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CEO Turnover and Volatility under Long-Term Employment Contracts

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Abstract

We study the role of the contractual time horizon of chief executive officers (CEOs) for CEO turnover and corporate policies. Using hand-collected data on 3,954 fixed-term CEO contracts, we show that remaining time under contract predicts CEO turnover. When contracts are close to expiration, turnover is more likely and is more sensitive to performance. We also show a positive within-CEO relation between remaining time under contract and firm risk. Our results are similar across short and long contracts and are driven neither by firm or CEO survival, nor technological cycles. They are consistent with incentives to take long-term projects with interim volatility.

I. Introduction

Differences in time horizon can create conflicts of interests between shareholders and management. Firm value maximizing decisions should trade off short-term and long-term cash flows based on shareholders' discount rates. However, theory suggests that the threat of dismissal gives risk-averse managers an

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incentive to avoid profit-maximizing but unobservable actions with long-term returns (Holmstrom (1982), Holmstrom and Ricart i Costa (1986), Knoeber (1986), Lipton (1987), Almazan and Suarez (2003), Goel and Thakor (2008), and Gormley and Matsa (2016)). Consistent with this, Jenter and Lewellen (2017) show empirically that the relationship between CEO turnover and past performance is asymmetric: Turnover is concentrated at low levels of performance and is almost insensitive to performance at the top. Therefore, volatility increases in the short run are costlier to executives than to the firm, as they increase turnover probability at low performance levels more than they decrease turnover probability at the top.

The long-term employment contract is theoretically the direct instrument to set a long-term career horizon, similar to election cycles in politics (Alesina, Roubini, and Cohen (1993)) and on boards (Fos and Tsoutsoura (2014)). Long-term contracts offer CEOs protection from turnover by making it more expensive for the firm to dismiss the CEO early on in the contract. This protection from dismissal can encourage CEOs to take profit-maximizing projects with initially negative or volatile returns. Yet, the question emerges whether long-term contracts do indeed matter in practice, and if so, how.

To better understand the role of long-term contract periods empirically, we introduce the first large-scale sample of CEO employment contracts. Filing CEO contracts is mandatory for US-listed firms. We hand-collect 3,954 contracts and record, for each one of these contracts, the start and the expiration dates. Our sample is the largest and most comprehensive known sample of CEO employment contracts.[1] We start by documenting stylized facts. Most employment contracts are between 1 and 5 years long, with an average length of 3 years. Contract lengths do not match the distance between peaks or troughs in variables that may indicate a natural firm time horizon, such as capital expenditures (CAPEX), sales, or depreciation. Instead, contract length seems to be a relevant factor in negotiations.

The time remaining under CEO contracts predicts actual turnover outcomes. The turnover odds are 73% lower for CEOs with 5 years remaining to expiration than for CEOs in the year before contract expiration. The probability of turnover decreases sharply (by 15%) from the year just before contract renewal to just afterwards. Turnover is also only sensitive to performance for CEOs in the 3 years before contract expiration. These results imply that contracts indeed provide protection from turnover, consistent with Liu and Xuan (2016) who document more earnings manipulation in the year before contract expiration. Premature turnover has real costs to CEOs: only few of them transition smoothly into an equivalent or better position subsequently.

How do corporate policies change over the course of a contract? Relying on within-CEO variation, we report patterns in corporate policies that are correlated with the time remaining under each contract and change at the time of contract renewals. Each additional year remaining to contract expiration translates into a

[1]Gillan, Hartzell, and Parrino (2009) introduce employment contracts to the finance literature by way of 255 explicit contracts (valid in 2000) of Standard & Poor's (S&P) 500 firms. Liu and Xuan (2016) study earnings management in the year before renewal for 159 contracts.

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3.3-basis point (bp) higher stock return volatility. Upon contract renewals, volatility increases sharply by 23 bps from the year before to the year after renewal.[2] The changes in volatility are driven by idiosyncratic rather than systematic risk and coincide with changes in investment and leverage.

Why is volatility higher at the beginning of long-term contracts? The insurance character of contracts gives risk-averse CEOs incentives to invest in profit-maximizing actions that are unobservable or risky in the short run (Holmstrom (1982), Almazan and Suarez (2003), and Manso (2016)). First, we show that the relation between contract horizon and risk is stronger where career concerns are stronger. Career concerns are likely of lesser importance for CEOs just short of retirement, founders, and CEOs with higher tenure. Indeed, the risk patterns we document are less pronounced for old, founder, and high-tenure CEOs. Second, an alternative explanation for our results would be if boards could predict technological cycles several years into the future and set contract lengths accordingly. It is more difficult to predict the length of technological cycles in faster-moving industries, so selection effects should be weaker in such industries. However, we show that the horizon-risk relationship is stronger in dynamic industries (measured using the product market fluidity measure of Hoberg, Phillips, and Prabhala (2014)), although the difference is not statistically significant. This pattern suggests that selection effects are not the only explanation for our findings.

We rule out several mechanical explanations for our results. Our main measure, the time to CEO contract expiration, delivers two sources of within-CEO variation: the decline of contract horizon over time within a contract and the sharp rise in contract horizon at contract renewal. These sources of within-CEO variation allow us to compare the volatility of a given firm-CEO pair at different points in the CEO's contract. Since the contract length is determined ex ante and without precise information about the outcome of future risk-taking decisions, we can isolate contract-related effects from ex post effects of actual risk-taking. As we have several observations for each contract, we can measure the effect of contract horizon within each CEO, even though the contract is likely to be chosen endogenously. In addition, the sharp increase of the measure at the time of contract renewal allows us to isolate the effects of contract horizon from other time-varying measures, such as tenure, age, and firm-specific trends. Our results also hold when we directly control for tenure and age fixed effects.

Our finding of an increase in volatility right after contract renewal excludes the majority of alternative explanations based on firm or CEO life cycles. However, it is still possible (in fact, likely) that investment opportunities are correlated with CEO contract cycles. The hiring of a new CEO may coincide with unusually good or bad investment opportunities, which then revert to the mean over the subsequent years. However, in a battery of placebo tests, we find no evidence for this explanation in firms without fixed-term contracts.

[2]This 23 bps corresponds to 13% of the standard deviation of volatility or 7% of its mean. This economic effect is similar to the effect of compensation (Coles, Daniel, and Naveen (2006)), or exposure to rare disasters early in life (Bernile, Bhagwat, and Rau (2017)), and larger than the effect of marital status (Roussanov and Savor (2014)).

Volatility can change with CEO tenure. Pan, Wang, and Weisbach (2015), (2016) describe two tenure-related effects. First, the hiring of a new CEO is often associated with major changes in the firm, causing volatility to first be high and then gradually decline, predicting (for the first contract of a CEO) similar findings to ours on volatility (Pan et al. (2015), see also Clayton, Hartzell, and Rosenberg (2005)). Second, a new CEO can reverse value-destroying projects of the former CEO and, subsequently, embark on value-destroying projects herself. This predicts (for the first contract of a CEO) the opposite of our findings on capital investment and no variation for later contracts (Pan et al. (2016)). We distinguish our results from these tenure-related effects by controlling flexibly for tenure and by comparing the level of risk-taking in the last year of a contract of a CEO to the level of risk-taking in the first year of the same CEO's *next* contract. Our results also hold when we use the subsample of CEOs whose contracts have been renewed. Another concern is that volatility could follow a firm-specific downward trend. However, while such trends should continue throughout renewal years, we observe that volatility changes sharply around such years. Finally, our findings are robust to controlling for selection into our sample and, separately, for firm fixed effects, they hold also when we control for age, tenure, or CEO compensation.

Our analysis makes several contributions to the existing literature. First, we contribute to the literature on CEO turnover. Debates in this area have focused on how CEO turnover is related to firm performance and corporate governance (e.g. Warner, Watts, and Wruck (1988), Weisbach (1988), Jenter and Kanaan (2015), and Jenter and Lewellen (2015)). We introduce a predictor of CEO turnover that substantially improves the precision of turnover models; in particular, this predictor identifies the years in which CEO turnover is and is not performance-sensitive. Contracts per se are also an important subject for the literature, as they are firms' primary means to establish a schedule of time horizon and evaluations.

Second, our work adds to the literature on long-term incentives by establishing an empirical link between CEO-specific contract horizon and volatility. A recent literature on CEO incentives examines the effect of changes in firm-specific risk. For instance, Gormley and Matsa (2011) study the risk arising from large, left-tail events in terms of shocks to job security, while Low (2009) reports changes in risk-taking behavior after legislation in Delaware increased protection against takeovers. Whereas Gormley and Matsa find that managers reduce operational risk in response to *increased* exogenous risk, Low finds that managers reduce operational risk in response to *reduced* exogenous risk. Furthermore, Garfinkel, Kim, and Lee (2013) argue that the latter effect is driven by older CEOs who are more insulated from career concerns in the event of a takeover. Another strand of the literature links investment to the duration of CEO incentives. Murphy and Zimmerman (1993), Matta and Beamish (2008), Antia, Pantzalis, and Park (2010), and Lee, Park, and Folta (2018) link investment to the ex-post tenure of a CEO or an expectation of her future tenure computed using industry averages. Gopalan, Milbourn, Song, and Thakor (2014), Edmans, Fang, and Lewellen (2017), and Ladika and Sautner (2018) study how long-term equity

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compensation affects investment. We contribute to this literature by documenting effects of long-term contracts on long-term investment with short-term volatility.

Finally, we contribute to the empirical literature on 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 a contract and discuss the choice between an explicit and an implicit contract. Building on their work, we show that explicit contracts not only exist but actually translate into career outcomes as they promise to, despite the potential cost of adhering to them and the built-in legal possibilities to renege on them. We then focus on corporate policies throughout the contracts and link contract horizon to volatility.

II. The Role of Long-term Contracts: Institutional Background and Conceptual Framework

A. Institutional Background

In a fixed-term employment contract, the firm commits to paying compensation for a certain number of years and is obligated to do so even if the employee is terminated and replaced prematurely. As an immediate consequence, the cost of termination is increasing in the numbers of years left under the contract. An executive terminated early is typically entitled to a multiple of the base salary and the minimum bonus, although this sum can be augmented contractually. As an example, consider John Mack's 2005 5-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.[3]

Therefore, 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 $41 million in 2006, the first year of his employment contract; therefore, severance pay for termination in 2006 would have exceeded $159 million. Assuming that his compensation remains at this level, severance pay in 2009 would have been

[3]Morgan Stanley, Form 8K, Exhibit 10, filed on Sept. 22, 2005. *Cause* refers to exceptions that allow the firm to dissolve the contract due to failure to perform duties, engagement in fraud and misconduct, conviction of a felony, material violation of Company policies, and breaches of the contract's confidentiality section.

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only $41 million (i.e. $117 million less).[4] For the turnover decision, the potential severance pay should be compared with the potential benefits of dismissing a CEO prematurely. In 2006, Morgan Stanley's net income was $7.5 billion: a bad CEO could have destroyed value worth much more than the severance package. To put these numbers into perspective: the median compensation-to-net income ratio is 2% in our sample, as compared to 1% for Mr. Mack. Thus, one way to interpret contracts is as an implicit commitment where premature dismissal causes nontrivial costs of a magnitude that may render turnover still beneficial.

