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Incentivizing CEOs via pay and forced turnover: Do tenure and managerial ability matter?

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Abstract. *Direct pay and dismissal for poor performance are important instruments to incentivize CEOs. I empirically analyze how the use of them depends on tenure and managerial ability. For managers promoted from within a firm, ability is proxied by age at the time of promotion. For outside hires, I use constructed measures of reputation based on media citations. Using a sample of firms in S&P 1500, I find that pay and performance sensitivity of dismissal probability increase with tenure. For outsider CEOs, better reputation increases pay, but decreases tenure sensitivity of pay with stronger effects for more current measures. For both insiders and outsiders, ability decreases the dismissal probability.*

Keywords: incentives, CEO pay, CEO dismissal, managerial ability, job tenure.

JEL Classification: J41, J63, L20, M52, M55.

Introduction

How to design the right type of executive compensation plans? This has been a constant challenge for boards and shareholders, and in essence, is a typical agency problem: the executive (the agent) must be motivated to act in the best interests of the shareholders (the principals), who have delegated their authority to the board of directors. The theoretical agency literature has mainly focused on the use of performance-related pay as an incentive device. However, incentives can also be provided by the threat of termination of employment following poor performance. These two instruments interact: a termination threat provides good incentives only if the expected future pay within the firm is significantly higher than the outside option.

Lazear (1981) argues that wages should increase with tenure to provide good incentives. But it is less clear whether the optimal termination threat will also be increasing; i.e., if poor performance is more likely to result in termination for senior than for junior executives. Moreover, Lazear's upward sloping wage schedule requires a long-run commitment as the wage exceeds marginal product over time. However, long-term contracts are not common in CEO labor markets; every year performance is mostly evaluated, and contracts are renewed.

In Olcay (2016), I consider a dynamic agency model with limited commitment to study the optimal contracts with incentive pay and termination threat. The model is designed to study incentive pay, but due its simplifying assumptions, the interpretation of its results applies to total pay as well. The main prediction is that the use of both incentive devices increases with tenure. A termination threat is included in the short-term contract if and only if the agent's expected future surplus from the relationship is sufficiently high compared to the principal's expected future gain. Moreover, at a given point in time, the observed productivity ("ability") of the agent affects the optimal contract in opposite ways. The higher is the agent's ability, the higher should be the wage conditional on good performance, and the smaller should be the risk of termination after poor performance.

The focus of this empirical study is to which extend pay and forced turnover are used as incentive devices for CEOs as well as whether there is a significant relationship of job tenure and managerial ability to these devices. We also consider how ability and tenure interact in the provision of incentives: does managerial ability influence the sensitivities of CEO pay and forced turnover to tenure? Several previous theories also have implications for these relationships: the learning theory of Murphy (1986), the career concerns model of Gibbons and Murphy (1992), and the entrenchment theory of Hermalin and Weisbach (1998).

Murphy's (1986) adverse selection model requires that the optimal contract should be designed to facilitate the shareholder's learning about managerial ability. Pay-performance sensitivity decreases over time as the shareholders learn more about ability by assessing CEO's performance. Yet, as beliefs about ability are updated through time, pay level increases.

Gibbons and Murphy's (1992) model also has adverse selection with unknown managerial ability; however, the presence of a competitive executive market creates career concerns:

the junior executive is motivated to work hard to establish her reputation and reluctant to bear too much risk. Therefore, the optimal pay-performance sensitivity increases over tenure as the board needs to offset the reduction in her career concerns and it becomes less difficult to share the risk. Moreover, learning leads to a decrease in the variance of expected performance and hence a performance that would not have triggered termination earlier may do so later: i.e., the sensitivity of dismissal probability increases (Allgood and Farrell, 2000).

The entrenchment theory of Hermalin and Weisbach (1998) differs dramatically from standard agency theories of optimal contracting; hence, produces quite different predictions. The senior executive is more likely to get entrenched, hence dominate the board becoming harder to be dismissed for performance and setting her own pay, which is higher and less sensitive to performance (Bebchuk and Fried, 2004).

Regarding the impact of managerial ability on incentive provision, career concerns theory makes an intuitive prediction. If the CEO has enough bargaining power, she may negotiate for a raise after strong profits and can capture the whole surplus created by the good news. Moreover, if low profits reveal bad news about ability, the shareholders have to bear the full negative surplus. Formalizing this perspective, Harris and Holmstrom (1982) suggest that shareholders suffer more from bad news than they benefit from good news. The entrenchment theory would again predict a positive ability-pay relationship: higher ability CEOs being more likely to get entrenched and increase their own pay.

Regarding the second incentive tool, the theories imply a weaker relationship with performance for highly talented CEOs. In a career concerns model, the reason is that those CEOs are identified with less performance uncertainty; hence, their performance is less likely to be informative. According to the entrenchment model, they are more powerful and hence more likely to face a passive board of directors; i.e. dismissal probability is both weaker and less sensitive to performance.

Table 1. *Theoretical predictions*

	Learning		Career Concerns		Entrenchment		Olcay (2016)	
	Tenure	Ability	Tenure	Ability	Tenure	Ability	Tenure	Ability
Total CEO Pay	+	n/a	n/a	+	+	+	+	+
Pay-Performance	-	n/a	+	n/a	-	-	+	+
Probability of Forced Turnover	n/a	n/a	n/a	n/a	-	-	+	-
Probability of Forced Turnover-Perf.	n/a	n/a	+	-	-	-	+	-

Table 1 summarizes the predictions of these theories we discussed so far. The empirical analysis here to investigate these hypotheses is twofold. Section 3 focuses on how CEO pay changes by tenure and managerial ability. Section 4, runs a similar analysis on performance-related turnover. Two empirical proxies for managerial ability are used: media visibility, attempting to capture reputational aspects of the outsider CEO's ability (hand-collected through counting articles in top business journals), and age when the insider CEO is promoted to the position. The idea is that higher media visibility and lower age at the time of promotion are both signals of higher managerial ability. Data on executive compensation, firm performance and control variables, both at the CEO and firm level, is

drawn from the COMPUSTAT database for the firms in S&P 1500 between 1998-2008. Data for forced turnover is hand-collected by reading news items found through Factiva and Google web search.

The results suggest that performance and the two incentive devices are highly correlated; i.e., these tools are indeed used as incentive mechanisms. Also, I find that pay and performance sensitivity of performance related dismissal probability increases with seniority. However, there is no strong evidence that dismissal probability follows a particular time pattern. For outsider CEOs, reputation, as a measure for managerial ability, increases pay but decreases dismissal probability where the impact is strongest as more current measures are used. It also decreases tenure sensitivity of pay only when it is proxied by the most current (i.e., short-term) measure. For insider CEOs, the likelihood of dismissal is also decreasing in managerial ability where ability is proxied by Age-at-promotion.

Early studies on the relationship between executive pay and performance (Coughlan and Schmidt, 1985; Murphy (1986); Jensen and Murphy, 1990; Abowd, 1990; Leonard, 1990) mainly agree that firm performance is largely positively related to pay-performance sensitivity after controlling for risk. Other studies are focused on whether CEOs are rewarded for performance which is measured relative to the market or industry (Antle and Smith, 1986; Gibbons and Murphy, 1992).

An important early finding in growing literature of CEO turnover is that a firm's net of market performance and the probability of turnover are inversely associated (Coughlan and Schmidt (1985) and Warner et al. (1988); yet, managers are rarely fired due to poor performance. Later research provides evidence that turnover rates become more sensitive to performance (e.g., Huson et al., 2001; Kaplan and Minton, 2012); i.e. termination, as an incentive tool, is becoming a more important threat over executives.

A related finding by Weisbach (1988) is that the magnitude of the turnover-performance relation is strongest in companies dominated by independent outside directors. Parrino (1997) shows that the outside replacements are mostly used by companies which perform poorly as compared to their peers. These studies indicate that poor firm performance is the single most important determinant of forced turnover.

Another line of empirical research disregards the implications of optimal contracting and instead explores the entrenchment effect of executive's equity ownership. Murphy and Zimmerman (1993), Denis et al. (1997) and Hadlock and Lumer (1997), Goyal and Park (2002), Dahya, Lonie, and Power (1998) and Nguyen (2011) investigate the impact of corporate governance and found that probability of turnover is negatively related to the ownership stake.

The paper proceeds as follows. Section 2 describes the data sources and variables. Sections 3 and 4 present the empirical tests and results regarding pay and forced turnover, respectively. Section 5 concludes.

1. Data description

To analyze the impact of tenure and managerial ability on pay and the likelihood of forced turnover, I construct a data set of the CEO labor market which contains detailed information on turnovers and empirical proxies for ability. This section explains how the data set is constructed and the collection process of variables.

1.1. Sample selection

The CEO succession data is hand-collected and includes all firms in S&P 500-Large Cap between 1998-2008. ExecuComp provides information on the top five executives of all firms in S&P 1500. I recognize a turnover for each year in which the CEO is identified in ExecuComp changes.

To identify forced departure, I carefully search news items on the Lexis-Nexis Academic Universe and Factiva for each CEO change. Changes accompanied by poor performance are identified as forced turnover. These news items openly state that prior stock price or accounting returns have been declining in the past quarters. Also, for each succession in the sample, I hand collect exact announcement dates which are the earliest dates of the news about incumbent CEO departure and successor CEO appointment. All other news which explicitly mention that CEO has departed the company because she became a CEO at another firm, forced out for different reasons (improper use of corporate funds, violation of Security Exchange Act, etc.), resigned due to conflict with board, left due to health reasons, deceased or retired are not included. This method of identifying turnover is similar to that of Weisbach (1988) and Denis and Denis (1995).

