

# Learning through a Smokescreen: CEO Compensation over Tenure

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**Preliminary and Incomplete**  
First Draft: December 2013

## ABSTRACT

In this paper we investigate the dynamics of executive compensation over the tenure of the CEO in a firm, where shareholders learn about a CEO's ability and the quality of the CEO-firm job match in the presence of reporting distortions. Career concerns are very high in the early years of tenure because of incomplete information and shareholders update their beliefs using current firm performance which, as suggested by Fudenberg and Tirole (1995), may be distorted by CEOs to maximize the expected length of their tenure. We consider the dynamics of CEO compensation using 1,624 completed tenure spells in 1,023 firms from 1992 to 2009 and use Altonji and Shakotko's (1987) methodology to account for job match and firm effects. While earnings management is found to influence compensation, this effect diminishes over the CEO's tenure. CEOs that decrease earnings management the most experience the highest increase in compensation. We show that the effect of career concerns varies based on CEO and firm characteristics. Consistent with the theory, earnings management is observed to have a stronger influence on compensation for CEOs without a fixed term employment contract, younger CEOs, firms in more competitive industries, and with fewer institutional investors. These results suggest that both managers and firms learn about CEO ability and the quality of the job match over the tenure of the CEO, and that this learning process is affected by the career concerns of CEOs.

*JEL classifications:* G3; G32; G38; J22; K22

*Keywords:* Executive Compensation; Tenure; Earnings Management; Career Concerns

**Acknowledgments:** We are grateful for comments received from Utpal Bhattacharya, Sreenivas Kamma, Marco Pagano, Tullio Jappelli, Robert Jennings, Anjan Thakor, Nick Williams, and seminar participants at Indiana University and University of Naples Federico II.

## 1. Introduction

Career concerns, which arise when a CEO's *current performance* is linked to future compensation (Gibbons and Murphy (1992)), are likely to be particularly critical during the early years of the CEO's tenure when the lack of past performance measures makes it harder for shareholders to disentangle random fluctuations in performance from the CEO's inherent ability and the quality of the match with the firm.<sup>1</sup> In this environment, both firms and managers learn about true managerial ability and the quality of the CEO-firm job match by observing recent performance measures (Harris and Holmstrom (1982), and Holmstrom and Ricart I Costa (1986)). At the same time, Fudenberg and Tirole (1995) argue that in an environment with "information decay", where recent performance measures are better than older ones for predicting future performance, managers have an incentive to distort reported earnings to maximize the chances of survivability and thus the length of their tenure. In this paper, we investigate the dynamics of executive compensation over a CEOs' tenure at a firm, when shareholders learn about CEO ability and the quality of the job match with the firm, in the presence of reporting distortions used strategically by CEOs for survival purposes.

Recent evidence suggests that earnings management may influence the level of CEO compensation (see for example Safdar (2003), Burns and Kedia (2006), Bergstresser and Philippon (2006), Efendi, Srivastava, and Swanson (2007), and Cornett, Marcus, and Tehranian (2008)). The importance of performance measures for compensation creates an incentive for CEOs to distort reported performance in order to increase their expected tenure (Fudenberg and Tirole, 1995). As noted by Gibbons and Murphy (1992), career concerns imply that the further a worker is from retirement, the more willing he is to take costly unobservable actions in order to influence the market's belief. Over time and with more information, however, shareholders should be able to "see through" any distorted reported performance with a consequent decay of earnings management's importance in the compensation choices made by shareholders, over the tenure of a CEO.

While the dynamics of compensation over tenure has not received adequate attention in the empirical executive compensation literature<sup>2</sup>, theory suggests that compensation will increase

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<sup>1</sup> Fama (1980), one of the first to discuss career concerns, argued that the discipline imposed by the managerial labor market made incentive contracts for CEOs redundant. Holmstrom (1982) showed that, while labor market discipline is important, it is not a perfect substitute for incentive contracts.

<sup>2</sup> The notable exceptions are Murphy (1986), Gibbons and Murphy (1992), and Cremers and Palia (2011).

over a CEO's tenure as more information is revealed about the CEO's performance, and due to accumulation of job-specific human capital (see Becker (1962), Mincer (1974), Parsons (1972), Kuratani (1973), and Hashimoto (1980), among others). To consider the effect of tenure on compensation we need to also consider that tenure is influenced by reported performance, which may be distorted by the CEO's actions. At the very least, one has to disentangle the effect of tenure as a measure of the CEO's firm-specific skills from the effect that earnings management, a la Fudenberg and Tirole (1995), has on compensation via its impact on CEO tenure.<sup>3</sup>

To examine the dynamics of CEO compensation over the tenure of the CEO and in the presence of earnings management, we use data on 1,624 completed CEO tenure spells in 1,023 firms forming part of the S&P 1500 index over the period 1992 to 2009. We remove year 0, i.e. the year of the CEO turnover, from our analysis because it is well known that incoming CEOs often engage in "big bath" accounting practices in their incoming year (Murphy and Zimmerman (1993)) to make their performance look good in subsequent years. Specifically, we examine the effects of tenure, various measures of earnings management, and the interaction between the tenure and earnings management, on total CEO compensation, controlling for other firm characteristics that are likely to affect compensation and using a methodology that takes into account the CEO-firm match.

Identifying the effect of tenure on compensation is made more difficult by the well-known problem that a positive relationship between tenure and compensation may arise because of unobserved CEO ability and firm factors, or the quality of the CEO-firm match. The concern about the job match effect is particularly important in the context of how compensation evolves over the CEO's tenure, but has been largely ignored in the executive compensation literature.<sup>4</sup> While good CEO-firm matches survive, bad matches do not. Therefore, CEOs that last longer may have higher compensation because they have located jobs where their productivity is high. Furthermore compensation increases over tenure on average because of better allocation of CEOs with the requisite skills to jobs that are a better fit for these skills. Therefore, to measure the compensation and tenure relationship, we must control for the ability of the CEO, firm-level

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<sup>3</sup> Using a normal learning process, Harris and Holmstrom (1982) argue along the same lines: the workers' market wage should be her current mean perceived productivity minus a term which depends only on the precision of beliefs about her productivity and her age. This second term may be thought of as an insurance premium for the downward rigidity of wages.

<sup>4</sup> Jovanovic (1979) and Johnson (1978) provided the first theoretical work about the importance of job matches as an explanation for both workers' tenure and their wage growth.

heterogeneity, and the quality of the CEO-firm match. We also note that earnings management is also a choice variable, and as such is likely to be correlated with unobserved ability, firm, and job match effects. We address these concerns by applying a modified version of the Altonji and Shakotko (1987) instrumental variable methodology (henceforth referred to as AS), which is widely used in the labor economics literature to examine the effect of tenure on wages. In the modified AS approach, we control for the firm effect and the job match effect.<sup>5</sup>

Using the entire sample of completed spells we find that the level of total CEO compensation increases with tenure, which is consistent with the argument that uncertainty about CEO ability and job match is resolved over time, as well as with the human capital argument that the CEO is compensated for job-specific human capital investment. Importantly for our research question, we find strong evidence that while on average earnings management appears to be positively related to compensation, the effect decreases rapidly over the tenure of the CEO. The impact of earnings management disappears around the fourth year of a CEOs' tenure.

The decreasing impact of earnings management on total CEO compensation over a CEO's tenure is consistent with Fudenberg and Tirole (1995). First, the impact is greater in the early years of tenure, when the CEO's concerns about survival are likely to be at their peak. Second, the impact decays over tenure as shareholders' uncertainty about CEO's ability and the quality of match decreases as more information is revealed over time. The results are also broadly consistent with Harris and Holmstrom (1982). First, as seniority in the job increases (tenure is extended) CEOs should have had more chances for their compensation to be bid up, and, second as they survive and more information is produced they should pay a lower insurance premia because their ability can be more precisely assessed.<sup>6,7</sup>

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<sup>5</sup> Since we do not observe CEO transitions across multiple firms, we cannot separately identify an individual effect and a job match effect, and refer to the sum of these as the job match effect. This is due to the specificity of the CEO market where there are very few transitions of CEOs across firms. The problem of disentangling time-invariant CEO effects, given the very limited mobility of CEO across firms, was also highlighted by Graham, Li and Qiu (2012), who focus on this dimension but do not control for the job-match effect.

<sup>6</sup> The first set of results about the relationship between tenure and compensation may also be consistent with the dynamic contracting hypothesis of Edmans, Gabaix, Sadzik and Sannikov (2009). Intertemporal risk sharing occurs in this model where the rewards to CEO's effort are spread across all future periods. Thus a higher compensation level will be required as tenure increases, because a risk-averse more-experienced CEO gets less utility from an increase in wealth as she is forced to consume it over fewer periods. However, the dynamic contracting theory has nothing to say about the use of earnings management, and its dynamic impact on CEO compensation across tenure.

<sup>7</sup> While the results on the impact of tenure on compensation may be consistent with the entrenchment hypothesis of Bebchuk and Fried (2004), because entrenchment should increase with tenure (thus, through their power, entrenched CEOs may set their own compensation), the entrenchment hypothesis has nothing directly to say about the dynamics

While the AS method controls for unobservable heterogeneity at the firm level, and for the CEO-firm match effect, we also undertake an instrumental variable analysis using instruments for earnings management based on Hazarika et al. (2012). Specifically, the instrumental variable estimates control for CEO and firm fixed effects, and for time-varying unobservable heterogeneity. The results are robust to this alternate methodology.

Next, we investigate cross-sectional heterogeneity in the dynamics of CEO compensation based on CEO and firm characteristics to examine whether and how career concerns affect the influence of tenure and earnings management on the level of compensation. First, if CEOs use more earnings management at the beginning of their tenure, and shareholders learn about the CEO and match over time, we should find that CEOs with high ability or whose match with the firm is of high quality should reduce earnings management most over their tenure. This, in turn, should mean that the CEOs who decrease earnings management the most should be rewarded by the largest increase in compensation. Such an increase is consistent with the Harris and Holmstrom (1982) hypothesis that resolution of uncertainty is largest for these CEOs. This is precisely what we find: CEOs who decrease earnings management most over time with respect to the first year of tenure, experience the largest increase in their level of compensation over their tenure.

