2,007 | 1,969 | 5,495 | 5,117 | 3,974 | 2,149 | 6,558 | 2,278 | 2,240 | 368 |

This table presents the results of OLS regressions, reporting coefficients and standard errors underneath. Standard errors are bootstrapped using 1999 replications. The dependent variable is volatility, and each column presents the regression results for a subsample indicated in the heading. Asterisks indicate that the estimates are significantly different from zero at the *** 1% level, ** 5% level, * 10% level.

## Table 9
## Identification

| Panel A: Descriptive statistics of alternative cycle and predicted contracts | | | |
|---|---|---|---|
| | Length (in years) | Within-firm st.dev. | Difference to actual contract (in remaining years) |
| Cycle length | | | |
| CAPEX, average | 3.89 | 0.35 | 0.92 |
| CAPEX, recent | | | 0.98 |
| R&D, average | 4.18 | 0.26 | 0.97 |
| Historic contract length | | | |
| Previous contract | 2.96 | 0.23 | 0.61 |
| Previous 2 contracts | 2.97 | 0.13 | 0.57 |
| Previous 3 contracts | 3.21 | 0.09 | 0.35 |
| Industry contract horizon | | | |
| Average contract length | 4.13 | 0.96 | 1.25 |
| Average years remaining | | | 0.00 |
| Average new contract length | 3.10 | 0.81 | 0.60 |
| Directorships | | | 1.07 |

| Panel B: Alternative cycles vs. contract based career risk. Dependent variable = volatility | | | | | | |
|---|---|---|---|---|---|---|
| | Expansion cycles | | | Industry contract horizon | | |
| | CAPEX Average | CAPEX Recent | R&D Average | All contracts Length | All contracts Remaining time | New contracts |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Turnover risk | -1.148*** | -1.241*** | -1.577* | -0.788*** | -0.854*** | -0.769*** |
| | 0.276449 | 0.285643 | 0.850829 | 0.0966047 | 0.0963827 | 0.10015 |
| Remaining years in cycle | 0.054 | 0.013 | 0.157 | -0.024** | -0.063*** | 0.006 |
| | 0.0364423 | 0.0330613 | 0.131952 | 0.0121607 | 0.0163756 | 0.0157869 |
| Constant | 3.589*** | 3.763*** | 4.126*** | 3.468*** | 3.563*** | 3.373*** |
| | 0.20235 | 0.193298 | 0.690516 | 0.0679203 | 0.06431 | 0.0703085 |
| Firm-Executive F.E. | Y | Y | Y | Y | Y | Y |
| R-squared | 66.20% | 65.70% | 65.50% | 65.10% | 65.20% | 64.70% |
| N | 1,960 | 1,905 | 270 | 10,228 | 10,206 | 9,775 |

| Panel C: Predicting CEO turnover. Cox hazard models | | | |
|---|---|---|---|
| | Recent | Recent 2 | Recent 3 |
| | (1) | (2) | (3) |
| Remaining years (previous contract) | 0.9606* | 0.9680 | 0.9738 |
| | (0.020) | (0.020) | (0.020) |
| Year F.E. | Y | Y | Y |
| N | 2,550 | 2,584 | 2,598 |

| Panel D: Alternative cycles vs. career risk estimated with previous contract. Dependent variable = volatility | | | | | | |
|---|---|---|---|---|---|---|
| | Expansion cycles | | | Industry contract horizon | | |
| | CAPEX Average | CAPEX Recent | R&D Average | All contracts Length | All contracts Remaining time | New contracts |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| Turnover risk (previous contract) | -2.473*** | -2.579*** | -2.963** | -1.227*** | -1.217*** | -1.253*** |
| | (0.652) | (0.644) | (1.223) | (0.192) | (0.189) | (0.194) |
| Remaining years in cycle | 0.02 | -0.061 | 0.143 | 0.122 | 0.015 | 0.099** |
| | (0.103) | (0.092) | (0.253) | (0.083) | (0.086) | (0.043) |
| Constant | 5.087*** | 5.445*** | 5.679*** | 3.533*** | 3.915*** | 3.709*** |
| | (0.623) | (0.602) | (0.986) | (0.344) | (0.243) | (0.203) |
| Firm-Executive F.E. | Y | Y | Y | Y | Y | Y |
| R-squared | 59.10% | 61% | 57.90% | 66.30% | 66.20% | 66.50% |
| N | 623 | 509 | 73 | 2,199 | 2,191 | 2,140 |