Table 2. *CEO turnover*

Year	Number of CEO changes	Turnover rate	Resign/ retire bad perf.	Resign 1	Resign 2	Resign 3	Retire 1	Retire 2	Merger/ Interim	Nothing
1998	43	11.2	11	1	1	2	12	10	3	3
1999	48	11.9	11	1	0	1	14	13	2	6
2000	58	13.8	18	3	2	4	10	13	2	6
2001	40	9.5	7	1	1	1	7	16	4	3
2002	44	10.3	11	3	2	1	7	11	3	6
2003	55	12.5	8	1	2	6	16	13	5	4
2004	63	14.0	9	0	5	7	18	20	0	4
2005	48	10.4	4	2	0	5	9	14	7	7
2006	63	13.3	10	4	6	3	21	13	2	5
2007	58	12.0	11	0	0	10	16	7	2	11
2008	22	5.5	5	1	0	2	5	5	2	2
TOTAL	542	11.4	105	17	19	42	135	135	32	57

Note: Resign/Retire Bad Per. consists of CEO changes after it is explicitly announced that the CEO change is due to bad performance. Resign1 is the cases where in the news it says the CEO suddenly quits and no further explanation is found. Resign2 is CEO changes after scandals (law suits due to affair with subordinates or violated such and such act), arrested or forced out for different reasons (such as conflict with the board or left the company for personal reasons.) Resign3 is cases where CEO left the firm for good reason, health reasons or deceased. Retire1 is instances where CEO has retired and joined the board as executive/non-executive chairman afterwards. Retire2 includes CEO changes with explicit evidence that CEO has really retired or being retired is not related with performance. Merger/interim refers to CEO changes after merger or acquisition, or CEO had appointed on interim basis before. Nothing consists of cases where no news item related with CEO change is found.

Table 3. *Forced CEO turnover*

	Number of CEO changes	Forced 1	% in all changes	Forced 2	Forced 3	% in all changes
1998	43	11	25.6	6	17	39.5
1999	48	11	22.9	9	20	41.7
2000	58	18	31.0	10	28	48.3
2001	40	7	17.5	3	10	25.0
2002	44	11	25.0	10	21	47.7
2003	55	8	14.5	10	18	32.7
2004	63	9	14.3	13	22	34.9
2005	48	4	8.3	8	12	25.0
2006	63	10	15.9	18	28	44.4
2007	58	11	19.0	12	23	39.7
2008	22	5	22.7	8	13	59.1
TOTAL	542	105	19.4	107	212	39.1

Note: FORCED1 consists of the observations in the category, Resign/Retire after Bad Perf. in Table 1. FORCED 2 is CEO changes below age of 60 and related with categories Retire1, Retire2 (excluding instances explicitly unrelated with performance), Resign1, Nothing. FORCED3 is the sum of FORCED1 and FORCED2.

By using news items, I form different categories for reasons of CEO departure. Table 2 includes information about the number of departures for different reasons during 1998-2008. The sample consists of 542 CEO changes out of 4769 firm-year observations during 1998-2008. The total turnover rate is 11.4%.(1) Using this detailed information, I construct the forced turnover data in Table 5. Forced 1 is constructed using the news items in which it is explicitly stated that the CEO is terminated for poor performance. This yields 105 CEO changes. For the rest of classification, I follow Parrino's (1997) method. Such classification is important in a study of forced turnover since CEOs are seldomly fired openly due to poor performance. I classify the remaining changes as potential forced departure if the departing CEO is less than the normal retirement age which is the mean age for CEO departure. In our sample, this is around age 61. In Table 5, Forced 2 includes CEO changes if the reason of departure is announced either as retired (but excluding those announcements which explicitly state that the departure is not related with performance), or if the reason is not specified, or the news item specifies the departure as unexpected or abrupt, and for all these observations the CEO is below the normal retirement age. This yields 107 more observations for forced turnover. Forced 3 is the sum of Forced 1 and Forced 2.

In Table 5, 39% of all CEO changes are performance related. This finding is in line with a total forced turnover rate of 36%, as found by Falato et al. (2015) whose sample covers the firms in S&P 1500 during 1993-2005. However, it is relatively higher than 23.4% as reported by Huson et al. (2001) for a sample of executives listed only in Forbes over the period 1989-1994. Table 5, however, reveals that while the turnover data in our sample does not show a particular time pattern, there is significant time variation in the rate of both forced and overall turnovers.

1.2. Measures for firm performance and firm level controls

I enhance the data set with several measures of firm performance, in addition to various firm level controls which have been identified as important measures in the CEO labor market. All measures discussed below are at calendar year-end and taken from COMPUSTAT. Descriptive statistics for these variables are summarized in Table 4.

Table 4. *Descriptive statistics*

	N	Mean	Med.	Std.Dev.	Max	Min
CEO Characteristics and Pay						
Tenure	10276	7.8	5	7.5	42	1
Age	10246	55.1	55	7.3	85	34
Outsider	5915	0.35	0	0.47	1	0
Total CEO Pay ($thousand)	10659	8	8	1.09	13.3	5.5
Performance Measures and Firm Controls						
Size (log Total Assets, $mil.)	10019	7.4	7.3	1.5	12.9	1.9
Dividend Yield	10011	1.38	0.6	3.27	169.7	0.1
Return on Assets (ROA)	11024	0.054	0.049	0.079	0.59	-1.66
Return on Equity (ROE)	10933	0.12	0.14	0.36	16.09	-1.97
Net Income over Assets (NIA)	11034	0.05	0.05	0.087	0.98	-2.8
Industry Adjusted ROA	11034	0.037	0.019	0.14	2.07	-4.48
Industry Adjusted ROE	10933	0.1	0.044	0.82	16.8	-18.7
Industry Adjusted NIA	11034	0.03	0.01	0.18	2.08	-5.06
Corporate Governance						
Share Ownership	11804	0.03	0	0.19	1	0
Board Member	11804	0.97	1	0.12	1	0
CEO Ability						
Age-at-promotion	3646	49.08	49	7.4	79	34
Good Press (1 year)	4781	23.6	6	65.6	1227	0
Good Press (3 years)	4781	57.7	17	155.6	3489	0
Good Press (5 years)	4781	81.5	25	221.8	4333	0
Press (1 year)	4781	29.5	8	84.8	1673	0
Press (3 years)	4781	73.7	20	199.4	4040	0
Press (5 years)	4781	104.2	29	286	4987	0

I use three different measures of firm performance: return on assets (ROA), return on equity (ROE) and ratio of Net Income to the book value of assets (NIA). To filter out industry specific shocks, I create industry average counterparts. In the COMPUSTAT database, each firm has been specified with a four-digit SIC code. To identify the industry, I use the first two digits of the SIC code which is used in calculating firm's industry-adjusted performance. By using the overall sample in COMPUSTAT (over 20,000 firms), I calculate industry averages for the firms in the sample at hand.

The main set of firm controls includes firm size (logarithm of total assets) and firm's dividend yield. While firm size is an important variable on CEO labour markets (Gabaix and Landier, 2008 and Tervio, 2007), dividend yield of the firm is used to control for firm's riskiness.

1.3. CEO pay, tenure and CEO characteristics

To examine the pay-tenure relationship, I use the natural logarithm of the dollar value of CEO's total pay (Exe- cuComp's TDC1) which includes salary, bonus, long-term incentive plans, restricted stock, and stock appreciation rights.

Previous research suggests that CEO pay is a function of age (e.g. Milbourn, 2003 and Chevalier and Ellison, 1999), hence it is included as a control variable. Data for CEO tenure is created by using data items in Execucomp. Finally, I classify CEOs who had been with their firms for one year or less at the time of their appointments as outsiders. As Table 4 summarizes, the median CEO in our sample has 5 years of tenure, is 55 years old and has been promoted from inside.

1.4. Measures for CEO's power on Corporate Governance

To control for CEO's potential power on corporate governance, I create two dummy variables using data items in ExecuComp: Board Member is equal to 1 if CEO has served as a director during the calendar year, and Share Ownership is equal to 1 if she holds more than 5% of the firm's total shares. Table 4 indicates that 3% of the sample contains firm-year observations with the firm's CEO holding either 5% or more of the total shares. Also 97% of the observations contain CEOs who are a board member.

1.5. Measures for CEO ability

I construct three different empirical proxies for ability. The first empirical proxy, Press, measures the media visibility of a CEO and attempts to capture how her ability is perceived. To create Press variable, I count the number of articles containing the CEO's name and company affiliation that appear in the major US global newspapers and business journals for a given year (see Appendix A). However, since reputation, as implied by Press variable builds in time, I extend this proxy further and create three different proxies out of it: Press (1 year), Press (3 years) and Press (5 years) which refer to the number of articles during the previous year, last three years, and last five years prior to the current year. With this extension, media visibility measures reputation in different time windows; Press (1 year) refers to a relatively more current measure of reputation whereas Press (5 years) is a proxy for less current measure.

Using Lexis-Nexis database and restricting the search to the sources in Appendix A, I conduct text searches using both the CEO's last name and company name. The classification of media visibility variable uses the same methods as previously used by Milbourn (2003), Francis et al. (2008), and Rajgopal et al., 2006): CEOs with higher media visibility are more likely to be of higher ability.

Following Falato et al. (2015), I construct a second empirical proxy, Good Press, by classifying the articles in which CEO's name appear by connotation. This aims to prevent any potential mistake that Press variable might cause since Press does not necessarily imply Good Press. Good Press only includes the number of articles with non-negative tone. To do that, I first create a Bad Press variable, which includes the number of articles only with negative connotation. To find the number of articles which Bad Press will include, I count the number of articles containing words with a negative connotation that appear in the major U.S. and global business newspapers in a calendar year (see Appendix A). Finally Good Press is defined by the difference between Press and Bad Press. Similar to the previous studies, in our sample Good Press is highly correlated with Press (0.97). However, in line with the cross sectional difference as Falato et al. (2015) finds, the correlation is higher at the high end of the distribution of Press (0.81 for above median CEOs), and relatively lower at the low end (0.67 for above median CEOs). According to Table 4, the median CEO receives 8 media mentions, out of which 6 is positive during a year. This number is equal to 20 (17 positive) when media mentions are counted over three years and equal to 29 (25 positive) when counted over five years.