Second, Fudenberg and Tirole (1995) note that CEOs may be more likely to distort reported performance if the firm cannot commit to a long-term employment contract. Indeed, if a CEO engages in performance distortion as an insurance device to increase the likelihood of survival then one should not expect such behavior if the CEO's position is covered by a long term contract. We use hand-collected data on the type of contract, if any, given to a CEO at the time of the appointment. These contracts can be of two types: either a fixed-term employment contract or an at-will employment contract. The former is a long-term type of contract while the latter is a short-term contract. We find that the dynamics of earnings management described above are driven by the CEOs without any contract or with an at-will employment contract. Indeed we find that CEOs with a fixed-term employment contract show lower earnings management and their compensation is not sensitive to the level of earnings management and its evolution through time. Thus, consistent with Fudenberg and Tirole (1995) and the career

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of earnings management on compensation over tenure. In fact, more entrenched CEOs may be more likely to use their power to manage more earnings over tenure. However, our evidence shows the opposite.

concerns argument, when given a long-term contract, CEOs are less likely to use earnings management to distort reported performance. Since on average the fixed term contracts' duration is about three years, these results explain, at least partially, the difference in the behavior of CEOs with and without a contract: it is precisely in the first few years of tenure that earnings management is mostly commonly used.

Third, as suggested by Gibbons and Murphy (1992) we should expect that career concerns are more important for younger CEOs compared to older CEOs, who are closer to retirement. Consistent with this hypothesis, we find that younger CEOs are more likely to use earnings management early on in their tenure compared to older CEOs, and the dynamics between earnings management and compensation across tenure is present only for younger CEOs.

Another important dimension that determines the CEO's propensity to use earnings management is the level of firm-level monitoring that she faces and the sophistication of the firm's shareholders. Shareholders should take into account the possibility of earnings management in the early part of the CEOs' tenure, but they may fail to infer precisely the value of true performance, because they are uncertain about the CEO's ability to distort performance. This is consistent with Dye (1988) where the message space of shareholders may be limited to a single-dimensional signal whereas the CEO, being the privately-informed agent, receives multiple informational signals.<sup>8</sup> However, we know that since CEOs face different levels of investor sophistication and monitoring, these firm-level dimensions may determine the actual amount of earnings management CEOs engage into. We use the presence of institutional investors (13F institutions) in the firm's ownership structure to proxy for the level of monitoring and sophistication of shareholders.<sup>9</sup> We find that CEOs in firms with more institutional owners are less likely to engage in earnings management throughout their tenure, and find no relationship between earnings management dynamics across the tenure horizon compared to CEOs in firms with lower institutional ownership.

Earnings management may also be a function of the demand by the CEO for such behavior: for example, a newly-appointed CEO in an industry with high product market competition, whose survival is at greater risk, may need to engage in more earnings

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<sup>8</sup> In other words, the Revelation Principle does not hold in this environment.

<sup>9</sup> We also use the size of the Board of Directors as another proxy for the level of monitoring CEOs face.

management. We find evidence consistent with this hypothesis. Finally, we also investigate how the earnings management dynamics over tenure may be different between insider CEOs – those who have been promoted from within the firm – and outsider CEOs – those who have been appointed from outside the firm. We find no evidence that the earnings management dynamics over the tenure of insiders CEOs are different from those of outsiders. This is consistent with Gibbons and Murphy’s (1992) argument that prior experience serving at lower levels in the corporation is “unlikely to yield precise information about the individual’s potential performance as CEO”. We find that what matters for how earnings management’s evolution influences compensation in the case of insiders is whether they are given a fixed-term employment contract or an at-will contract (or no contract), confirming the importance of such agreements for our research question.

Our results suggest the use of earnings management by CEOs early on in their tenure as one possible way to deal with the uncertainty that exists about their ability and the quality of the match and increase the survivability on the job (insurance motive). More importantly, we find that the impact of earnings management over compensation decreases over time. This result, coupled with the findings of Hazarika et al. (2012) who show that CEOs with higher earnings management are more likely to be fired by the firm, imply that CEOs whose ability or whose match with the firm are found to be acceptable to shareholders remain on the job and are rewarded with higher compensation. One may ask whether the use of earnings management over the CEOs’ tenure is an optimal response given that such behavior may be costly. As Hermalin and Weisbach (2008) and Fudenberg and Tirole (1995) demonstrate, it is very likely that the optimal amount of earnings management is higher than zero for most firms. Monitoring CEOs’ actions in the first few years of the tenure, when such uncertainty exists, and detecting performance distortion is a costly activity as well. Recently appointed CEOs may also need to be given some space by the shareholders to find their feet. Thus, while Clikeman (2003) and Leuz, Nanda, and Wysocki (2003) show that earnings management may be costly in the cross-section, the dynamics that we describe in this paper may emerge as one type of response that firms and CEOs have to address uncertainty and career concerns.

Evidence suggests that earnings management may be costly for firms (see, amongst many others, Dechow, Sloan, and Sweeney (1996), Palmrose, Richardson, and Scholz (2004), Karpoff, Lee, and Martin (2008), Hennes, Leone, and Miller (2008), Gande and Lewis (2009),

and Karpoff and Lou (2010)), and Hazarika, Karpoff and Nahata (2012) show that earnings management increases the likelihood of a forced CEO turnover. Shareholders can take actions to control such behavior but such actions crucially depend on the shareholders' ability to disentangle real performance from distorted reported performance, which may be more difficult in the early years of the CEO's tenure. Over time, and with more information updates, shareholders should have enough information that can be used to assess correctly the CEO's ability and quality of the match. Our results suggest that managers may use earnings management to increase compensation, but this effect diminishes over time.

Our paper makes a contribution to two main strands of the literature. First, most of the empirical literature on executive compensation investigates mostly the cross-sectional dimension, i.e. how compensation varies across firms and sectors. Gibbons and Murphy (1992) and, more recently, Cremers and Palia (2011), investigate an under-researched area in executive compensation: how compensation changes over the tenure of the CEO. Murphy (1986) models and empirically examines implications of multi-period managerial labor contracts under two alternative hypotheses: incentives (where productivity depends on unobservable managerial effort), and learning (where ability is revealed over time). While the evidence supports both arguments, the learning hypothesis appears to be a better fit for the results, which show that earnings growth decreases with experience. We make two contributions to this literature. As suggested by Fudenberg and Tirole (1995), we introduce the distortions that CEOs can make to reported performance to survive on the job, and investigate how the interaction of these distortions with (over) tenure influence compensation. Thus, we are the first – to our knowledge – to consider how CEOs change their earnings management over tenure and, through the use of the AS methodology, disentangle the effect of tenure as a measure of the CEO's firm-specific skills from the effect that earnings management has on compensation via its impact on CEO tenure. Second, we also make a contribution to the large literature on firm transparency, showing how earnings management is strategically used by incoming CEOs due to career concerns and its impact on compensation.

The remainder of the paper is organized as follows. Section 2 discusses the sample construction and the empirical methodology. Section 3 and 4 describe the results, and, Section 5 concludes.



## 2 Data and Empirical Methodology

### 2.1 Data

We obtain data from a variety of sources. We identify all CEO turnovers from the Standard & Poor's ExecuComp database over the period 1992–2010. From these data we exclude interim CEO appointments, i.e. CEOs with tenure of two years including the year of the appointment, and retain CEOs for whom we observe consecutive years from at least the first year of appointment. Following the literature, financial firms (6000-6999) and regulated utilities (4900-4999) are excluded. The final sample includes 1,624 CEO turnovers in 1,023 firms for a total of 7,941 firm-year observations. All variables used in the analysis are described in Appendix A.

We focus on the level of total compensation, and collect the relevant variable (TDC1) recorded by ExecuComp. We use the natural logarithm of total compensation for our compensation specifications.

Firm-level control variables that have been found to influence compensation (such as return on assets, market-to-book ratio, leverage etc.) are obtained from Compustat, and data on share prices and number of shares outstanding from the Center for Research in Security Prices (CRSP). The institutional ownership data are from Thomson Financial. We have complete information about compensation and earning management measures for 7,628 firm-year observations. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles.

As career concerns are likely to influence CEOs differently, depending on their characteristics, we collect data on (a) whether a CEO has an employment contract with the firm and its type (fixed term vs. at-will), (b) CEO's age at the time of appointment, and (c) whether a CEO is promoted internally (insider) or recruited from outside the firm (outsider).

The Securities Exchange Act of 1934, Regulation S-K, Item 402 requires that firms disclose information about the employment contract terms between the firm and the CEO. Similar to Schwab and Thomas (2005), Gillan et al. (2009), and Xu (2011), we collect information about the existence of an employment contract and its terms (fixed term or at-will) from SEC filings.<sup>10</sup> For each CEO in the sample, we collect information about CEO age at the

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<sup>10</sup> In a fixed term contract, the firm's commitment is to pay compensation to the CEO for a specific number of years and should continue to do so if it terminates employment without cause. Under at-will contract, the employment relationship can be terminated by both the employer and the employee for "good cause, for no cause, or even for

time of appointment and year of appointment from ExecuComp and, if the data is missing (and to check its correctness), we also search the Factiva and Lexis-Nexis databases. We also obtain data about whether the newly appointed CEO is an insider (defined as a CEO who was an employee of the firm for at least five years before being appointed as the CEO), or an outsider from ExecuComp, Factiva, and Lexis-Nexis by reading the press statements and related news issued by the companies in our sample around the date of the CEO appointment.

## 2.2 Measures of Earnings Management

As highlighted in the literature,<sup>11</sup> the degree of accounting transparency of a firm is inversely related to the degree of earnings smoothing and discretion: both measures should capture the extent to which CEOs misstate the firm's true economic performance. Earnings smoothing measures gauge the extent to which management dampens fluctuations in reported earnings relative to true earnings, thus increasing accounting opacity. Another measure of accounting opacity is earnings discretion, namely the latitude that management has in reporting – and thereby misstating – earnings, based on the extent and use of accounting accruals.

We first compute earnings management measures at the firm level, and then disentangle other measures into their “normal” and “abnormal” components, thereby obtaining firm-level measures of excessive earnings smoothing and earnings discretion. As shown in the accounting literature (for example Francis et al. (2005)), the informativeness of reported earnings is influenced by various factors, such as environmental uncertainty and industry affiliation, as well as by intentional estimation mistakes arising from insiders' incentives to reduce transparency. In keeping with the maintained hypothesis, we want to capture exclusively management's intentional errors to reduce transparency. We use the *abnormal* component of earnings smoothing and earnings discretion without the use of any control variables.

We use four different measures of accounting transparency. The first earnings management measure (EM1) is based on an approach that disentangles normal from abnormal accruals using performance-augmented modified Jones model as in Hazarika, Karpoff and Nahata (2012). We use the Fama-French 48 industry-groups to compute industry-specific and year-specific

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cause morally wrong, without being thereby guilty of legal wrong” (Payne vs. Western & Atlantic Railroad Co., 81 Tenn. 507, 519-520, 1884 WL 469 (September Term, 1884).