B. Contracts and the Role of Turnover

Formally, long fixed-term contracts provide financial insurance against early termination to the employee: they receive compensation through the term of their contract even if they are terminated without cause. Thus, the contract establishes the amount of severance pay as a function of time. Financial insurance in the form of severance pay is more valuable to a risk-averse employee than to a risk-neutral firm. Hence, it can allow the firm to negotiate more favorable other terms, such as lower compensation. In addition, the high severance at the beginning of the contract discourages the firm from replacing the CEO with a marginally better candidate early on and thus creates commitment. This commitment in turn changes the incentives of the CEO. These effects of fixed-term contracts on CEO compensation and incentives are present independently of the specific reasons for CEO dismissals, which we discuss next.

As Jenter and Lewellen (2017) show empirically, CEO turnover is concentrated at low levels of performance and is almost insensitive to performance at the top. Hence, a CEO with career concerns has more to lose from bad outcomes than to gain from good ones.[5] The asymmetry of turnover-performance sensitivity is consistent with moral hazard and learning models of turnover. First, the threat of dismissal disciplines CEO behavior (Weisbach (1988), Morck, Shleifer, and Vishny (1989), Denis, Denis, and Sarin (1997), Mikkelson and Partch (1997), and Bertrand and Mullainathan (2003)). CEOs whose performance indicates that they did not exert enough effort or shirked are punished by being fired. Second, by observing performance over time, a firm may learn that its CEO is of low quality or a bad match (Hermalin and Weisbach (1998), Aghion and Jackson (2016), and Vladimirov (2017)) and, therefore, dismiss her. Finally, a firm may also dismiss its CEO because the firm's circumstances and needs change, causing the CEO to no longer be the best match (Anderson, Bustamante, Guibaud, and Zervos (2018)). This is especially relevant if a CEO with a particular skill set was selected for a particular task, such as implementing a strategy chosen by the board. Indeed, Jenter and Lewellen (2017) find evidence consistent with the quality of the CEO-firm match changing over time.

[4] See Rusticus (2006), Dahiya and Yermack (2008), Rau and Xu (2013), and Goldman and Huang (2015) for further details on severance pay.

[5] A back-of-the-envelope-calculation using the turnover-performance sensitivity coefficients of Jenter and Lewellen (2017) shows that turnover probability differs by 5.08 percentage points between the lowest and the third lowest decile of returns. By contrast, the turnover probability difference between the 10th and 8th deciles is only 1.57 percentage points. In addition, the post-turnover career outcomes for managers are also worse on the downside (see Section IV.D).

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As a consequence, compensation incentives that connect managerial wealth to the upside of risky projects are an inefficient means to motivate CEOs to take on projects with substantial downside (and hence turnover) risk. In contrast, long-term employment contracts can provide insurance against low-performance states.

In reality, all three of the above motives are likely to explain CEO turnovers. Firms dismiss CEOs if bad performance suggests shirking, low ability, or a bad match, and firms dismiss CEOs who have completed the project they were hired for. Consequently, CEOs are likely to choose their actions with these possibilities in mind and avoid projects that increase the probability of bad performance or worsen the CEO-firm match. Long-term contracts can serve as commitment to not dismiss the CEO quickly, alleviating the career concerns of the CEO and inducing her to take actions she otherwise would not.

All three motives for CEO turnover predict that turnover should be low in the early years of a fixed-term contract, and high towards its end. The turnover-performance sensitivity increases towards the end of a fixed-term contract if the purpose of CEO turnover is to penalize CEOs for shirking or to replace low-ability CEOs. If, however, CEOs are let go at the end of a contract simply because the task they were hired for is complete, there is no reason to expect the turnover-performance sensitivity to change over time. Finally, the optimal contract length is determined by how long it takes for the consequences of CEO actions to fully reveal themselves, or by the expected length of the task the CEO was hired for.

The insurance provided by a fixed-term contract should be especially valuable for certain types of hires. First, CEOs hired from outside the firm have a higher cost of settling into their role. They also have weaker relationships with board members and less firm-specific human capital. Therefore, they may prefer a contract that gives them time to adjust before a formal assessment of their ability or the quality of their match with the firm. Second, firms operating in more uncertain environments are more likely to encounter situations where it is advantageous to replace the CEO. The insurance provided by a fixed-term contract can therefore be more valuable to CEOs of such firms. Consistent with these arguments, Gillan et al. (2009) show that outside hires and firms operating in riskier environments are indeed more likely to sign longer CEO contracts. Our first testable prediction is on how contracts are awarded: *The length of fixed-term contracts is determined by uncertainty about the CEO and about the firm's prospects.*

For contracts to be useful as a commitment device, they cannot be not empty promises. The third testable prediction is that *CEOs are more likely to be dismissed when their contract horizon (time remaining on the contract) is short*. When evaluating the CEO, the firm weighs the cost of firing the CEO versus the benefit of replacing her with a potentially better CEO. The fourth prediction is that *CEO turnover should be more sensitive to performance when the contract horizon is short*.

C. Long-Term Contracts and Volatility

The different roles of turnover imply different volatility patterns through the term of a contract. First, a long-term contract can provide *incentives* for

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executives to take actions that are not reflected in performance until future periods. This is useful if such actions are optimal for the firm but not for a CEO who fears early turnover. Hence, long-term contracts motivate CEOs to take actions that are ultimately positive-NPV, but may temporarily be observationally equivalent to a bad CEO-firm match, low CEO ability, or shirking. The key friction that long-term contracts can alleviate is transient volatility of ultimately profitable projects. This stands in contrast with the stylized form of myopia models as in Narayanan (1985) and Stein (1989), where investment opportunities are common knowledge, as is the myopic action that arises in equilibrium. While that setup is useful to illustrate the issue of "short-termism", explicit contracting on the desired action can eliminate the problem (Darrough (1987), Von Thadden (1995), and Edmans (2011)). However, explicit contracting is impossible when transient performance effects are observationally equivalent to undesirable things such as low ability or shirking and hence may lead to punishment for the manager, as illustrated in Shleifer and Vishny (1997). Although such "long-term" incentives do not necessarily involve risk-taking, they thus predict a distinctive pattern of *declining volatility throughout the contract and an abrupt increase at renewals* as managers under a longer contract horizon are encouraged to take on actions that can be volatile in a transient phase.

Long-term contracts set incentives differently from long-term equity compensation. While Holmstrom (1982) and Manso (2016) argue that compensation can incentivize managers to take uncertain projects, Glover and Levine (2017) and Dittmann, Maug, and Spalt (2010) show in calibrations that this is not always possible. This is because the threat of turnover makes poor performance costly. Stock-based compensation allows the CEO to benefit from the upside of risky strategies. Long-term contracts, in contrast, provide insurance to downside risk. Therefore, they can encourage projects with downside risk while compensation incentives cannot.

Second, a pure *learning* argument (without incentive effects of contracts) predicts that volatility should decline during the *tenure* of the CEO (Pan et al. (2015)). The decline in volatility should be monotonic over time, and volatility should not increase at contract renewals. The decreasing pattern in volatility should be driven by idiosyncratic risk.

Third, without uncertainty about the quality of the match (if the contract length matched to a specific task and the executive is dismissed after she completes this task), there is no reason to expect any correlation between volatility and the time remaining under the contract. This is because the market has all the information about the actions and projects taken throughout the contract in advance. We term this the *selection* argument. Uncertainty about the identity of the next task facing the firm, or the next CEO, may lead to an *increase* in volatility towards the end of the contract of the incumbent CEO. Observed stock return volatility is likely shaped by all three channels: incentives, learning, and selection.

Contractual incentives can also lead to a negative relation between CEO contract horizon and risk. First, recent work has identified inside debt (defined as payments to the CEO in unsecured fixed claims) as a way to mitigate managerial risk-taking (Edmans and Liu (2011)). Inside debt includes nonqualified

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defined-benefit pensions and deferred compensation accounts, but would also include unsecured claims to future salaries promised in employment agreements. A longer contract horizon thus implies a higher level of inside debt. As Sundaram and Yermack (2007) and Cassell, Huang, Sanchez, and Stuart (2012) find, higher inside debt is associated with less risk, thus creating a negative relationship between contract horizon and risk-taking. Second, "gambling for resurrection" (e.g. the contexts of asset substitution (Jensen and Meckling (1976)) and mutual fund managers (Chevalier and Ellison (1997), Kempf, Ruenzi, and Thiele (2009), Hu, Kale, Pagani, and Subramanian (2011), and Huang, Sialm, and Zhang (2011))), may induce higher return volatility when the time to contract expiration is short. For the CEO to engage in such behavior, she must take on short-term projects towards the end of her contract so that she can enjoy the potentially high payoffs in the immediate future. This would lead to higher volatility towards the end of the contract. The alternative prediction is therefore that *CEO contract horizon is negatively related to risk.* Concerning contract renewals, inside debt, speculation about turnover and succession, and gambling for resurrection would predict also that *risk decreases following contract renewals*.

III. Data

A. Information on Contracts and Descriptive Statistics

Regulation S-K of the Securities Exchange Act of 1934 requires disclosure of the terms of employment contracts and agreements between U.S. registrants and named executive officers. Following Schwab and Thomas (2005) and Gillan et al. (2009), we collect explicit contracts from regulatory filing exhibits and, when available, from The Corporate Library. For all S&P 1500 firms that do not file an explicit contract, we read all proxy filings and 10-Ks 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. No such agreements are included in our main sample. 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. Excluding these observations does not significantly alter our results. We obtain separation dates from ExecuComp, Risk Metrics, or BoardEx.

Our sample contains the data on 3,954 fixed-term employment contracts entered into between Jan. 1, 1992 and Dec. 31, 2008, for 2,964 CEOs and 2,901 firms. Table 1 reports descriptive statistics. Panel A in Table 1 reports the number of contracts by length. Most contracts are for less than 6 years; the modal value is 3 years (1,515 contracts), followed by 2-year (741) and 5-year contracts (551). Of the 39 contracts for longer than 10 years, 12 are explicitly linked to the executive's retirement age. Altogether, 28 contracts in our sample are explicitly linked to age. As Jenter and Lewellen (2015) show, such linkage typically occurs when the age of the CEO reaches 65 (23 contracts). Most of the 64 contracts of less than a year's duration are renewals effective until the end of the calendar year (38 contracts); the remaining 26 contracts in this group are for interim CEOs. The so-called evergreen contracts (i.e. those that are automatically renewed every day or month to retain the same time to contract expiration), are not frequent (73 contracts in

TABLE 1
Summary Statistics

Table 1 reports descriptive statistics of our sample of contracts. Information on contracts is hand-collected from SEC filings for the period of 1992–2008. Panel A shows the number of observations by contract length. Panel B shows summary statistics for all firm-year observations in our sample of fixed-term contracts, separating observations of new and renewed CEOs in columns 7 and 8. Panel C shows summary statistics for firm characteristics at the start of the contract for our entire sample of fixed-term contracts (column 1), fixed-term contracts separated by length (columns 3–7), and the sample of at-will contracts that we use for the matching analysis (column 2). Variables are defined in Appendix A. All nondiscrete variables are winsorized at the 1% level.