The final empirical proxy in our empirical analysis is Age-at-promotion, which will be used in analyzing the sub-sample of insider CEOs. The idea is that the firm has an opportunity

to observe the performance of an insider executive for a significantly long time before she is promoted to the position. Therefore, the lower the age at the time of promotion, the higher managerial ability as perceived by the board. CEOs of higher ability will spend less time on the corporate ladder and given the potential reluctance of firms to promote younger executives due to well-known hurdles, a lower age at the time of promotion is indeed a signal for higher ability. In this way, I intend to capture observed aspects of managerial ability, which cannot be achieved by our reputation proxy. To create this variable, I use ExecuComp's data items on current age and date when the executive became CEO and also use OneSource for missing data entries in ExecuComp. As Table 4 indicates, the median CEO's age when she is promoted to the position is equal to 49.

Measuring managerial ability has in fact been a great challenge for empirical researchers. Among these, Hayes and Schaefer (1999) proposes an interesting method which utilizes deriving implications for financial market responses to news of unexpected firm-manager separations. But this counts on infrequent events. More recently Demerjian et al. (2012) use Data Envelopment Analysis (DEA) which yields a measure for managerial efficiency isolated from firm efficiency. However, the results are highly sensitive to how the relative importance of the variables used for firm's efficiency score is specified and this cannot be statistically tested.

2. Analysis I: Relations of CEO pay with tenure and managerial ability

2.1. CEO pay and tenure

The theoretical background for this section is based on the models as discussed in the Introduction. Before the results, we discuss our empirical strategy which will be used to test the hypothesis on tenure-pay relationships.

2.1.1. Empirical strategy

The econometric model specifications used consider both linear and nonlinear relationships regarding the tenure variable. Additionally, to deal with the potential problem of unobserved heterogeneity, a fixed-effects (FE) model is used to study the relationship between tenure and pay. The baseline regression takes the following form:

$$w_{ijt} = \beta_1 \times Tenure_{ijt} + \beta_2 \times Tenure_{ijt}^2 + \beta_3 \times Tenure_{ijt} \times Performance +$$

$$\beta_4 * Tenure_{ijt}^2 \times Performance + \beta_5 \times Performance + \beta_6 \times Controls_{ijt} + \alpha_{ij} + e_{ijt} \quad (1)$$

where w_{ijt} is the log of annual total pay (TDC1) of CEO i, at firm j, in year t. The controls are both at the firm and at the CEO level and discussed in Section 2. Since in our data set, we do not observe CEOs working for more than one firm, in equation (1), α_{ij} is the time invariant and unobserved CEO-firm fixed effect (i.e. the "match effect") whereas $\mathbb{E}_{ijt}$ is the idiosyncratic error term. Although the previously discussed theories do not suggest a particular prediction on the sign of β_2 they persistently point out a positive sign for β_1.

The advantage of the FE model is to eliminate the well-known bias created by the OLS method which discards the unobserved differences across individuals in the study of panel

data. Although it has limitations in investigating the effects of time invariant and observed individual characteristics (e.g. being an outsider CEO), FE model performs more efficiently, especially in the presence of time invariant unobserved heterogeneity which is correlated with other explanatory variables, i.e. alpha in equation (1) (see also, for example, Murphy (1986), Aggarwal and Samwick (1999, 2003); Cichello (2005). Employing a fixed-effect at the CEO-firm level helps us to interpret the results of the estimation as a measure of the relationship between pay and tenure for a given CEO-firm match.(2) Note that by using equation (1), we investigate the determinants of total pay which is in logs. But since the performance variable is in levels, β_5 helps us to calculate total pay-performance elasticities. Therefore, β_3 is estimate of tenure impact on total pay-performance elasticities.(3)

2.1.2. Results

Using the specification in equation (1) to relate natural logarithm of CEO total pay to CEO tenure variables, I consider alternative measures for firm performance: ROA, ROE and NIA.(4) These measures are based on accounting returns which are widely used in the study of executive compensation literature due to lower noise they have as compared to stock prices (Banker and Datar, 1989). Year dummies are also included to control potential common factors which affect all individuals in a given year.

Results of the regressions are presented in Table 5. Standard errors are corrected for both heteroscedasticity and autocorrelation, and clustered at the CEO level. In Table 5, the first specification considers ROA as a performance measure whereas the second and third use ROE and ratio of NIA, respectively. Regardless of whether a linear or non-linear specification is used, the results systematically report a positive and statistically significant relationship between the level of CEO pay and tenure.

Table 5. *CEO performance, pay and tenure*

	Model 1		Model 2		Model 3	
Variables	(1)	(2)	(1)	(2)	(1)	(2)
Tenure	0.028* (2.21)	0.0510*** (3.58)	0.0254* (2.06)	0.0486*** (3.67)	0.0273* (2.09)	0.0477** (3.36)
Tenure^2		-.000948** (-2.93)		-0.00102*** (-3.38)		-0.000868** (-2.71)
ROA	0.907** (4.06)	0.874*** (4.11)				
ROE			0.0763* (2.05)	0.0424* (2.07)		
NIA					0.082*** (4.32)	0.65*** (4.28)
ROA∗Tenure	0.0479 (1.35)	0.0499 (0.62)				
ROA∗Tenure^2		-0.000760 (-0.27)				
ROE∗Tenure			0.0176 (1.68)	0.0120 (0.53)		
ROE∗Tenure^2				0.000180 (0.19)		
NIA∗Tenure					0.0557 (1.77)	0.0954 (1.37)
NIA*Tenure^2						-0.00216 (-0.92)
Age	0.0256 (1.88)	0.0248 (1.96)	0.0259* (1.98)	0.0249 (1.90)	0.0268 (1.96)	0.0258 (1.88)

	Model 1		Model 2		Model 3	
Variables	(1)	(2)	(1)	(2)	(1)	(2)
Size	0.261**	0.207***	0.323***	0.256***	0.267***	0.211***
	(4.37)	(3.50)	(5.52)	(4.21)	(4.48)	(3.54)
Divyield	0.251	-0.00792	0.343	-0.0102	0.239	-0.00812
	(1.11)	(-0.98)	(1.49)	(-1.12)	(1.05)	(-1.01)
Share Ownership	-0.0297	-0.0323	-0.0319	-0.0368	-0.0251	-0.0296
	(-0.43)	(-0.49)	(-0.46)	(-0.56)	(-0.36)	(-0.45)
Board Member	-0.376	-0.203	-0.385	-0.201	-0.371	-0.203
	(-0.23)	(-0.26)	(-0.28)	(-0.30)	(-0.18)	(-0.20)
Number of Obs.	7568	7568	7508	7508	7568	7568
Number of CEOs	1930	1930	1922	1922	1930	1930
R^2	17%	21%	23%	25%	18%	21%

Note: Model 1 uses Return on Assets (ROA), Models 2 and 3 uses Return on Equity (ROE) and the ratio of Net Income to the book value of assets (NIA) respectively. Size is proxied by natural log of Net Sales. Divyield is the firm's dividend yield. Share Ownership is a dummy which takes value 1 if the CEO's ownership of total shares is greater than 5%. Board Member is a dummy variable which is equal to one if the CEO served as a board member during the fiscal year. All specifications include year dummies. In parantheses, we present t-statistics using robust standard errors clustered by CEO. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%, respectively.

In terms of the control variables, the results also suggest a positive and statistically significant relationship between firm performance indicators and CEO pay. Since pay is in logarithms but all performance measures are in levels, it is possible to interpret the performance-pay elasticities using the fitted value of each performance measure evaluated at its sample median. For example, under non-linearity assumption, the related estimated coefficient implies that 1% increase in ROA (ROE and NIA, respectively), corresponds to 0.06% increase in total pay (0.02% and 0.06%, respectively).(5) However, note that the coefficients of the interaction variables between tenure and performance are not significant.

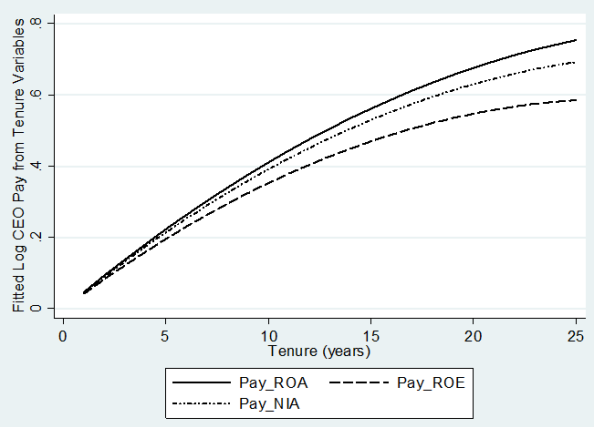
The results report that larger firms pay higher levels of pay; larger firms may employ better qualified and better paid managers (Rosen, 1982; Kostiuk, 1990). Since firm size is defined as natural logarithm of sales, the estimated coefficient in Table 5, is directly interpreted as the elasticity of CEO pay to firm size. The results predict that, holding everything else constant, a firm that is 10% larger in size, depending on the econometric model specification, will pay its CEO about 20-25% more.

CEO age has a marginally significant and positive impact on total pay. Calculating the elasticity of pay to age by evaluating the fitted value of age at sample median yields the following prediction: controlling for performance, tenure, firm size, risk and CEO's power in corporate governance, a CEO at the age of 55 will be paid 15% more relative to a CEO at the age of 50. One explanation is that older CEOs are more experienced and hence compensated by a higher level of pay. The other reason could be that older CEOs are likely to be wealthier as compared to their younger peers; therefore they are more expensive to incentivize. Finally, I include controls for the CEO's corporate governance; i.e., Board Member and Share Ownership, both of which are defined in Section 2. However, the results report no significant relationship between these controls and CEO pay.