<sup>11</sup>See, for example, Jones (1991), Dechow and Dichev (2002), Dechow et al. (2010), Francis, LaFond, Olsson and Schipper (2005), and Leuz, Nanda and Wysocki (2003).

parameter estimates that then give us firm-specific normal accruals. Following the literature, we exclude all firm-year observations that do not have sufficient data to estimate any of the measures of earning management and when there are fewer than ten observations in a Fama-French 48 industry group for any specific year. We then proceed to compute the absolute level of abnormal accruals by subtracting normal accruals from actual accruals. Appendix A explains the details of how we calculate this and the other three measures of accounting transparency.

### **2.3 Sample Description**

Table 1 provides the descriptive statistics of our sample of completed spells. Panel A shows the number of CEOs in each year of their tenure, Panel B shows the number of CEO turnovers in each calendar year over our sample period together with the CEO characteristics (insiders, young CEOs and CEOs with fixed-term contract), Panel C shows the distribution of the main compensation variables and the four main measures of earnings management and Panel D shows the correlation between tenure, compensation variables and earnings management measures.

[Insert Table 1]

From Panel A, we note that out of the 1,624 CEO appointments over our sample period, almost 300 CEOs are not observed any longer in our data at the start of the fourth year and another 300 CEOs drop out in the fourth year. Only 555 CEOs of the original 1,624 CEOs start the seventh year of their tenure. These statistics show that the probability of termination is high in the first four years of tenure. These terminations may be voluntary or forced turnovers (firings), or retirements. Panel C shows that, consistent with existing literature, the median (mean) tenure of a CEO is 7 (7.24) years. The average (median) CEO's age at the time of appointment is 51 (52) years, almost 40% of the CEOs are promoted from inside the firm, and more than 50% of the CEOs start their tenure with an employment contract. The mean and median values of the four earnings management measures are consistent with those found in existing literature. Importantly, Panel D shows that the total level of compensation is positively correlated with tenure and negatively correlated with all four measures of earnings management. Furthermore, the total level of compensation is negatively correlated with earnings management measures.

## 2.4 Empirical Methodology and Results

The labor economics literature suggests several theories for why compensation may increase with tenure. The human capital argument discussed by Becker (1975), and Mincer (1974), among others, suggests that additional years on the job imply accumulated job-specific skills, which are rewarded with higher compensation by the current employer. Other explanations for the compensation and tenure relationship rely on uncertainty about the innate ability of the worker, and the quality of the job match. CEO compensation may increase over the tenure of the CEO because good CEO job matches survive, while bad matches do not. In this case, we may observe a positive relationship between compensation and tenure on average because of a better allocation of CEOs to jobs that match their skills, instead of job-specific skills. Moreover, earnings management is also likely to be affected by unobserved job match and firm effects. Therefore, to measure the compensation, tenure, and earnings management relationship, we must control for the quality of the CEO-firm match.

Following the labor economics literature we specify the compensation distribution as follows:

$$Y_{i,j,t} = \beta_1 T_{ijt} + \beta_2 T_{ijt}^2 + \beta_3 EM_{ijt} + \beta_4 T_{ijt} \times EM_{ijt} + \beta_5 T_{ijt}^2 \times EM_{ijt} + \beta_6 X + \varepsilon_{ijt} \quad (1)$$

$$\varepsilon_{ijt} = \alpha_i + \alpha_j + \alpha_{ij} + \eta_{ijt}$$

where  $i$  indexes individuals,  $j$  indexes firms, and  $t$  indexes the time.  $Y$  is the natural log of TDC1,  $T$  is the number of years CEO  $i$  has been the CEO at firm  $i$ , at time  $t$ , and  $EM$  refers to earnings management.  $X$  includes observable firm characteristics that are likely to affect CEO compensation. The error term  $\varepsilon_{ijt}$  consists of a fixed individual effect  $\alpha_i$ , a fixed firm effect  $\alpha_j$ , a fixed job-match effect  $\alpha_{ij}$ , and a transitory component  $\eta_{ijt}$ . The fixed job match effect reflects variations in compensation across firms that arise due to reasons raised in the job-matching and efficiency wages literature (Altonji and Shakotko, 1987). The main problem with identification is that  $T$  and  $EM$  may be correlated with  $\alpha_i, \alpha_j, \alpha_{ij}$ , so ordinary least squares will yield inconsistent estimates. AS argue that the net effect of the job match component is to introduce an additional upward bias in the OLS estimates of the tenure variable in equation (1).

To control for unobservable heterogeneity we adopt the instrumental variable estimator proposed by Altonji and Shakotko (1987), referred to as the IV1 estimator in the literature. The instrumental variable is used as an instrument for  $T$ ,  $T^2$ , and  $EM$ .

Let  $\tau_{ij}$  be the set of  $t$  for which we can observe individual  $i$  in firm  $j$ , and  $N_{ij}$  the number of such observations. Altonji and Shakotko (1987) propose an instrumental variable that is the deviation of the tenure variables around their means for each job match spell:

$$\hat{T}_{ijt} \equiv T_{ijt} - \bar{T}_{ijt} \quad (2)$$

where

$$\bar{T}_{ijt} \equiv \frac{1}{N_{ij}} \sum_{t \in \tau_{ij}} T_{ijt}$$

For example, since we observe completed spells only, if a CEO has a tenure of 7 years with a given firm,  $\bar{T}_{ijt} = \frac{1}{7}(1 + 2 + 3 + 4 + 5 + 6 + 7) = 4$ . For a CEO with a tenure of 4 years,  $\bar{T}_{ijt} = 2.5$ . The instrumental variable is then constructed as  $T_{ijt} - \bar{T}_{ijt}$  for each year of tenure. We construct the instrumental variables for  $EM$  and  $T^2$ , and their interaction term with the tenure variable and the higher order tenure variables, similarly. The estimation method is a two stage least squares approach, using the variable in equation (2) as an instrument for the tenure and earnings management measures in equation (1).

The main advantage of this instrumental variable is that it is uncorrelated by construction with the individual, firm and job match effects. However, because we do not observe CEO transitions across firms, i.e. we do not observe a CEO moving to another firm as a CEO, since such events are quite rare, we are not able to distinguish the individual effect  $\alpha_i$  from the job match effect  $\alpha_{ij}$  in equation (1), so we refer to the sum of these two effects as the job match effect. The problem of disentangling time-invariant CEO effects from time-invariant firm effects on compensation, given the very limited mobility of CEO across firms, was highlighted by Graham, Li and Qiu (2012), who focus on this specific dimension but do not control for the job-match effect which, according to the labor literature, is a crucial dimension of how compensation varies over tenure. As a robustness check, we provide estimates with CEO fixed effects, and, firm fixed effects, but without job match effects.

Lastly, we also provide instrumental variable estimates using instruments suggested by Hazarika et al. (2012). Specifically, the instruments include (i) special items, which is the sum of special items, extraordinary items, and restructuring charges as reported by Compustat; and (ii) operating earnings volatility, computed as the standard deviation of operating earnings (ROA) measured over the five prior years. We also include the AS instruments described above in this analysis. The instrumental variable estimates control for time-varying unobservable heterogeneity, and CEO, or firm, fixed effects.

### **3. Results: Earnings Management and Tenure**

We start our analysis by exploring the behavior of earnings management over the CEOs' tenure. Under the maintained hypothesis, we should find that CEOs use more earnings management early on in their tenure and reduce it over the years as uncertainty diminishes. We regress tenure on each measure of earnings management and include firm-level observable characteristics which include *Return on Assets*, *Leverage*, *Market-to-Book Ratio*, *Firm Size*, *Stock Turnover*, *Stock Returns Volatility*, and *Past Returns* at the firm level, Fama-French 48 industry dummies, and year dummies. The standard errors are clustered at the CEO-firm level. It should be noted that, since earnings management is endogenous, our sole objective in this specification is to test, in a multivariate set up, whether tenure is correlated with the CEO-induced earnings management. The results are shown in Table 2 and Figure 1.

[Insert Table 2 and Figure 1]

The main result in Table 2 is that all four measures of earnings management correlate negatively with tenure in a statistically and economically significant way. It should be noted that we remove the first year of the CEO's tenure (year 0) from our analysis and thus these results are not driven by the "big bath" behavior of CEOs as they start their job. Figure 2 shows graphically, the evolution of the *EMI* measure over the CEOs' tenure together with the fitted values obtained from the regression shown in Column 1 of Table 2. The results in Table 2 and Figure 1 are consistent with the view that earnings management is very high in the first years of tenure and

diminishes rapidly in successive years. These results, together with those of Hazarika et al. (2012), suggest that the dynamics of income smoothing modeled by Fudenberg and Tirole (1995) evolve significantly over tenure: if managers have an incentive to distort reported earnings to maximize the chances of survival then such career concerns appear to be highest in the first three years of tenure and diminish significantly afterwards.

We next investigate the dynamics of executive compensation over a CEOs' tenure at a firm, when shareholders learn about CEO ability and the quality of the job match with the firm, in the presence of reporting distortions used strategically by CEOs for survival purposes. Existing literature has investigated the cross-sectional relationship between earnings management and compensation, ignoring the relationship over the tenure of the CEO at the firm. Thus, the main variable of interest is the interaction of earnings management with tenure (and tenure squared) on the level of compensation. Under the hypothesis that shareholders' uncertainty about CEO's ability and the quality of match decreases as more information is revealed over time, we should expect that the impact of any performance distortion on compensation decreases over the CEO's tenure. The results are shown in Table 3.

[Insert Table 3]

We start the analysis using specification (1) above and including firm, and CEO fixed effects separately, which are reported in the Panel A of Table 3 (Columns 1-4 report the results with firm fixed effects and Columns 5-8 report the results with CEO fixed effects). In every specification we find that the level of earnings management positively correlates with the level of compensation. Most importantly, the coefficient estimates of the interaction variable between earnings management and tenure is always negative with high statistical and economic significance across most of the measures we use. This evidence is consistent with the view that the impact of performance distortion on compensation becomes smaller over the CEO's tenure. Compensation is found to be positively correlated with tenure but, overall, the coefficient estimates of tenure are more statistically significant when we include CEO fixed effects compared to when we use firm fixed effects. The latter result is consistent with the findings of Cremers and Palia (2011).

While our results support the hypothesis when controlling for individual CEO effects and firm effects, tenure and earnings management are also likely to be correlated with the job-match effect in the error term, as described in Section 2. We proceed to address this source of endogeneity by using the Altonji and Shakotko (1987) methodology described earlier, which controls for both job match and firm fixed effects. The results are shown in Panel B of Table 3.

