The executive turnover risk premium

Florian S. Peters and Alexander F. Wagner*

May 29, 2008

Abstract

Executive compensation has increased dramatically over the past 15 years, but so has forced CEO turnover. We argue that part of the development of CEO pay can be explained by the adverse consequences that forced turnover implies for a CEO. We find that for the CEOs of the largest US corporations, a one percentage point increase in exogenous turnover risk is associated with $40,000 to $90,000 more in terms of total compensation. The size of this risk premium is in line with estimates of the importance of career concerns and forfeiture risk. This relation survives a test of reverse causation and controlling for unobserved firm heterogeneity. We argue that the robustly positive correlation between turnover and compensation is not consistent with a view of entrenched CEOs setting their own compensation and turnover risk.

JEL-Code: D8, G34, M52

Keywords: Executive compensation, entrenchment, turnover, corporate governance

---

* Peters: University of Zurich and University of California at Berkeley, Wagner: Swiss Finance Institute (University of Zurich) and Harvard University. Address: Swiss Banking Institute, Plattenstrasse 14, CH-8032 Zurich, Switzerland, Phone: +41(44) 634-3963, Email: fpeters@isb.uzh.ch and wagner@isb.uzh.ch. We thank Cristian Dezsö, Dirk Jenter, and Bob Parrino for generously sharing data from their respective papers. We thank Darrell Duffie, Michel Habib, Mark Huson, Gary King, Camelia Kuhnen, Kevin Murphy, Bob Parrino, Zacharias Sautner, René Stulz, Michael Wolf, and Jeffrey Zwiebel for discussions, and seminar participants at the CEPR European Summer Symposium in Financial Markets, the NCCR FINRISK annual meeting, the SFI annual meeting, the Midwest Finance Association conference, the University of Vienna, the Helsinki School of Economics, UNC, Cranfield University, and Amsterdam Business School for comments. We also thank the SFI, the NCCR FINRISK and the University of Zurich Research Priority Program "Finance and Financial Markets" for financial support.

1 Introduction

This paper investigates the idea that turnover risk is priced in executive compensation. If CEO contracts are designed efficiently (even if they are subject to standard frictions such as private information), there are clear reasons why greater turnover risk should go hand in hand with greater compensation: If CEOs expect contractual compensation agreements, which frequently require cancelation of unvested equity-based pay in case of turnover, to be rigorously enforced, the expected value to CEOs of current compensation packages may be significantly lower than usually assumed. In addition, there may be important career concerns for a CEO who is fired in that, on average, fired CEOs earn less and manage smaller firms in the future. To guarantee participation of CEOs, efficient contracts would, therefore, require rising compensation as turnover risk rises. Thus, the efficient contracting hypothesis implies a positive correlation between turnover probabilities and compensation.

Of course, efficient contracting may not be what characterizes US corporations. Imagine, by contrast, a situation where a CEO sets his own pay and job security, in the spirit of Bebchuk and Fried (2004). The CEO is unlikely to be able to do so without constraints. Rather, he may have a "budget" of entrenchment that determines his possibility set for choosing between combinations of compensation and job security. For a given level of entrenchment, the CEO faces a tradeoff between higher pay and higher turnover risk, as accountability rises with pay. In a sample of CEOs with varying degrees of entrenchment, every rational CEO is going to equate the marginal benefits from greater pay and job security, much like a consumer chooses his optimal consumption bundle when his budget varies. Assuming compensation and turnover are normal goods, more entrenchment will go hand in hand with both higher pay and lower turnover risk. Under the partial entrenchment hypothesis, therefore, we should observe a negative cross-sectional and time series correlation between turnover probabilities and compensation.

Motivated by these diverging hypotheses, we provide empirical evidence on the relationship between expected hazard rates for CEOs, estimated from turnover data, and compensation actually received. We find a strongly significant positive association between turnover

risk and compensation. This correlation holds with and without controls for entrenchment, implying that contracting is efficient for a given level of entrenchment, but also occurs along a CEOs participation constraint across different degrees of entrenchment. We also show that these results are unlikely to be driven by reverse causation, and they survive controlling for CEO-firm fixed effects. The overall picture that emerges is hard to reconcile with an entrenchment view of executives.

We begin in section 2 by presenting some stylized facts on executive pay and forced turnover. We find that the secular rise of total (risk-neutral) pay occurred hand in hand with a rise in forced turnover of CEOs.[1] Indeed, forced turnover of CEOs of major US corporations has increased massively over the past 20 years. While only about 1% of CEOs of major US companies were fired in 1980, 3%-4% were fired in 2000, and 5% in 2005. We also discuss two channels through which forced turnover and compensation levels are likely to be linked. First, forced turnover can lead to loss of the unvested portions of executive pay. Second, forced turnover has adverse labor market consequences; fired CEOs earn far less and manage smaller companies later in their professional lives. Both elements suggest that if contracts with CEOs are formed efficiently, there may be a turnover risk premium that drives part of the development of executive compensation. Quantitatively, a calibration exercise for the effect of forfeiture risk on executive values of compensation and a rough calculation of the present discounted cost of career concerns in the form of lower compensation until retirement suggest that the median CEO is likely to perceive a one percentage point increase in forced turnover risk approximately equivalent to a decrease in compensation on the order of 3%-5%. We also explain how, by contrast, the entrenchment hypothesis would give rise to a negative cross-sectional correlation between compensation and turnover risk.

To determine whether a turnover risk premium in fact exists for the largest US corporations for 1993-2004, we proceed in two steps. In Section 3 we first estimate a hazard rate which the CEO is exogenously exposed to, i.e., which does not depend on management skill

[1]Total pay includes cash payments as well as equity-based rewards. By risk-neutral pay, we mean that options that are part of the compensation package are valued according to the Black-Scholes formula, which assumes risk-neutrality. This valuation technique is employed in the most widely used database on executive compensation, ExecuComp, which we also use here.

or entrenchment, as it is only for this exogenous part of the hazard rate that the CEO can expect to be compensated for. Consistent with this idea we estimate hazard rates which are predicted by year, industry affiliation, and industry performance. This is motivated by a major theme in the recent literature on CEO turnover, namely, that boards do not appear to filter out industry performance when judging CEOs (see Jenter and Kanaan (2006)). In a second step, we include the estimated turnover probability as a regressor in a compensation regression. Controlling for a broad set of variables, we find a statistically and economically significant, positive association between turnover and CEO compensation.

Although the theoretical case for a turnover risk premium is plausible under the efficient contracting hypothesis, we also explicitly address potential endogeneity issues in our empirical analysis. First, we find that in the years preceding turnover CEOs who are fired later do not earn more than CEOs who later leave voluntarily. This is contrary to a reverse causation explanation where increased turnover risk results from higher pay and the associated performance expectations. Second, it could be that a third factor is driving both turnover risk and compensation. Ideally, we would like to address this omitted variable problem with an instrumental variables approach. Unfortunately, it is very hard to find a suitable instrument for turnover risk because virtually all conceivable determinants of turnover risk also are directly related to compensation. However, in addition to controlling for a broad array of variables, we provide two pieces of evidence against the endogeneity concern. First, we find that our results survive when we include CEO-firm fixed effects. As argued in Himmelberg, Hubbard, and Palia (1999), controlling for unobserved heterogeneity in this way can go a long way towards reducing concerns that observed correlations are spurious. Second, we find that the turnover risk premium is larger for younger CEOs than for older ones. This result is consistent with career concerns being an important factor determining the relationship between turnover risk and pay, while it is less obvious to attribute this pattern to endogeneity.

Although our primary concern is with the sign of the coefficient of turnover risk in the compensation regression, we also note that the quantitative effects we find are plausible in their magnitude when compared to the existing theoretical calibration of the importance

of forfeiture risk and a back-of-the-envelope calculation of the power of career concerns that we summarize in Section 2. The fixed-effects regressions (which yield conservative estimates of the size of the turnover risk premium) suggest that a one percentage point increase in the probability of forced turnover is associated with about \$2% to \$4.5% more in pay, corresponding to about \$40,000 to \$90,000 for the median CEO. It is noteworthy that these findings arise when controlling for factors such as pay-performance incentives, firm size, and corporate governance that arguably proxy for some of the elements identified by recent theories to explain the rise in executive pay.[2] Our contribution in this respect, therefore, is to show that turnover risk remains a significant determinant of executive compensation even after controlling for other factors known to influence pay.

The notion that more risky jobs should receive higher pay is quite natural, and so should be of interest to economists more broadly. The context of executive compensation offers the advantage that data on turnover and compensation is available for a broad cross-section of firms across a multi-year time period. We are not aware of any other empirical study that has tried to draw a causal connection between forced turnover and executive pay.[3] These findings thus also add to the literature on executive compensation and corporate governance more broadly defined. Other papers have focused on the role of turnover as an incentive device (Subramanian, Chakraborty, and Sheikh 2002, Hallman, Hartzell, and Parsons 2005) and the implications of termination risk on managerial risk-taking (Chakraborty, Sheik, and Subramanian 2004). The optimal shape of incentives is also the focus of the study by Gillan,

[2]See Murphy (1999) for empirical evidence on the rise of pay-performance sensitivity; Gabaix and Landier (2008) on the association between firm size and CEO pay within a framework of competitive markets and rare skills; and Bebchuk and Fried (2004) on the entrenchment view.

[3]Eisfeldt and Rampini (2008) have documented a correlation of aggregate, realized levels of M&A related turnover and compensation with the business cycle to motivate a theoretical model of optimal incentives. By contrast, we focus on a broader definition of forced turnover as well as individual CEO data. Bebchuk, Cremers, and Peyer (2008) show that CEOs who earn a larger fraction of the total pay to the top executives at a firm have lower turnover risk. However, this risk is the risk due to firm-specific performance and is, therefore, conceptually different from the exogenous risk that we measure here. Our results also indirectly contrast with those of Hayes, Hillegeist, and Keating (2005) who find a negative association between financial distress risk and compensation.

Hartzell, and Parrino (2006) on explicit and implicit contracts. In contrast to these papers, our focus is on the level of pay.

2 Executive turnover and executive compensation

In this section, we motivate our study by presenting stylized facts on executive turnover and executive compensation, and by providing arguments for why these two concepts are likely to be tightly linked.

2.1 Executive compensation

To set the stage, consider Figure 1. This graph shows average CEO pay between 1993-2005 in the S&P 1500 firms. The levels reflect much of the unease that many commentators have with the development of executive compensation: a dramatic increase in the level of executive pay. But besides this, other aspects are noteworthy: First, after 2000 average CEO pay has actually declined for a few years to rise again only after 2003. Second, also following 2000, the composition of CEO pay has changed substantially. Bonuses (immediate cash rewards) have become much more important recently, while the share of equity-based pay (deferred rewards) in CEOs' compensation packages has decreased.