Panel A. Contract Length

Length (Years)	<1	1	2	3	4	5	6	7	8	9	10	>10	Evergreens
All fixed-term	64	416	741	1,515	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	1,132	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 B. Descriptive Statistics (Years under Fixed-Term Contracts)

		N	Mean	Median	Std. Dev.	Mean New CEO	Mean Renewed CEO
Firm	ASSETS ($millions)	7,456	1,745	568	2,561	1,051	2,660
	ROA	7,456	4.60%	6.54%	18.23%	−1.71%	8.78%
	STOCK_RETURN	7,456	11.67%	7.06%	61.52%	11.10%	13.29%
	MARKET_TO_BOOK	7,456	2.70	2.09	1.99	2.54	2.84
	LEVERAGE	7,456	21.60%	24.42%	34.98%	21.50%	25.60%
	VOLATILITY	7,456	3.07%	2.59%	1.74%	3.22%	2.65%
	BETA	7,456	0.90	0.90	0.59	0.84	1.07
	IDIO_RISK	7,456	2.84%	2.35%	1.69%	3.00%	2.38%
	RD_ASSETS	7,456	0.04	0.00	0.14	0.06	0.03
	CAPEX_ASSETS	7,456	0.07	0.04	0.10	0.07	0.07
	FINANCE_INDUSTRY	7,456	0.23	0.00	0.42	0.26	0.13
	OIL_AND_GAS_INDUSTRY	7,456	0.03	0.00	0.18	0.03	0.04
	ANALYST_FORECAST_SD	5,279	0.09	0.05	0.14	0.09	0.09
	PRODUCT_MARKET_FLUIDITY	5,928	7.38	6.89	3.51	6.77	7.59
CEO/ Governance	REMAINING_YEARS	7,456	2.47	2.00	2.29	2.45	2.51
	AGE	7,456	54	54	9	52	55
	RENEWAL	7,456	0.34	0.00	0.47	0.00	1.00
	PCT_CEO_OWNERSHIP	3,348	3.53	1.50	6.21	0.58	0.55
	CHAIRMAN_AND_CEO	7,456	52%	100%	50%	45%	60%
	SALARY (2000 $, thousands)	3,348	551	491	301	491	658

Panel C. Descriptive Statistics (Start of the Contract)

	Fixed-Term Contracts	At-Will	Fixed-Term Contracts by Contract Length (Years)				
			1	2	3	4	5
ASSETS ($millions)	1,379	1,894	1,066	1,198	1,340	1,480	1,529
ROA	1.1%	4.2%	−3.6%	−0.3%	1.2%	3.5%	2.6%
STOCK_RETURN	11.9%	13.7%	8.7%	11.0%	9.7%	17.8%	14.2%
MARKET_TO_BOOK	2.54	2.91	2.83	2.58	2.44	2.51	2.67
LEVERAGE	24%	15%	18%	25%	23%	27%	28%
VOLATILITY	3.16	3.17	3.28	3.39	3.14	3.21	3.09
BETA	0.89	1.15	0.91	0.94	0.82	0.89	0.93
IDIO_RISK	2.93	2.88	3.01	3.15	2.93	2.99	2.88
RD_ASSETS	4%	7%	9%	5%	4%	6%	3%
CAPEX_ASSETS	6%	7%	7%	6%	7%	6%	7%
ANALYST_FORECAST_SD	0.09	0.09	0.10	0.09	0.09	0.09	0.09
PRODUCT_MARKET_FLUIDITY	7.38	6.80	7.17	7.17	7.95	7.31	7.20

total). As a consequence of the every-day-renewal term in evergreen contracts, nonrenewal is equally possible at every date, and the effective horizon does not change over time. Hence, these contracts are comparable to at-will contracts in terms of time horizon patterns and severance provisions. For each contract of a given type and length, we indicate what percentage it constitutes among all the sample contracts of that type.

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Panel B in Table 1 reports summary statistics for firm-years under the previously described fixed-term contracts. These contracts constitute the sample for our subsequent analysis. The average firm in our sample has $1.8 million in total assets, a return on assets (ROA) of 4.6%, annual stock returns of 11%, a market-to-book ratio of 2.7, and leverage of 22%. We use 3 measures of risk: volatility, beta, and idiosyncratic risk. Volatility is the standard deviation of daily stock returns; beta is the market beta from a Fama–French 3-factor model estimated using one year of daily data; and idiosyncratic risk is the standard deviation of the residuals from that model. We calculate all three volatility measures for contract years (12-month periods counting from the effective date), using the effective date and the expiration date of each contract. The mean volatility is 3%, the mean beta is 0.90, and the mean idiosyncratic risk is 2.8%. On average, our sample firms spend 4% of their asset value on R&D and 7% on CAPEX.

Table 1 Panel B also gives descriptive statistics of CEO and corporate governance characteristics. The mean CEO age is 54 years and 53% of the sample firm-years are under renewed contracts. On average, CEOs receive $5.9 million in total compensation (TDC1, inflation adjusted to year 2000). More than half of CEOs also hold the position of chairman. Our main variable, remaining years, has a mean of 2.47 and a standard deviation of 2.29.

B. Selection into Contract Types

Panel C in Table 1 reports the characteristics of our sample firms in the fiscal year before the contract starts. We measure most variables on a fiscal year basis, except volatility. As contract start dates and turnover dates typically do not coincide with fiscal year ends, we match them to the appropriate fiscal year and label them as "t to $t+1$ years remaining" in our regressions. The mean firm size (as measured by assets) of our sample firms is $1,379 million, return on assets (ROA) is 1.1%, annual stock returns are 2.4%, and the average market-to-book ratio is 2.54.

Consistent with the results of Gillan et al. (2009), we find differences between firms with versus without fixed-term CEO contracts (i.e. CEOs employed at will). Firms that enter fixed-term contracts are on average smaller and perform worse than firms without fixed-term contracts. They are also more levered and have more idiosyncratic risk, but less systematic risk. This is not because they grow more or invest more: they have lower market-to-book ratios and invest less in R&D and CAPEX than firms without fixed-term contracts. In terms of firm-level time horizon, firms without fixed-term CEO contracts have shorter cycles peak-to-peak but longer ones trough-to-trough, compared to those with fixed-term contracts. This suggests that firms with contracts do not systematically have shorter or longer "natural" time horizons. These cycles also do not seem more likely to change ex post: firms without contracts operate in less dynamic markets (measured using the product market fluidity measure of Hoberg et al. (2014)).

Next, we compare firms that enter into different contract lengths. Table 2 shows regressions of contract length on firm and CEO characteristics. Renewed contracts are significantly, 0.87 years, longer than first contracts, holding other factors constant. Firms with high analyst forecast dispersion enter into

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TABLE 2
Determinants of Contract Length

Table 2 reports the results of OLS regressions of CEO contract length (CONTRACT_LENGTH) on firm and CEO characteristics. Regressions contain one observation per contract, and measure independent variables in the year prior to the start of contract. Column 1 contains regressions for the full sample of contracts. Columns 2 and 3 contain regressions for renewed contracts only. Column 4 contains regressions for first contracts only. Variables are defined in Appendix A. All regressions contain Fama–French 49 industry fixed effects. Standard errors (in parentheses) are robust to heteroscedasticity and are clustered at the firm level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: CONTRACT_LENGTH			
	1	2	3	4
RENEWED_CONTRACT	0.865***			
	(0.128)			
LENGTH_OF_PREVIOUS_CONTRACT		0.333***	0.125***	
		(0.079)	(0.040)	
ln(AGE)	0.484		0.575	0.966**
	(0.360)		(0.524)	(0.412)
ln(ASSETS)	0.064		0.127*	0.029
	(0.042)		(0.066)	(0.052)
PRODUCT_MARKET_FLUIDITY	0.002		0.012	0.013
	(0.017)		(0.027)	(0.022)
FIRM_AGE	0.011		0.011	0.012
	(0.008)		(0.011)	(0.009)
ANALYST_FORECAST_SD	−0.525**		−0.313	−0.396
	(0.214)		(0.337)	(0.256)
CEO_EXTERNAL_HIRE				−0.087
				(0.119)
PAST_YEAR_ROA_NEGATIVE				−0.380**
				(0.177)
PAST_YEAR_RETURN_NEGATIVE				−0.048
				(0.114)
HEADQUARTERS_NOT_IN_METRO				0.168
				(0.117)
Contracts	All	Renewed	Renewed	First
Industry fixed effects	Yes	Yes	Yes	Yes
N	3,568	1,020	562	1,016
R^2	6.30%	7.30%	15.20%	4.50%

significantly shorter contracts, suggesting that less information about future outcomes reduces contract length. Columns 2–3 show that the length of the previous contract of a CEO is positively correlated with the length of her renewed contract. Column 4 examines whether firms grant longer contracts if they would have a difficult time finding a CEO otherwise. Indeed, we find that firms with poor past performance (ROA) grant shorter contracts, suggesting that assessing CEO ability and match quality is especially important to such firms. Firms headquartered outside a metropolitan statistical area grant longer first contracts, but this relation is not statistically significant. Firm age, product market fluidity, and whether the CEO is an external hire are not significantly related to contract length.

IV. Contracts and Career Outcomes

We introduce remaining time under contract as a predictor of turnover probability and document the average turnover time profile under ex ante contracts. Our null hypothesis is that there is no correlation between the remaining time on the contract of the CEO and the turnover probability. This would indicate that

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contract expiration terms are empty promises: They may matter for CEOs in that they provide them with severance ex post, but are otherwise inconsequential.

A. Contracts and Turnover Probability

The probability of turnover varies over the course of the contract, becoming more likely at the end. Panel A in Table 3 shows the probability of turnover by the number of years remaining (columns) and length of contracts (rows). Turnover can occur at any time during a contract, not only at its expiration. For example, CEO turnover took place in 4% of all years in which CEOs had 5 years remaining under 5-year contracts. Conditional on survival, turnover probability under 5-year

TABLE 3
Turnover Probability (Univariate)

Table 3 reports statistics on turnover and renewals for our sample of contracts starting between 1992 and 2008, using turnover incidents within the same time period. Panel A reports the percentage of observations with a turnover event out of all years in a given pair of number of remaining years (columns) and contract length (rows). Panel B reports, for contracts of different length (columns), the probability that the CEO is terminated before the last year of the contract (early termination), the probability that the CEO is terminated at contract end, the probability that no turnover happens under the current contract (renewal), as well as statistics for the subsample of renewed contracts. Note that, for 1-year contracts, we cannot distinguish between early termination and termination at contract end. Panel C reports the percentage of contracts renewed by the number of years remaining on the contract at the time that renewal took place. Panel D reports contract renewal statistics by contract length.