There are several important results worth noting. First, after controlling for the job-match effect, we find that the negative coefficient of the interaction variable between each earnings management measure and tenure becomes larger, with higher economic and statistical significance. For three of the four measures, the coefficient is significant at least at the 5% confidence level. This result confirms that the impact of earnings management on compensation decays rapidly over tenure. The impact of the level of earnings management over compensation is positive and has statistical and economic significance. We also find that the coefficient of the interaction between the earnings management measures and tenure squared is positive and in most cases statistically significant as well. Broadly speaking, CEOs' compensation does not appear to suffer negatively in the first three years of tenure from high earnings management, but the effect becomes negative after this period.

Putting together these three results on the evolution of the impact of earnings management on compensation, we find that the evidence is consistent with Fudenberg and Tirole (1995): the impact is largest in the first years of the tenure, precisely when the CEO's concerns about survival are highest, and, second, the impact decays over tenure as more information is produced reducing shareholders' uncertainty about CEO's ability and the quality of the job match.

Considering the effect of tenure on compensation, we find that the coefficient estimate is positive and statistically significant, implying that compensation rises with tenure, consistent with the labor economics literature. Theory suggests that the effect of tenure over compensation can be due to two forces: first, accumulation of job-specific human capital, and, second, resolution of uncertainty about ability and match. At the very least, one has to disentangle the effect of tenure as a measure of the CEO's firm-specific skills from the effect that earnings management, a la Fudenberg and Tirole (1995), has on compensation via its impact on CEO tenure. The AS methodology allows us to reach this objective, and we find evidence consistent with both channels.



The result regarding the impact of tenure on compensation may also be consistent with other theories that have been proposed in the executive compensation literature. One potential explanation is the entrenchment hypothesis of Bebchuk and Fried (2004): CEOs who survive in the job may become more powerful as their tenure is extended and, through their power, entrenched CEOs may set their own compensation. Another potential explanation is the dynamic contracting hypothesis of Edmans, Gabaix, Sadzik and Sannikov (2009) where intertemporal risk sharing generates rewards to CEO's effort to be spread across all future periods. In such a scenario, a higher compensation level will be required as tenure increases, because a risk-averse more-experienced CEO gets less utility from an increase in wealth as she is forced to consume it over fewer periods. However, the entrenchment hypothesis and the dynamic contracting hypothesis are silent on how earnings management interacts with tenure to produce an impact on compensation that evolves over tenure. It is possible that more entrenched CEOs may be more likely to use their power to manage more earnings over tenure. To the extent that this is done, our results suggest that higher levels of distortions in reported income by entrenched managers produce a negative impact on their level of compensation. This is not to say that the entrenchment effect does not influence compensation. However, our results rule out that such effects occur through the management of earnings which existing literature has indicated as a potential tool that entrenched managers can use for strategic reasons (other than survival).

If it is true that CEOs tend to use more earnings management at the beginning of their tenure as an insurance tool and that shareholders learn about the CEO and match over time, we should find that CEOs with intrinsically high ability or whose match with the firm is of high quality should reduce the level of earnings management the most compared with other CEOs. This, in turn, should imply that the CEOs who decrease significantly their earnings management will be rewarded by the sharpest rise of their total level of compensation (besides being kept on the job). To investigate this, we consider how the *change* in the level of earnings management for each year relative to the level in the first year of tenure influences the change in the level of compensation with respect to the first year of tenure.

Specifically, we measure the change in the level of earnings management from the first year using dummy variables to capture CEOs that have increased their earnings management in the following way. For each CEO, we calculate the difference between the value that each earnings management measure takes in each year of the CEO's tenure and its value in the first year of

tenure and then calculate the time-series median of EM1 difference over each CEO's tenure. We construct a dummy variable that is equal to one in year  $t$  if the difference in year  $t$  is greater than the median of the difference over the entire CEO's tenure, and zero otherwise. We define the EM Diff Median variables in this way.<sup>12</sup> Each specification controls for the level of earnings management in each year, tenure and observable firm characteristics. We show the results in Table 4.

[Insert Table 4]

For all the specifications (with firm fixed effects in Panel A, CEO fixed effects in Panel B and the Altonji Shakotko job match and firm effects in Panel C) we find that the estimated coefficients for the variable that captures the change of earnings management with respect to year one is negative and is statistical significant for most of the specifications. This means that CEOs who decrease (increase) their earnings management most with respect to their own level in the first year of tenure are those who experience the largest increase (decrease) in their level of compensation. Hence, it appears that, on average, CEOs that survive tend to use a much lower level of earnings management compared to their own level of earnings management in the early part of the tenure and any excessive use of earnings management in later years has a negative impact on their compensation.

#### **4. CEO characteristics and the dynamics of compensation and earnings management**

Gibbons and Murphy (1992) argue that career concerns are not likely to influence all CEOs in the same way. For example, they suggest that such concerns are strongest for workers further away from their retirement. Fudenberg and Tirole (1995) show that one important condition for CEOs to distort reported performance is that the firm cannot commit to a long-term contract. Indeed, if a CEOs engages in performance distortion to increase the likelihood of survivability then one should not expect such behavior (or less likely) to take place if the CEO's position is covered by a long term contract. These considerations suggest that we should investigate more deeply the cross-sectional heterogeneity across CEOs to explore whether and how career concerns shape the influence of tenure and earnings management on the level of compensation.

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<sup>12</sup> We also use the 75<sup>th</sup> percentile of the difference as a threshold to check for robustness of results.

We start by investigating the condition imposed by Fudenberg and Tirole (1995): the presence of long term contracts given by the firm to the CEO. We collect data on the type of contract, if any, is a CEO is given at the time of the appointment. These contracts can be of two types: either a fixed-term employment contract or at-will employment contract. The former is a long-term type of contract while the latter is a short-term contract. Figure 2 shows how earnings management over tenure differs between CEOs with, and those without, a fixed-term employment contract. In the Figure we plot the fitted values from the same specification used in Table 2 for the EM1 measure on the sample of CEOs with and without contract. The evidence shows that distortions of reported performance are larger in the first years of CEOs without a contract (compared to CEOs with contracts) and its use rapidly diminishes over tenure.

[Insert Table 5 and Figure 2]

Estimating specification (1) for the two groups of CEOs, we describe the results in Table 5 where, for brevity, we show the results using only two measures of earnings management (EM1 and EM4). In columns 1 and 3 we show the specification for the sample of CEOs with a fixed-term employment contract and in columns 2 and 4 the specification for the sample of CEOs without such contracts. We find that the dynamics of earnings management found in the overall sample are driven exclusively by the CEOs without a contract or with an at-will employment contract. Overall, we find that CEOs with a fixed-term employment contract use significantly less earnings management, and that their compensation is not sensitive to the level of earnings management and its evolution through time. Thus, consistent with Fudenberg and Tirole (1995) and career concerns, when given a long-term contract, CEOs are not found to use earnings management to distort reported performance, probably because their survival, at least up to the duration of the contract, is more likely than that of CEOs without any contract. Since fixed term contracts have an average duration of about three years, these results explain, at least partially, the difference in the behavior of CEOs with, from those of CEOs without, a contract: as we discussed above it is precisely in the first three years of tenure that earnings management is mostly used.

Our results raise the question as to why all firms do not provide a fixed term contract to their newly appointed CEOs, given the evidence in the literature regarding the costs of earnings management. It should be noted, though, that there are costs associated with fixed term contracts,

the most important of which is giving up the relative ease with which shareholders can terminate the employment if the CEO does not perform as expected. Shareholders may value this option especially in the early years when they need to learn about the CEOs' ability and job match with relatively limited information. At the very least these results show that there is an important trade-off that shareholders face. The actual outcome may depend on time-invariant firm characteristics (like firm culture) or the job match. Our empirical design considers both dimensions.

We also investigate how the earnings management dynamics over tenure may be different between insider CEOs – those who have been promoted from within the firm – and outsider CEOs – those who have been appointed from outside the firm. On one hand, if one were to focus entirely on the CEO's inherent ability, one should expect that an insider CEO is better known than an outsider CEO, and we should expect that earnings management's impact on compensation will have very different dynamics compared to that of outsiders. On the other hand, the other important dimension is the CEO-firm match and, as Gibbons and Murphy (1992) argue, being an insider in a non-CEO role may be a very different experience than being a CEO. In other words, the challenges inherent in the job match are such that insiders may not be judged differently than outsiders by shareholders.

We find no evidence that the earnings management dynamics on compensation over the tenure of insider CEOs are different from those of outsiders, consistent with the conjecture of Gibbons and Murphy (1992). Thus, what may matter is not so much the status of insiders versus outsiders, but whether a fixed-term employment contract is given to the CEO or not. Consistent with this conjecture, we proceed to use our employment contract data to explore whether insider CEOs with a fixed term employment contract behave differently from other insider CEOs (outsider CEOs) without a fixed term employment contract in Table 6.

[Insert Table 6]

The results shown in Table 6 provide evidence consistent with the view that having an employment contract matters even when an insider is promoted to the role of the CEO: insider CEOs with an employment contract are found to have a much lower propensity to use earnings management early during their tenure compared to other insider CEOs without a contract.

As suggested by Gibbons and Murphy (1992) we expect that career concerns are likely to be more important for younger CEOs who are further from retirement. Figure 3 shows how earnings management over tenure differs between younger and older CEOs. We plot the fitted values from the same specification used in Table 2 for the EM1 measure on the sample of young and old CEOs. The evidence shows that distortions of reported performance are larger in the early years of tenure for young CEOs (compared to old CEOs) and its use rapidly diminishes over tenure.

[Insert Table 7 and Figure 3]

We test this hypothesis using specification (1) for the young and old CEO samples and describe the results in Table 7. Consistent with our hypothesis, we find that younger CEOs show a larger use of earnings management early on in their tenure compared to older CEOs, and the dynamics between earnings management and compensation across tenure is found only for younger CEOs.

Another important dimension that determines a CEOs' propensity to manage earnings, is the extent of firm-level monitoring faced and the sophistication of the firm's shareholders. Shareholders should take into account the possibility of earnings management in the early part of the CEOs' tenure but they may fail to infer precisely the value of true performance, because they face uncertainty about the CEO's ability to distort performance. This is consistent with Dye (1988) where the message space of shareholders may be limited to a single-dimensional signal whereas the CEO, being the privately-informed agent, receives multiple informational signals. However, we know that since CEOs face different levels of investor sophistication and monitoring, these firm-level dimensions may determine the actual amount of earnings management CEOs engage into. We use the presence of institutional investors (13F institutions) in the firm's ownership structure and the size of the Board to proxy for the level of monitoring and sophistication of shareholders.