[INSERT FIGURE 1: MEAN S&P1500 CEO PAY]

2.2 CEO turnover

We use data from four recent studies and own hand-collected data to explore the actual extent of forced turnover. Our primary data draws on Jenter and Kanaan (2006) which we extend by employing the same method to extend the sample to 1993-2004. We refer to the combined data as JKOWN. Identifying a turnover as "forced" is not straightforward as firms almost never officially state a turnover as forced. Classification thus requires hand-collection of data from multiple sources, in particular press releases.[4]

[4]Therefore, we are extremely grateful to the cited authors for providing us with the data. The methodology follows Parrino (1997). All departures for which the press reports state that the CEO is fired, forced

[INSERT FIGURE 2: TURNOVER RATES FROM JENTER AND KANAAN(2006), COMBINED WITH AUTHORS' OWN DATA]

A more limited sample of companies is covered in two other studies. Dezsoe (2006) extends the Huson, Parrina, and Starks (2001) data set on CEO turnover and we refer to the extended data set as DHPS. This data is shown in Figure 3. A third study is Booz-Allen-Hamilton (2005), which we refer to as BAH. Unfortunately, this study only provides aggregate turnover data, but the overall pattern matches nicely with the data we use here.

[INSERT FIGURE 3: TURNOVER RATES FROM HUSON ET AL. (2001) AND DEZSÖ (2006)]

While the data sets differ in the details, Figures 2 and 3 tell the same basic story: There has been a secular rise in forced turnover rates. The increase has become especially salient in the 1990s, with the evidence suggesting that nowadays a 3% to 4% chance of forced CEO turnover per year is not unusual for the largest US corporations. Although substantially lower than voluntary turnover, this nonetheless represents a significant threat, especially when considering the involuntary turnover risk a CEO faces over his entire prospected tenure. For a newly hired CEO the raw yearly turnover probabilities imply a 25% to 30% probability of getting fired during a 7-year tenure.

Another interesting feature is that the data in Figure 2 show a decrease in turnover after 2000, before it rises again; executive pay shows a similar pattern. The same pattern also shows in the BAH study, the graph for which we omit for space reasons. Combining the data on executive turnover and compensation suggests that the two may be connected: Indeed,

out, or retires or resigns due to policy differences or pressure, are classified as forced. Turnovers of CEOs below the age of 60 which have not been classified as forced by the press criterion, are classified as forced if the articles do not report the reason to be death, poor health, or acceptance of another position or the articles report that the CEO is retiring but does not announce the retirement date at least 6 months before the succession. For further details, see the original paper. It is possible that the extent of forced turnover is understated by this method, but to the extent that this problem has not changed over time or is not prevalent only in particular firms, our inferences will not be adversely affected.

the raw correlations between mean CEO pay and forced turnover for the DHPS, JKOWN, and BAH data, respectively, are 93%, 51%, and 54%. While this is at most suggestive evidence as it relies on only a few data points it motivates us to explore a possible causal relation between forced turnover and compensation in more detail.

The non-monotonic pattern of CEO pay after 2000 is, indeed, a feature that may allow us to reevaluate many of the arguments that have been advanced in explaining the level and trend in executive pay. Recent theories have intended to show that the secular rise of executive pay can be explained by the similar increase in firm size within a framework of competitive markets and rare skills (Gabaix and Landier 2008) or a change in the composition of managerial skills needed to manage a corporation (Murphy and Zaboinik 2004). Other authors have advocated the managerial entrenchment view in explaining excessive executive pay (Bebchuk and Fried 2004). It is clear, however, that these theories have difficulties explaining the non-monotonic evolution of CEO pay in recent years.

On the other hand, some observers have argued that total compensation may to a large extent be driven by stock market valuations, as a significant share of CEO pay is equity-based. This would explain not only the general rise but also the non-monotonic pattern of CEO pay in the years following the burst of the dot-com bubble. A skill-related explanation in the spirit of Gabaix and Landier (2008) would also be consistent with this pattern if market capitalization is used as a proxy for firm size. While stock market valuation is certainly an important determinant of CEO pay, we show in our empirical section below that forced turnover risk is a highly significant determinant of total compensation even after controlling for market value, both in the time-series and the cross-section.

2.3 The link between turnover and compensation

The basic conclusion we draw from these facts is that while CEOs have undoubtedly been able to secure a dramatic increase in pay, they are also facing increasing risk of involuntary turnover. There are at least two powerful reasons why under efficient contracting a greater probability of forced turnover may be fundamentally associated with greater pay levels.

First, a CEO may lose the unvested portion of his equity-based pay in case of forced

turnover. While some companies require the cancelation of unvested equity-based pay only in case of voluntary departure, most equity compensation plans do not distinguish between forced and voluntary turnover. Instead, they contain general formulations requiring forfeiture of unvested stocks and options when the employment terminates (without specifying the reason). Other compensation plans explicitly provide for cancelation in case of forced turnover.[5] Of course, in case of forced CEO turnover, severance agreements may compensate for the forfeiture of unvested stocks and options, either through lump-sum payments or by waiving forfeiture rules altogether. However, Rusticus (2006), Dahiya and Yermack (2006), and Sletten and Lys (2006) show that CEOs can in general expect only relatively small amounts of severance to be contractually guaranteed.[6] The biggest portion of severance payments, thus, is discretionary. Arguably, CEOs cannot, ex ante, count on these deviations from contractual agreements, especially in times when they face stronger and more assertive boards (who may be willing to fire earlier, see Ertugrul and Krishnan (2007)) and active shareholders. A number of papers have studied the discount to the value of options due to early termination of employment (Noreen and Wolfson 1981, Foster, Koogler, and Vickrey 1993, Cuny and Jorion 1995, Carpenter 1998, Hull and White 2004, Ingersoll 2006, Sircar and Xiong 2007). To our knowledge, the only study that quantifies the impact of forfeiture risk for all S&P 1500 CEOs and takes into account their complete packages, rather than just concentrating on valuing one sample option, is Peters and Wagner (2007). They use the certainty-equivalent approach in the spirit of Lambert, Larcker, and Verrecchia (1991) and Hall and Murphy (2002), but adjust for the possibility that option and stock are canceled before the vesting date, or that the CEO is forced to exercise options after the vesting date but before the retirement date. They find that theoretical values of executive options for a typical CEO

[5]For example, Viacom's 2006 long-term management incentive plan states that "[...] in the event that [...] the Participant ceases to be an employee of the Company by reason of the voluntary termination by the Participant or the termination by the Company [...] all rights with respect to Stock Options that are not vested as of such event will be relinquished" (see http://www.sec.gov/Archives/edgar/data/1339947/000119312507086534/ddef14a.htm)

[6]While only about 50% of CEOs' employment agreements contain an explicit severance provision, the median contracted amount of severance is only about 2 to 3 times base salary and bonus.

(one with relative risk aversion of 2-3 and wealth in company stock of 50%) who faces a forced turnover hazard rate of, say, 4% can be, in principle, substantially lower than the Hall and Murphy (2002) estimates of executive values, and, therefore, also much lower than the Black-Scholes value which applies for a freely tradable option (see Black and Scholes (1973), Merton (1973)). The overall discount to compensation values in the 1993-2004 period due to this particular consequence of turnover risk is nonetheless likely to be modest, as executives also receive compensation that is not subject to forfeiture, and because the primary risk factor in that period was stock price volatility. Peters and Wagner (2007) calculate that a one percentage point increase in turnover risk for a typical CEO is likely to be associated with a decrease in the certainty equivalent of compensation from his present job on the order of \$20,000 to \$40,000, which corresponds to about 1%-2% of total compensation for the median CEO in our sample.

Getting fired may, of course, have more detrimental consequences to a CEO than the potential loss of some of his past compensation. Indeed, it may imply a substantial loss of future compensation. The literature on career concerns (e.g., Gibbons and Murphy (1992)) has long considered the interaction between explicit and implicit incentives (pay-performance sensitivities). Here, we are again more concerned with the relationship between turnover risk and the level of pay. Fee and Hadlock (2004) provide intriguing evidence that this ought to be a major concern for CEOs. They find that (1) in three quarters of cases of turnovers (even voluntary ones), new salaries are lower than old salaries, (2) only a third of CEOs who were fired reappear at other employers in their sample, (3) those who do obtain new employment after having been fired do so at firms approximately one-tenth as large as their old employer, and that (4) those for whom salary data is available (and who are, therefore, likely to have gotten the best new jobs), experience pay cuts on the order of 20%.

While the 20% pay loss arguably understates the average earnings consequences of forced turnover, Fee and Hadlock's findings on the size of subsequent employers allows one to obtain a second approximate benchmark. We can translate the decrease in firms size by a factor of ten into the corresponding pay reduction using the coefficient of log firm size in a regression of log total compensation on firm size (and control variables). Consistent with other studies on

CEO compensation, we find this coefficient to be approximately 0.40 (see empirical section below). This implies that a ten-fold decrease in firm size is associated with a 4-fold decrease in pay. In other words, a dismissed CEO is likely to earn about one quarter of his pre-turnover pay, or incur a 75% pay loss. Note that both the 20% and 75% estimates are conditional on the CEO finding a new employer at all. Altogether this suggests that an expected pay reduction of 50% or more is not unreasonable. Peters and Wagner (2007) provide a simple calculation of the present discounted cost of getting fired. They calculate the amount of certain compensation (paid until retirement) which yields the same expected lifetime income as compensation which is subject to reduction when forced turnover occurs.[7] The difference between this certain compensation and the current actual compensation gives an estimate of the discount due to turnover-related compensation risk. Assuming a 50% pay loss following forced turnover and a turnover probability of 3%, they find that risky compensation has a certainty equivalent value which is 2.8%, 5.7%, and 8.1% lower than nominal values for CEOs that retire in 5, 10, and 15 years, respectively. This implies a discount in the range of 1-3% per percentage point of forced turnover risk.

In sum, the available calculations of the importance of forfeiture risk and career concerns suggest that a one percentage point increase in forced turnover risk is equivalent to a discount in compensation on the order of around 4%-6% for CEOs around 15 years away from retirement and 2%-3% for CEOs a decade closer to retirement.

These two forces – forfeiture of equity-based pay and career concerns – apply to both an individual CEO as well as to the cross-section of CEOs when contracts are designed efficiently. That is, if shareholders (or boards) efficiently choose the optimal combination of incentives (which directly relate to overall compensation levels) and turnover risk, those firms that put the CEO at higher risk of losing his job have to pay him more to ensure his participation. The efficient contracting hypothesis, therefore, suggests that there should be a positive relationship between turnover risk and compensation. In this paper, we are concerned with the fact that in the data this relationship holds. Developing a model of

[7]Taking into account risk aversion is difficult in this lifetime utility setup, and so that estimate obtained is probably on the lower end of the real importance of career concerns.

why some firms choose high compensation and high turnover risk while others choose low compensation and low turnover risk is outside the scope of this paper.