Panel A. Turnover Probability by Contract Length and Remaining Years

	Sample Average: 11.49%						
	Remaining Years						
Contract Length	5	4	3	2	1	0	0 or 1
1					14%	34%	21%
2				8%	11%	25%	17%
3			6%	8%	14%	30%	20%
4		4%	7%	13%	17%	27%	21%
5	4%	6%	8%	9%	19%	32%	24%
All contracts	3%	5%	7%	9%	15%	29%	21%

Panel B. Renewal Probability by Contract Length

	Contract Length				
	1	2	3	4	5
Probability of early termination		11%	18%	21%	24%
Probability of termination at contract end		17%	12%	13%	10%
Probability of renewal	68%	72%	70%	66%	66%
If renewed:					
Average next contract length	1.71	2.16	2.90	2.83	2.90
Probability of same-length contract	42%	48%	60%	11%	30%

Panel C. Contract Renewal Incidence by Number of Years Remaining

	Remaining years						
	0	1	2	3	4	5	>5
Percentage of contracts renewed	35.9%	37.1%	18.2%	5.0%	1.8%	1.0%	1.0%

Panel D. Renewal Statistics by Contract Length

		Remaining Contract Time at Expiration (Years)	
Contract Length	Percentage Renewed in Last or Penultimate Year	All Contracts	Contracts Renewed before Expiration
1		0.63	
2		0.63	
3	75.43%	0.93	2.20
4	63.64%	1.21	2.39
5	59.83%	1.43	2.72
>5	37.50%	3.10	4.80

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contracts then increases with every year closer to contract expiration, reaching a conditional turnover probability of 32% for the expiration year. Overall, the unconditional turnover likelihood in our sample is 11.49%, which is similar to the value of 11.82% reported by Jenter and Lewellen (2017) and lower than the 15.8% reported by Kaplan and Minton (2012). For the interpretation of these results, note that some contracts continue beyond 2008 (i.e. the end of our sample period for which we track turnovers).

The relation between turnover probability and time to contract expiration reflects not only the financial consequences of terminating a contract, but also the role that contract horizons play in the evaluation of executives. As the expiration date approaches, an unfavorable prognosis can prompt both parties to seek other options, leading to an increased rate of turnover close to, but before the expiration date. This is consistent with the observed pattern of increasing turnover likelihood throughout a contract.

A comparison of the turnover rates under different contract lengths shows also that the steepness of the increase in turnover probability throughout contracts differs by contract length. Panel B in Table 3 summarizes career outcome statistics by contract length. The observational unit for this panel is one contract, in contrast to Panel A, where it is one firm-year (and hence conditional on surviving up to that year). Shorter contracts have generally a lower probability of premature termination, but a higher probability of termination at the contract end. This results in a relatively even distribution of the probability of renewal between contracts of different length.

Panel B of Table 3 shows that many CEOs receive a contract that is the same length as the previous one. In fact, 48% of CEOs completing a 2-year contract receive another 2-year contract, and 60% of CEOs completing a 3-year contract receive another 3-year contract. If the board expected the CEO to remain in office for 4 (6) years, and this was their most important consideration when choosing contract length, they could have chosen to offer one 4-year (6-year) contract instead of two 2-year (3-year) contracts. Of course, having the opportunity to dismiss the CEO after 2 years may still be optimal ex ante, but the renewal of these contracts suggests that our turnover results are not driven purely by boards selecting the contract length accurately at the initial hiring of the CEO. Hence, these results suggest that selection or learning about CEO ability are not the only channels underlying our results.

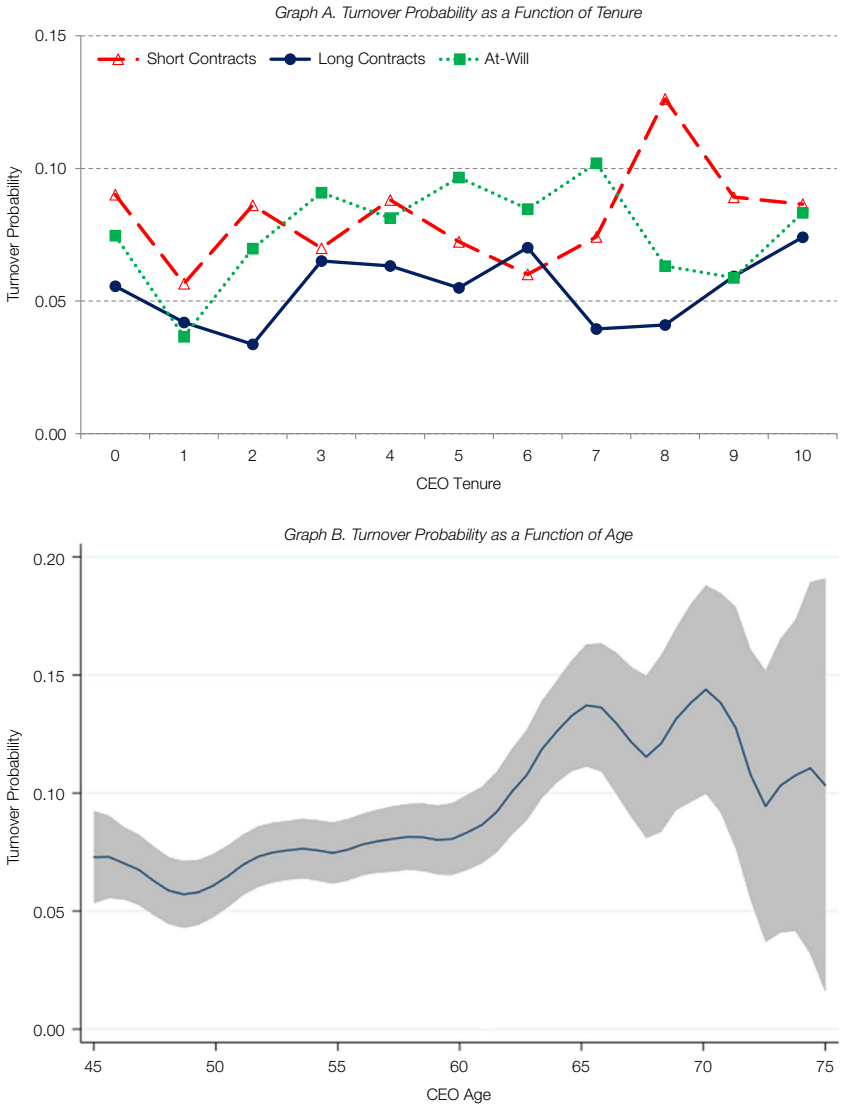
Contracts are typically renewed at, or shortly before, expiration. Panel C in Table 3 shows that most contracts are renewed in the year of expiration (36%) or in their penultimate year (37%). Only 8.8% of contracts are renewed with 3 years or more remaining. Panel D in Table 3 shows that the percentage of contracts renewed early increases with original contract length. Even so, 60% of 5-year contracts, and 75% of 3-year contracts are renewed in their last or second-to-last year. The average remaining time on a 5-year (3-year) contract at renewal is 1.43 (0.93) years.

Contract horizon may be correlated with other time-varying variables. Figure 1 shows that turnover probability does not have a systematic relation with tenure or age, except for the retirement-related peak around age 65. Figure 1 also shows turnover rates for CEOs employed under at-will contracts, the majority of

FIGURE 1

Turnover Probability by CEO Tenure and by CEO Age

Graph A of Figure 1 shows CEO turnover probability as a function of CEO tenure, separately for short contracts (length of maximum 3 years), long contracts (length exceeding 3 years), and at-will contracts. Tenure = 0 denotes CEOs in their first year who have not completed one year of service. Graph B shows a local polynomial regression of turnover probability on age for CEOs under a fixed-term contract using an Epanechikov kernel and a bandwidth of 1 year. The area around the local polynomial regression curve shows the 95% confidence interval.



whom have severance pay equal to 2 or 3 times base pay. Indeed, we see similar turnover rates for fixed-term and at-will CEOs up to 4 years of tenure.[6]

[6]In unreported tests, we verify that turnover rates are equal for each value of CEO tenure from 0 to 4 years. We thank the referee for suggesting this comparison.

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B. Multivariate Tests of Turnover

We now use a multivariate setting to examine how remaining time on the contract of the CEO relates to turnover probability. We start by estimating the following ordinary least squares (OLS) model:

$$\lambda_{it} = \alpha + \sum_{h=1}^{>5} \beta_h D_{itT-h} + \varphi \boldsymbol{s}_{it} + \rho_i + \gamma_t + \varepsilon_{it}, \tag{1}$$

where i indexes firms, t indexes time, D_{itT-h} are dummies that equal 1 when the CEO of firm i has h years remaining on her contract at time t, and ρ_i are firm fixed effects (FE). That is, we use within-firm variation in turnover probability under different contract horizons, where the base case against which we compare outcomes is a year with less than 1 year under the CEO contract. To capture fluctuations in the economy and the factors that vary over time across industries, such as the degree of competition and the supply of CEOs, we control for time in service (tenure) $\boldsymbol{s}_{it}$ and for year fixed effects γ_t. The dependent variable λ_{it} is turnover, which equals 1 if the CEO leaves in a given firm-year (and set to 0 otherwise).

Initial contract length is set endogenously, as we show in Section III.B. However, contract length is set ex ante without precise information about future circumstances. Further, once the contract is signed, the number of remaining years changes in a predetermined manner from one year to the next. Contract horizon either decreases by one year, or, upon renewal, it increases sharply. Section IV.A discussed two features that we rely on to identify the effect of contracts on turnover: First, that most CEO contracts are renewed close to expiration, and second, that many CEOs receive contracts that are of the same length as their previous contracts.

Column 1 in Table 4 reports our results. As the number of years remaining under contract can change within a given fiscal year, we denote them in our tables as "1–2 years remaining", etc. Turnover probability is decreasing in the number of years remaining under contract. CEOs in their second-to-last contract year are 3.9 percentage points less likely to be dismissed as compared to those in the last year before expiration. The difference rises to 11.9 percentage points for CEOs with 5 or more years remaining on their contract. We reject that all of the coefficients on the remaining year dummies are equal to one another at the 1% level in all specifications.