Figure 1 plots the relationship between log of total pay for a non-linear tenure-pay relationship using the estimates of Models 1, 2 and 3, and is obtained in the following way: for each model, the predicted values for pay are obtained through the estimated coefficients of second specification in Table 5. Consistent with the theoretical predictions, the figure

suggests that tenure increases pay. Although the theory does not provide a particular prediction, observe that the impact of tenure on pay has a decreasing rate: pay is highly sensitive to tenure in first years of appointment, but less sensitive thereafter.

Figure 1. *Tenure and CEO Pay*



2.2. The impact of ability on CEO pay and tenure-pay relationship

Recall that all theories discussed have a common prediction: higher managerial ability is associated with higher pay regardless of the assumption about the information on ability (i.e.; imperfect (as in learning and career concerns models) or not (as in Olcay, 2016). To test this, I use the age of an insider CEO as a proxy since the younger the CEO is at the time of promotion, the higher her managerial ability will be as evaluated by the board. For outsider CEOs, however, media visibility will be used to proxy managerial reputation.

Table 6. *Proxy: media visibility*

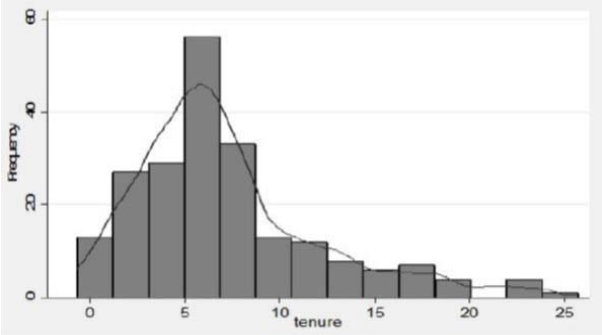
	Press		Good Press	
	Top 25%	Bottom 25%	Top 25%	Bottom 25%
Panel A (1 year)				
Median Media Visibility	51	1	40	1
Tenure	5	5	5	5
CEO Pay(log total compensation)	9.84	8.3	9.23	8.4
ROA	0.068	0.052	0.058	0.053
ROE	0.170	0.142	0.161	0.146
NIA	0.058	0.052	0.058	0.053
Panel B (3 years)				
Median Media Visibility	129	3	101	3
Tenure	5	5	5	5
CEO Pay(log total compensation)	9.26	8.35	9.26	8.38
ROA	0.056	0.052	0.056	0.052
ROE	0.159	0.147	0.160	0.147
NIA	0.057	0.054	0.057	0.054
Panel C (5 years)				
Median Media Visibility	177	5	140	4
Tenure	5	5	5	4
CEO Pay(log total compensation)	9.26	8.36	9.25	8.38
ROA	0.058	0.051	0.058	0.051
ROE	0.161	0.144	0.161	0.144
NIA	0.058	0.052	0.058	0.052
Number of Obs.	1195	1195	1195	1195

Table 7. *Proxy: Age-at-promotion*

	Top 25%	Bottom 25%
Age-at-promotion	45	56
Tenure	9	3
CEO Pay(log total compensation)	8.69	8.71
ROA	0.058	0.04
ROE	0.146	0.142
NIA	0.059	0.047
Number of Obs.	2609	2609

Tables 6 and 7 present the descriptive statistics of our empirical proxies for the top and the bottom quartiles of the sample. In Table 6, median tenure is equal to 5 years. Not surprisingly, median CEO's performance is always higher in the top quartile. In terms of how far ability affects tenure sensitivity of pay, Figure 2 provides a brief idea where the two quartiles are compared in terms of the percentage change in compensation as the median CEO's tenure increases from less than 5 years to more than 5 years. Note that median CEO at the top quartile experiences a higher percentage change in compensation as compared to median CEO at the bottom quartile.

Figure 2. *% Change in Median CEO Compensation as tenure Increases (from "less than 5 years" to "more than 5 years") – Top 25% vs. Bottom 25%*



2.2.1. Empirical strategy

To explore the impact of managerial reputation over pay and tenure-pay relationship, I again use FE model where equation (1) is modified in the following way:

$$w_{ijt} = \beta_1 \times Tenure_{ijt} + \beta_2 \times Tenure_{ijt}^2 + \beta_3 \times Ability_{it} + \beta_4 \times (Ability_{it} * * Tenureijt) + \beta_5 \times (Ability_{it} \times Tenureijt) + \beta_6 \times Controls_{ijt} + \alpha_{ij} + e_{ijt} \quad (2)$$

In line with the previously discussed theories, we expect to have estimated $\beta_3 > 0$. Even though our theoretical discussion does not provide a particular prediction, we also test whether ability has an impact on tenure-sensitivity of CEO pay, i.e. whether the estimated $\beta_4 > 0$ is statistically different than zero.

3.2.2. Results

Focusing on the short-term measure of reputation in Table 8, we find that one unit increase in the number of "positive" media mentions increases CEO pay by 1.22% when ROA is used as a performance measure (by 1.19% and 1.18% when ROE and NIA is used,

respectively). However, the impact is much lower when total media mentions is used: in Table 10, one more media mention increases CEO pay by 0.48% when ROA is used as a performance measure.

The median CEO in our sample earns $6.7k. Therefore our results imply that one more positive media mention implies an increase in CEO pay by $80,000 (by $40,000 if total mentions is used). On the other hand, the estimated coefficients of the interaction terms suggest a consistent finding across Tables 5-10 and Tables 11-13: reputation decreases the tenure sensitivity of CEO pay. More specifically, one more media mention, depending on the choice of performance measure, decreases the sensitivity by around 0.05%.

Table 8. *CEO performance, pay, tenure and reputation – Good Press (1 year)*

Variables	(1)	(2)	(3)
Tenure	0.0790* (2.44)	0.0716* (2.30)	0.0791* (2.44)
$Tenure^2$	-0.00246** (-2.81)	-0.00234** (-2.70)	-0.00245** (-2.80)
ROA	1.972* (2.43)		
ROE		0.321* (2.07)	
NIA			1.801* (2.31)
Good Press (1 year)	0.0119* (2.44)	0.0116* (1.86)	0.0114* (2.25)
Good Press (1 year)*Tenure	-0.00153* (-2.18)	-0.00142* (-2.01)	-0.00149* (-2.08)
Good Press (1 year)*$Tenure^2$	0.0000397 (1.76)	0.0000366 (1.74)	0.0000385 (1.67)
Good Press (1 year)*ROA	0.00369 (0.13)		
Good Press (1 year)*ROE		0.00664 (0.55)	
Good Press (1 year)*NIA			0.00583 (0.21)
Size	0.280*** (3.77)	0.270*** (3.91)	0.286*** (3.85)
Age	-0.00991 (-0.53)	0.0000745 (0.00)	-0.0103 (-0.56)
Share Own.	0.973* (2.49)	0.970** (2.71)	0.970* (2.49)
Divyield	0.444 (0.82)	0.773 (1.71)	0.449 (0.83)
No. of Obs.	524	513	524
No. of CEOs	125	123	125
R^2 21.0%	19.3%		21.4%

Note: This table reports panel regression of CEO pay levels (log of annual compensation) on various variables where CEO-firm fixed effects is used. Model 1 employs Return on Assets (ROA) as a performance measure. Models 2 and 3 uses Return on Equity (ROE) and the ratio of Net Income to the book value of assets (NIA) respectively. Reputation is proxied by Good Press(1 year), which counts the number of articles where CEO's name appears during 1 year prior to the current fiscal year. Size is proxied by natural log of Net Sales. Divyield is the firm's dividend yield. Share Ownership is a dummy which takes value 1 if the CEO's ownership of total shares is greater than 5%. Board Member is a dummy variable which is equal to one if the CEO served as a board member during the fiscal year. All specifications include year dummies. In parentheses, we present robust standard errors clustered by CEO. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%, respectively.

The impact of reputation, however, decreases when measured over a longer term. In Table 9, when measured over 3 years, sensitivity of pay to reputation is around 0.08%: as the median CEO receives one more positive media mention, the total pay increases by 0.48% on average (by 0.38% if number of total mentions is used in Table 12). Moreover, the medium-term measure does not play a significant role on tenure elasticity of pay as we consider the results in Tables 5 and 12 and run F-tests for joint significance of this proxy measure and tenure variables.(6)

Similarly, we find that if reputation is measured over 5 years, results are insignificant both for tenure-pay relationship and tenure-elasticity of pay (see Table 9).

Table 9. *CEO performance, pay, tenure and reputation – Good Press (3 & 5 years)*

Variables	(1)	(2)	(3)	(1)	(2)	(3)
Tenure	0.0609 (1.44)	0.0444 (1.12)	0.0611 (1.44)	0.0623 (1.09)	0.0424 (0.8)	0.0616 (1.08)
Tenure^2	-0.00207* (-2.00)	-0.00178 (-1.76)	-0.00207* (-2.00)	-0.00221 (-1.76)	-0.0019 (-1.59)	-0.00218 (-1.74)
ROA	1.874* (-2.17)			1.688 (-1.3)		
ROE		0.261 (-1.79)			1.487* (-2.24)	
NIA			1.724* (-2.09)			1.554 (-1.22)
Good Press (3 year)	0.00462* (-2.13)	0.00402* (-2.15)	0.00439* (-2.04)			
Good Press (3 year)*Tenure	-0.000556* (-2.05)	-0.000488* (-2.01)	-0.000538* (-2.06)			
Good Press (3year)*Tenure^2	0.0000143 (-1.87)	0.0000127 (-1.8)	0.0000138 (-1.74)			
Good Press (3 year)*ROA	0.00268 (-0.45)					
Good Press (3 year)*ROE		0.0022 -0.87				
Good Press (3 year)*NIA			0.00382 -0.64			
Good Press (5 year)				0.00157 (-0.88)	0.00217) (-1.17)	0.00143 (-0.77)
Good Press (5 year)*Tenure				-0.000224 (-1.13)	-0.00026 (-1.29)	-0.000212 (-1.02)
Good Press (5year)*Tenure^2				0.00000628 (-1.13)	0.00000749 (-1.38)	0.0000058 (-1)
Good Press (5 year)*ROA				-0.000138 (-0.03)		
Good Press (5 year)*ROE					-0.00193 (-1.02)	
Good Press (5 year)*NIA						0.00117 (-0.24)
Size	0.265** (-2.95)	0.247** (-3.04)	0.271** (-3.02)	0.308** (-2.74)	0.262* (2.43)	0.308** (-2.74)
Age	-0.00716 (-0.30)	0.00685 -0.34	-0.00742 (-0.31)	0.00401 (-0.15)	0.0169 (-0.7)	0.004 (-0.15)
Share Own.	0.930* (-2.38)	0.936** (-2.67)	0.929* (-2.38)	0.947* (-2.59)	0.912* (-2.61)	0.949* (-2.6)
Divyield	0.581 (-0.9)	1.075* (-2.06)	0.597 (-0.92)	0.715 (-0.98)	1.293 (-1.95)	0.715 (-0.97)
No. of Obs.	405	400	405	306	305	306
No. of CEOs	108	106	108	81	80	80
R^2	20.40%	18.90%	20.20%	19.60%	22.10%	19.60%

Note: This table reports panel regression of CEO pay levels (log of annual compensation) on various variables where CEO-firm fixed effects is used. Model 1 employs Return on Assets (ROA) as a performance measure.