Panel A presents descriptive statistics of alternative cycle and contract horizon measures. Panel B and D present the results of OLS regressions, reporting coefficients and standard errors underneath. The dependent variable is volatility. In Panel D, turnover probability is estimated with the length of the previous contract. Panel C presents presents the results of hazard model estimations, reporting hazard ratios for CEO turnover and standard errors underneath. Asterisks indicate that the estimates are significantly different from zero at the *** 1% level, ** 5% level, * 10% level.

## Table 9
## Other firm/executive characteristics

| | Compensation | Execucomp sample | Age | Tenure | Firm age | Firm F.E. | CEO F.E. |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Turnover probability | -0.5905*** | -0.6004*** | -0.664*** | -0.484*** | -0.355*** | -0.781*** | -0.667*** |
| | (0.087) | (0.105) | (0.077) | (0.075) | (0.079) | (0.079) | (0.107) |
| Sensitivity of unvested equity grants | 0.0032* | | | | | | |
| | (0.00186) | | | | | | |
| Sensitivity of vested equity grants | -0.0002 | | | | | | |
| | (0.00015) | | | | | | |
| Log total compensation | -0.0421 | | | | | | |
| | (0.045) | | | | | | |
| Group 1 (age < 55 / tenure < 3) | | | 0.207** | 0.481*** | | | |
| | | | (0.08104) | (0.06447) | | | |
| Group 2 (age 55-60 / tenure 3-5) | | | 0.091 | 0.317*** | | | |
| | | | (0.07694) | (0.06766) | | | |
| Group 3 (age 60-64 / tenure 6-8) | | | -0.027 | 0.157** | | | |
| | | | (0.07662) | (0.06326) | | | |
| Log firm age | | | | | -0.363*** | | |
| | | | | | (0.05333) | | |
| Constant | 3.2280*** | 2.9175*** | | | | 2.539** | 0.959 |
| | (0.35) | (0.052) | | | | (1.12) | (2.295) |
| Firm-executive F.E. | Yes | Yes | Yes | Yes | Yes | | |
| Age group F.E. | | | Yes | | | | |
| Tenure group F.E. | | | | Yes | | | |
| Firm F.E. | | | | | | Yes | |
| Executive F.E. | | | | | | | Yes |
| R-squared | 64% | 64% | 66% | 66% | 66% | 63% | 65% |
| N | 4,730 | 4,730 | 9,030 | 9,030 | 9,030 | 9,030 | 4,916 |

This table present the results of OLS regressions, reporting coefficients and standard errors underneath that are bootstrapped using 1999 replications. The dependent variable is volatility. Asterisks indicate that the estimates are significantly different from zero at the *** 1% level, ** 5% level, * 10% level.

**Table 11**
**Robustness**

| | Years to actual turnover | Last two years | No first year | Deciles |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| Turnover probability | | | -0.967*** | |
| | | | (0.099) | |
| Actual time to turnover | 0.077*** | | | |
| | (0.01) | | | |
| Last two years before turnover | | -0.338*** | | |
| | | (0.05) | | |
| Low turnover probability | | | | -0.090* |
| | | | | (0.052) |
| Medium turnover probability | | | | -0.387*** |
| | | | | (0.031) |
| High turnover probability | | | | -0.557*** |
| | | | | (0.049) |
| Constant | 2.871*** | 3.145*** | 2.539** | 1.017*** |
| | (0.047) | (0.033) | (1.12) | (0.292) |
| Firm-executive F.E. | Yes | Yes | Yes | Yes |
| R-squared | 66% | 64% | 63% | 65% |
| N | 7,153 | 11,990 | 9,284 | 10,366 |