[Insert Tables 8 and 9]

In columns 1 and 3 of Panel A (B) we show the results for the impact of earnings management on compensation for CEOs in firms with high institutional ownership (firms with

smaller boards) and in columns 2 and 4 for CEOs in firms with low institutional ownership (firms with larger boards). We find that CEOs that face higher monitoring or more sophisticated investors are less likely to engage in earnings management throughout their tenure and show no relationship between earnings management dynamics across the tenure horizon compared to CEOs in firms with a lower level of institutional ownership.

Finally, the amount of earnings management may be a function of the demand by the CEO for such a behavior: for example, a newly-appointed CEO in an industry with high product market competition, whose survivability is highly at risk given this pressure, may need to engage in more earnings management compared to a CEOs in an industry with low product market competition. To identify competitive industries, for each industry in the sample, we calculate the time-series average of its Herfindhal Index over the entire sample period. We then compare each industry's time-series average Herfindhal Index with the cross-sectional median Herfindhal Index in the sample. An industry is classified as competitive if its time-series average Herfindhal Index is below the median Herfindhal Index in the sample. Industries are defined using Fama and French 48 industries definition. The results, shown in Table 9, are consistent with this hypothesis: CEOs in more competitive industries appear to use more earnings management compared to those in less competitive industries with a consequent different impact on compensation over tenure.

## **5. Conclusions**

In this paper, we investigate the dynamics of executive compensation over a CEOs' tenure at a firm, when shareholders learn about CEO ability and the quality of the job match with the firm, in the presence of reporting distortions used strategically by CEOs for survival purposes. To precisely estimate the effect of tenure on compensation we need to consider that tenure is influenced by reported performance, which may be distorted by the CEO's actions. At the very least, one has to disentangle the effect of tenure as a measure of the CEO's firm-specific skills from the effect that earnings management, a la Fudenberg and Tirole (1995), has on compensation via its impact on CEO tenure.

To examine the dynamics of CEO compensation over the tenure of the CEO and in the presence of earnings management, we use data on 1,624 completed CEO tenure spells in 1,023 firms forming part of the S&P 1500 index. We examine the effects of tenure, various measures

of earnings management, and the interaction between the tenure and earnings management, on total CEO compensation, controlling for other firm characteristics that are likely to affect compensation and using a methodology that takes into account the CEO-firm match. While earnings management is found to influence compensation, this effect diminishes over the CEO's tenure. CEOs that decrease earnings management the most experience the highest increase in compensation. We show that the effect of career concerns varies based on CEO and firm characteristics. Consistent with the theory, earnings management is observed to have a stronger influence on compensation for CEOs without a fixed term employment contract, younger CEOs, firms in more competitive industries, and with fewer institutional investors. These results suggest that both managers and firms learn about CEO ability and the quality of the job match over the tenure of the CEO, and that this learning process is affected by the career concerns of CEOs.

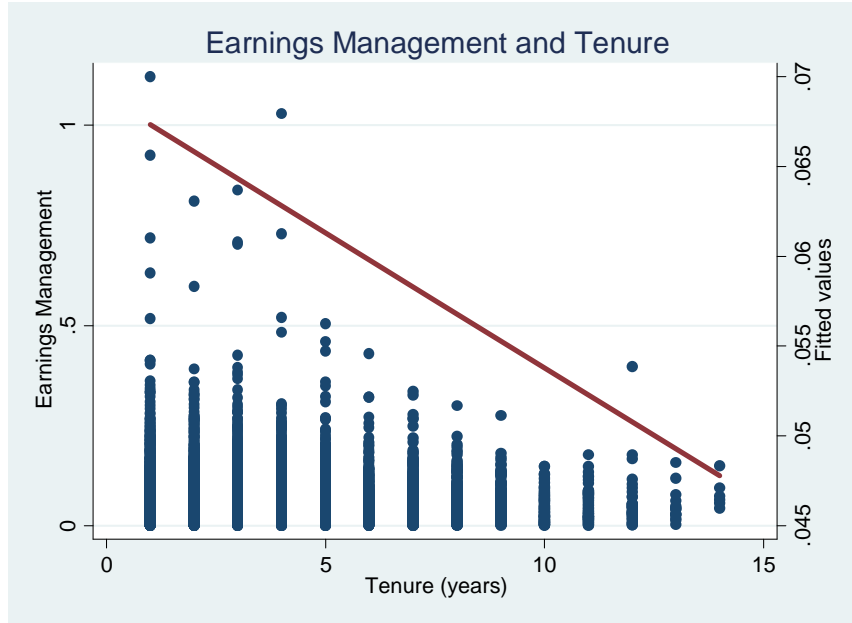
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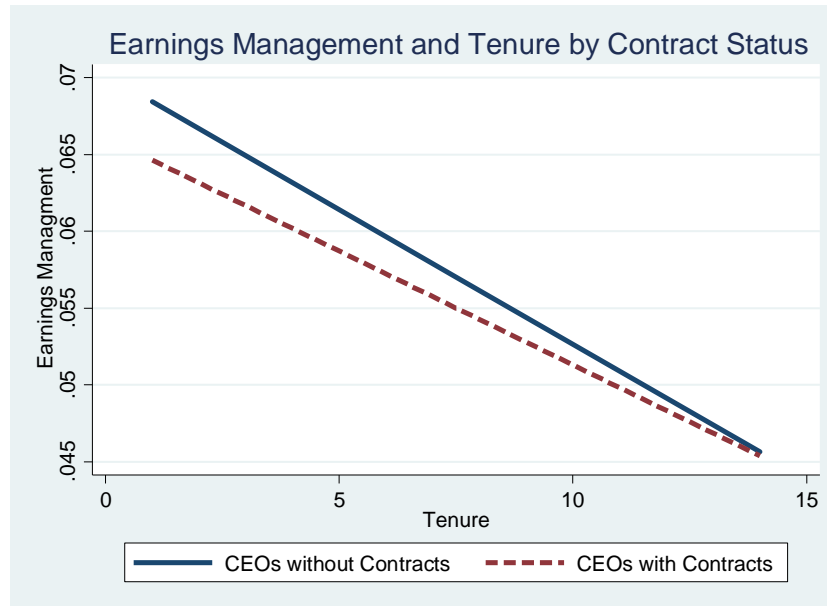
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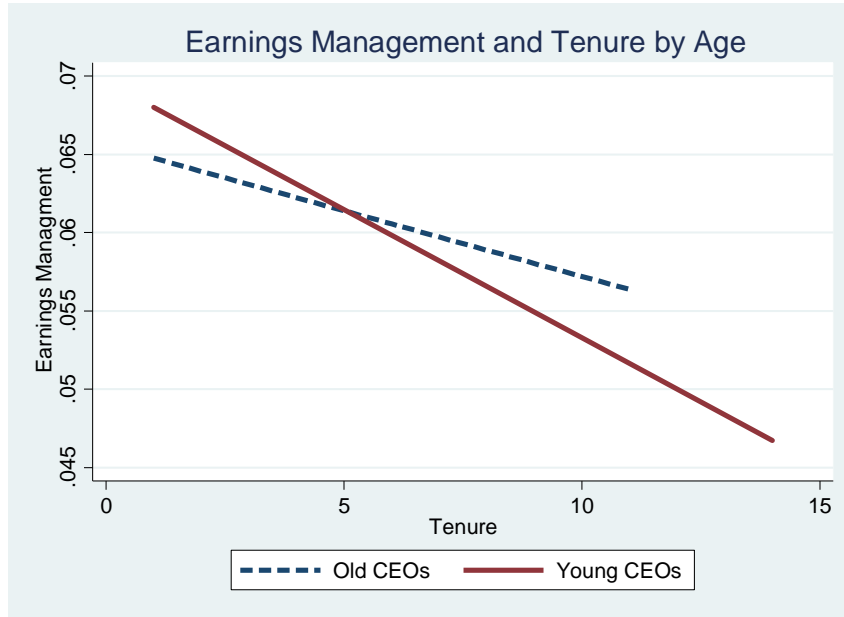
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**Figure 1.** The figure shows the evolution of earnings management (EM1 measure) over the CEOs' tenure. Fitted values are obtained from a regression that controls for a number of firm characteristics found to influence tenure, includes CEO and industry fixed effects and clusters standard errors at the CEO-firm level.



**Figure 2.** This Figure plots the relationship between earnings management and CEO's tenure for CEOs with an explicit employment agreement (CEOs with Contracts) and CEOs that have been appointed without a contract (CEOs without Contracts). Earnings management is captured using EM1 (Performance-augmented Modified Jones Model). Both lines plot the curve resulting from the prediction of a linear regression of EM1 on tenure. The blue solid line shows results for CEOs without contracts, while the red dashed line shows results for CEOs with contracts.



**Figure 3.** This Figure plots the relationship between earnings management and CEO’s tenure for young CEOs (Young CEOs) and old CEOs (Old CEOs). A CEO is defined as young if she was no older than 56 years when appointed and old if she was 57 years old or older when appointed. Earnings management is captured using EM1 (Performance-augmented Modified Jones Model). Both lines plot the curve resulting from the prediction of a linear regression of EM1 on tenure. The blue dashed line shows results for old CEO, while the red solid line shows results for young CEOs.

## Appendix - Variable Definitions

### Panel A. CEO Level Variable

|                    |   |
|--------------------|---|
| Tenure             | The tenure of the CEO in years.   |
| Total Compensation | The natural logarithm of the CEO total compensation. We use TDC1 in ExecuComp. Prior to December 2006, TDC1 was Salary + Bonus + Other Annual + LTIP Payouts + Restricted Stock Grants + Value of Options Granted+ All Other. After December 2006, TDC1 was Salary + Bonus+ Non-Equity Incentive Plan Compensation + Grant-Date Fair Value of Stock Awards + Value of Options Granted + Other Compensation. |
| Compensation Delta | Sensitivity of CEO compensation to share price, expressed in \$ '000.   |
| Compensation Vega  | Sensitivity of CEO compensation to stock returns volatility, expressed in \$ '000.  |
| CEO Age            | The CEOs age at the appointment.  |
| Young CEO Dummy    | A dummy variable that is equal to 1 if the CEO has less than 56 years when she is appointed, and zero otherwise.  |
| CEO Contract Dummy | A dummy variable that is one if the CEO has an explicit employment agreement, and zero otherwise.   |
| Insider CEO        | A CEO that has spent at least 5 years in the firm before being appointed.   |