Models 2 and 3 uses Return on Equity (ROE) and the ratio of Net Income to the book value of assets (NIA) respectively. Reputation is proxied by Good Press(3 years) (or Good Press (5years), depending on the specification) which counts the number of articles where CEO's name appears during 3 years (5 years) prior to the current fiscal year. Size is proxied by natural log of Net Sales. Divyield is the firm's dividend yield. Share Ownership is a dummy which takes value 1 if the CEO's ownership of total shares is greater than 5%. Board Member is a dummy variable which is equal to one if the CEO served as a board member during the fiscal year. All specifications include year dummies. In parantheses, we present robust standard errors clustered by CEO. Level of significance are denoted by ***,**, and * for statistical significance at 1%, 5% and 10%, respectively.

Table 10. *CEO performance, pay, tenure and reputation – Press (1 year)*

Variables	(1)	(2)	(3)
Tenure	0.0775* (2.42)	0.0703* (2.28)	0.0774* (2.41)
$Tenure^2$	-0.00243** (-2.80)	-0.00231** (-2.69)	-0.00241** (-2.79)
ROA	1.988* (2.49)		
ROE		0.327* (2.12)	
NIA			1.837* (2.37)
Press (1 year)	0.00830* (2.34)	0.00742* (2.15)	0.00792* (2.11)
Press (1 year)*Tenure	-0.00111* (-2.12)	-0.00105 (-1.92)	-0.00108* (-1.99)
Press (1 year)*$Tenure^2$	0.0000292 (1.69)	0.0000275 (1.67)	0.0000284 (1.58)
Press (1 year)*ROA	0.00260 (0.12)		
Press (1 year)*ROE		0.00490 (0.53)	
Press (1 year)*NIA			0.00381 (0.17)
Size	0.286*** (3.84)	0.274*** (3.99)	0.291*** (3.93)
Age	-0.0103 (-0.55)	-0.000128 (-0.01)	-0.0106 (-0.57)
Share Own.	0.985* (2.53)	0.981** (2.75)	0.980* (2.52)
Divyield	0.456 (0.84)	0.785 (1.74)	0.460 (0.84)
Number of Obs.	524	513	524
Number of CEOs	125	123	125
R^2 21%		19%	21%

Note: This table reports panel regression of CEO pay levels (log of annual compensation) on various variables where CEO-firm fixed effects is used. Model 1 employs Return on Assets (ROA) as a performance measure. Models 2 and 3 uses Return on Equity (ROE) and the ratio of Net Income to the book value of assets (NIA) respectively. Reputation is proxied by Press (1 year), which counts the number of articles where CEO's name appears during 1 years prior to the current fiscal year. Size is proxied by natural log of Net Sales. Divyield is the firm's dividend yield. Share Ownership is a dummy which takes value 1 if the CEO's ownership of total shares is greater than 5%. Board Member is a dummy variable which is equal to one if the CEO served as a board member during the fiscal year. All specifications include year dummies. In parentheses, we present robust standard errors clustered by CEO. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%, respectively.

Table 11. *CEO performance, pay, tenure and reputation – Press (3&5 years)*

Variables	(1)	(2)	(3)	(1)	(2)	(3)
Tenure	0.061 (-1.44)	0.0449 (-1.13)	0.0612 (-1.45)	0.0616 (-1.09)	0.0422 (-0.8)	0.0609 (-1.08)
Tenure^2	-0.00207* (-2.02)	-0.00179 (-1.78)	-0.00207* (-2.01)	-0.0022 (-1.77)	-0.0019 (-1.60)	-0.00217 (-1.75)
ROA	1.913* (-2.19)			1.736 (-1.33)		
ROE		0.272 (-1.84)			1.517* (-2.27)	
NIA			1.775* (-2.12)			1.618 (-1.26)
Press (3 years)	0.00367* (-2.05)	0.00332* (-2.16)	0.00351* (-2.08)			
Press (3 years)*Tenure	-0.000448* (-2.07)	-0.000406* (-2.50)	-0.000436* (-2.32)			
Press (3 years)*Tenure^2	0.0000117 (-1.97)	0.0000106 (-1.91)	0.0000113 (-1.84)			
Press (3 years)*ROA	0.00167 (-0.36)					
Press (3 years)*ROE		0.00146 (-0.73)				
Press (3 years)*NIA			0.00247 (-0.52)			
Press (5 years)				0.00122 (-0.91)	0.0018 (-1.28)	0.00112 (-0.8)
Press (5 years)*Tenure				-0.000178 (-1.18)	-0.000217 (-1.42)	-0.000169 (-1.07)
Press (5 years)*Tenure^2				0.00000512 (-1.2)	0.00000634 (-1.53)	0.00000476 (-1.06)
Press (5 years)*ROA				-0.00058 (-0.16)		
Press (5 years)*ROE					-0.00183 (-1.22)	
Press (5 years)*NIA						0.000328 (-0.08)
Size	0.267** (-2.96)	0.249** (-3.06)	0.272** (-3.03)	0.311** (-2.76)	0.264* (-2.46)	0.311** (-2.76)
Age	-0.00742 (-0.31)	0.0067 -0.33	-0.00766 (-0.32)	0.00393 (-0.15)	0.0169 (-0.7)	0.00391 (-0.15)
Share Own.	0.924* (-2.38)	0.926** (-2.67)	0.922* (-2.38)	0.935* (-2.57)	0.898* (-2.59)	0.937* (-2.58)
Divyield	-0.577 (-0.89)	1.074* (-2.05)	0.592 (-0.91)	0.72 (-0.98)	1.302 (-1.96)	0.721 (-0.98)
Number of Obs.	405	400	405	306	305	306
Number of CEOs	108	106	108	81	80	80
R^2	20%	19%	20%	19%	22%	19%

Note: This table reports panel regression of CEO pay levels (log of annual compensation) on various variables where CEO-firm fixed effects is used. Model 1 employs Return on Assets (ROA) as a performance measure. Models 2 and 3 uses Return on Equity (ROE) and the ratio of Net Income to the book value of assets (NIA) respectively. Reputation is proxied by Press (3 or 5 year), which counts the number of articles where CEO's name appears during 3 or 5 years prior to the current fiscal year. All specifications include year dummies. In parentheses, we present robust standard errors clustered by CEO. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%, respectively.

Table 12. *CEO performance, pay, tenure and ability (Age-at-promotion)*

Variables	Model 1	Model 2	Model 3
Tenure	-0.0433 (-1.02)	-0.0506 (-1.19)	-0.0430 (-1.01)
Tenure^2	0.000399 (0.26)	0.000555 (0.36)	0.000390 (0.25)
Age-at-promotion	-0.00171 (-0.29)	-0.00348 (-0.61)	-0.00167 (-0.28)
Age-at-promotion*Tenure	0.00143 (1.54)	0.00157 (1.69)	0.00143 (1.53)
Age-at-promotion*Tenure^2	-0.0000202 (-0.49)	-0.0000234 (-0.57)	-0.0000200 (-0.49)
ROA	0.224 (0.85)		
ROE		0.00129*** (6.06)	
NIA			0.305 (1.12)
Size	0.439*** (24.67)	0.443*** (25.21)	0.439*** (24.67)
Share Ownership	-0.464** (-2.63)	-0.450* (-2.53)	-0.465** (-2.63)
Dividend Yield	0.272* (2.37)	0.297** (2.66)	0.277* (2.40)
Number of Obs.	5977	5977	5977
Number of CEOs	1569	1569	1596
R^2 32.6		32.7	32.1

Note: This table reports estimates from panel OLS regression of CEO pay levels (log of annual compensation) on various variables by replicating the analysis of pay as presented in Tables 8-11, but ability is this time proxied by the CEO's age at the time of promotion. In parenthesis, we present robust standard errors clustered by CEO. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%, respectively.