This table present the results of OLS regressions, reporting coefficients and standard errors underneath that are bootstrapped using 1999 replications. The dependent variable is volatility. In column 3, turnover probability is estimated with a sample excluding the first year of each CEO. In column 4, low (medium, high) turnover probability denotes the first (eighth and ninths, tenth) decile of turnover risk. Asterisks indicate that the estimates are significantly different from zero at the *** 1% level, ** 5% level, * 10% level.

# APPENDIX

## A.1. At-will exceptions

| | | At-will exceptions | | |
|---|---|---|---|---|
| Code | State | Public policy | Implied contract | Good faith and fair dealing |
| AL | Alabama | 0 | 1 | 1 |
| AK | Alaska | 1 | 1 | 1 |
| AZ | Arizona | 1 | 1 | 1 |
| AR | Arkansas | 1 | 1 | 0 |
| CA | California | 1 | 1 | 1 |
| CO | Colorado | 1 | 1 | 0 |
| CT | Connecticut | 1 | 1 | 0 |
| DC | District of Columbia | 1 | 1 | 0 |
| DE | Delaware | 1 | 0 | 1 |
| FL | Florida | 0 | 0 | 0 |
| GA | Georgia | 0 | 0 | 0 |
| HI | Hawaii | 1 | 1 | 0 |
| ID | Idaho | 1 | 1 | 1 |
| IL | Illinois | 1 | 1 | 0 |
| IN | Indiana | 1 | 0 | 0 |
| IA | Iowa | 1 | 1 | 0 |
| KS | Kansas | 1 | 1 | 0 |
| KY | Kentucky | 0 | 1 | 0 |
| LA | Louisiana | 0 | 0 | 0 |
| ME | Maine | 0 | 1 | 0 |
| MD | Maryland | 1 | 1 | 0 |
| MA | Massachusetts | 1 | 0 | 1 |
| MI | Michigan | 1 | 1 | 0 |
| MN | Minnesota | 1 | 1 | 0 |
| MS | Mississippi | 1 | 1 | 0 |
| MO | Missouri | 1 | 0 | 0 |
| MT | Montana | 1 | 0 | 1 |
| NE | Nebraska | 0 | 1 | 0 |
| NV | Nevada | 1 | 1 | 1 |
| NH | New Hampshire | 1 | 1 | 0 |
| NJ | New Jersey | 1 | 1 | 0 |
| NM | New Mexico | 1 | 1 | 0 |
| NY | New York | 0 | 1 | 0 |
| NC | North Carolina | 1 | 0 | 0 |
| ND | North Dakota | 1 | 1 | 0 |
| OH | Ohio | 1 | 1 | 0 |
| OK | Oklahoma | 1 | 1 | 0 |
| OR | Oregon | 1 | 1 | 0 |
| PA | Pennsylvania | 1 | 0 | 0 |
| RI | Rhode Island | 0 | 0 | 0 |
| SC | South Carolina | 1 | 1 | 0 |
| SD | South Dakota | 1 | 1 | 0 |
| TN | Tennessee | 1 | 1 | 0 |
| TX | Texas | 0 | 0 | 0 |
| UT | Utah | 1 | 1 | 1 |
| VT | Vermont | 1 | 1 | 0 |
| VA | Virginia | 1 | 0 | 0 |
| WA | Washington | 1 | 1 | 0 |
| WV | West Virginia | 1 | 1 | 0 |
| WI | Wisconsin | 1 | 1 | 0 |
| WY | Wyoming | 1 | 1 | 1 |

This table presents the at-will exceptions by state.