### Panel B. Measures of Discretionary Accruals

|     |   |
|-----|---|
|     | Absolute discretionary accruals calculated using the performance-augmented modified Jones model as in Hazarika, Karpoff and Nahata (2012), p. 48.   |
| EM1 | <p>Total accruals for firm <math>j</math> in year <math>t</math> are measured as: <math>TA_{j,t} = (\Delta CA_{j,t} - \Delta CL_{j,t} - \Delta Cash_{j,t} + \Delta STDEBT_{j,t} - DEPN_{j,t}) / Assets_{j,t-1}</math>, where <math>\Delta CA_{j,t}</math> = firm <math>j</math>'s change in current assets (Compustat #4) from year <math>t-1</math> to year <math>t</math>, <math>\Delta CL_{j,t}</math> = firm <math>j</math>'s change in current liabilities (Compustat data item 5) from year <math>t-1</math> to year <math>t</math>, <math>\Delta Cash_{j,t}</math> = firm <math>j</math>'s change in cash (Compustat data item 1) from year <math>t-1</math> to year <math>t</math>, <math>\Delta STDEBT_{j,t}</math> = firm <math>j</math>'s change in debt in current liabilities (Compustat data item 34) from year <math>t-1</math> to year <math>t</math>, <math>DEPN_{j,t}</math> = firm <math>j</math>'s depreciation and amortization expense (Compustat data item 14) in year <math>t</math> and <math>Assets_{j,t-1}</math> = firm <math>j</math>'s book value of assets (Compustat data item 6) in year <math>t-1</math>. We estimate the following regression, which is estimated for each of the 48 Fama-French (1997) industry groups in each calendar year <math>t</math>.</p> $TA_{j,t} = \phi_{0j} + \phi_{1j} \left( \frac{1}{Assets_{j,t-1}} \right) + \phi_{2j} (\Delta Rev_{j,t} - \Delta AR_{j,t}) + \phi_{3j} PPE_{j,t} + \phi_{4j} ROA_{j,t-1} + u_{j,t}$ <p><math>\Delta Rev_{j,t}</math> = firm <math>j</math>'s change in revenues (Compustat data item 12), divided by <math>Assets_{j,t-1}</math> (Compustat data item 6); <math>\Delta AR_{j,t}</math> = firm <math>j</math>'s change in account receivables (Compustat data item 2), divided by <math>Assets_{j,t-1}</math>; <math>PPE_{j,t}</math> = firm <math>j</math>'s gross value of property, plant and equipment (Compustat data item 7) divided by <math>Assets_{j,t-1}</math>; <math>ROA_{j,t-1}</math> = firm <math>j</math>'s operating income before depreciation (Compustat data item 13) on assets in year <math>t-1</math>.</p> <p>EM1 is the absolute value of the difference between total accruals and the estimated value of total accruals calculated using the coefficients obtained by the regression above.</p> |
| EM2 | <p>Absolute discretionary accruals calculated using the classic Jones model as in Hazarika, Karpoff and Nahata (2012), Internet Appendix, p.7.</p> $TA_{j,t} = \phi_{0j} + \phi_{1j} \left( \frac{1}{Assets_{j,t-1}} \right) + \phi_{2j} (\Delta Rev_{j,t}) + \phi_{3j} PPE_{j,t} + u_{j,t}$ <p>EM2 is the absolute value of the difference between total accruals and the estimated value of total accruals calculated using the coefficients obtained by the regression above.</p>  |
| EM3 | <p>Absolute accruals over lagged assets as in Bergstresser and Philippon (2006). Total accruals for firm <math>j</math> in year <math>t</math> are measured as: <math>TA_{j,t} = (\Delta CA_{j,t} - \Delta CL_{j,t} - \Delta Cash_{j,t} + \Delta STDEBT_{j,t} - DEPN_{j,t}) / Assets_{j,t-1}</math></p>   |

Absolute discretionary accruals calculated using the performance-augmented modified Jones model as in Hazarika, Karpoff and Nahata (2012), p. 48, including year dummy variables as in Bergstresser and Philippon (2006).

EM4

$$TA_{j,t} = \phi_{0j} + \phi_{1j} \left( \frac{1}{Assets_{j,t-1}} \right) + \phi_{2j} (\Delta Rev_{j,t} - \Delta AR_{j,t}) + \phi_{3j} PPE_{j,t} + \phi_{4j} ROA_{j,t-1} + \sum_{year=y} y_y + u_{j,t}$$

EM4 is the absolute value of the difference between total accruals and the estimated value of total accruals calculated using the coefficients obtained by the regression above.

### Panel C. Firm-Level Control Variables

|                         |  |
|-------------------------|--|
| Firm Size               | The natural logarithm of a firm's market capitalization calculated as the company's shares outstanding (in million) multiplied by market price as of the end of the month of December. |
| Institutional Ownership | The percentage of the shares held by 13F investors at the end of each year.  |
| Leverage                | The book value of debt divided by the book value of total assets.  |
| Market-to-Book          | The market value of equity at the end of the year divided by the book value of common equity.  |
| Number of Directors     | The number of directors seating on a firm's board.   |
| Past Stock Returns      | The firm's stock returns, computed as the average stock market return over the previous 12 months.   |
| Return on Assets        | The net income in year $t$ divided by total assets in year $t-1$ .   |
| Stock Return Volatility | The firm's stock returns volatility, computed as the standard deviation of the stock returns over the previous 12 months.  |
| Stock Turnover          | The average of the previous 12 months stock turnover.  |

### Panel D. Additional Variables

|                                     |  |
|-------------------------------------|--|
| High Institutional Ownership Dummy  | A dummy variable that is equal to one if the percentage of institutional ownership in a firm in the CEO's appointment year is equal to or larger than the median of institutional ownership calculated over all the CEO's appointment years, and zero otherwise.   |
| Weak Board Dummy                    | A dummy variable that is equal to one if the board has a number of directors equal to or larger than the time-series cross sectional median number of directors in the sample, and zero otherwise.   |
| Highly Competitive Industries Dummy | A dummy variable that is equal to one if an industry has a competitive product market, and zero otherwise. For each industry in the sample, we calculate the time-series average of the industry's Herfindhal Index over the entire sample period. We then compare each industry's time-series average Herfindhal Index with the cross-sectional median calculated using all the time-series averages Herfindhal Index in the sample. An industry is classified as competitive if its time-series average Herfindhal Index is below the median of the cross-sectional time-series average Herfindhal index in the sample. Industries are defined using Fama and French 48 industries definition. |
| EM1Diff Median                      | For each CEO, using EM1, we calculate the difference between the value that EM1 takes in each year of the CEO's tenure and its value the first year of her tenure (EM1 difference). We calculate the time-series median of EM1 difference over each CEO's tenure. We then construct a dummy variable that is equal to one in year $t$ if EM1 difference in year $t$ is greater than the median of EM1 difference over the entire CEO's tenure, and zero otherwise.   |
| EM1Diff 75th Percentile             | For each CEO, using EM1, we calculate the difference between the value that EM1 takes in each year of the CEO's tenure and its value the first year of her tenure (EM1 difference). We calculate the time-series 75th percentile of EM1 difference over each CEO's tenure. We then construct a dummy variable that is equal to one in year $t$ if EM1 difference in year $t$ is greater than the 75th percentile of EM1 difference over the entire CEO's tenure, and zero otherwise.   |

|                         |  |
|-------------------------|--|
| EM2Diff Median          | For each CEO, using EM2, we calculate the difference between the value that EM2 takes in each year of the CEO's tenure and its value the first year of her tenure (EM2 difference). We calculate the time-series median of EM2 difference over each CEO's tenure. We then construct a dummy variable that is equal to one in year $t$ if EM2 difference in year $t$ is greater than the median of EM2 difference over the entire CEO's tenure, and zero otherwise.                   |
| EM2Diff 75th Percentile | For each CEO, using EM2, we calculate the difference between the value that EM2 takes in each year of the CEO's tenure and its value the first year of her tenure (EM2 difference). We calculate the time-series 75th percentile of EM2 difference over each CEO's tenure. We then construct a dummy variable that is equal to one in year $t$ if EM2 difference in year $t$ is greater than the 75th percentile of EM2 difference over the entire CEO's tenure, and zero otherwise. |
| EM3Diff Median          | For each CEO, using EM3, we calculate the difference between the value that EM3 takes in each year of the CEO's tenure and its value the first year of her tenure (EM3 difference). We calculate the time-series median of EM3 difference over each CEO's tenure. We then construct a dummy variable that is equal to one in year $t$ if EM3 difference in year $t$ is greater than the median of EM3 difference over the entire CEO's tenure, and zero otherwise.                   |
| EM3Diff 75th Percentile | For each CEO, using EM3, we calculate the difference between the value that EM3 takes in each year of the CEO's tenure and its value the first year of her tenure (EM3 difference). We calculate the time-series 75th percentile of EM3 difference over each CEO's tenure. We then construct a dummy variable that is equal to one in year $t$ if EM3 difference in year $t$ is greater than the 75th percentile of EM3 difference over the entire CEO's tenure, and zero otherwise. |
| EM4Diff Median          | For each CEO, using EM4, we calculate the difference between the value that EM4 takes in each year of the CEO's tenure and its value the first year of her tenure (EM4 difference). We calculate the time-series median of EM4 difference over each CEO's tenure. We then construct a dummy variable that is equal to one in year $t$ if EM4 difference in year $t$ is greater than the median of EM4 difference over the entire CEO's tenure, and zero otherwise.                   |
| EM4Diff 75th Percentile | For each CEO, using EM4, we calculate the difference between the value that EM4 takes in each year of the CEO's tenure and its value the first year of her tenure (EM4 difference). We calculate the time-series 75th percentile of EM4 difference over each CEO's tenure. We then construct a dummy variable that is equal to one in year $t$ if EM4 difference in year $t$ is greater than the 75th percentile of EM1 difference over the entire CEO's tenure, and zero otherwise. |

**Table 1**  
**Descriptive Statistics**

This table describes the main characteristics of the CEOs and firms in the sample. For the period 1992–2010, we obtain information from ExecuComp, Factiva, Lexis-Nexis, Compustat and CRSP. Panel A describes the number of CEOs-firm observations. Panel B describes the frequency of CEO turnovers. Panel C shows descriptive statistics for CEO level characteristics, discretionary earnings management measures and firm level characteristics. Panel D provides the time-average of the cross-sectional pairwise correlation coefficients between the CEOs' tenure, total pay, compensation sensitivity and the earnings management measures for the entire sample. We report the significance level of correlation coefficients using the Bonferroni adjustment. In Panel D, \* indicates significance at 10% or less. All variables shown are described in the Appendix and are winsorized at the 1% level.