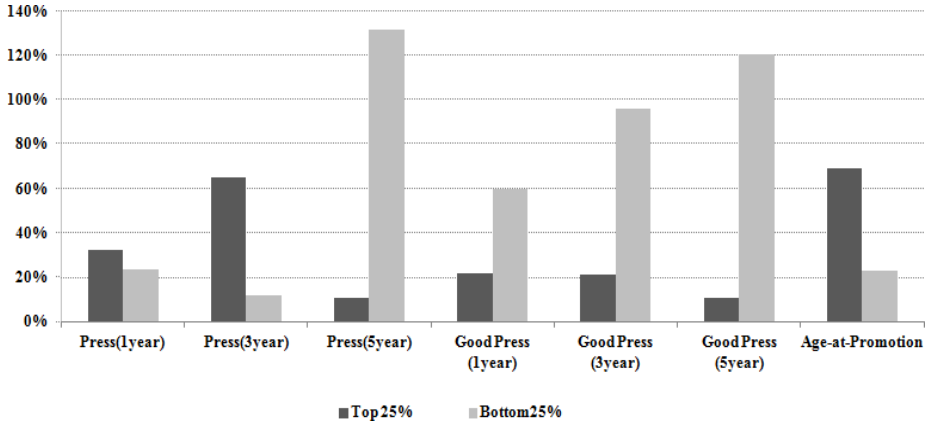
Our last empirical proxy, Age-at-promotion, is used for insider CEOs but it is a time-invariant variable; therefore OLS is appropriate to evaluate the effect of this fixed CEO characteristic. In Table 12 we find no significant impact of ability on pay or tenure-elasticity of pay. But we will see that Age-at-promotion performs well in the analysis of forced turnover.

3. Analysis II: Relations of CEO forced turnover with tenure and managerial ability

3.1. CEO forced turnover and tenure

Our primary interest in this section is to explore how the likelihood of performance-related turnover changes through a CEO's tenure and test the hypotheses as discussed in the Introduction. In Figure 3, we observe that frequency of forced turnover significantly increases in the first 7 years of tenure. However, after that, it decreases.

Figure 3. *Incidence of forced CEO turnover*



3.1.1. Empirical strategy

I employ a Cox semi parametric proportional hazard model although previous literature has extensively used logistic models (e.g. Falato et al., 2015 and Subramaniyan et al., 2002). However, given the right-censored nature of forced turnover data, logistic regressions might lead to inconsistent results. One advantage of the Cox model is that it provides the probability of forced turnover at a given point in time conditional on the fact that CEO has survived up to this point. Moreover, it is semi-parametric and makes no assumption about the nature of the survival distribution.

The hazard function represents the probability of employment termination conditional on the duration lasting up to time t and takes the following form:

$$\lambda\big(t\big|X(t)\big) = \lambda_0(t)e^{\beta^t X(t)} \tag{3}$$

where the X vector includes CEO and firm controls, CEO age, firm size and performance and several other controls for corporate governance. The baseline hazard rate, $\lambda_0(t)$, is a function of time only and it does not depend on the covariates. To estimate β, Cox model uses a semi-parametric technique: the likelihood function is the sum of the probabilities that a CEO-firm relationship is forced to end at a particular time, given that one such event has occurred at time t.

3.1.2. Results

We start with a baseline specification using limited number of controls to estimate equation (3). The failure event is defined as the incident of forced turnover taking value 1 if there is forced turnover, and zero otherwise. Hazard rate is treated as a dependent variable. Therefore, a positive (negative) coefficient implies a positive (negative) marginal impact on the hazard: the covariate induces a shorter (longer) expected time as the CEO. Furthermore, the impact of a unit increase in a covariate over the hazard rate is simply calculated by $e^{\widehat{\beta}}$, where $\widehat{\beta}$ is the Cox estimated coefficient of the covariate.

In Table 13, the results are obtained by using NIA as a performance variable (including ROE and ROA produce qualitatively similar results). For each model in Table 13, the first

specification includes performance measures only; second and third specification includes controls, and controls with interaction terms, respectively. The other controls are firm size, CEO age and industry performance. In all specifications, standard errors are clustered at CEO level and they are adjusted taking into account that multiple error terms can be attributed to each CEO.

Table 13. *CEO performance and forced turnover*

		Model 1			Model 2	
Variable	(1)	(2)	(3)	(1)	(2)	(3)
Firm Perf.	-0.67*** (-3.71)	-0.845*** (-4.11)	3.169 (0.63)			
Size		0.232** (2.93)	0.268*** (3.47)		0.228** (2.91)	0.272*** (3.37)
Age		-0.034*** (-3.37)	-0.034*** (-3.37)		-0.034*** (-3.38)	-0.036*** (-3.41)
Size*Firm Perf.			-0.812* (-2.30)			
Age*Firm Perf.			0.0088 (0.16)			
Adj. Firm Perf.				-0.69*** (-3.83)	-0.854*** (-4.16)	4.505 (1.02)
Industry Perf.				0.294 (1.10)	0.637* (2.35)	6.556 (1.38)
Size*Adj. Firm Perf.						-0.926 (-1.57)
Age*Adj. Firm Perf.						-0.0002 (-0.23)
Size*Ind. Perf.						-1.103 (-1.78)
Number of Obs.	4269	4226	4226	4269	4226	4226
Number of CEOs.	934	915	915	934	915	915
Log Pseudolikelihood	-1162.4	-1039.2	-1038.1	-1161.7	-1039.1	-1037.7

Note: This table presents the estimates from Cox Proportional Hazard Model where hazard rate is the dependent variable. Failure event is defined as performance related departure. Firm performance is measured by Return on Assets (ROA) in Model 1 and in Model 2 by industry-adjusted ROA and 2-digit SIC industry ROA as a measure of industry performance. Robust-clustered (within industry) standard errors are reported in parenthesis. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%.

The results suggest that firm performance, whether adjusted or not, has a negative coefficient: as performance increases, the hazard of forced turnover decreases. The sizes of the predicted coefficients also imply that this effect is economically significant. Age and firm size consistently have opposite effects on the hazard ratio. Holding everything else constant, older CEOs are exposed to a lower hazard of forced turnover. However, the hazard increases as the firm size increases. Intuitively, larger firms attract a greater pool of executives; hence, it is much easier to replace a poorly performing CEO. Firm size is also significant when interacts with firm performance: size increases the sensitivity of hazard of forced turnover to firm performance. Finally, industry performance is only marginally significant. To increase robustness, we add several controls capturing CEO's power on corporate governance. In Table 14, observe that the results do not drastically change and note that the hazard rate of forced turnover is inversely related with both measures of this variable. Now, we illustrate the estimated survival probability using the regression results in Table 14.(7)

Table 14. *CEO performance and forced turnover – More controls*

	Model 1		Model 2	
Variable	(1)	(2)	(1)	(2)
Outsider	-0.247* (-2.41)	-0.243* (-2.37)	-0.244* (-2.35)	-0.250* (-2.41)
Firm Performance	-0.254*** (-5.12)	-0.716* (-2.10)		
Size	0.0180* (1.99)	0.0180* (1.99)	0.0175* (2.94)	0.0170
Age	-0.00379** (-3.26)	-0.00382*** (-3.30)	-0.00380** (-3.27)	-0.00377*** (-3.31)
Share Ownership	-13.82*** (-34.05)	-12.43*** (-32.11)	-12.90*** (-32.73)	-13.02*** (-32.91)
Board Member	-0.254*** (-3.40)	-0.260*** (-3.70)	-0.253*** (-3.39)	-0.157 (-1.05)
Board Member*Firm Perf.		0.00474 (1.42)		
Adjusted Firm Performance			-0.258*** (-5.01)	-0.655 (-1.39)
Industry Performance			0.200*** (3.57)	2.437 (0.86)
Board Member*Adj. Firm Perf.				0.396 (0.86)
Board Mbr.*Industry Perf.				-2.639 (0.86)
Number of Obs.	4226	4226	4226	4226
Number of CEOs.	915	915	915	915
Log Pseudolikelihood	-1022	-1021.9	-1021.5	-1020.7

Note: This table presents the estimates from Cox Proportional Hazard Model where hazard rate is the dependent variable. Failure event is defined as the performance related departure. Sample period covers 1998-2008. In Model 1, firm performance is measured by Return on Assets (ROA). Model 2 uses industry-adjusted ROA and 2-digit SIC industry ROA as a measure of industry performance. Size is proxied by natural lof of Net Sales. Outsider is a dummy which takes value 1 if the CEO is an external hire, 0 otherwise. Share Ownership is a dummy which takes the value 1 if the CEO's ownership is higher than 5% of the total shares of the firm; and 0 otherwise. Board Member is a dummy if the CEO served as a board director for the fiscal year. Robust clustered (within industry) standard errors are reported in parenthesis. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%, respectively.

In Figures 4b and 4c we investigate how probability of survival varies across different performance groups. Observe that for the lowest performer CEOs survival probability gets very close to zero over tenure. This contradicts with the entrenchment theory which suggests that senior CEOs are more entrenched and hence would be more likely to be retained after poor performance.

Finally, we focus on how the hazard rate changes over time and whether its performance sensitivity follows a particular time pattern. In Figure 5, hazard rate increases during approximately 17 years of tenure. The performance sensitivity increases over time as the two hazard functions get further apart through tenure. Since Cox proportional hazard estimation limits the analysis of hazard rate in relation to tenure at a qualitative level, I employ logit regression as a robustness check. Table 15 reports the results (the coefficients reported as marginal effects). Observe that the interaction terms are significant and negative: the performance sensitivity of dismissal probability increases over time, supporting the predictions of career concerns model and Olcay (2016).