Linear models avoid the incidental parameters problem that can lead to incorrect estimates of fixed effects in nonlinear models (Neyman and Scott (1948), Heckman (1981)). However, linear probability models generate predictions that are outside the [0,1] range, attenuate coefficient estimates towards 0, and are imprecise as compared to hazard models in our context. Therefore, we confirm our results using the proportional hazard model

$$\lambda_{it} = \lambda_0(s_{it}) e^{\alpha + \sum_{h=1}^{>5} \beta_h D_{itT-h} + r_i + \gamma_t + \varepsilon_{it}}, \tag{2}$$

where λ_0 is the baseline hazard rate that depends on the number of years s_{it} that the CEO has been in office. Hazard rate λ_{it} captures the likelihood that a CEO

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TABLE 4

Remaining Years under Contract and Turnover Probability

Table 4 summarizes models of CEO turnover. Columns 1 and 3–7 contain estimates from linear probability models, reporting coefficient estimates with standard errors given underneath. Column 2 reports results from a Cox proportional hazard model; the values shown are hazard ratios for CEO turnover with standard errors given underneath. In the OLS models, the dependent variable is a dummy set to 1 only for the years in which a firm's CEO leaves. TENURE_PERFORMANCE is 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 (see Jenter and Lewellen (2017)). Short contracts are contracts with the length of maximum 3 years. Long contracts are those with the length of 4 years or more. All other independent variables are defined in Appendix A. Standard errors (in parentheses) are robust to heteroscedasticity and are clustered at the CEO level. The data span the years 1992–2008. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Sample	All	All	Renewed	Long	Short	All	All
Model	OLS	Cox	OLS	OLS	OLS	OLS	OLS
Performance Measure						RETURN	TENURE_PERFORMANCE
	1	2	3	4	5	6	7
1_2_YRS_REMAINING	−0.039***	0.906	−0.061***	−0.005	0.013	−0.019	−0.020
	(0.009)	(0.100)	(0.02)	(0.019)	(0.010)	(0.013)	(0.014)
2_3_YRS_REMAINING	−0.085***	0.698***	−0.111***	−0.028	−0.021**	−0.047***	−0.046***
	(0.009)	(0.083)	(0.02)	(0.018)	(0.010)	(0.013)	(0.013)
3_4_YRS_REMAINING	−0.108***	0.525***	−0.125***	−0.037**		−0.070***	−0.070***
	(0.01)	(0.071)	(0.021)	(0.018)		(0.012)	(0.013)
4_5_YRS_REMAINING	−0.116***	0.380***	−0.144***	−0.056***		−0.081***	−0.079***
	(0.013)	(0.077)	(0.026)	(0.018)		(0.013)	(0.014)
>5_YRS_REMAINING	−0.119***	0.273***	−0.160***	−0.067***		−0.088***	−0.087***
	(0.013)	(0.060)	(0.024)	(0.017)		(0.012)	(0.013)
<1_YR_REMAINING × PERFORMANCE						−0.020	−0.011
						(0.013)	(0.013)
1_2_YRS_REMAINING × PERFORMANCE						−0.042***	−0.024***
						(0.011)	(0.009)
2_3_YRS REMAINING × PERFORMANCE						−0.038***	−0.026***
						(0.009)	(0.007)
3_4_YRS_REMAINING × PERFORMANCE						−0.002	−0.002
						(0.012)	(0.009)
4_5_YRS_REMAINING × PERFORMANCE						0.007	−0.003
						(0.013)	(0.007)
>5_YRS_REMAINING × PERFORMANCE						0.002	−0.0001
						(0.011)	(0.008)
Tenure	0.001		−0.005***	−0.001**	−0.001*	−0.002***	−0.001***
	(0.0008)		(0.001)	(0.001)	(0.001)	(0.000)	(0.000)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes		Yes	Yes	Yes		
Industry fixed effects		Yes				Yes	Yes
	F-test: Coefficients of remaining years all equal						
F-test	20.34***		5.96***	5.736***	9.578***		
Est. turnover prob. in renewal years			0.212				
Est. turnover prob. in years after renewals			0.061				
	t-test: Renewal = after renewal						
t-test			28.37***				
N	7,456	7,456	3,986	3,101	4,355	7,113	7,113

leaves the firm i in year t, conditional on having served in office until that time. This formulation controls for a nonlinear effect of tenure. We use the Cox (1972) partial likelihood model for the baseline hazard, which does not specify a functional form for $\lambda_0(s)$. As such models do not allow for a large number of fixed effects, we replace the firm fixed effects with industry fixed effects r_i.

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Column 2 in Table 4 shows that CEOs with more time remaining to contract expiration are significantly less likely to leave the firm. The odds of turnover for a CEO in her fifth-to-last contracted year are 63 percentage points lower than for a CEO in her last year remaining, conditional on the CEO surviving in office until the given year. These results are not driven by new CEOs. For CEOs employed under a renewed contract, the estimates (Table 4 column 3) are similar in their magnitude and statistical significance.[7]

Selection into contracts of different initial length may affect our results. To mitigate concerns about selection into long vs. short contracts, we split the sample into observations under contracts longer than 3 years and those not longer than 3 years (see columns 4 and 5 in Table 4). Doing so allows us to examine volatility holding contract length "fixed," up to an approximation. The coefficients are larger in magnitude for years under longer contracts (3%–7%), but equally significant for short contracts, with the coefficient of 2% for the horizon of 2–3 years remaining.

Appendix B in the Supplementary Material shows that the turnover-contract horizon results are robust to: i) controlling for institutional ownership, CEO age, and board composition, ii) using logit models, iii) controlling for CEO, age, and tenure fixed effects, and iv) excluding voluntary turnovers.

C. Contracts and Turnover-Performance Sensitivity

The relation between distance to contract expiration and CEO turnover probability may reflect a natural managerial life cycle rather than conscious turnover decisions. For long-term contracts to help motivate long-term actions that in the short-term are observationally equivalent to low effort or bad quality, contracts need shield CEOs specifically from turnover after poor performance. To examine this, column 6 in Table 4 adds interaction terms of lagged returns and remaining time to contract expiration to the specification of column 1. In line with our initial observation that contracts shield CEOs from turnover pressure, CEOs have the highest turnover-performance slope in their last year before contract expiration, followed by the year of contract expiration, and the second-to-last year before expiration. The turnover probability of CEOs with 3 or more years left on their contract is not significantly sensitive to past performance. In addition to current performance, boards may consider a longer history of performance. Column 7 in Table 4 shows a similar pattern when measuring performance over the entire tenure period (Jenter and Lewellen (2017)), except that the interaction in the year of expiration is insignificant. *Tenure performance* is defined as the cumulative stock return over the preceding 5 years or since the start of the tenure of the current CEO (whichever is more recent).[8]

[7] In a test in Section V, we compare renewed CEOs in the year prior to renewal to the year after. To assist the interpretation of these results later, we show that CEOs are significantly more likely to be dismissed in renewal years than in the years following renewal years, by a factor of 3.5. Since this difference follows by construction (as the number of remaining years is reset), we show these estimates only as a basis for later tests, rather than for interpretation on their own.

[8] For this exercise, we use cumulative raw returns and include industry fixed effects instead of cumulative industry-adjusted returns. Gormley and Matsa (2014) show that, in settings such as this,

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Finally, contract terms improve the accuracy of turnover prediction. Using the remaining time on the contract of the CEO alone produces a higher model fit than the previous literature does using firm size, profitability, dividend payer status, tenure performance, and the book-to-market (B/M) ratio (Jenter and Lewellen (2017)). Moreover, adding contract information to traditional models of CEO turnover results in a meaningful increase of model precision (see Supplementary Material Appendix C).

We conclude that the schedule of long-term CEO contracts predicts the timing of turnover. More time remaining under the contract is associated with lower CEO turnover probability as well as a lower sensitivity of CEO turnover to firm performance. The higher rate of turnover closer to contract expiration is potentially consistent with an incentive role of contracts and selection of contract length to match projects of a certain length. However, higher turnover-performance sensitivity is more consistent with the incentive role of contracts than with the selection of contract length. If the main reason to grant the CEO a contract was to match the duration project she was hired to lead, once the project is completed she will be replaced irrespective of her performance.

D. Career Outcomes

Theoretically, it is also possible that the contract is offset or dwarfed by post-employment career patterns. To show that this is not the case, we explore career outcomes of 874 CEOs after their turnover.[9] Only 6 CEOs in our sample transition immediately from their old firm to a new one. The scarcity of such transitions indicates that CEO turnover is typically not beneficial for CEOs. To further investigate this claim, we expand the definition of promotions to encompass 1 year or 3 years after the turnover (the latter follows Brickley, Coles, and Linck (1999)) yielding 76 and 106 additional promotions. While such promotions may be better outcomes ex post, a gap of up to 3 years creates substantial uncertainty ex ante in terms of whether the former CEO will be able to find a comparable job. In general, the career outcomes are not great: after turnover, 234 CEOs retire without any position, not even an independent directorship.

Subsequent career outcomes are not significantly related to the remaining contract horizon at turnover. Panel A in Table 5 reports summary statistics of the number of cases for different career outcomes, the number of years remaining on the contract of the CEO at the time of turnover, and the results of t-tests comparing the number of years remaining for our three different promotion categories to the number of years remaining for CEOs who do not find a better position within 3 years. Consistent with our results on turnover incidence over the contract horizon, most CEOs leave only in the 2 years before contract expiration. The 6 CEOs who find employment immediately leave with 0.33 years remaining on their contract. The CEOs whom it takes longer to find a new position actually leave earlier rather

the fixed-effects approach is preferable when one seeks to account for industry heterogeneity. We obtain qualitatively and quantitatively similar results using as opposed to industry-adjusted returns.

[9]We use ExecuComp, Bloomberg, LinkedIn, Crunchbase, Wikipedia, SEC filings, news releases by the old and new employers, as well as general media coverage. Whether a new position represents a "promotion" is subjective. To be conservative, we count all nonfounder CEO positions and most CFO, COO, president, Managing Director, and similar positions as promotions.

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TABLE 5
Career Outcomes

Table 5 reports information on the relation between remaining years on the contract of a CEO and subsequent career outcomes. Panel A shows summary statistics on career outcomes of CEOs in our sample. Remaining years is the average number of years remaining on the CEO contract at the time of turnover. In the rightmost column, we test whether the number of years remaining for a given career outcome category is significantly different from the case of not finding a better position within 3 years. Panel B shows regressions of a dummy variable that equals 1 if the CEO finds subsequent employment on the number of remaining years of her contract at the time she leaves the firm. Panel C shows OLS regressions of the employment gap (i.e., the time it takes the CEO to find subsequent employment) on the number of years remaining on the contract of the CEO. The data span the years 1992–2008. Standard errors (in parentheses) are robust to heteroscedasticity. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Summary Statistics of Career Outcomes

	N	Remaining Years	*t*-Test Difference
Hired immediately	6	0.33	−2.19*
Hired within 1 year, but not immediately	76	1.64	3.34***
Hired after more than 1 year, but within 3 years	106	1.12	0.94
No position found after 3 years	686	1.07	
Executive position after more than 3 years, or nonexecutive position only	*452*	*1.08*	
No further positions found	*234*	*1.06*	

Panel B. Remaining Years under Contract and the Probability of Finding a New Job

	Dependent Variable: CEO Finds New Employment		
	OLS	Logit	Probit
	1	2	3
REMAINING_YEARS	0.008	0.043	0.025
	(0.011)	(0.056)	(0.033)
Constant	0.723***	0.959***	0.592***
	(0.019)	(0.097)	(0.058)
N	874	874	874
R^2/Pseudo-R^2	0.001	0.001	0.001

Panel C. Remaining Years under Contract and Employment Gap after Leaving the Firm

	Dependent Variable: Employment Gap (Years)	
	CEOs with Position Within 3 Years	All CEOs with Some Future Position
	1	2
REMAINING_YEARS	−0.043	0.099
	(0.035)	(0.111)
Constant	0.653***	3.053***
	(0.067)	(0.204)
N	188	640
R^2	0.008	0.001

than later in the contract: with 1.64 years remaining for the CEOs who find a better position within a year, 1.12 years for the CEOs who take 1–3 years to find a better position, and 1.07 years for the CEOs who find no further employment. As the number of years remaining for the best outcome (i.e. moving immediately) is quite low and the number of years remaining is considerably higher for the second-best outcome, our evidence is inconclusive. If anything, career outcomes are better if turnover occurs early on in the contract. Panels B and C of Table 5 show in a regression setting that there is no significant relation between contract horizon at turnover and subsequent career outcomes. These results validate the idea that, regardless of how many years CEOs have remaining on their contract, career consequences of termination are similarly dire.