## A.2. Variable definitions

| | |
|---|---|
| *Age* | Executive's age in years |
| *AIMR* | Industry adjusted AIMR scores (see Brown and Hillegeist, 2007) |
| *Analyst forecast STD* | Standard deviation of analyst forecasts of that year's EPS |
| *Annual stock returns* | Fiscal year total stock returns |
| *Anti-takeover* | State with "business combination laws" according to Bertrand and Mullainathan (1999) |
| *Assets* | Book assets (in $ millions) |
| *Beta* | Coefficient on the market excess returns in a regression in which the dependent variable is the daily stock return, run for each firm-year |
| *Book-to-market (B/M)* | Ratio of the book value of assets to the market value of assets: the market value is calculated as the sum of the book value of assets and the market value of common stock less the book value of common stock, cash, and deferred taxes. Market values are measured at the end of the fiscal year. |
| *CAPEX/assets* | Capital expenditures divided by lagged assets |
| *Cash flow* | Earnings before extraordinary items plus depreciation, divided by lagged assets |
| *Chairman and CEO* | 1 if the CEO also holds the Chairman position of the Board |
| *Contract length* | Expiration year minus start year of the contract |
| *Dividend* | 1 if the fim pays dividends that year |
| *Election year* | 1 if the contract is due to expire in the following year |
| *Exception rule* | 1 if the contract is governed by the law of a state with a good faith & fair dealing at-will |
| *Finance industry* | 1 if the firm operates in the Banking or Insurance industry |
| *Garmaise* | Index of Garmaise (2006) |
| *Governance index* | The index developed by Gompers, Ishii and Metrick (2003) |
| *Idiosyncratic risk* | Standard deviation of residuals in a regression in which the dependent variable is the daily stock return, run for each firm-year |
| *Incentive to total compensation* | Value of bonus, stock, and option grants to total CEO pay |
| *Industry homogeneity* | Median (across all firms of one of the 49 Fama-French industries) of the percentage variation in monthly stock returns that is explained by an equally weighted industry index; market-adjusted returns are annual stock returns adjusted by the value-weighted CRSP index. |
| *Industry sales volatility* | 49 Fama-French industry average of variance in sales over the past seven years |
| *Industry survival rate* | Industry rate of year-to-year survival within the COMPUSTAT database |
| *Institutional ownership* | Percentage of shares owned by institutional owners that file form 13f |
| *Leverage* | Net debt divided by total assets |
| *Low analyst forecast error* | 1 if analyst forecast STD is below median |
| *Market-to-book* | Reciprocal of book-to-market |
| *Number of SEOs* | Number of equity issuances announced by the firm in the given year |
| *Percent CEO ownership* | Percentage of shares owned by the CEO |
| *Percent insiders on board* | Percentage of insiders among board members |
| *Percent unexercisable* | Value of unexercisable options divided by the value of unexercised options |
| *R&D/assets* | Research and development expenditures divided by lagged assets |
| *Remaining years* | Expiration year minus current year |
| *Renewal* | Indicator variable for CEOs who were in office at the time of the contract start |
| *Restatement* | 1 if the firm files an earnings restatement in that year |
| *Return on assets (ROA)* | Earnings before interest and taxes divided by assets |
| *Sensitivity of vested equity grants* | Stock price sensitivity of vested equity grants calculated using the method of Core and Guay (2002) |
| *Sensitivity of unvested equity grants* | Stock price sensitivity of unvested equity grants calculated using the method of Core and Guay (2002) |
| *Stock return* | Annual stock returns |
| *Salary* | CEO's base salary in thousands of US$, adjusted to 2000 $ |
| *Tenure* | Number of years the CEO has been in office |
| *Tenure performance* | The stock return measured over the preceding 5 years, or since the start of the CEO's tenure, whichever is shorter, scaled by its standard deviation |
| *Total compensation* | CEO's total annual compensation (TDC1) in thousands of US$, adjusted to 2000 $ |
| *Turnover* | 1 if the executive leaves the CEO position |
| *Volatility* | Standard deviation of daily stock returns |