On the CEO level, a third reason for a positive association between turnover risk and compensation is possibly at work. Consider a CEO who is setting his own compensation and turnover risk. Clearly, he would like high compensation and low turnover risk. Arguably, the relation between these two "goods" is such that a pay increase is more valuable if it can be sustained with a higher probability. Conversely, the marginal value of job security is higher when the pay associated with it is also higher. That is, the marginal benefit of compensation is proportional to the level of job security, and vice versa. For example, such multiplicative preferences with respect to job security and pay arise naturally in a simple model where the CEO's utility is given by the expected value of compensation, and turnover negatively affects future compensation.[8]

The CEO is unlikely to be free in choosing any combination of turnover risk and compensation; instead, he needs to expend his political capital in the firm to achieve his goals. It is quite natural to assume, therefore, that he faces an entrenchment budget constraint: Increasing compensation requires him to also accept a higher probability of getting fired, perhaps because he is now held more accountable. That is, the CEO chooses from a menu of turnover risk - compensation pairs which reflect the tradeoff between the two as well as his level of entrenchment.[9]

Importantly, however, as we move from the individual CEO level to the cross-section, we would expect a negative correlation between turnover risk and compensation under the entrenchment hypothesis. Consider, in particular, a series of CEOs with differing levels of entrenchment. Given the multiplicative preferences, each CEO will choose his optimal combination of compensation and job security, but those with a greater entrenchment budget will choose more of both. This follows from a standard microeconomic argument by which an

[8]The idea of multiplicative preferences in the context of executive compensation has also been recently advocated by Edmans, Gabaix, and Landier (2008), though they focus on effort choice.

[9]This idea of partial entrenchment has been modeled in the context of hidden compensation in Kuhnen and Zwiebel (2007).

agent with greater income will consume more of all (normal) goods.[10] Summarizing, under (partial) entrenchment, we would expect to observe a negative correlation between turnover probabilities and compensation.

Summary of predictions. These arguments suggest a clear econometric test. Controlling for entrenchment, both the efficient contracting and the entrenchment hypotheses predict a positive correlation of forced turnover risk and compensation. However, not controlling for entrenchment, the entrenchment hypothesis implies a negative correlation, while the efficient contracting hypothesis implies a positive correlation even in that case.[11] *Prima facie*, the evidence from aggregate CEO compensation and turnover data presented so far appears to speak against a negative correlation. We explore this relation in more detail in the next section.

3 The empirical relationship between turnover risk and executive compensation

In this section, we study the empirical relationship between turnover risk and executive compensation. We begin by describing the data. We then turn to the estimation of hazard rates for CEOs, which are the key explanatory variable in our compensation regressions. Then we present our results.

[10] It is possible, of course, that those who are more entrenched will also have lower or higher relative costs of attaining compensation than job security. That is, the entrenchment budget constraint not only shifts, but also tilts as we vary entrenchment. It is not clear why this should be the case.

[11] It is theoretically possible that, if reservation utilities of CEOs vary sufficiently, a cross-section of CEOs will actually display a negative relationship between turnover risk and compensation even under efficient contracting. Thus, observing a positive relationship may also indicate that reservation utilities are sufficiently similar.

3.1 Data

We start with the Jenter and Kanaan (2006) database on CEO turnover which covers the period 1993 to 2001, and we expand it by adding the years 2002 to 2004. In terms of numbers of companies covered, this combined database is the most extensive source on CEO turnover available to date, covering the entire ExecuComp universe of firms from 1993 to 2004.[12] From 1993 on ExecuComp covers nearly all S&P1500 companies. Our combined data set on CEO turnovers includes 2,304 CEO turnovers of which 507 are classified as forced. We merge this data set with ExecuComp from which we obtain compensation and some basic balance sheet data, and with the CRSP database from which we obtain stock returns. To obtain a set of corporate governance variables we then merge the resulting sample with the RiskMetrics directors database. The final sample used in the main compensation regressions has 14,579 CEO-year observations with non-missing data on compensation, balance-sheet variables, stock returns and volatilities. Since RiskMetrics data is available only starting in 1996, regressions including corporate governance variables and CEO characteristics are based on 7,143 CEO-year observations. While our results are robust to the inclusion of all observations with complete data, for our main analysis we exclude owner CEOs, which we define as CEOs with ownership stakes above 10%. The reason is that the hazard rates we estimate below are unlikely to hold for owner-CEOs as these executives are virtually never fired.[13] Owner-CEOs account for about 10% of CEO-years in our sample.

Table 1 displays descriptive statistics. Panel B and C contain firm and CEO compensation characteristics which reflect the entire ExecuComp universe over the sample period 1993-2004. Firm size is large and highly skewed with mean (median) market capitalization of around 14.2 (2.2) billion dollars. Total compensation is also highly skewed at a mean (median) of about 4.4 (2.0) million dollars. The average percentage of equity-based pay is nearly 40% over the entire period, but varies significantly over time as seen in figure 1. The corporate governance variables, given in panel C, are representative of a smaller and more recent sample as this data is available only starting in 1996. Finally, Panel D presents

[12] Acquiring data beyond 2004 is part of our ongoing efforts.

[13] Only one CEO with an ownership stake of above 10% is classified as fired in our sample.

some basic CEO characteristics. The outsider variable is available only for a subsample of CEOs, because the date when the CEO joined the firm is frequently missing in ExecuComp. While over the entire sample period about 36% of CEOs are outside hires, this variable is monotonically increasing from only 27% in 1993 to 38.5% in 2004.

[INSERT TABLE 1: DESCRIPTIVE STATISTICS]

3.2 Estimating turnover risk

Our initial motivation for this study was based on the stylized fact that average CEO pay and forced turnover frequencies are correlated over time (see Section 2). In order to extend our analysis of the empirical relationship between turnover risk and compensation to the cross section, we need a turnover measure that varies across CEOs. We use a Probit model to estimate empirical hazard rates. Predicted values from a Probit model are equivalent to hazard rates, as they implicitly condition on the CEO being in office in year $t-1$. In the next subsection we briefly show this equivalence formally. We then proceed to describe and justify the determinants of the exogenous hazard rate and present our estimation results.

A Probit model for the hazard rate. We begin by briefly outlining our empirical approach to modeling the turnover hazard rate. Let T_F denote the time of forced CEO turnover. The hazard rate, $h(t)$, can be interpreted as the instantaneous probability (per time unit) that the CEO is fired, conditional on his survival up to time t. It is defined as

$$\begin{aligned} h(t) &= \lim_{\Delta t \to 0} \frac{1}{\Delta t} P[t < T_F \leq t + \Delta t | T_F > t] \\ &= \lim_{\Delta t \to 0} \frac{1}{\Delta t} \frac{P[t < T_F \leq t + \Delta t]}{P[T_F > t]} = \frac{f(t)}{1 - F(t)} \end{aligned} \tag{1}$$

It is constant and equal to λ for the exponential distribution function. Less formally, $h(t)\Delta t$ gives the probability that a CEO is fired during the period Δt given he is in office at time t.

To obtain CEO-specific hazard rates we use the predicted values from a Probit regression model, where the dependent variable is the turnover dummy. The turnover dummy, D_{it}, where i denotes the company and t the year, is defined as follows: it takes the value of one if the CEO of firm i is no longer in office at the end of fiscal year $t+1$, conditional on being

in office at the end of fiscal year t. It is zero if he remains in office throughout fiscal year $t+1$. Thus, just as the hazard rate, the turnover indicator conditions on the CEO's survival up to time t. The Probit model can then be stated as

$$E[D_{it}|x_{it}] = P[D_{it} = 1|x_{it}] = P[t < T_F \leq t+1|T_F > t, x_{it}] = \Phi(\beta' x_{it}) \tag{2}$$

where x_{it} is a vector of explanatory variables, β is the coefficient vector, and Φ denotes the normal probability distribution function. Predicted values of this regression are estimates of 1-year firing probabilities conditional on survival up to year t:

$$\hat{h}^{1yr}(t) = E[D_{it}|x_{it}, \hat{\beta}] = 0 \cdot (1 - \Phi(\hat{\beta}' x_{it})) + 1 \cdot \Phi(\hat{\beta}' x_{it}) = \Phi(\hat{\beta}' x_{it}) \tag{3}$$

This is formally equivalent to the theoretical 1-year firing probability given by

$$h^{1yr}(t) = P[t < T_F \leq t+1|T_F > t] = \frac{\int_t^{t+1} f(t)dt}{1 - F(t)} = 1 - e^{-\lambda} \xrightarrow[\lambda \to 0]{} \lambda \tag{4}$$

To obtain the instantaneous, predicted hazard rate, $\hat{\lambda}$, we transform the fitted values from the Probit regression into $\hat{\lambda} = -\log(1 - \hat{h}^{1yr}(t))$.

Determinants of the exogenous hazard rate. Our ultimate goal is to assess the relation between turnover risk and compensation. An obvious concern with this approach is that turnover risk is endogenous to CEO skill. Turnover hazard rates which reflect CEO skill would not necessarily be positively associated with CEO pay, because the relation would pick up both the compensation for exogenous turnover risk and the penalty due to poor skill. On the other hand, hazard rates predicted by exogenous factors only, should indeed be positively correlated with pay as they represent an a priori greater risk exposure of the CEO.

To control for endogeneity of turnover risk we predict the hazard rate with variables unrelated to CEO skill. By doing so we deviate from the existing literature on executive turnover which largely focuses on relative performance sensitivity (see Huson, Parrina, and Starks (2001), Jenter and Kanaan (2006), Kaplan and Minton (2006)). These studies are

interested in the sensitivity of both idiosyncratic and industry- or market-induced performance on turnover probabilities. In the present study we explicitly exclude idiosyncratic performance from the Probit regression specification as it is strongly related to CEO skill.

We use two specifications to estimate exogenous hazard rates. In Model 1 we use industry and year dummies only. In Model 2 we also include industry performance. This is motivated by the recent literature on CEO turnover which suggests that industry-induced performance is a significant determinant of turnover. Note that this approach does not preclude that, within a given year and industry, CEOs are fired efficiently in the sense that the worst performing CEOs are fired first. Our hazard rates thus represent prior probabilities of turnover which hold for all CEOs in a given year and industry group.

Estimated hazard rates. Table 2 presents the results for the Probit regressions. The results for model 1, which uses industry and year dummies only, show that the Finance sector exhibits the lowest firing probability, followed by the Utilities and the Manufacturing & Energy sectors while turnover risk is highest in the High Tech sector. Interestingly, the High Tech sector is also the one with the highest average CEO compensation over the sample period while in the Utilities sector CEO pay is the lowest. (We conduct the main analysis including all sectors, but the results are robust to the exclusion of utilities and financials.)

The results from Model 2, which adds current-year and lagged industry returns, show a significant relation between forced turnover and industry performance suggesting that boards do not completely filter out industry-induced performance in their firing decision. We note, however, that sensitivity of turnover to industry performance is ultimately very low: a 1 percentage point increase in the current (lagged) industry return is associated with a 0.01 percentage point decrease in the probability of forced turnover. As pointed out before, we explicitly omit idiosyncratic performance in the Probit regressions in order to obtain hazard rates which are unrelated to CEO skill. Even though idiosyncratic performance is a significant determinant of forced turnover, its omission as a regressor does not bias the coefficient estimates of the other determinants since idiosyncratic performance is, by definition, orthogonal to industry performance, industry and year dummies.