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V. Contract Horizon and Risk

A. Contract Horizon and Return Volatility

To analyze the relation between CEO contract horizon and risk, we estimate the model:

$$y_{it} = \theta h_{it} + \rho_i + \tilde{\varepsilon}_{it}, \tag{3}$$

where y_{it} is the risk of a firm led by CEO i in year t, h_{it} is contract horizon, and ρ_i is a set of CEO fixed effects (or firm fixed effects, in column 7 of Table 6). That is, we estimate the changes in risk for a given executive as the CEO time horizon changes over the course of the contract.

Table 6 Panel A, column 1 reveals a strong and significant positive correlation between the number of years remaining on the contract of the CEO and return volatility. One additional year remaining on the CEO contract corresponds to an increase of 3.3 bps in return volatility. The 3.3 bps correspond to 1.9% of 1-standard-deviation of return volatility.

In Table 6 Panel A, column 2, we examine possible nonlinearities in the relation between the number of years remaining and volatility. We regress volatility on 5 dummy variables capturing remaining contract times from 1–2 years remaining to over 5 years remaining. The omitted case is less than 1 year remaining. Volatility is significantly higher for CEOs with 2–3 years remaining and for each category longer than 3 years. The rate of increase from one category to the next is lower for the CEOs with longer than 4 years remaining. When a CEO has 3–4 years remaining on her contract, as compared to when she has less than a year remaining, the difference in volatility is 26 bps, which equals 15% of the standard deviation of volatility.

The economic significance of our results is of similar order of magnitude to those of recent papers examining volatility. Coles et al. (2006) find that a 1-standard-deviation increase in CEO compensation vega is associated with an increase in volatility equal to 11% of its standard deviation, or 6% of its mean. Roussanov and Savor (2014) find that return volatility of firms run by single CEOs is significantly higher than that of firms run by married CEOs. The difference is 3% of the mean of return volatility. Bernile et al. (2017) show that return volatility of firms whose CEO was exposed to extreme disasters early in her life have lower volatility. The difference in volatility relative to other CEOs is 3.6 percentage points, or 16% of the standard deviation of volatility, or 10% of its mean.

Firms in different industries and life cycle points may perceive the unit of one year differently. In column 3 in Panel A of Table 6 we measure the time remaining relative to the total length of the contract instead of the number of years remaining. This measure equals 100% for CEOs with full time remaining under any contract and 0% for CEOs at expiration of a contract of any length. Our results hold. Moving from the beginning to the mid-point of a contract corresponds to a reduction in volatility of 12 bps.

CEOs whose contracts are renewed offer a second way to test the relation between contract horizon and volatility. The contract horizon of the CEO resets upon renewal, whereas time-varying variables, such as tenure and age, and other general or firm-specific trends do not. If it is contract horizon, rather than other

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TABLE 6
Risk

Table 6 reports regressions of volatility on the number of years remaining on the contract of a CEO (Panel A) and summary statistics on changes in volatility at discrete contracting points (Panel B). In Panel A, we present the results of OLS regressions, reporting coefficients with standard errors underneath. The dependent variable is VOLATILITY in all regressions of Panel A. Regressions in columns 1–6 are estimated with CEO fixed effects and the regression in column 7 is estimated with firm fixed effects. Variables are defined in Appendix A. Standard errors are robust to heteroscedasticity and are clustered at the CEO level. The data span the years 1992–2008. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Volatility Regressions

	Dependent Variable: VOLATILITY						
Sample	All	All	All	Renewed	Years Around Renewal	Renewed	All
	1	2	3	4	5	6	7
REMAINING_YEARS	0.033**						0.032**
	(0.014)						(0.013)
1_2_YRS_REMAINING		0.100*					
		(0.052)					
2_3_YRS_REMAINING		0.163***					
		(0.051)					
3_4_YRS_REMAINING		0.260***					
		(0.063)					
4_5_YRS_REMAINING		0.228***					
		(0.078)					
>5_YRS_REMAINING		0.281***					
		(0.093)					
FRACTION_REMAINING			0.248***				
			(0.059)				
RENEWAL_YEAR				−0.078		−0.051	
				(0.066)		(0.067)	
YEAR_AFTER_RENEWAL				0.152**	0.293***	0.143**	
				(0.065)	(0.112)	(0.064)	
TENURE						−0.022***	
						(0.005)	
Constant	2.987***	2.905***	2.923***	2.659***	2.488***	2.802***	2.990***
	(0.035)	(0.042)	(0.036)	(0.058)	(0.102)	(0.067)	(0.031)
Fixed effects	CEO	CEO	CEO	CEO	CEO	CEO	Firm
R^2	0.615	0.615	0.617	0.003	0.003	0.017	0.591
N	7,456	7,456	7,456	3,986	1,164	3,986	7,456
				F-test: Renewal = after renewal			
F-test				6.590**		4.670**	
p-value				(0.011)		(0.031)	

Panel B. Within CEO Changes in Volatility – Summary of Magnitudes

	Mean	Median
First year of initial to last year of initial contract	−0.3528	−0.2168
Last year of initial to first year of renewed contract	0.4348	0.5529
First year of renewed contract to 3 years after	−0.5112	−0.2470

time-varying variables, that affects behavior, then risk should also sharply change around renewals. To test this prediction, we define 2 dummy variables: one for the year when the contract is expiring and up for renewal (renewal year) and the other for the year after the renewal (year after renewal). Since we want to compare only the respective 2 years around renewals, we do not define these dummies for the first and last year of each CEO in our contract sample (new hires, leaving CEOs, as well as the CEOs who previously or subsequently had no fixed-term contract).

Column 4 in Panel A of Table 6 reports the results. Volatility is significantly higher after renewals than it is in renewal years by 26(=15.2+7.8) bps.

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The F-test, reported at the bottom of the table, shows that the difference is significant at the 5% level. We conclude that our results are not driven by time-varying variables, such as tenure or age, or a downward trend in volatility. Volatility is also lower in renewal years than in other years, although the coefficient itself is not statistically significant. Speculation about CEO succession can increase return volatility close to contract expiration, which can have the opposite of our baseline effect and, therefore, can offset it. However, volatility is significantly higher in the years following renewals than in other years. Column 5 shows that, if we include only renewal years and the years after renewals in our regressions, our results are similar: volatility increases significantly after renewal years. These results are illustrated in Figure 2. We plot estimates of volatility measured as the standard deviation of daily returns (Panel A), and idiosyncratic risk (Panel B) around contract renewals. The graph shows point estimates and 95% confidence intervals for years around renewals after correcting for firm fixed effects. The top panel shows that volatility decreases slightly (by 7 bps) from 2 years before a renewal year to 1 year prior, but this decrease is not statistically significant. In the year of the renewal, volatility remains similar compared to year −1.

However, there is a marked and significant increase in volatility in the year after the renewal. Volatility increases by 17 bps relative to year 0, and 19 bps relative to year −1. This increase is significant both relative to the renewal year (year 0) and relative to the preceding years. Finally, 2 years after the renewal, volatility, on average, returns to the level observed in year −2. We document similar patterns for idiosyncratic risk.

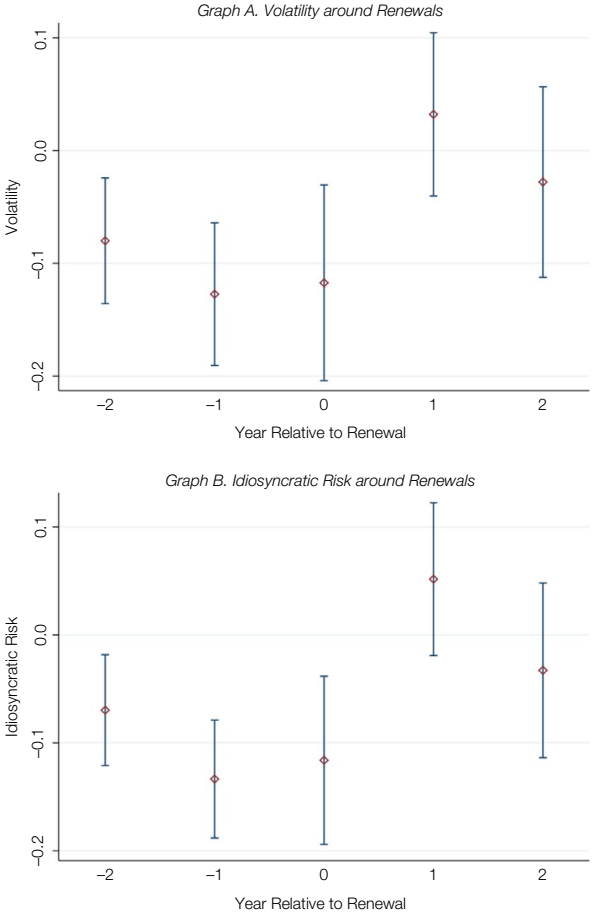
A further advantage of this analysis is that we can directly control not only for CEO fixed effects, but also for tenure, because it is not collinear with our 2 dummy variables. This allows us to directly measure the learning effect shown by Pan et al. (2015) and separate it from the effect of contract horizon. These results are shown in column 6 in Panel A of Table 6. Volatility is significantly higher in the years after contract renewals than in renewal years, even after we directly control for tenure. Consistent with Pan et al. (2015), we also find that, in general, volatility declines with tenure. Because we use CEO fixed effects in these regressions, controlling for any other variable that changes linearly over time, such as CEO age, yields similar results. Appendix E in the Supplementary Material shows that our results are similar when we replace the linear measure of tenure with the natural logarithm of CEO age. Finally, column 7 shows the baseline regression with firm fixed effects instead of CEO fixed effects. Our results remain similar: longer time to contract expiration is associated with higher volatility. One additional year remaining on the contract of the CEO corresponds to an increase of 3.2 bps in return volatility. The 3.2 bps correspond to 1.8% of 1-standard-deviation of return volatility.