Figure 4. *[a] Tenure and Likelihood of Forced CEO Turnover; [b] Tenure and Likelihood of Forced CEO Turnover (Top 25% vs. Bottom 25% Performance); [c] Tenure and Likelihood of Forced CEO Turnover (At Top 5%, Top 25%, Bottom 25% and Bottom 5% Performance)*

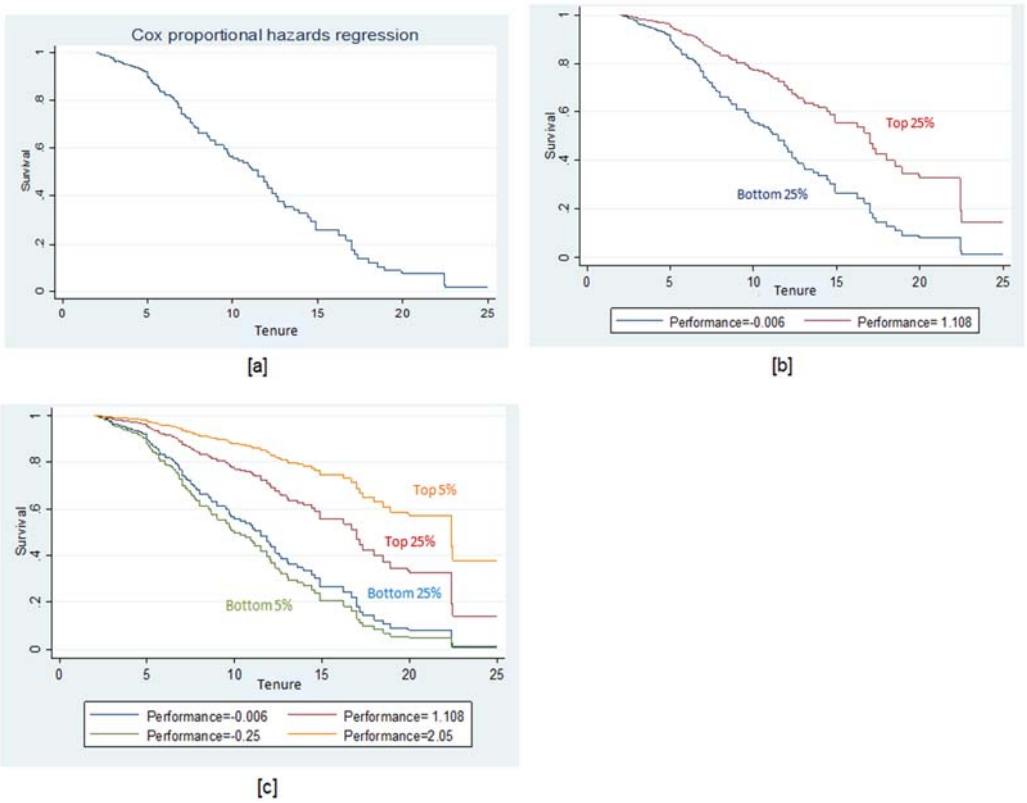


Figure 5. *Incidence of Forced CEO Turnover – Top 25% vs. Bottom 25%*

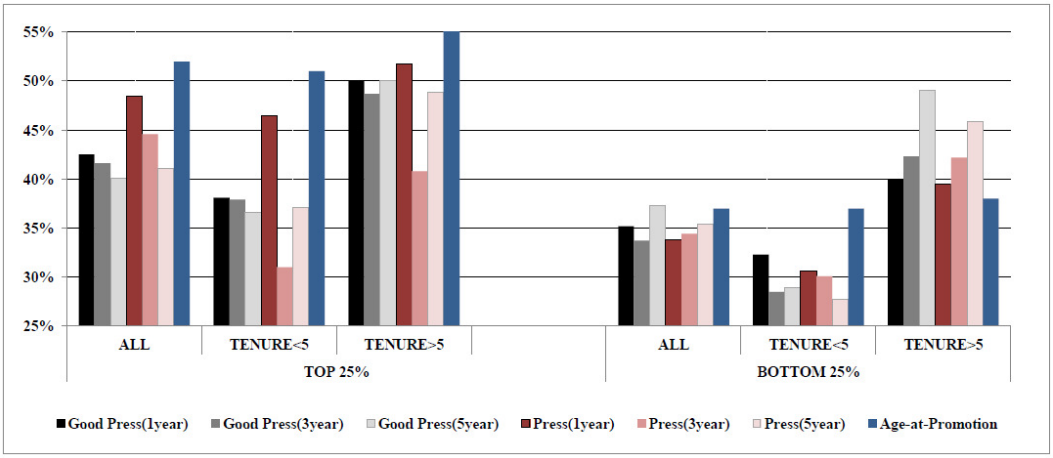


Table 15. *CEO Performance and Forced Turnover – Logit*

Variables	(1)	(2)	(3)	(4)	(5)
Tenure	-0.0006 (0.010)	-0.0007 (0.011)	0.0037 (0.012)	0.0042 (0.012)	0 .0050 (.0127)
Adj. Firm Perf.		-0.0285*** (0.004)	-0.0165 * (0.006)	-0.0162** (0.007)	-0.0158** (0.007)
Industry Perf.		0.0255*** (0.004)	0.0236*** (0.006)	0.0250*** (0.004)	0.0253 (0.0047)
Tenure*Adj.Firm Perf			-0.0016 (0.0006) **	-0.0017** (0.0007)	-0.0018** (0.0008)
Age				0.0032 (0.011)	0.0019 (0.011)
Size				0.0759 (0.074)	0.0643 (0.074)
Board Member				0.1350 (0.554)	-0.4982 (0.728)
Outsider				-0.0474 (0.087)	-0.0507 (0.088)
Board Mbr.*Adj.Firm Perf.					0.0766* (0.044)
Board Mbr.*Ind.Perf.					0.1095 (0.078)
Number of CEOs	912	912	912	912	912
Number of Observations	4309	4309	4309	4309	4309
Log pseudolikelihood	-779.8	-720.6	-709.9	-673.6	-671.6

Note: This table presents the estimates from Logit regression. Dependent variable takes value 1 if the CEO is dismissed due to poor performance, 0 otherwise. Sample period covers 1998-2008. Firm performance is measured by Return on Equity (ROA). Size is proxied by natural lof of Net Sales. Outsider is a dummy which takes value 1 if the CEO is an external hire, 0 otherwise. Share Ownership is a dummy which takes the value 1 if the CEO's ownership is higher than 5% of the total shares of the firm; and 0 otherwise. Board Member is a dummy if the CEO served as a board director for the fiscal year. Robust clustered (within industry) standard errors are reported in parantheses. Level of significance are denoted by ***,**, and * for statistical significance at 1%, 5% and 10%, respectively.

3.2. The impact of ability on forced turnover and tenure-forced turnover relationship

The theories discussed consistently predict that a CEO of higher ability will be less likely to be forced out. However, they differ regarding what they assume about the information on ability. Learning and career concerns models assume imperfect information of the board where true ability is unknown but the belief on ability is updated each time, yet Olcay (2016) assumes no such informational problem.

Before the analysis, in Figure 5 we compare the forced turnover rates of the top and bottom quartiles of the sample population. Observe that the top quartile (CEOs with higher media visibility) experiences a higher forced turnover rate as compared to the bottom quartile regardless of the type of empirical proxy employed. However, the top quartile shows significant variation. For example, when we use Good Press (1year), among the first top 5% of the sample population, the forced turnover rate is 30%. But for the second top 5% and the third top 5% of the sample population, the rates are 37% and 39%, respectively.

3.2.1. Empirical strategy and results

To estimate equation (3) while including ability as an additional covariate, I employ two set of regressions: one with the subsample of outsider CEOs (using the press variable as a proxy for reputation) and second with the subsample of insider CEOs (using Age-at-promotion).

The results for the outsider CEOs are in Tables 16 and 17. All standard errors are clustered at the CEO level.(8) The results suggest a significant impact for media visibility as a proxy for reputational aspects of managerial ability: higher media visibility implies lower estimated hazard of forced turnover. However, coefficients of Press variables in Table 17 are notably lower than their counterparts in Table 16. Not surprisingly, Good Press, which includes only positive reputation, decreases the hazard rate more than Press of whose small fraction accounts for negative reputation. However, there is a common result: the impact of reputation gets weaker as it is measured over longer terms; i.e., the short-term measure has the strongest effect on the likelihood of forced turnover.

Table 16. *CEO performance, forced turnover and reputation – Good Press*

	Model 1		Model 2		Model 3	
Variables	(1)	(2)	(1)	(2)	(1)	(2)
Adj. Firm Perf.	-0.214*	-0.0809	-0.224*	-0.0451	-0.207	-0.118
	(-2.24)	(-0.45)	(-2.41)	(-0.23)	(-1.96)	(-0.68)
Industry Perf.	-0.487	-0.439	-0.489	-0.418	-0.193	-0.184
	(-1.43)	(-1.12)	(-1.45)	(-1.01)	(-0.88)	(-0.67)
Good Press(1y.)	-.0006***	-0.0002				
	(-3.85)	(-0.57)				
Good Press(1y.)*						
Adj. Firm Perf.		-0.00541				
		(-1.17)				
Good Press(1y.)*						
Ind. Perf.		-0.00423				
		(-0.75)				
Good Press(3y.)			-.00019**	-0.00006		
			(-3.64)	(-0.53)		
Good Press(3y.)*						
Adj. Firm Perf.				-0.00147		
				(-1.32)		
Good Press(3y.)*						
Ind. Perf.				-0.0008		
				(-0.63)		
Good Press(5y.)					-0.00010*	-0.00007
					(-2.25)	(-1.08)
Good Press(5y.)*						
Adj. Firm Perf.						-.000006
						(-1.03)
Good Press(5y.)*						
Ind. Perf.						-0.0004
						(-0.64)
Age	-0.00394*	-0.0039*	-0.0038*	-0.0038*	-0.0042*	-0.0043*
	(-2.28)	(-2.26)	(-2.28)	(-2.16)	(-2.31)	(-2.30)
Firm Size	0.0454	0.0449	0.0444	0.0434	0.0346	0.0339
	(1.92)	(1.76)	(1.86)	(1.70)	(1.56)	(1.45)
Share Ownership	-2.550***	-3.787	-3.822	-3.821	-3.839	-3.841
	(-17.82)	(.)	(.)	(.)	(.)	(.)
Board Member	-0.46***	-0.43***	-0.46***	-0.44***	-0.46***	-0.45***
	(-7.02)	(-7.21)	(-7.16)	(-7.68)	(-8.30)	(-7.74)
Number of Obs.	559	559	490	490	372	372
Pseudo Log.	-101.68	-101.23	-101.91	-101.28	-80.64	-80.39

Note: This table presents the estimates from Cox Proportional Hazard Model where hazard rate is the dependent variable. Failure event is defined as the performance related departure. Sample period covers 1998-2008. Firm performance is measured by Return on Equity (ROA). Size is proxied by natural lof of Net Sales. Outsider is a dummy which takes value 1 if the CEO is an external hire, 0 otherwise. Share Ownership is a dummy which takes the value 1 if the CEO's ownership is higher than 5% of the total shares of the firm; and 0 otherwise. Board Member is a dummy if the CEO served as a board director for the fiscal year. Press1, Press 3 and Press 5 count the number of articles in which CEO's names appeared during the last 1 year, 3 years, and 5 years prior to the fiscal year. The number only includes articles with positive or neutral connotations. Robust clustered (at the CEO level) standard errors are reported in parentheses. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%, respectively.