| Panel A – Sample Description |                |                         |  |
|------------------------------|----------------|-------------------------|--|
| Year from Appointment        | Number of CEOs | No Missing Compensation | No Missing Compensation & All Measures of EM |
| 1                            | 1,624          | 1,579                   | 1,530  |
| 2                            | 1,624          | 1,616                   | 1,571  |
| 3                            | 1,305          | 1,300                   | 1,267  |
| 4                            | 1,026          | 1,018                   | 990  |
| 5                            | 745            | 743                     | 719  |
| 6                            | 555            | 552                     | 535  |
| 7                            | 398            | 397                     | 382  |
| 8                            | 274            | 274                     | 264  |
| 9                            | 168            | 167                     | 160  |
| 10                           | 101            | 101                     | 95   |
| 11                           | 66             | 65                      | 62   |
| 12                           | 35             | 35                      | 33   |
| 13                           | 14             | 14                      | 14   |
| 14                           | 6              | 6                       | 6  |
| Number of Observations       | 7,941          | 7,867                   | 7,628  |

| Panel B – Frequency of CEO Turnovers                  |                |          |            |                    |
|---|----------------|----------|------------|--------------------|
| First Year of Appointment<br>(Year of Appointment =1) | Number of CEOs | Insiders | Young CEOs | CEOs with Contract |
| 1992  | 1              | 0        | 1          | 0                  |
| 1993  | 63             | 27       | 44         | 1                  |
| 1994  | 36             | 10       | 27         | 6                  |
| 1995  | 56             | 27       | 34         | 9                  |
| 1996  | 88             | 38       | 58         | 20                 |
| 1997  | 91             | 29       | 71         | 29                 |
| 1998  | 88             | 30       | 67         | 27                 |
| 1999  | 97             | 32       | 68         | 27                 |
| 2000  | 112            | 48       | 91         | 41                 |
| 2001  | 129            | 55       | 106        | 49                 |
| 2002  | 140            | 50       | 106        | 54                 |
| 2003  | 94             | 44       | 72         | 34                 |
| 2004  | 104            | 38       | 82         | 39                 |
| 2005  | 90             | 33       | 71         | 33                 |
| 2006  | 123            | 52       | 96         | 56                 |
| 2007  | 104            | 44       | 78         | 33                 |
| 2008  | 114            | 46       | 91         | 49                 |
| Total Number of Observations                          | 1,530          | 603      | 1,163      | 513                |

| Panel C – Descriptive Statistics                                |       |         |          |        |         |          |
|---|-------|---------|----------|--------|---------|----------|
|   | N     | Mean    | SD       | P05    | Median  | P95      |
| <b>CEO Level Variable</b>                                       |       |         |          |        |         |          |
| Tenure  | 7,628 | 4       | 2        | 1      | 3       | 8        |
| Total Compensation (in Million of \$)                           | 7,628 | 5307.30 | 10332.99 | 534.11 | 3053.41 | 16151.53 |
| Compensation Delta  | 6,402 | 31.27   | 46.23    | 1.00   | 15.19   | 124.89   |
| Compensation Vega   | 6,131 | 143.26  | 324.01   | 0.00   | 49.54   | 566.36   |
| CEO Age at Appointment  | 7,628 | 51.37   | 6.26     | 41.00  | 52.00   | 61.00    |
| Young CEO Dummy   | 7,628 | 0.79    | 0.41     | 0.00   | 1.00    | 7,628    |
| CEO Contract Dummy  | 7,011 | 0.52    | 0.37     | 0.00   | 1.00    | 1.00     |
| Proportion of Insider CEOs                                      | 7,628 | 0.40    | 0.49     | 0.00   | 0.00    | 1.00     |
| <b>Measures of Discretionary Accruals</b>                       |       |         |          |        |         |          |
| EM1 (Performance-augmented Modified Jones Model)                | 7,628 | 0.063   | 0.063    | 0.004  | 0.049   | 0.167    |
| EM2 (Classic Jones Model)                                       | 7,628 | 0.063   | 0.066    | 0.004  | 0.048   | 0.171    |
| EM3 (Total Accruals)  | 7,628 | 0.062   | 0.061    | 0.005  | 0.049   | 0.157    |
| EM4 (Performance-augmented Modified Jones Model & Year Dummies) | 7,628 | 0.049   | 0.058    | 0.003  | 0.034   | 0.135    |
| <b>Firm Characteristics</b>                                     |       |         |          |        |         |          |
| Return on Assets  | 7,616 | 0.042   | 0.150    | -0.157 | 0.056   | 0.187    |
| Leverage  | 7,597 | 0.232   | 0.197    | 0.000  | 0.214   | 0.539    |
| Market-to-Book  | 7,350 | 2.769   | 22.051   | 0.365  | 2.089   | 7.982    |
| Firm Size (in Billions of \$)                                   | 6,891 | 3.880   | 6.390    | 0.104  | 1.400   | 17.100   |
| Stock Turnover  | 7,390 | 0.17%   | 0.14%    | 0.04%  | 0.13%   | 0.46%    |
| Past Stock Returns  | 7,228 | 11.26%  | 5.91%    | 4.44%  | 9.78%   | 23.54%   |
| Stock Returns Volatility  | 7,228 | 0.87%   | 3.75%    | -5.17% | 0.91%   | 6.94%    |
| Institutional Ownership   | 6,674 | 69.70%  | 19.57%   | 30.87% | 73.24%  | 95.50%   |
| Number of Directors   | 4,084 | 10      | 2        | 6      | 9       | 14       |
| <b>Dummy Variables Used in Additional Sample Splits</b>         |       |         |          |        |         |          |
| High Institutional Ownership Dummy                              | 7,460 | 0.275   | 0.447    | 0.000  | 0.000   | 1.000    |
| Weak Board Dummy  | 4,084 | 0.493   | 0.500    | 0.000  | 0.000   | 1.000    |
| Highly Competitive Industries Dummy                             | 7,628 | 0.249   | 0.432    | 0.000  | 0.000   | 1.000    |

| Panel D – Correlation Matrix |          |          |          |          |         |         |        |     |
|------------------------------|----------|----------|----------|----------|---------|---------|--------|-----|
|                              | (1)      | (2)      | (3)      | (4)      | (5)     | (6)     | (7)    | (8) |
| (1) Tenure                   | 1        |          |          |          |         |         |        |     |
| (2) Total Compensation       | 0.0737*  | 1        |          |          |         |         |        |     |
| (3) Compensation Delta       | 0.1835*  | 0.5502*  | 1        |          |         |         |        |     |
| (4) Compensation Vega        | 0.1621*  | 0.5993*  | 0.9256*  | 1        |         |         |        |     |
| (5) EM1                      | -0.0577* | -0.0407* | -0.0574* | -0.0529* | 1       |         |        |     |
| (6) EM2                      | -0.0569* | -0.039*  | -0.049*  | -0.049*  | 0.8854* | 1       |        |     |
| (7) EM4                      | -0.0547* | -0.0363* | -0.0369  | -0.0353  | 0.8156* | 0.8114  | 1      |     |
| (8) EM5                      | -0.0591* | -0.0228  | -0.0279  | -0.0281  | 0.6278* | 0.6344* | 0.7059 | 1   |



**Table 2 -- Earnings Management and Tenure**

This Table reports panel regressions with CEO fixed effects for the relationship between earnings management and CEO's tenure. The dependent variable is the CEO's tenure, while we use as independent variables four different measures of earnings management: a) the Performance-augmented Modified Jones Model (EM1) in column (1), the classic Jones model (EM2) in column (2), Total Accruals (EM3) in column (3) and the Performance-augmented Modified Jones Model with years dummies (EM4) in column (4). All the variables of earnings management are unsigned. All regressions exclude the year in which the CEO was appointed. Variable definitions are found in the Appendix. Variables are winsorized at the 1% level. All regressions include the constant term, but the coefficient is not reported. P-values are in parentheses. \* indicates significance at 1% (\*\*\*), 5% (\*\*), 10% (\*).

|  | (1)                      | (2)                      | (3)                      | (4)                      |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| EM1                                    | -2.8479***<br>(0.000)    |                          |                          |                          |
| EM2                                    |                          | -2.7233***<br>(0.000)    |                          |                          |
| EM3                                    |                          |                          | -2.3694***<br>(0.002)    |                          |
| EM4                                    |                          |                          |                          | -3.4767***<br>(0.000)    |
| Return on Assets                       | -2.8221***<br>(0.001)    | -2.8263***<br>(0.001)    | -2.8544***<br>(0.001)    | -2.8334***<br>(0.000)    |
| Leverage                               | 2.4278***<br>(0.003)     | 2.4042***<br>(0.003)     | 2.4322***<br>(0.003)     | 2.6014***<br>(0.001)     |
| Market-to-Book Ratio                   | 0.0001<br>(0.952)        | 0.0000<br>(0.975)        | 0.0001<br>(0.958)        | 0.0001<br>(0.958)        |
| Firm Size                              | 1.1972***<br>(0.000)     | 1.1861***<br>(0.000)     | 1.1877***<br>(0.000)     | 1.2218***<br>(0.000)     |
| Stock Turnover                         | 1,003.2079***<br>(0.000) | 1,001.3833***<br>(0.000) | 1,001.3126***<br>(0.000) | 1,004.7326***<br>(0.000) |
| Stock Returns Volatility               | -0.9528<br>(0.400)       | -0.9737<br>(0.391)       | -1.0060<br>(0.376)       | -1.0820<br>(0.343)       |
| Past Stock Returns                     | -7.6073***<br>(0.000)    | -7.6222***<br>(0.000)    | -7.6520***<br>(0.000)    | -7.8393***<br>(0.000)    |
| Industry Dummies                       | YES                      | YES                      | YES                      | YES                      |
| Errors Clustered at the Firm-CEO Level | YES                      | YES                      | YES                      | YES                      |
| Robust Errors                          | YES                      | YES                      | YES                      | YES                      |
| Observations                           | 6,619                    | 6,632                    | 6,633                    | 6,619                    |
| R-squared                              | 0.215                    | 0.214                    | 0.212                    | 0.216                    |
| Number of CEOs                         | 1,460                    | 1,463                    | 1,463                    | 1,460                    |

**Table 3 -- CEO Compensation, Earnings Management and Tenure**

This Table reports multivariate analyses for the relationship between CEO compensation and earnings management over the CEO's tenure. Panel A reports panel regressions with firm fixed from column (1) to column (4) and panel regressions with CEO fixed effects from column (5) to column (8). Panel B reports instrumental variables regressions estimated using generalized least square (IV-GLS) in which the independent variables are constructed following the methodology of Altonji and Shakotko (1987). In each Panel, the dependent variable is the logarithm of total compensation (Total Compensation). Each Panel shows results using four different measures of earnings management as independent variables: a) the Performance-augmented Modified Jones Model (EM1) in column (1) and column (5), the classic Jones model (EM2) in column (2) and column (6), Total Accruals (EM3) in column (3) and column (7) and the Performance-augmented Modified Jones Model with years dummies (EM4) in column (4) and column (8). All the variables of earnings management are unsigned. All regressions exclude the year in which the CEO was appointed. Variable definitions are found in the Appendix. Variables are winsorized at the 1% level. All regressions include the constant term, but the coefficient is not reported. P-values are in parentheses. \* indicates significance at 1% (\*\*), 5% (\*\*), 10% (\*).