Panel B in Table 6 provides more information on the magnitude of the volatility effect. We show that the change in volatility from the first to the last year of a CEO contract is negative: specifically, volatility declines throughout the contract. The average (median) decline in volatility from the first contract year of a CEO to the last is 35 (22) bps. Mirroring the results of our regressions, we see a marked increase in volatility around renewals. From the last year of an initial contract to the first year of a renewed contract (for those CEOs whose contracts are renewed)

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FIGURE 2
Changes in Volatility and Idiosyncratic Risk around Contract Renewals

Graph A of Figure 2 shows residuals from a regression of volatility on CEO fixed effects for CEOs whose contracts are renewed in the years around the renewal. The horizontal axis measures event time in years around the renewal. Year 0 is the year of the renewal. The vertical axis measures volatility in percentage points. The circles represent the average of the residuals and the bars show the upper and lower end of the 95% confidence interval. Graph B shows similar estimates for idiosyncratic risk. Volatility and idiosyncratic risk are defined in Appendix A.



the mean volatility increase is 43 bps and the median is higher at 55 bps. After that abrupt increase, volatility declines again: from the first year of a renewed contract to 3 years after contract renewal, volatility declines by 51 bps on average (25 bps at the median).

In columns 1–4 of Table 7, we decompose volatility into systematic risk and idiosyncratic risk, and then reestimate models 1 and 6 from Table 6. We find that the documented changes in volatility reflect changes in idiosyncratic risk rather than systematic risk. Hence, the effect we find is not likely to be driven by changes in risk management but rather in firm-specific risk, such as investment projects.

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TABLE 7
Composition of Volatility and Sources of Risk

Table 7 reports the results of OLS regressions, reporting coefficients with standard errors underneath. The dependent variable is beta in columns 1–2, idiosyncratic risk in columns 3–4, capital expenditures divided by total assets in columns 5–6, and leverage in columns 7–8. Variables are defined in Appendix A. All regressions are estimated with CEO fixed effects. Standard errors are robust to heteroscedasticity and are clustered at the CEO level. The data span the years 1992–2008. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	BETA		IDIO_RISK		CAPEX/ASSETS		LEVERAGE	
Sample	All	Renewed	All	Renewed	All	Renewed	All	Renewed
	1	2	3	4	5	6	7	8
REMAINING_YEARS	−0.003		0.046***		0.003***		0.006***	
	(0.005)		(0.014)		(0.001)		(0.002)	
RENEWAL_YEAR		−0.016		−0.071		−0.012***		−0.008
		(0.028)		(0.060)		(0.003)		(0.012)
YEAR_AFTER_RENEWAL		−0.042		0.149**		0.007*		0.022*
		(0.028)		(0.059)		(0.004)		(0.012)
TENURE		0.001		−0.023***		−0.001***		−0.002*
		(0.002)		(0.006)		(0.000)		(0.001)
AGE		−0.0004		−0.011**		−0.001***		0.0004
		(0.002)		(0.005)		(0.000)		(0.001)
Constant	0.915***	1.100***	2.721***	3.153***	0.059***	0.082***	0.057***	0.244***
	(0.011)	(0.102)	(0.033)	(0.272)	(0.002)	(0.004)	(0.002)	(0.013)
Fixed effects	CEO	CEO	CEO	CEO	CEO	CEO	CEO	CEO
R^2	0.387	0.000	0.629	0.030	0.535	0.016	0.534	0.004
N	7,456	3,986	7,456	3,986	7,456	3,986	7,456	3,986
				F-test: Renewal = after renewal				
F-test		0.628		7.258***		12.314***		3.977**
p-value		(0.428)		(0.007)		(0.000)		(0.046)

The decreasing pattern of volatility throughout the contract, paired with an increase around contract renewals, are consistent with incentive effects. Our results on CEO turnover imply that contracts affect the timing of turnover and thus provide insurance to the CEO. In line with an incentive role of contracts, they alleviate the threat of being fired for poor performance temporarily at the beginning of the contract. This in turn also makes risk-averse managers more willing to invest projects that have an initial, transient phase of high volatility.

The interpretation of a positive relationship between volatility and time remaining on the contract would be different only if the turnover results do not operate through the incentives channel, but *exclusively* through the two alternative channels: learning and selection. First, while a declining pattern of volatility throughout the contract is consistent with the learning channel, the observed increases in volatility after contract renewals are difficult to explain in a pure learning model without incentives. Second, the selection argument does not predict a specific relation between time remaining on the contract and volatility. Still, volatility patterns may be influenced by a number of factors, and are likely heterogeneous across firms. Therefore, in Section VI we provide further evidence suggesting that the relation between time remaining and volatility does not operate only through the learning and the selection channels.

In Appendix D of the Supplementary Material, we show that our results are robust to controlling for compensation, CEO and firm age, excluding the first year of CEOs, and accounting for lags between CEO decisions and volatility. We also

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argue that our results cannot be driven by contract renewals prior to expiration. We further show that our results are not driven by CEO or firm survival, long or short contracts only, or selection into the sample of fixed-term contracts.

B. Contract Horizon and Implied Volatility from Traded Options

Using stock return volatility to measure risk may capture operating decisions the CEO makes early in the contractual term. We therefore use changes in implied volatilities from options data to shed light on whether the market anticipates changes in corporate policies. Doing so enables us to exploit the exact timing of CEO contract renewals, as we can calculate implied volatility around the month of the renewal. If the market anticipates more risk taking immediately after a contract renewal, implied volatility should increase sharply around the renewal window.[10] Table 8 shows that the results using implied volatilities are similar to our baseline results. We find that implied volatility of options is low in the 2 (3) months prior to the CEO election and is high in the 2 (3) months following the renewal. In all of our specifications, we can reject the null hypothesis that implied volatility of the 2 periods is equal at the 10% level or better. These patterns suggest that the market anticipates changes in corporate policies by the new or renewed CEO early in her contract.

TABLE 8

Option-Implied Volatility around Contract Renewals

Table 8 reports the results of OLS regressions of option-implied volatility around contract renewals. The dependent variable, IMPLIED_VOLATILITY, is the implied volatility on 1-month, at-the-money call option contracts, obtained from OptionMetrics. Month 0 is the month in which the contract is up for reelection. The independent variables in columns 1 and 2 are indicators for months (−2, −1) before and months (1, 2) after the election month. The independent variables in columns 3 and 4 are indicators for months (−3, −1) before the election month and months (1,3) after the election month. Additionally, the models in columns 2 and 4 control for CEO tenure (measured in months). All regressions include CEO fixed effects. The bottom of each column shows the results of an F-test whose null hypothesis is that the coefficient of the dummy variable before the election would equal the coefficient of the dummy variable after the election. The data span the years 1992–2008. Standard errors are robust to heteroscedasticity and are clustered at the CEO level. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: IMPLIED_VOLATILITY			
	1	2	3	4
MONTHS_(−2, −1)_RELATIVE_TO_ELECTION	−0.3945	−0.3329		
	(0.288)	(0.284)		
MONTHS_(1,2)_RELATIVE_TO_ELECTION	0.4031	0.4200*		
	(0.247)	(0.245)		
MONTHS_(−3, −1)_RELATIVE_TO_ELECTION			−0.3842	−0.3226
			(0.275)	(0.271)
MONTHS_(1,3)_RELATIVE_TO_ELECTION			0.3660	0.3816
			(0.265)	(0.264)
TENURE		−0.0856***		−0.0855***
		(0.030)		(0.030)
CEO fixed effects	Yes	Yes	Yes	Yes
N	39,135	39,135	38,946	38,946
No. of firms	1,284	1,284	1,282	1,282
Adj. R^2	0.0005	0.001	0.0003	0.001
F-test (election = after)	4.185**	3.756*	3.838*	3.409*
p-value	(0.041)	(0.053)	(0.050)	(0.065)

[10] We use the implied volatility on 1-month, at-the-money call option contracts, because 1-month option contracts are the most liquid (Rogers, Skinner, and Van Buskirk (2009)), and call options on individual stocks are traded in a much higher volume than puts (Goyenko, Ornthanalai, and Tang (2014)).

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C. Sources of Risk

In this section, we explore two specific channels that could drive the change in volatility: capital investment and financial leverage. Long-term decisions, while mostly illustrated as investment in theoretical models (e.g., Stein (1989), Von Thadden (1995)), may also take other forms such as hiring specific managers or shifting resources between business units. However, such actions are more difficult to observe empirically. Columns 5–6 in Table 7 show a positive association between remaining years and capital expenditures (normalized by lagged total assets). Compared to years in which the CEO has less than 1 year remaining on her contract, capital investment is 1.4 bps (or 15% of 1-standard-deviation) higher than when the CEO has 3–4 years remaining. Similar to our findings for volatility, we also find that capital expenditures increase once the contract of the CEO is renewed, relative to the year before (i.e. the renewal year). The F-tests indicate that the difference is highly statistically significant.

Columns 7–8 in Table 7 show a positive relation between remaining years and financial leverage. Columns 7 reveals a significant positive correlation between these 2 factors. The economic significance of these effects is also smaller than for investment. The results using contract renewals in columns 8 are less robust than those found for capital expenditure. Overall, the results show that a longer time to contract expiration is associated with a higher investment. The effect on leverage is also positive, but weaker both economically and statistically.

Overall, these results on the sources of risk provide further evidence consistent with the incentive role of contracts. Both idiosyncratic risk and capital expenditures follow the same pattern as volatility: they decline over the course of the contract, and increase after contract renewals. These patterns suggest that the CEO actively takes on projects with a transient volatility phase early on in her contract.

VI. Channels

A. Sample Splits

To provide evidence suggestive of career concerns, we investigate whether our results are stronger in those subsamples where the different theoretical explanations predict them to be.

Our results should be stronger in cases where CEOs have greater career concerns. One relevant example is CEOs far from retirement. Indeed, Jenter and Lewellen (2015) show that CEOs just over the common retirement threshold of 65 years of age are more likely to agree to a sale of their firms. Therefore, we expect that these CEOs would be less concerned about their future career, and thus spread risk-taking initiatives evenly instead of avoiding them at the end of the contract. We verify that older CEOs and specifically those aged over 65 face a lower renewal probability (these results are unreported for brevity). By contrast, there is less reason to expect technological cycles to be less prevalent for firms with old CEOs. In conclusion, we expect the effect of career concerns to be stronger for younger CEOs.

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Our results are prevalent only for young CEOs. In column 1 of Table 9, we interact our main variables with a dummy variable for CEOs under and over 65 years of age. Volatility is significantly related to contract horizon only for CEOs aged under 65. While the statistical insignificance of the coefficient for CEOs aged over 65 may be related to the smaller size of the subsample (756 observations, or 10% of our sample), the coefficient is also much smaller, 0.010 as compared to 0.042 for younger CEOs. Since the average contract length is 3 years, our results should hold for age thresholds starting from 62 years. We confirm this in column 2. As further evidence that our results are weaker for CEOs with lower career concerns, we examine founders and CEOs with a higher tenure. Columns 3–4 of Table 9 show that our results are present only for nonfounder CEOs and low-tenure CEOs (tenure below 5 years).[11]

Next, selection effects are likely to be weaker than treatment effects in those firms where it may be more difficult to predict the length of technological or managerial cycles. As contract horizon is set ex ante, variables unrelated to the contract that explain our results should be predictable by boards: otherwise, it is unlikely that their effects on volatility over time coincide with the contract horizon. One relevant example is fast-moving industries. In such industries, it may be difficult to predict the length of technological cycles ex ante and, therefore, problematic to set a fixed term for a contract that coincides with volatility later. Therefore, we expect selection effects to be weaker in such industries.