[INSERT TABLE 2: PROBIT REGRESSIONS]

Table 3 illustrates the distributions of the predicted hazard rates across the sample years. The variation in hazard rates across industries is quite substantial. The highest spread is observed in year 2000 where the difference in forced turnover probability between the riskiest and the safest sector is four percent. As shown in Panel B, the spread between the 5% and 95% quantile is in most years even larger when industry performance is added to the Probit specification.

The large cross-sectional variation of hazard rates evident from Table 3 provides a strong source of identification and thus allows us to examine the link between turnover risk and compensation in a cross sectional and panel setting.

[INSERT TABLE 3: HAZARD RATE DISTRIBUTIONS]

3.3 Empirical findings on turnover risk and compensation

Main Results. With our estimate of forced turnover risk in hand, we can now proceed with the second step of our analysis, namely, estimating a compensation regression with turnover risk as the key explanatory variable. Table 4 presents our primary empirical results.[14] The results first indicate that the basic control variables have the expected signs: CEOs whose pay is more tightly tied to performance are compensated with significantly higher expected levels of pay. Further, current and lagged stock return is positively correlated with pay, CEOs of larger firms earn more, and compensation is higher when volatility is higher.

The key result for our purposes is that the predicted hazard rate for CEOs is strongly positively correlated with total compensation: The results suggest that a one percentage point increase in the hazard rate is associated with about 7% more in terms of total compensation. In dollar values this corresponds to around $140,000 more risk-neutrally valued

[14] In general, the standard errors in the OLS regressions should be adjusted to account for the estimation error in the first step probit regression. However, Pagan (1984) shows that the OLS standard errors are valid under the null hypothesis that the hazard rate has no explanatory power. This is the hypothesis evaluated in this paper.

pay for the median CEO, and to around $300,000 for CEOs receiving mean compensation. This positive association between forced turnover risk and compensation is more consistent with the efficient contracting view than with the prediction of the entrenchment view of the paysetting process for executives.

Columns (2) and (4) add corporate governance variables that proxy for entrenchment and CEO characteristics. (The sample size is reduced because the RiskMetrics data are available only starting in 1996.) Chairman-CEOs earn nearly 20% more than non-chairman CEOs; outsider CEOs earn 7.5% more than insiders. Neither board size nor the percentage of independent directors are robustly positively or negatively related to CEO pay. Older (more experienced) CEOs earn more, while CEO tenure is not significantly related to compensation. (However, the latter insignificance is due to collinearity between age and tenure. When including only one of the two variables, each comes out significantly and with positive sign.) Importantly, the result for the impact of the hazard rate remains of similar size and economically and statistically significant even when controlling for these additional variables. We interpret these findings as evidence that for a given level of entrenchment, CEOs do move along a turnover-risk-compensation tradeoff, as posited by the theory.

Two additional features of our findings are particularly noteworthy. First, the results hold with (and without) controlling for the extent to which equity-based compensation is used. Controlling for this factor is important because a general tendency towards stronger incentives could be a common factor behind turnover and compensation. According to this hypothesis, boards would grant pay packages with higher proportions of equity-based pay, and would, at the same time, be more willing to fire CEOs.[15] More incentive compensation would, for risk-averse CEOs, be associated with higher expected values of pay. Thus, this mechanism may cause turnover risk and levels of compensation to be correlated. Therefore, not controlling for the variation in the extent to which equity-based pay is used would possibly overstate the effect of turnover risk on pay. Similarly, the hazard rate is highly significant

[15]Note that the fact that monetary incentives and turnover as an incentive device can be substitutes is perfectly compatible with the notion that as boards wish to implement stronger incentives overall, they make more use of both tools. This is the same argument why a more entrenched CEO gives himself both higher pay and more job security.

even after controlling for firm size as measured by the log of market capitalization. This shows that our estimates do not pick up spurious relations due to the correlation between turnover risk and market values. This also suggests that endogeneity due to omitted variables is unlikely to be a big concern. We investigate reverse causality further below.

Second, the relation holds when controlling for year effects. As the year dummies pick up the common variation of turnover risk and compensation over time, this result indicates that there is an additional cross-sectional relation between the two variables.

[INSERT TABLE 4: LOG COMPENSATION AND TURNOVER RISK]

Time-series relations. This and the following subsection aim at disentangling the time-series and cross-sectional elements of the turnover-compensation relation. We start by separating the time-series effects in a regression using CEO-firm fixed effects. With this specification, identification depends only on time-series variation of the hazard rate for a given CEO-firm combination. Notice that, as companies rarely change industry over time, variation in the hazard rate of Model 1 comes from the within-industry time-series variation of the hazard rate only, while Model 2 also generates variation due to changes in industry performance. For this reason we do not use year dummies as additional controls, as they would leave no or little additional co-variation between the hazard rate and compensation. Table 5 contains the results of the fixed effects regressions. The hazard rate enters positively in all regressions and is always significant. The fixed-effects regressions imply that a one percentage point increase in turnover risk is associated with about 2%-4.5%, or $40,000 to $90,000, more in compensation for the median CEO. As expected, this effect is smaller than in the earlier regressions, as we now control for unobserved CEO-fixed effects which are possibly correlated with turnover risk. Notice that this is quantitatively in line with the sum of the theoretical effects of forfeiture risk and career concerns.[16]

[16]The hazard rate coefficient is lower by about one half if the extended Probit specification is used to estimate the hazard rate. One explanation for this finding is that in this case the hazard rate is by construction negatively correlated with industry and hence total stock returns. This may introduce a mechanical relation between the hazard rate and (the equity-based part of) total compensation even if total stock returns are controlled for.

Also note that even with time-series identification only, and even when controlling for market value, the hazard rate coefficient remains positive and highly significant. Recall that market capitalization exhibits a similar non-monotonic time-series pattern as the hazard rate and total compensation. The results of Table 5 now show that market valuations cannot alone explain the time-series evolution of CEO pay and that the hazard rate has additional explanatory power.

Finally, we point out that the fixed effects regressions further alleviate concerns that our results are driven by endogeneity, an otherwise common issue in the literature on corporate governance. In general, the ideal way to proceed in determining the exogeneity of turnover risk would be to find an appropriate instrumental variable for turnover risk. But it is hard to imagine an exogenous variable that affects turnover risk directly, and compensation only indirectly through turnover risk, as is required for a valid instrument. While we cannot completely rule out the possibility that endogeneity biases the hazard rate coefficient, we note that the fixed effects regressions control for any time-invariant unobserved heterogeneity. With this in mind, it is not obvious what could, in theory, constitute an omitted variable that drives our results.[17]

[INSERT TABLE 5: FIXED EFFECTS REGRESSIONS]

Cross-sectional relations. In order to isolate the pure cross-sectional component of the turnover effect, we estimate cross-sectional regressions by averaging all annual observations of a CEO in a given firm. The results shown in Table 6 corroborate our previous findings. The magnitude of the coefficients relative to those obtained in the fixed effects regressions indicates that the cross-sectional element is even more important in the overall relation between turnover risk and compensation than the time-series element.

[17] Our findings thus differ from other corporate governance studies where effects are often not robust to the inclusion of fixed effects. For example, Himmelberg, Hubbard, and Palia (1999) show that a large fraction of the cross-section variation in managerial ownership is explained by unobserved firm heterogeneity and that once one controls for firm fixed effects in addition to observables, there is no statistically significant effect of managerial ownership on performance. That is, they show that unobserved heterogeneity generates a spurious correlation between ownership and performance. By contrast, we can conclude that the correlation between turnover risk and compensation is not spurious by the same standard.

[INSERT TABLE 6: CROSS-SECTIONAL REGRESSIONS]

CEO age and the turnover risk premium. One theoretical source of the turnover risk premium derives from career concerns of a CEO. Intuitively, these career concerns should be strongest for young CEOs. If getting fired implies that a CEO drops several notches in terms of the size of company he will lead in the future (as the evidence suggests) experiencing such a drop earlier in the career should be more damaging as a longer stream of future income will be affected. This suggests that the turnover risk premium should be decreasing with CEO age.

In Table 7 we take this prediction to the data. We estimate our regressions as before, but now split them by age quintiles. The table has four quadrants: two each for the basic controls, but varying the model for the hazard rate (shown in Panel A); and two each for the extended controls, including corporate governance characteristics, also varying the model for the hazard rate (shown in Panel B). To conserve space, we only report the coefficients of the hazard rate in the compensation regression. In all four cases, the same pattern emerges. The very youngest group of CEOs does not receive a turnover risk premium. Further research may explore the source of the non-monotonicity between quintiles 1 and 2; this is a feature that shows up in all four models and, therefore, seems to be hinting at something special about the youngest CEOs. However, for quintiles 2 up to 5 we observe, with only one statistically significant exception, a monotonic decline of the turnover risk premium with age. Observing this relationship across all quintiles is a rather harsh requirement. Note that for all four models, the turnover risk premium for CEOs below the median age is greater than that for CEOs above the median age.

Furthermore, in unreported regressions we find that including an interaction term of the hazard rate with age quintile - instead of running separate regressions for each age group - yields a negative and highly significant coefficient.

This evidence lends further support to the career concerns explanation of the turnover risk premium. It also speaks in favor of causality running from turnover risk to compensation instead of vice versa as it is not obvious how this pattern should emerge from reverse causation. We now address the latter question more systematically.

Addressing reverse causation. The argument that efficient executive compensation should rise in response to higher turnover risk is intuitively appealing. But one other explanation for our findings is conceivable: The positive correlation between turnover risk and compensation may be driven by reverse causation. In particular, one possible concern is that high CEO pay increases firing risk as it leads to higher performance expectations and accountability of CEOs. The key idea of our approach to investigate this issue is that the cause must occur *before* the effect. The methodology thus relies on the time-series pattern of turnover and compensation.[18] If higher compensation increases turnover risk, we would expect that compensation is particularly high before a forced turnover. Conversely, if it is true that turnover risk causally affects compensation through a turnover risk premium, we would expect that compensation increases following a forced turnover as agents will revise their perception of turnover risk upward when forced turnover occurs.

We use voluntary turnovers as a benchmark and compare the evolution of CEO compensation around forced and voluntary turnovers. To do this, we use the following regression model:

$$Y_{it} = \sum_{\tau=-\underline{T}}^{\overline{T}} \pi_\tau^F F_{i\tau} + \sum_{\tau=-\underline{T}}^{\overline{T}} \pi_\tau^V V_{i\tau} + \beta' X_{it} + \epsilon_{it} \tag{5}$$

The dependent variable Y is the log of total CEO compensation. The indices i and t reference the firm and the fiscal year, respectively. The index τ denotes the year relative to the year of CEO turnover. More precisely, τ is normalized such that $\tau = 0$ is the last fiscal year the incumbent CEO is in office. so that $\tau < 0$ indicates the $-\tau^{\text{th}}$ year before turnover and $\tau > 0$ indicates the τ^{th} year after turnover. X_{it} is a vector of control variables.