Table 17. *CEO performance, forced turnover and reputation – Press*

	Model 1		Model 2		Model 3	
Variables	(1)	(2)	(1)	(2)	(1)	(2)
Adj. Firm Perf.	-0.211* (-2.23)	-0.0926 (-0.55)	-0.223* (-2.41)	-0.0496 (-0.26)	-0.207 (-1.94)	-0.123 (-0.72)
Industry Perf.	-0.488 (-1.44)	-0.457 (-1.17)	-0.489 (-1.45)	-0.421 (-1.02)	-0.195 (-0.88)	-0.187 (-0.69)
Press(1y.)	-.0005*** (-4.40)	-0.0001 (-0.60)				
Press(1y.)*						
Adj. Firm Perf.		-0.0044 (-1.18)				
Press(1y.)*						
Ind. Perf.		-0.003 (-0.75)				
Press(3y.)			-.0001*** (-4.24)	-0.00005 (-0.59)		
Press(3y.)*						
Adj. Firm Perf.				-0.0012 (-1.27)		
Press(3y.)*						
Ind. Perf.				-0.0007 (-0.64)		
Press(5y.)					-.00009* (-2.30)	-.00006 (-1.24)
Press(5y.)*						
Adj. Firm Perf.						-.000005 (-0.98)
Press(5y.)*						
Ind. Perf.						-0.00035 (-0.62)
Age	-0.0039* (-2.31)	-0.004* (-2.32)	-0.0038* (-2.29)	-0.0038* (-2.18)	-0.0042* (-2.33)	-0.0043* (-2.32)
Firm Size	0.0460 (1.93)	0.0456 (1.78)	0.0448 (1.86)	0.0440 (1.72)	0.0353 (1.58)	0.0349 (1.49)
Share Own.	-2.502*** (-17.53)	-2.435*** (-17.45)	-3.822 (.)	-3.822 (.)	-3.840 (.)	-3.841 (.)
Board Mbr.	-0.46*** (-7.07)	-0.43*** (-7.09)	-0.47*** (-7.34)	-0.44*** (-7.65)	-0.47*** (-8.41)	-0.46*** (-7.64)
Number of Obs.	559	559	490	490	372	372
Pseudo Log	-101.61	-101.18	-101.85	-101.25	-80.55	-80.27

Note: This table presents the estimates from Cox Proportional Hazard Model where hazard rate is the dependent variable. Failure event is defined as the performance related departure. Sample period covers 1998-2008. Firm performance is measured by Return on Equity (ROA). Size is proxied by natural lof of Net Sales. Outsider is a dummy which takes value 1 if the CEO is an external hire, 0 otherwise. Share Ownership is a dummy which takes the value 1 if the CEO's ownership is higher than 5% of the total shares of the firm; and 0 otherwise. Board Member is a dummy if the CEO served as a board director for the fiscal year. Press1, Press 3 and Press 5 count the number of articles in which CEO's names appeared during the last 1 year, 3 years, and 5 years prior to the fiscal year. Robust clustered (at the CEO level) standard errors are reported in parentheses. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%, respectively.

Finally, we employ Age-at-promotion. Note that higher values signal lower ability. Therefore, the results in Table 18 suggest that there is a significant and inverse relationship between ability and dismissal probability, reinforcing our results with reputation. Note that these results support the predictions of the previously discussed theoretical models. However, we find no significant impact of ability regarding the performance sensitivity of this incentive tool.

Table 18. *CEO performance, forced turnover and ability (Age-at-promotion)*

	Model 1		Model 2	
Variables	(1)	(2)	(1)	(2)
Age-at-promotion	0.0213* (2.19)	0.0314* (1.97)	0.0196* (2.08)	0.0266* (2.12)
Adjusted Firm Perf.			-0.00106* (-2.32)	-0.613 (0.95)
Firm Perf.	-0.199 (-0.93)	0.707 (0.74)		
Industry Perf.			-0.187 (-0.85)	
Age-at-promotion*Adj. Firm Perf.				-0.0178 (-1.35)
Age-at-promotion*Firm Perf.		-0.0198 (-0.92)		
Age-at-promotion*Adj. Firm Perf.				-0.0223 (-0.55)
Size	0.00890 (0.76)	0.00889 (0.75)	0.0102 (0.84)	0.00891 (0.74)
Share Ownership	-14.36 (.)	-9.323*** (-26.96)	-9.770*** (-28.19)	-10.19*** (-28.75)
Board Member	0.438 (.)	-0.296 (-1.40)	-2.699 (.)	0.695 (.)
Number of Obs.	1565	1565	1565	1565
Number of CEOs	364	364	364	364
Log-pseudo likelihood	-182.76	-182.6	-182.64	-182.38

Note: This table presents the estimates from Cox Proportional Hazard Model where hazard rate is the dependent variable. Failure event is defined as the performance related departure. Sample period covers 1998-2008 and internally-hired CEOs. In Model 1, firm performance is measured by Return on Assets (ROA). Model 2 uses industry-adjusted ROA and 2-digit SIC industry ROA as a measure of industry performance. Size is proxied by natural lof of Net Sales. Share Ownership is a dummy which takes the value 1 if the CEO's ownership is higher than 5% of the total shares of the firm; and 0 otherwise. Board Member is a dummy if the CEO served as a board director for the fiscal year. Ability is proxied by the age of CEO at the time of promotion. Robust clustered (at the CEO level) standard errors are reported in parentheses. Level of significance are denoted by ***, **, and * for statistical significance at 1%, 5% and 10%, respectively.

4. Concluding comments

Both total pay and threat of dismissal are common tools to provide incentives for top executives. I study the impact of tenure, managerial ability and their interactions on the use of these incentive tools. I examine the predictions of several theories (namely, Murphy (1986), Gibbons and Murphy (1992), Hermalin and Weisbach (1998) and Olcay (2016)) to test the significance of these variables on both CEO pay and likelihood of forced CEO turnover.

Using a sample of firms in S&P 1500, I find a positive relationship between tenure and total pay, in support of all the theories discussed. However, the results on survival probability over tenure rule out the entrenchment effects as suggested by Hermalin and Weisbach (1998). This result, together with the strong connection of performance with the two devices, could be interpreted in favour of the optimal contracting models (Murphy, 1986; Gibbons and Murphy, 1992, and Olcay, 2016): incentives matter and firms use both instruments more strongly as the CEO is more senior in her tenure.

In order to explore how executive contracts are associated with managerial ability, I use two different proxies. For outsider CEOs, a media visibility measure, aiming to capture

reputational aspects of ability, and for insiders, age at time of promotion are employed. In line with the theoretical predictions, I find that reputation increases pay, yet with stronger impacts for more current measures. Reputation also decreases dismissal probability, but again current measures have stronger impacts. For insiders, ability is found to reinforce the adverse impact on the dismissal probability. These findings support the theoretical literature on optimal contract design. Furthermore, I find evidence for the predictions of Gibbons and Murphy (1992) and Olcay (2016) that the dismissal probability becomes more sensitive to performance over tenure. Finally, to inspire future theoretical work on executive contract design, I examined ability for its potential impact on tenure sensitivity of the two incentive tools and found that only a short-term measure has a significant impact and it decreases the tenure sensitivity of pay.

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Notes

(1) This is consistent with previous studies, 12.2% (Parrino, 1997), 9.3% (Denis et al., 1997).

(2) In line with fixed effects assumption, all regressions in this section report a correlation between vector of controls and individual fixed-effects.

(3) One could instead analyze the pay-performance sensitivities which requires to calculate both share and option sensitivity which necessitate calculation of the prices of outstanding options unreported in the annual statements. See Guay (2002) for a recent estimation technique to overcome this issue.

(4) The use of single performance measure is as common as the use of multiple performance measures. Murphy (1998) documents that even when multiple measures are used, they are additive and can be treated like separate plans, e.g. 80% of the cash compensation is based on NIA and 20% is based on ROA, with a separate schedule relating cash compensation to each performance measure.

(5) These could be contrasted with other studies which estimate pay-to-performance sensitivities using a change in share holder value as a performance variable. For example, Jensen and Murphy (1990), reports an estimated pay-to-performance sensitivity of 0.325 for a sample of Forbes executives.

(6) Related p-values for F-test are 0.1719, 0.1897 and 0.1766 in Table 9 for model specifications 1, 2 and 3, respectively.

(7) This is done using Model 2. Model 1 yields qualitatively similar results

(8) Since firm performance, either adjusted or not, produces qualitatively similar results, I present only the estimation results with adjusted firm performance.

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Appendix

Publications included in the search to construct the media visibility variables: Businessweek, Dow Jones News Service, Financial Times, Forbes, Fortune, International Herald Tribune, Los Angeles Times, The Economist, The New York Times, The Wall Street Journal, The Wall Street Journal Asia, The Wall Street Journal Europe, The Washington Post, USA Today.

Our Good Press proxy excludes from the total count articles containing the following keywords (taken from Falato, 2015): scandal or investigate* or (cut w/2 jobs) or resign* or (force* w/3 quit) or dismiss* or demote* or demotion or accuse* or criticism* or allegation* or indict* or arrest* or guilty or fraud or litigation or abrasive or excessive pay or overpaid or perquisites or (force* w/3 step down) or under scrutiny or under pressure or law suit or class action or in trouble.