TABLE 9
Heterogeneity and Mechanism

Table 9 reports the results of OLS regressions, reporting coefficients with standard errors underneath. The dependent variable is VOLATILITY. We interact contract-related variables with dummies for CEOs over/below the retirement age of 65 (column 1), for CEOs over/below 62 years of age (column 2), founder CEOs (column 3), CEOs with a tenure longer than/at most 5 years (column 4), and for firms with high/low product market fluidity based on the measure of Hoberg et al. (2014) (column 5). All regressions contain CEO fixed effects. Other variables are defined in Appendix A. Standard errors are robust to heteroscedasticity and are clustered at the CEO level. The data span the years 1992–2008. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

	Dependent Variable: VOLATILITY				
Group 1: Group 2:	Under 65 Over 65	Under 62 Over 62	Not Founder Founder CEO	TENURE $\geq$ 5 TENURE $<$ 5	High Fluidity Low Fluidity
	1	2	3	4	5
Group 1					0.044 (0.128)
Group 1 × REMAINING YEARS	0.042*** (0.015)	0.046*** (0.018)	0.037** (0.014)	0.044*** (0.017)	0.040* (0.023)
Group 2 × REMAINING YEARS	0.01 (0.024)	0.008 (0.016)	0.021 (0.038)	0.006 (0.033)	0.071*** (0.025)
Constant	2.972*** (0.039)	2.988*** (0.045)	2.973*** (0.034)	2.980*** (0.036)	3.005*** (0.074)
CEO fixed effects	Yes	Yes	Yes	Yes	Yes
R^2	0.615	0.615	0.663	0.617	0.599
N	7,456	7,456	7,456	7,456	5,427
	F-test: Equality of slope coefficients				
F-test	1.692	2.770*	0.600	1.065	0.999
p-value	(0.193)	(0.096)	(0.439)	(0.302)	(0.318)

[11] Our cutoff of 5 years is motivated by the finding of Pan et al. (2015) that the market learns about CEO ability and fit during the first 5 years. Our results are robust to using a cutoff value of 8 or 10 years instead.

We provide evidence against the hypothesis that selection effects drive our results using the product market fluidity measure developed by Hoberg et al. (2014).[12] We split the sample by the annual median product market fluidity. Column 5 of Table 9 shows that the coefficient for the number of remaining years is indeed higher (albeit not significantly) for firms with high product market fluidity. The results are very similar when we interact fluidity with all other measures related to contract horizon that we use in the paper. On balance, while the relation between the number of years remaining and volatility is stronger in more dynamic industries, this difference does not reach statistical significance.

B. Volatility Patterns in Firms Without Fixed-term Contracts

The results above are consistent with the prediction that CEOs adopt corporate policies in response to contractual protection. Yet, it is possible that CEO contract cycles are correlated with investment opportunities. If it is not the contract that causes the relation between contract horizon and volatility, but rather technological cycles or the board's decision to evaluate and keep the CEO precisely when a volatility cycle has completed, we should see similar volatility cycles also in the absence of fixed-term contracts. Therefore, we use CEOs without fixed-term contracts to identify noncausal cycles related to hiring and renewal decisions. We use 3 different tests in this setting and find that the number of years remaining in the cycle is not significantly related to volatility. Appendix E in the Supplementary Material discusses these tests in detail.

C. Magnitudes in Terms of CEO Turnover Probability

Our results suggest that insurance against early turnover is one of the channels through which contracts affect volatility. In Appendix F of the Supplementary Material, we focus on this channel and estimate magnitudes in a 2-stage least squares model using contract horizon as a predictor for turnover probability in the first stage. Alternatively, we use a Cox hazard model of CEO turnover. We find economic effects similar to our main analysis, suggesting that protection from turnover is a quantitatively important mechanism driving the relation between contract horizon and risk.

VII. Conclusion

This paper studies the link between CEO contract horizon and volatility. We introduce novel data on the length of CEO employment contracts in the United States and document several stylized facts about them. The time remaining under contract is a strong predictor of CEO turnover. Both turnover probability and turnover-performance sensitivity increase over the course of the contract as it approaches expiration. Contract horizon is related to firm outcomes: stock return volatility, especially the idiosyncratic component, capital expenditures, and, to a lesser extent, leverage are higher at the beginning of the contract. At renewals, when the contract horizon is reset, all these outcome variables sharply increase, suggesting that our results are not driven by other life cycle variables, such as CEO or firm age, tenure, or general time trends.

[12] These data are available at http://hobergphillips.tuck.dartmouth.edu/.

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Consistent with optimal contracting, we show that firms and CEOs enter into longer contracts in situations where a longer contract is more useful, indicating that firms may use long-term contracts as an instrument to set incentives. We find that the positive horizon-volatility relationship is more pronounced where such incentives are more likely to be effective: with younger CEOs, CEOs with shorter tenure, and CEOs who are not the founder of the firm.

Stock-based compensation introduces convexity in CEO incentives and therefore allows the CEO to benefit from the upside of risky strategies. However, while such stock-based compensation may incentivize CEOs to pursue projects with a significant upside, it is not clear how much they help with projects with a considerable downside. As Jenter and Lewellen (2017) show, turnover-performance sensitivity is asymmetric. Traditional equity compensation instruments are therefore a costly means to help the risk-averse CEO overcome the worries that prevent them from taking projects with downside risk (Holmstrom (1982), Manso (2016)). Our work highlights that contracts provide insurance to this downside risk.

We document the direct (CEO turnover) and indirect consequences (volatility) of contract terms. Overall, our results point to contract length as an important element in the CEO contract design. Boards and regulators should take incentive consequences into account if they consider changing contract terms or regulations regarding executive employment contracts. Finally, our paper suggests that boards and CEOs set contract length with a purpose. This implies that many firms have a long-term horizon that goes beyond the daily stock return and quarterly earnings.

Appendix A. Variable Definitions

Appendix A defines the variables that are used in the main analysis of the paper and are not described in detail the text.

AGE: Executive's age in years.

AIMR: Industry adjusted Association for Investment Management and Research AIMR scores (see Brown and Hillegeist (2007)).

ANALYST_FORECAST_SD: Standard deviation of analyst forecasts of the current year's earnings per share.

ANTI_TAKEOVER: State with "business combination laws" according to Bertrand and Mullainathan (1999).

STOCK_RETURN: Stock returns over the past year.

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: 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.

BUSY_DIRECTORS: Number of directors holding 3 or more directorships, defined as "busy" by Fich and Shivdasani (2006) divided by the total number of directors on the board.

CAPEX_ASSETS: Capital expenditures divided by lagged assets.

CASH_COMPENSATION: Salary plus bonus (in $thousands).

CEO_EXTERNAL_HIRE: Indicator equal to 1 if the CEO was hired from outside the firm.

CHAIRMAN_AND_CEO: Indicator equal to 1 if the CEO also holds the Chairman position of the Board.

CONTRACT_LENGTH: Expiration year minus start year of the contract.

DIVIDEND: Indicator equal to 1 if the firm pays dividends in the current year.

EXCEPTION_RULE: Indicator equal to 1 if the contract is governed by the law of a state with a good faith and fair dealing at-will exception.

FIRM_AGE: Number of years since incorporation, or if not available, since the appearance of the firm in Compustat.

FORMER_CEO: Indicator equal to 1 if the CEO was in office before the current contract.

FOUNDER: Indicator equal to 1 if the CEO is the founder of the firm.

FRACTION_REMAINING: Remaining years dividend by contract length.

GARMAISE: Index of Garmaise (2011).

GOVERNANCE_INDEX: The index developed by Gompers, Ishii, and Metrick (2003).

HEADQUARTERS_NOT_IN_METRO: Indicator equal to 1 if the firm's headquarters are located outside a metropolitan statistical area as defined by the U.S. Census Bureau.

IDIO_RISK: Standard deviation of residuals in a Fama–French 3-factor model, estimated for each firm-year.

INCENTIVE_TO_TOTAL_COMP: Value of bonus, stock, and option grants to total CEO pay.

INDEPENDENT_DIRECTORS: Number of independent directors divided by the number of directors on the board.

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.

IN_METRO: Indicator equal to 1 if the firm is headquartered in a metropolitan area. *Source:* Census Bureau.

LEVERAGE: Net debt divided by total assets.

LOW_ANALYST_ERROR: Indicator equal to 1 if analyst forecast standard deviation is below median.

MARKET_TO_BOOK: The reciprocal of BOOK_TO_MARKET.

NEWS_RELEASES: Number of news releases (Capital IQ).

OIL_AND_GAS_INDUSTRY: Indicator equal to 1 if the firm's primary Standard Industrial Classification (SIC) code is in the oil and gas industry.

PCT_CEO_OWNERSHIP: Number of shares owned by the CEO divided by the number of total shares outstanding (in %).

PCT_INSIDERS_ON_BOARD: Percentage of insiders among board members.

PRODUCT_MARKET_FLUIDITY: The text-based measure of product market fluidity developed by Hoberg et al. (2014).

RD_ASSETS: Research and development expenditures divided by lagged assets.

REMAINING_YEARS: Expiration year minus current year.

RENEWAL YEAR: Indicator equal to 1 if the contract is due to expire in the following year.

ROA: Earnings before interest and taxes divided by assets.

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SENS_VESTED_GRANTS: Sensitivity of vested equity grants with respect to a 1% change in the stock price calculated using the method of Core and Guay (2002), in $thousands.

SENS_UNVESTED_GRANTS: Sensitivity of unvested equity grants with respect to a 1% change in the stock price calculated using the method of Core and Guay (2002), in $thousands.

SALARY: CEO base salary in thousands of US$, adjusted to 2000 dollars.

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 tenure of the CEO, whichever is shorter, scaled by its standard deviation.

TOTAL_COMPENSATION: Total annual compensation (TDC1) for CEO in thousands of US$, adjusted to 2000 dollars.

TOTAL_DELTA: Sensitivity of vested plus unvested equity grants.

TOTAL_VEGA: Vega of vested plus unvested equity grants.

TURNOVER: Indicator equal to 1 if the executive leaves the CEO position.

TURNOVER_PROBABILITY: Fitted value of regressions reported in Table 3.

VEGA_VESTED: Sensitivity of vested equity grants with respect to a 0.01 change in return volatility calculated using the method of Core and Guay (2002), in $ thousands.

VEGA_UNVESTED: Sensitivity of unvested equity grants with respect to a 0.01 change in return volatility calculated using the method of Core and Guay (2002), in $thousands.

VOLATILITY: Standard deviation of daily stock returns.

YEAR_AFTER_RENEWAL: Indicator equal to 1 if the contract was renewed in the previous year.

YR(S)_REMAINING: Indicator equal to 1 if the CEO has the specified number of years remaining on her contract.

Supplementary Material

Supplementary Material for this article is available at https://doi.org/10.1017/S0022109019000632.

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