The key variables are the $F_{i\tau}$ and $V_{i\tau}$ indicator variables. $F_{i\tau}$ equals one if forced turnover occurs in firm i at $-\tau$ years from the current year t, and zero otherwise. $V_{i\tau}$ is defined analogously for firms in which turnover occurs voluntarily.

[18] In drawing conclusions about causality from the time-series relation of variables, our method is closely related to the concept of Granger causality. A variable X_t is said to "Granger cause" the variable Y_{t+1} if (a) X_t occurs before Y_{t+1}; and (b) it contains information useful in forecasting Y_{t+1} that is not found in a group of other appropriate variables.

The vectors π_τ^F and π_τ^V are the parameters of interest in this equation. They measure the period-specific means of total compensation in firms where CEO turnover is forced and voluntary, respectively, conditional on all covariates. By including a pair of indicator variables, (π_τ^F, π_τ^V), for each period, the relation between turnover type and compensation is allowed to vary with τ. The coefficient difference $\pi_\tau^F - \pi_\tau^V$ are interpreted as the percentage point difference in CEO compensation between firms where turnover is forced and firms where turnover is voluntary, for a given period τ, and controlling for other determinants of CEO pay. For example, a coefficient difference $\pi_{-3}^F - \pi_{-3}^V = .05$ means that three years before the turnover, CEOs who are dismissed earn 5 percentage points more than CEOs that depart voluntarily. The time series of the coefficient differences $\pi_\tau^F - \pi_\tau^V$ around turnover potentially allows us to detect causal effects of forced departure on compensation. If these differences were significantly positive before turnover, reverse causality would indeed be a concern.

Figure 4 shows the results. The solid lines plot the point estimates of the coefficient differences, $\pi_\tau^F - \pi_\tau^V$, by period, as obtained from equation (5). The dashed lines indicate critical values corresponding to a 95% significance level (they are curved because of the varying number of observations at different time horizons). (The detailed regression results including significance tests for the differences of coefficients are given in Table 8.) Panel A displays the regression estimates using the basic set of firm-specific control variables we also used in the hazard rate regressions. Panel B shows the results when corporate governance variables are added as controls. Recall that in the regressions of the previous section hazard rates are determined entirely by year and industry. Here, by contrast, we use the actual occurrence of turnover as a proxy for the increased perception of turnover risk and control for industry and year effects. Hence, the results of the two regression approaches can be seen as complementary since turnover risk is driven by distinct sources.

The two panels of Figure 4 suggest that in the years preceding turnover, CEO compensation does not differ systematically between firms that experience forced and voluntary turnovers. The point estimates for the pre-turnover period are both positive and negative and lie within the critical bounds, for most time horizons. In contrast, in the years following turnover, CEO compensation appears to be at least borderline significantly higher

in firms experiencing forced turnovers relative to their otherwise similar counterparts. All point estimates except in the last year are positive and some lie above the upper critical value.[19]

To confirm this statistically, we define a coarser set of indicator variables, F_{i-}, V_{i-}, F_{i+}, V_{i+}, where "-" and "+" indicate the entire pre- and post-turnover period, respectively, and run the same regressions as before but replace the period-specific indicators by the pre- and post turnover indicators. Table 9 shows the results. In the pre-turnover period, CEOs later leaving voluntarily earn more or the same as those who are later fired. In the post-turnover period, by contrast, CEOs following dismissed predecessors earn around 9 percent points more than CEOs who replace voluntarily departed CEOs, according to Model 1. In Model 2, this difference is not significant. The difference-in-differences tests reported below the simple difference tests underscores that forced turnover brings about a significant shift in the CEO pay relative to voluntary departures. The occurrence of forced turnover shifts CEO compensation in these firms upward by 11 to 15 percentage points relative to firms where the CEO departed voluntarily, and this difference is significant for both models.

An alternative explanation for our finding that CEO compensation rises when forced turnover occurs is that a firm may have to pay a premium in order to attract a good CEO, in particular if the incumbent CEO is fired without a good plan for a successor. This may well be true, and further research may model this insight formally, but the evidence unambiguously rejects the reverse causation hypothesis.

Robustness. The results are robust to a large variety of alternative specifications and subsamples. For space reasons, we only point out that the results continue to hold (1) if we exclude financials and utilities and (2) if we exclude CEOs in the top and bottom percentile of total compensation. If (3) we include CEOs with ownership stakes above 10%, the hazard rate coefficients generally remain significant but occasionally less so.

[19]Consistent with our findings, Elsaid and Davidson (2007) show that the average total compensation of successor CEOs increases substantially over that of their predecessor. They also argue that successors of fired CEOs may view the position as being riskier than in voluntary turnover.

4 Conclusion

This paper has presented evidence of a positive relationship between forced turnover risk and compensation for the CEOs of the largest US corporations. This finding is robust to numerous controls and survives several econometric tests for reverse causation and endogeneity. Our interpretation is that the evidence in this respect is more consistent with an efficient contracting model of executive compensation than with an entrenchment model. Specifically, partially entrenched CEOs would aim at (and succeed in) increasing compensation and decreasing turnover risk; shareholders setting efficient pay instead have to observe a participation constraint that requires increasing compensation for increasing turnover risk. The entrenchment view's prediction of a negative correlation between turnover risk and compensation is not borne out in the data. A second contribution of the paper is to show that the empirical magnitude of the turnover risk premium is in line with theoretically calibrated predictions.

No paper can claim to once and for all resolve the debate over the extent to which CEO compensation is set efficiently, and this paper is not an exception. Even though our evidence on the positive correlation of observable compensation and turnover seems fairly robust, it is still possible, for example, that CEOs set themselves lower observable but higher non-observable pay as they maximize the probability of retaining their jobs.[20] Moreover, it is clear that some CEOs do achieve spectacular compensation packages while at the same time being apparently immune against the risk of being fired. If these were the rule rather than the exception, government intervention would be called for. But precisely in the light of these cases of egregious abuse of power and failing corporate governance, it is reassuring that, at least with respect to the relationship between pay and turnover risk, the available evidence suggests that, on average, the market for CEOs works efficiently.

[20] See Kuhnen and Zwiebel (2007) for a model along these lines.

References

Bebchuk, L., K. J. M. Cremers, and U. Peyer (2008): "CEO centrality," *Mimeo.*

Bebchuk, L., and J. Fried (2004): *Pay without performance.* Harvard University Press, Cambridge.

Black, F., and M. Scholes (1973): "The Pricing of Options and Corporate Liabilities," *Journal of Political Economy*, 81(3), 637–654.

Booz-Allen-Hamilton (2005): "CEO Succession 2005 (and various other years with the same title)," *Mimeo.*

Carpenter, J. (1998): "The exercise and valuation of executive stock options," *Journal of Financial Economics*, 48, 127–158.

Chakraborty, A., S. Sheik, and N. Subramanian (2004): "Termination risk and managerial risk-taking," Discussion paper, UMass Boston College of Management et al.

Cuny, C., and P. Jorion (1995): "Valuing executive stock options with endogenous departure," *Journal of Accounting and Economics*, 20, 193–205.

Dahiya, S., and D. Yermack (2006): "You can't take it with you: Sunset provisions for equity compensation when managers retire, resign or die," *Mimeo.*

Dezsoe, C. (2006): "Entrenchment and Changes in Performance Following CEO Turnover," *Mimeo.*

Edmans, A., X. Gabaix, and A. Landier (2008): "A Multiplicative Model of Optimal CEO Incentives in Market Equilibrium," *Mimeo.*

Eisfeldt, A. L., and A. A. Rampini (2008): "Managerial incentives, capital reallocation, and the business cycle," *Journal of Financial Economics*, 87(1), 177–199.

Elsaid, E., and W. N. Davidson (2007): "What happens to CEO compensation following turnover and succession?," *Mimeo.*

Ertugrul, M., and K. Krishnan (2007): "CEO dismissal timing and costs of delayed action: Do some boards act too late?," *Mimeo*.

Fama, E. F., and K. R. French (1997): "Industry Costs of Equity," *Journal of Financial Economics*, 43, 153–193.

Fee, C. E., and C. J. Hadlock (2004): "Management turnover across the corporate hierarchy," *Journal of Accounting and Economics*, 37, 3–38.

Foster, T. W., P. R. Koogler, and D. Vickrey (1993): "Valuation of Executive Stock Options and the FASB Proposal: An Extension," *Accounting Review*, 68(1), 184–189.

Gabaix, X., and A. Landier (2008): "Why has CEO pay increased so much?," *Quarterly Journal of Economics*, 123(1), 49–100.

Gibbons, R., and K. Murphy (1992): "Optimal incentives in the presence of career concerns," *Journal of Political Economy*, 100(3), 468–505.

Gillan, S. L., J. C. Hartzell, and R. Parrino (2006): "Explicit vs. implicit contracts: Evidence from CEO Employment Agreements," *Mimeo*.

Gompers, P. A., J. L. Ishii, and A. Metrick (2003): "Corporate Governance and Equity Prices," *Quarterly Journal of Economics*, 118(1), 107–155.

Hall, B. J., and K. J. Murphy (2002): "Stock options for undiversified executives," *Journal of Accounting and Economics*, 33, 3–42.

Hallman, G., J. C. Hartzell, and C. Parsons (2005): "Carrots and sticks: The threat of dismissal and incentive compensation," *Mimeo*.

Hayes, R. M., S. A. Hillegeist, and E. K. Keating (2005): "Financial Distress Risk and Initial CEO Compensation Contracts," *Mimeo*.

Himmelberg, C. P., R. G. Hubbard, and D. Palia (1999): "Understanding the determinants of managerial ownership and the link between ownership and performance," *Journal of Financial Economics*, 53, 353–384.

Hull, J., and A. White (2004): "How to value employee stock options," *FInancial Analysts Journal*, 60, 114–119.

Huson, M. R., R. Parrina, and L. T. Starks (2001): "Internal Monitoring Mechanisms and CEO Turnover: A Long-Term Perspective," *Journal of Finance*, 56(6), 2265–2297.

Ingersoll, J. E. (2006): "The Subjective and Objective Evaluation of Incentive Stock Options," *Journal of Business*, 79(2).

Jenter, D., and F. Kanaan (2006): "CEO turnover and relative performance evaluation," *Mimeo*.

Kaplan, S. N., and B. A. Minton (2006): "How has CEO turnover changed? Increasingly perfromance sensitive boards and increasingly uneasy CEOs," *Mimeo*.

Kuhnen, C. M., and J. Zwiebel (2007): "Executive pay, hidden compensation, and managerial entrenchment," *Mimeo*.

Lambert, R., D. F. Larcker, and R. E. Verrecchia (1991): "Portfolio considerations in valuing executive compensation," *Journal of Accounting Research*, 29(1), 129–149.

Merton, R. C. (1973): "The Theory of Rational Option Pricing," *Bell Journal of Economics and Management Science*, 4(1), 141–183.

Murphy, K. J. (1999): "Executive Compensation," in *Handbook of Labor Economics*, ed. by O. Ashenfelter, and D. Card. Elsevier Science North Holland.

Murphy, K. J., and J. Zaboinik (2004): "CEO pay and appointments: A market-based explanation for recent trends," *American Economic Review*, 94(2), 192–196.

Noreen, E., and M. Wolfson (1981): "Equilibrium Warrant Pricing Models and Accounting for Executive Stock Options," *Journal of Accounting Research*, 19, 384–398.

Pagan, A. (1984): "Econometric issues in the analysis of regressions with generated regressors," *International Economic Reivew*, 25(1), 221–247.

Parrino, R. (1997): "CEO turnover and outside succession: A cross-sectional analysis," *Journal of Financial Economics*, 46(2), 165–197.

Peters, F., and A. F. Wagner (2007): "Vulnerable Executive Compensation," *Mimeo*.

Rusticus, T. (2006): "Executive Severance Agreements," *Mimeo*.

Sircar, R., and W. Xiong (2007): "A general framework for evaluating executive stock options," *Journal of Economic Dynamics and Control*, 31, 2317–2349.

Sletten, E., and T. Lys (2006): "Motives for and Risk-Incentive Implications of CEO Severance," *Mimeo*.

Subramanian, N., A. Chakraborty, and S. Sheikh (2002): "Performance incentives, performance pressure, and executive turnover," *Mimeo*.

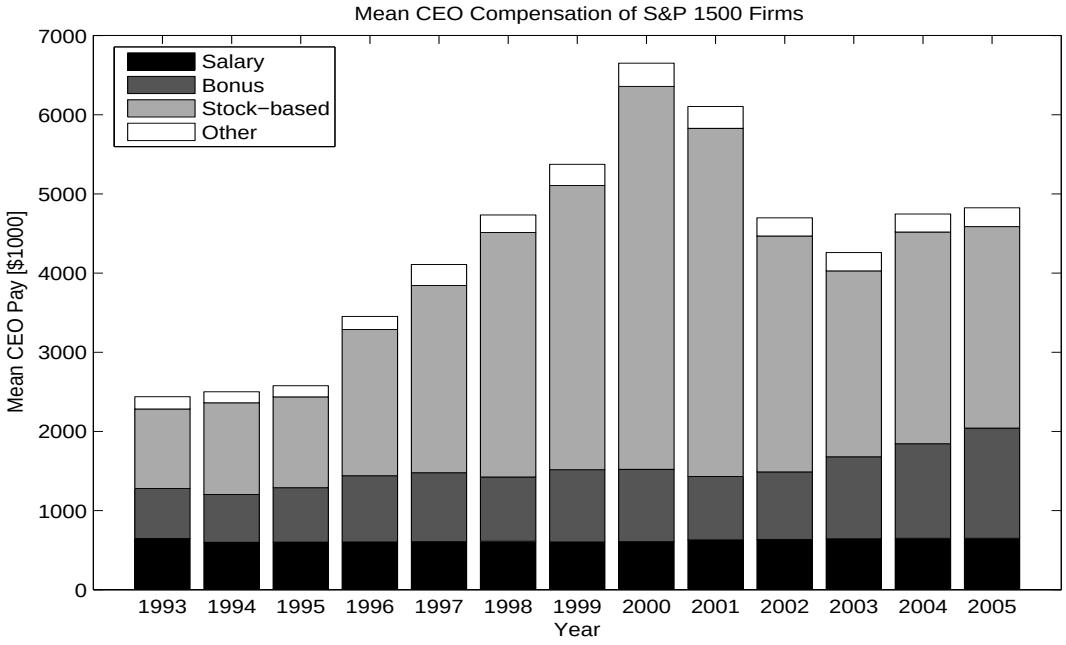

Figure 1: Average compensation of S&P 1500 CEOs, 1993-2005. Pay levels are converted to 2000 dollars using the consumer price index provided by the U.S. Bureau of Labor Statistics. Source: ExecuComp

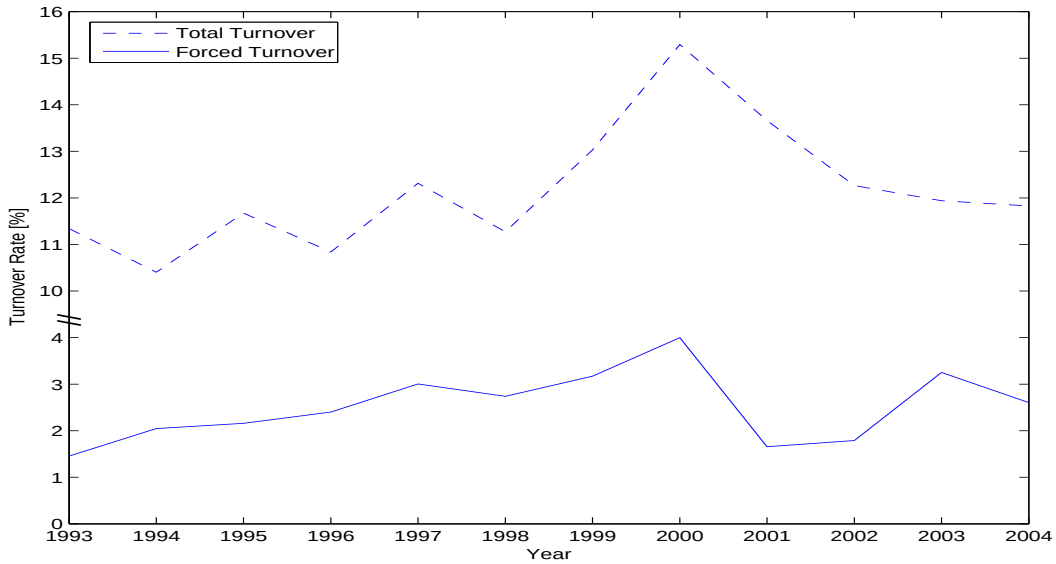

Figure 2: Turnover rates for CEOs in the ExecuComp database, 1993-2004. Underlying data is from Jenter and Kanaan (2006) for the period 1993-2001. Data for 2002-2004 is collected by the authors.

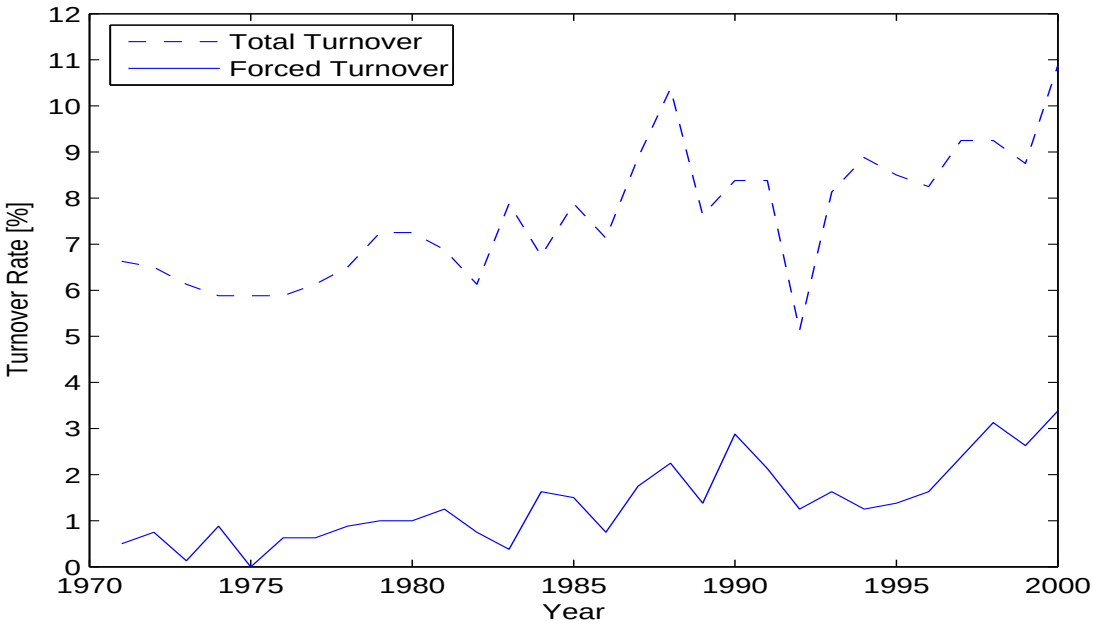

Figure 3: Turnover rates for CEOs of the Fortune 800 firms, 1975-2000. Underlying data are from Huson et al. (2001) and Dezsö (2006).

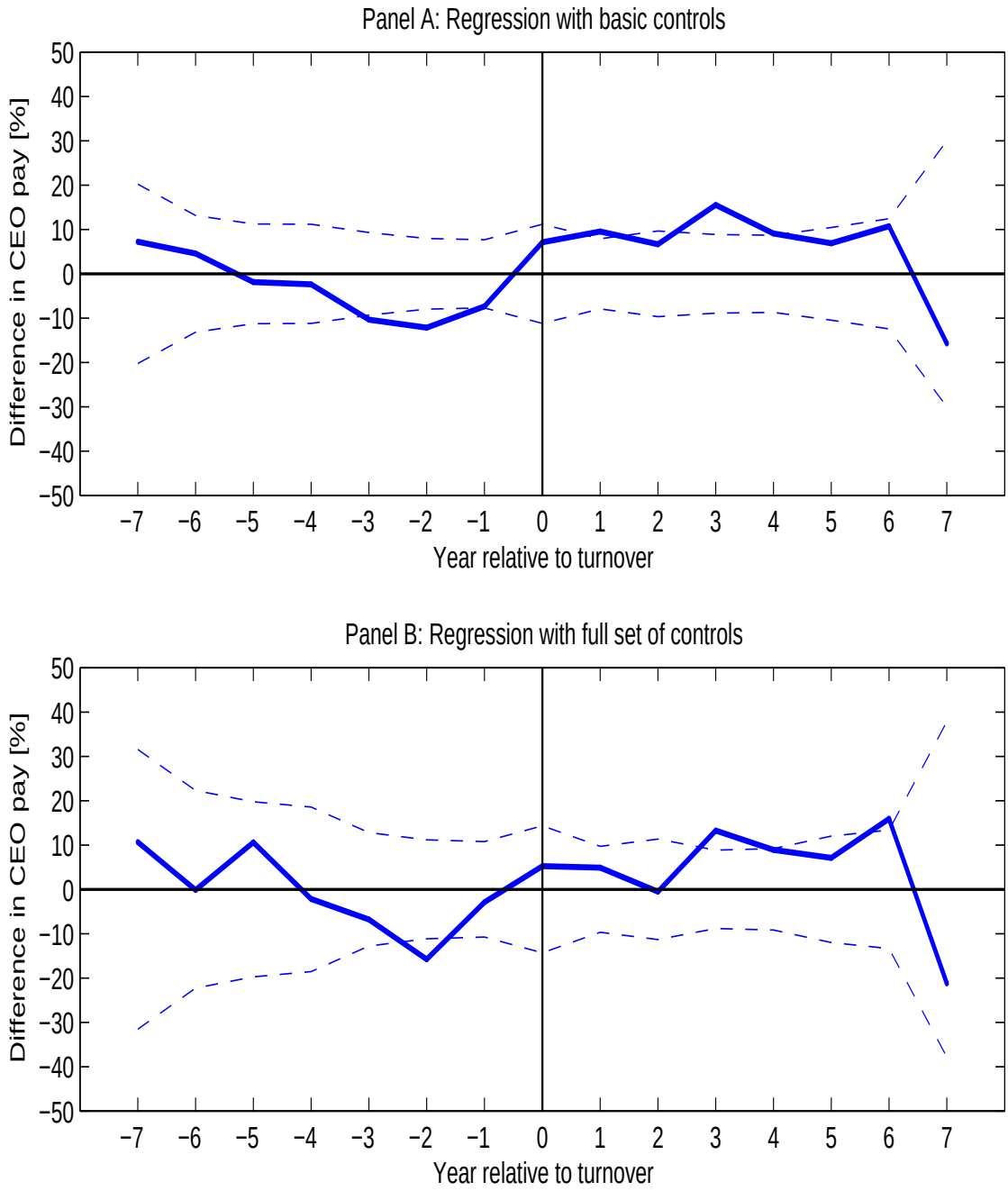

Figure 4: The figure shows the percentage difference in compensation between CEOs in firms where turnover is forced and firms where turnover is voluntary. The solid line plots the point estimates of the coefficient differences $\pi_\tau^F - \pi_\tau^V$ by period. The dashed lines represent critical values (for a 95% confidence level) of a two-sided Wald test of coefficient differences. Year zero refers to the last fiscal year the incumbent CEO is in office.

Table 1: Descriptive Statistics.

PANEL A: Frequency of Forced and Voluntary Turnover

# firm years	# turnovers	#forced turnovers	#voluntary turnovers
19922	2304	507	1797

PANEL B: Firm Characteristics

	Mean	Median	Std	N
Market cap [$m]	14160.35	2274.36	53571.84	19486
Total assets [$m]	10223.61	1354.05	45349.99	19657
Market-to-book	2.05	1.44	2.54	19486
ROA [%]	2.21	3.93	24.34	19886
Volatility [%]	41.70	36.10	22.96	16704

PANEL C: CEO Compensation Characteristics

	Mean	Median	Std	N
Total compensation [$1000]	4397.15	2034.67	11548.55	19512
Salary [$1000]	617.82	561.52	337.55	19675
Bonus [$1000]	682.13	339.75	1597.02	19675
Black-Scholes value of option grants [$1000]	2275.47	550.26	9274.24	19552
Value of Restricted Stock [$1000]	417.97	0.00	5231.69	19675
Other Compensation($1000)	392.57	48.21	1638.99	19675
Percentage of Equity-based Pay	38.60	38.78	29.85	19512

PANEL D: Corporate Governance Variables

	Mean	Median	Std	N
CEO is chairman	0.63	1.00	0.48	12246
Board size	9.63	9.00	2.99	12393
Percentage of independent directors	64.06	66.67	17.84	12393
Governance index	9.30	9.00	2.67	15813

PANEL E: CEO Characteristics

	Mean	Median	Std	N
Age	55.01	55	7.44	11278
Tenure	7.58	5	7.15	18023
Outsider	0.36	0	0.48	13469

Note: The table displays descriptive statistics. Panel A contains turnover statistics. Data for 1993-2001 are from Jenter and Kanaan (2006). Additional data for 2002-2004 is collected by the authors. Panel B contains basic firm characteristics. Panel C contains CEO compensation variables. Both firm and compensation variables are converted to constant 2000 dollars using the Consumer Price Index provided by the Bureau of Labor Statistics. Corporate governance variables, given in Panel D, are from RiskMetrics. The governance index is from Gompers, Ishii, and Metrick (2003). CEO characteristics are given in Panel E.

Table 2: Probit regressions estimating the probability of forced turnover.

	Model 1	Model 2
Median industry return in t		-0.01***
		(0.000)
Median industry return in t-1		-0.02***
		(0.000)
Consumer	0.65***	0.83***
	(0.000)	(0.000)
High Tech	1.50***	1.61***
	(0.000)	(0.000)
Health	0.70***	0.95***
	(0.000)	(0.000)
Finance	-0.54***	-0.77***
	(0.000)	(0.000)
Utilities	0.23***	0.12***
	(0.000)	(0.000)
Other	0.78***	0.90***
	(0.000)	(0.000)
Year dummies	Yes	Yes
Observations	19922	19922

Note: Estimates are marginal probabilities expressed in percent. Industry dummies are defined according to the five-industries Fama and French (1997) classification, extended to include Finance and Utilities as separate groups. The omitted industry is Manufacturing and Energy. Industry returns are median returns of the corresponding industry group according to the Fama-French classification, and are expressed as decimals. P-values, reported in parentheses, are calculated with robust standard errors clustered at the industry level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 3: Distribution of predicted hazard rates by year, 1993-2004.

PANEL A: Model 1

Year	Q5	Q25	Q50	Q75	Q95	Mean	Q95-Q5
1993	0.77	1.16	1.64	1.67	2.14	1.45	1.37
1994	1.10	1.63	2.28	2.31	2.93	2.04	1.83
1995	1.20	1.76	2.45	2.48	3.14	2.21	1.94
1996	1.32	1.94	2.69	2.72	3.43	2.43	2.11
1997	1.60	2.33	3.19	3.28	4.05	2.93	2.45
1998	1.48	2.15	2.97	3.05	3.78	2.73	2.30
1999	1.71	2.47	3.38	3.47	4.28	3.16	2.57
2000	2.25	3.20	4.32	4.43	5.41	4.02	3.16
2001	0.84	1.26	1.78	1.83	2.31	1.65	1.47
2002	0.93	1.38	1.95	2.00	2.52	1.79	1.59
2003	1.64	2.37	3.25	3.34	4.13	3.00	2.49
2004	1.37	2.00	2.77	2.85	3.53	2.55	2.16
All years	1.16	1.78	2.45	3.20	4.32	2.55	3.16

PANEL B: Model 2

Year	Q5	Q25	Q50	Q75	Q95	Mean	Q95-Q5
1993	0.48	1.20	1.32	1.75	2.39	1.46	1.91
1994	0.93	1.55	1.89	2.47	3.07	2.03	2.14
1995	1.05	1.77	2.33	2.71	2.99	2.21	1.94
1996	1.09	1.97	2.52	3.07	3.47	2.42	2.38
1997	1.18	2.20	2.90	3.57	4.45	2.92	3.27
1998	1.14	2.12	2.73	3.42	4.01	2.74	2.87
1999	2.08	2.64	3.17	3.70	4.14	3.16	2.06
2000	2.39	3.33	3.95	4.90	6.15	3.99	3.76
2001	0.61	1.12	1.34	2.18	3.59	1.65	2.98
2002	0.60	1.32	1.50	2.50	3.60	1.82	3.00
2003	1.44	2.40	3.02	3.69	4.52	3.02	3.08
2004	1.67	2.03	2.60	2.97	3.35	2.54	1.68
All years	1.05	1.70	2.52	3.19	4.49	2.54	3.44

Note: Hazard rates are estimated using the predicted values of the Probit regressions in Table 2 and expressed in percent.

Table 4: OLS regressions for log of total compensation of S&P1500 CEOs, 1993-2004.

	Model 1		Model 2	
Dependent Variable	Ln(Total Comp) (1)	Ln(Total Comp) (2)	Ln(Total Comp) (3)	Ln(Total Comp) (4)
Hazard rate [%]	0.0859***	0.0765***	0.0518***	0.0603***
	(0.000)	(0.000)	(0.000)	(0.000)
Equity-based pay [%]	0.0180***	0.0183***	0.0181***	0.0183***
	(0.000)	(0.000)	(0.000)	(0.000)
Return [%]	0.0014***	0.0015***	0.0014***	0.0015***
	(0.000)	(0.001)	(0.000)	(0.001)
Return in t-1 [%]	0.0000*	0.0012***	0.0000	0.0014***
	(0.058)	(0.000)	(0.119)	(0.000)
Ln(Market value) in t-1	0.3565***	0.3499***	0.3546***	0.3494***
	(0.000)	(0.000)	(0.000)	(0.000)
Volatility in t-1 [%]	0.0006	0.0007	0.0009*	0.0007
	(0.258)	(0.391)	(0.090)	(0.387)
Chairman		0.1503***		0.1499***
		(0.000)		(0.000)
Board size		-0.0055		-0.0059
		(0.356)		(0.321)
Indept. directors [%]		-0.0012		-0.0012
		(0.157)		(0.161)
Governance index		0.0147***		0.0147***
		(0.002)		(0.002)
Outsider		0.0925***		0.0923***
		(0.001)		(0.001)
Age		0.0058**		0.0058**
		(0.011)		(0.010)
Tenure		0.0021		0.0022
		(0.445)		(0.430)
Year fixed effects	Yes	Yes	Yes	Yes
Observations	14579	7143	14579	7143
Adjusted R-squared	0.639	0.657	0.637	0.657

Note: This table presents panel regressions of log total compensation on the turnover hazard rate and other determinants. The hazard rate is the predicted value from the Probit regressions shown in Table 2, using model 1 for regressions 1 and 2, and model 2 for regressions 3 and 4. All variable definitions are given in section 3.1. Total compensation includes salary, bonus, restricted stock granted, the Black-Scholes value of option grants and other compensation. Nominal values are converted to 2000 dollars using the consumer price index provided by the U.S. Bureau of Labor Statistics. Observations with CEO ownership greater than 10% are excluded. P-values, reported in parentheses, are calculated with robust standard errors clustered at the CEO-firm level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 5: CEO-firm fixed effects regressions for log total compensation of S&P1500 CEOs, 1993-2004.

	Model 1		Model 2	
Dependent Variable	Ln(Total Comp) (1)	Ln(Total Comp) (2)	Ln(Total Comp) (3)	Ln(Total Comp) (4)
Hazard rate [%]	0.0435***	0.0329***	0.0210***	0.0241***
	(0.000)	(0.000)	(0.000)	(0.000)
Equity-based pay [%]	0.0184***	0.0186***	0.0184***	0.0186***
	(0.000)	(0.000)	(0.000)	(0.000)
Return [%]	0.0013***	0.0013***	0.0013***	0.0014***
	(0.000)	(0.001)	(0.000)	(0.001)
Return in t-1 [%]	0.0000	0.0013***	0.0000	0.0014***
	(0.498)	(0.000)	(0.484)	(0.000)
Ln(Market value) in t-1	0.3845***	0.2516***	0.3895***	0.2512***
	(0.000)	(0.000)	(0.000)	(0.000)
Volatility in t-1 [%]	0.0019***	0.0007	0.0016**	0.0005
	(0.004)	(0.592)	(0.015)	(0.702)
Chairman		0.0000		-0.0005
		(0.999)		(0.986)
Board size		-0.0101*		-0.0099*
		(0.050)		(0.053)
Indept. directors [%]		-0.0017		-0.0017
		(0.247)		(0.249)
Governance index		-0.0184*		-0.0186*
		(0.074)		(0.074)
Tenure		0.0438***		0.0441***
		(0.000)		(0.000)
CEO-firm fixed effects	Yes	Yes	Yes	Yes
Observations	14579	9228	14579	9228
CEO-firm observations	3906	2809	3906	2809
Adjusted R-squared	0.528	0.493	0.526	0.492

Note: This table presents fixed effects regressions of log total compensation on the turnover hazard rate and other determinants. The hazard rate is the predicted value from the Probit regressions shown in Table 2, using model 1 for regressions 1 and 2, and model 2 for regressions 3 and 4. All variable definitions are given in section 3.1. CEO age is omitted due to collinearity with tenure in fixed effects regressions. Total compensation includes salary, bonus, restricted stock granted, the Black-Scholes value of option grants and other compensation. Nominal values are converted to 2000 dollars using the consumer price index provided by the U.S. Bureau of Labor Statistics. Observations with CEO ownership greater than 10% are excluded. P-values, reported in parentheses, are calculated with robust standard errors clustered at the CEO-firm level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 6: Cross-sectional regressions for log total compensation of S&P1500 CEOs, 1993-2004.

	Model 1		Model 2	
Dependent Variable	Ln(Total Comp) (1)	Ln(Total Comp) (2)	Ln(Total Comp) (3)	Ln(Total Comp) (4)
Hazard rate [%]	0.0714*** (0.000)	0.0673*** (0.000)	0.0601*** (0.000)	0.0683*** (0.000)
Equity-based pay [%]	0.0181*** (0.000)	0.0188*** (0.000)	0.0182*** (0.000)	0.0188*** (0.000)
Return [%]	0.0015*** (0.000)	0.0013*** (0.000)	0.0015*** (0.000)	0.0014*** (0.000)
Return in t-1 [%]	0.0000 (0.469)	0.0015*** (0.000)	0.0000 (0.465)	0.0017*** (0.000)
Ln(Market value) in t-1	0.3585*** (0.000)	0.3473*** (0.000)	0.3577*** (0.000)	0.3469*** (0.000)
Volatility in t-1 [%]	0.0006 (0.214)	0.0012 (0.134)	0.0006 (0.197)	0.0010 (0.206)
Chairman		0.1868*** (0.000)		0.1862*** (0.000)
Board size		0.0012 (0.847)		0.0018 (0.779)
Indept. directors [%]		-0.0015* (0.076)		-0.0014 (0.101)
Governance index		0.0150*** (0.004)		0.0152*** (0.004)
Outsider		0.0751*** (0.008)		0.0748*** (0.008)
Age		0.0019 (0.377)		0.0019 (0.355)
Tenure		0.0003 (0.899)		0.0003 (0.895)
Observations	14579	7143	14579	7143
CEO-firm observations	3906	2049	3906	2049
Adjusted R-squared	0.638	0.678	0.638	0.679

Note: This table presents cross-sectional regressions of log total compensation on the turnover hazard rate and other determinants. All variables are time-series averages for a given CEO-firm combination over all years in the sample. The hazard rate is the predicted value from the Probit regressions shown in Table 2, using model 1 for regressions 1 and 2, and model 2 for regressions 3 and 4. All variable definitions are given in section 3.1. Total compensation includes salary, bonus, restricted stock granted, the Black-Scholes value of option grants and other compensation. Nominal values are converted to 2000 dollars using the consumer price index provided by the U.S. Bureau of Labor Statistics. Observations with CEO ownership greater than 10% are excluded. P-values, reported in parentheses, are calculated with robust standard errors clustered at the CEO-firm level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 7: Turnover risk premia and career concerns.

PANEL A: Regressions with basic set of controls

	Model 1			Model 2		
Age group	Coefficient	P-value	N	Coefficient	P-value	N
Q1	0.0820	(0.013)	2517	0.0354	(0.139)	2517
Q2	0.0979	(0.001)	3131	0.0922	(0.000)	3131
Q3	0.0860	(0.002)	2309	0.0823	(0.000)	2309
Q4	0.0768	(0.008)	2658	0.0428	(0.082)	2658
Q5	0.0631	(0.142)	2330	0.0228	(0.525)	2330
Below median	0.0899	(0.000)	7194	0.0627	(0.000)	7194
Above median	0.0717	(0.006)	5751	0.0339	(0.107)	5751

PANEL B: Regressions with full set of controls

	Model 1			Model 2		
Age group	Coefficient	P-value	N	Coefficient	P-value	N
Q1	0.0663	(0.107)	1413	0.0429	(0.193)	1413
Q2	0.0807	(0.024)	1768	0.0827	(0.004)	1768
Q3	0.0630	(0.078)	1308	0.0633	(0.026)	1308
Q4	0.0975	(0.004)	1505	0.0665	(0.020)	1505
Q5	0.0623	(0.245)	1149	0.0273	(0.506)	1149
Below median	0.0732	(0.005)	4060	0.0632	(0.002)	4060
Above median	0.0704	(0.029)	3083	0.0488	(0.050)	3083

Note: This table presents estimates of the hazard rate coefficient for subsamples differing by CEO age. Panel A contains the results using the basic set of control variables as in columns (1) and (3) of Table 4. Panel B contains the results using the full set of controls as in columns (2) and (4) of Table 4. The sample is split into age quintiles (rows Q1 to Q5) or halves (above / below median). The 20%, 40%, 60%, and 80% quintiles are, respectively, ages 49, 54, 57, and 62. Model 1 and Model 2 refer to the empirical models for estimating the hazard rates (see table 2). P-values are calculated with robust standard errors clustered at the CEO-firm level, and are reported in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.

Table 8: Event time regressions of log total compensation of S&P1500 CEOs, 1993-2004.

	(1)		(2)	
Dependent Variable	Ln(Total Comp)		Ln(Total Comp)	
	$\Delta\pi_\tau$	P-value	$\Delta\pi_\tau$	P-value
$\pi^F_{-7} - \pi^V_{-7}$	0.0723	(0.557)	0.1066	(0.578)
$\pi^F_{-6} - \pi^V_{-6}$	0.0461	(0.566)	-0.0014	(0.992)
$\pi^F_{-5} - \pi^V_{-5}$	-0.0188	(0.783)	0.1061	(0.376)
$\pi^F_{-4} - \pi^V_{-4}$	-0.0235	(0.729)	-0.0220	(0.846)
$\pi^F_{-3} - \pi^V_{-3}$	-0.1034 *	(0.069)	-0.0682	(0.380)
$\pi^F_{-2} - \pi^V_{-2}$	-0.1216 **	(0.012)	-0.1579 **	(0.020)
$\pi^F_{-1} - \pi^V_{-1}$	-0.0735	(0.116)	-0.0288	(0.659)
$\pi^F_0 - \pi^V_0$	0.0710	(0.297)	0.0524	(0.548)
$\pi^F_1 - \pi^V_1$	0.0956 **	(0.047)	0.0488	(0.408)
$\pi^F_2 - \pi^V_2$	0.0664	(0.259)	-0.0052	(0.940)
$\pi^F_3 - \pi^V_3$	0.1556 ***	(0.004)	0.1325 **	(0.014)
$\pi^F_4 - \pi^V_4$	0.0910 *	(0.087)	0.0893	(0.110)
$\pi^F_5 - \pi^V_5$	0.0691	(0.276)	0.0711	(0.331)
$\pi^F_6 - \pi^V_6$	0.1076	(0.154)	0.1589 *	(0.050)
$\pi^F_7 - \pi^V_7$	-0.1570	(0.390)	-0.2120	(0.357)
Firm-specific controls	Yes		Yes	
Corporate governance controls	No		Yes	
CEO characteristics	No		Yes	
Year fixed effects	Yes		Yes	
Industry fixed effects	Yes		Yes	
Observations	8083		5055	
Adjusted R-squared	0.99		0.99	

Note: The table displays the results of event time regressions according to equation $Y_{it} = \sum_{\tau=-\underline{T}}^{\overline{T}} \pi^F_\tau F_{i\tau} + \sum_{\tau=-\underline{T}}^{\overline{T}} \pi^V_\tau V_{i\tau} + \beta' X_{it} + \epsilon_{it}$. π^F_τ and π^V_τ are the coefficients of dummy variables, $F_{i\tau}$ and $V_{i\tau}$, which indicate the period relative to the year of turnover and whether CEO turnover was forced or voluntary. The subscript indicates the period relative to the turnover year. The superscript "F" indicates that turnover in period zero was forced, superscript "V" indicates the complementary case of voluntary turnover. X_{it} is a vector of control variables. P-values of differences in coefficients are calculated from Wald statistics using standard errors clustered at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively. The point estimates of the coefficient differences are plotted in Figure 4.

Table 9: Event time regressions of log total compensation of S&P1500 CEOs, 1993-2004.

Dependent Variable	Ln(Total comp)	
	(1)	(2)
$\pi_-^F - \pi_-^V$	-0.0678 *	-0.0696
	(0.077)	(0.249)
$\pi_+^F - \pi_+^V$	0.0887 **	0.0405
	(0.015)	(0.335)
$(\pi_+^F - \pi_+^V) - (\pi_-^F - \pi_-^V)$	0.1565 ***	0.1101 *
	(0.001)	(0.100)
Firm-specific controls	Yes	Yes
Corporate governance controls	No	Yes
CEO characteristics	No	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Observations	8083	4256
Adjusted R-squared	0.68	0.68

Note: The table displays the results of event time regressions according to equation $Y_{it} = \pi_-^F F_- + \pi_+^F F_+ + \pi_-^V V_- + \pi_+^V V_+ + \beta' X_{it} + \epsilon_{it}$. The dependent variable is the log of total compensation. F_-, V_-, F_+, V_+ are dummy variables indicating the pre- and post-turnover periods and whether CEO turnover was forced or voluntary. Subscript "-" indicates the pre-turnover period while subscript "+" indicates the post-turnover period. Superscript "F" indicates that turnover was forced while superscript "V" indicates the complementary case of voluntary turnover. P-values of differences in coefficients are calculated from Wald statistics using standard errors clustered at the firm level. *, **, and *** denote significance at the 10%, 5%, and 1% level, respectively.