Panel A: Regressions with Firm Fixed Effects and CEO Fixed Effects

|  | (1)        | (2)        | (3)        | (4)        | (5)        | (6)        | (7)        | (8)        |
|--|------------|------------|------------|------------|------------|------------|------------|------------|
| EM1                                    | 0.7714*    |            |            |            | 0.8099*    |            |            |            |
|  | (0.064)    |            |            |            | (0.056)    |            |            |            |
| EM1*Tenure                             | -0.4092**  |            |            |            | -0.3283*   |            |            |            |
|  | (0.040)    |            |            |            | (0.066)    |            |            |            |
| EM1*Tenure Squared                     | 0.0302     |            |            |            | 0.0317*    |            |            |            |
|  | (0.101)    |            |            |            | (0.076)    |            |            |            |
| EM2                                    |            | 0.8140**   |            |            |            | 0.7389*    |            |            |
|  |            | (0.018)    |            |            |            | (0.054)    |            |            |
| EM2*Tenure                             |            | -0.3649**  |            |            |            | -0.2237*   |            |            |
|  |            | (0.043)    |            |            |            | (0.078)    |            |            |
| EM2*Tenure Squared                     |            | 0.0202     |            |            |            | 0.0178     |            |            |
|  |            | (0.235)    |            |            |            | (0.274)    |            |            |
| EM3                                    |            |            | 0.8142**   |            |            |            | 0.8703*    |            |
|  |            |            | (0.050)    |            |            |            | (0.054)    |            |
| EM3*Tenure                             |            |            | -0.3435*   |            |            |            | -0.3781**  |            |
|  |            |            | (0.070)    |            |            |            | (0.048)    |            |
| EM3*Tenure Squared                     |            |            | 0.0380**   |            |            |            | 0.0423**   |            |
|  |            |            | (0.048)    |            |            |            | (0.025)    |            |
| EM4                                    |            |            |            | 1.1450**   |            |            |            | 1.3299***  |
|  |            |            |            | (0.010)    |            |            |            | (0.008)    |
| EM4*Tenure                             |            |            |            | -0.4342**  |            |            |            | -0.5092**  |
|  |            |            |            | (0.048)    |            |            |            | (0.027)    |
| EM4*Tenure Squared                     |            |            |            | 0.0348     |            |            |            | 0.0410*    |
|  |            |            |            | (0.131)    |            |            |            | (0.079)    |
| Tenure                                 | 0.0462*    | 0.0424*    | 0.0563**   | 0.0468*    | 0.0788***  | 0.0733***  | 0.0818***  | 0.0831***  |
|  | (0.057)    | (0.061)    | (0.043)    | (0.054)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    |
| Tenure Squared                         | -0.0016    | -0.0010    | -0.0020    | -0.0015    | -0.0021    | -0.0014    | -0.0028*   | -0.0022    |
|  | (0.352)    | (0.535)    | (0.249)    | (0.378)    | (0.193)    | (0.384)    | (0.097)    | (0.167)    |
| Return on Assets                       | 0.4792***  | 0.4958***  | 0.4990***  | 0.4834***  | 0.4012***  | 0.4135***  | 0.4175***  | 0.4005***  |
|  | (0.000)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    |
| Leverage                               | -0.4538**  | -0.4479**  | -0.4434**  | -0.4492**  | -0.2360    | -0.2368    | -0.2346    | -0.2309    |
|  | (0.030)    | (0.032)    | (0.034)    | (0.031)    | (0.209)    | (0.207)    | (0.209)    | (0.215)    |
| Market-to-Book Ratio                   | 0.0002     | 0.0002     | 0.0002     | 0.0002     | -0.0000    | -0.0000    | 0.0000     | -0.0000    |
|  | (0.503)    | (0.512)    | (0.471)    | (0.511)    | (0.977)    | (0.956)    | (0.957)    | (0.947)    |
| Firm Size                              | 0.3605***  | 0.3548***  | 0.3566***  | 0.3590***  | 0.3955***  | 0.3924***  | 0.3942***  | 0.3930***  |
|  | (0.000)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    |
| Stock Turnover                         | 10.3142    | 11.8276    | 11.4589    | 10.0279    | -6.6518    | -5.7599    | -5.8419    | -6.8778    |
|  | (0.617)    | (0.567)    | (0.580)    | (0.629)    | (0.782)    | (0.811)    | (0.808)    | (0.776)    |
| Stock Returns Volatility               | 0.7089*    | 0.7039*    | 0.7132*    | 0.6960*    | 1.5437***  | 1.5392***  | 1.5385***  | 1.5392***  |
|  | (0.071)    | (0.073)    | (0.068)    | (0.077)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    |
| Past Stock Returns                     | -1.5166*** | -1.5281*** | -1.5537*** | -1.5099*** | -2.5310*** | -2.5276*** | -2.5492*** | -2.5141*** |
|  | (0.003)    | (0.003)    | (0.002)    | (0.003)    | (0.000)    | (0.000)    | (0.000)    | (0.000)    |
| Firm Fixed Effect                      | YES        | YES        | YES        | YES        | NO         | NO         | NO         | NO         |
| CEO Fixed Effect                       | NO         | NO         | NO         | NO         | YES        | YES        | YES        | YES        |
| Industry Dummies                       | YES        | YES        | YES        | YES        | YES        | YES        | YES        | YES        |
| Year Dummies                           | YES        | YES        | YES        | YES        | NO         | NO         | NO         | NO         |
| Errors Clustered at the Firm-CEO Level | YES        | YES        | YES        | YES        | YES        | YES        | YES        | YES        |
| Robust Errors                          | YES        | YES        | YES        | YES        | YES        | YES        | YES        | YES        |
| Observations                           | 6,619      | 6,632      | 6,633      | 6,619      | 6,619      | 6,632      | 6,633      | 6,619      |
| R-squared                              | 0.706      | 0.706      | 0.706      | 0.707      | 0.149      | 0.149      | 0.149      | 0.150      |
| Number of Firms                        | 940        | 942        | 942        | 940        |            |            |            |            |
| Number of CEOs                         |            |            |            |            | 1,460      | 1,463      | 1,463      | 1,460      |

Panel B: IV GLS Regressions - Altonji and Shakotko (1987)

|                          | (1)                   | (2)                   | (3)                   | (4)                   |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| EM1                      | 0.9681***<br>(0.007)  |                       |                       |                       |
| EM1*Tenure               | -0.4986***<br>(0.008) |                       |                       |                       |
| EM1*Tenure Squared       | 0.0369**<br>(0.050)   |                       |                       |                       |
| EM2                      |                       | 0.8514***<br>(0.009)  |                       |                       |
| EM2*Tenure               |                       | -0.3978**<br>(0.044)  |                       |                       |
| EM2*Tenure Squared       |                       | 0.0251*<br>(0.902)    |                       |                       |
| EM3                      |                       |                       | 0.9319***<br>(0.006)  |                       |
| EM3*Tenure               |                       |                       | -0.4315**<br>(0.011)  |                       |
| EM3*Tenure Squared       |                       |                       | 0.0455**<br>(0.010)   |                       |
| EM4                      |                       |                       |                       | 1.3414***<br>(0.000)  |
| EM4*Tenure               |                       |                       |                       | -0.5291***<br>(0.006) |
| EM4*Tenure Squared       |                       |                       |                       | 0.0414**<br>(0.047)   |
| Tenure                   | 0.0375**<br>(0.020)   | 0.0305**<br>(0.050)   | 0.0396*<br>(0.037)    | 0.0374**<br>(0.016)   |
| Tenure Squared           | -0.0019<br>(0.212)    | -0.0010<br>(0.475)    | -0.0024*<br>(0.089)   | -0.0016<br>(0.226)    |
| Return on Assets         | 0.3325***<br>(0.000)  | 0.3333***<br>(0.000)  | 0.4089***<br>(0.000)  | 0.3635***<br>(0.000)  |
| Leverage                 | -0.1264<br>(0.221)    | -0.0998<br>(0.325)    | -0.3322***<br>(0.005) | -0.2088*<br>(0.056)   |
| Market-to-Book Ratio     | 0.0000<br>(0.990)     | -0.0000<br>(0.971)    | 0.0000<br>(0.909)     | -0.0000<br>(0.990)    |
| Firm Size                | 0.4244***<br>(0.000)  | 0.4252***<br>(0.000)  | 0.3867***<br>(0.000)  | 0.4113***<br>(0.000)  |
| Stock Turnover           | 19.1448*<br>(0.075)   | 20.6499*<br>(0.053)   | 10.6235<br>(0.351)    | 14.4522<br>(0.192)    |
| Stock Returns Volatility | 0.9912***<br>(0.000)  | 0.9965***<br>(0.000)  | 0.9659***<br>(0.000)  | 0.9742***<br>(0.000)  |
| Past Stock Returns       | -2.0080***<br>(0.000) | -2.0248***<br>(0.000) | -1.8722***<br>(0.000) | -1.9672***<br>(0.000) |
| Industry Dummies         | YES                   | YES                   | YES                   | YES                   |
| Year Dummies             | YES                   | YES                   | YES                   | YES                   |
| Observations             | 6,619                 | 6,632                 | 6,633                 | 6,619                 |
| Number of CEO-Firms      | 1,473                 | 1,476                 | 1,476                 | 1,473                 |

**Table 4 – Changes in CEO Compensation and Earnings Management Dummies**

This Table reports multivariate analyses for the relationship between changes in CEO compensation with respect to year one and changes in earnings management. Panel A reports panel regressions with firm fixed effects. Panel B reports panel regressions with CEO fixed effects. Panel C reports instrumental variables regressions estimated using generalized least square (IV-GLS) in which the independent variables are constructed following the methodology of Altonji and Shakotko (1987). In each Panel, the dependent variable is the difference between the logarithm of the CEO's total compensation (Total Compensation) in each year and the logarithm of her total compensation in year one. Each Panel shows results using four different measures of earnings management as independent variables: a) the Performance-augmented Modified Jones Model (EM1) in column (1) and column (5), the classic Jones model (EM2) in column (2) and column (6), Total Accruals (EM3) in column (3) and column (7) and the Performance-augmented Modified Jones Model with years dummies (EM4) in column (4) and column (8). All the variables of earnings management are unsigned. For each CEO, using each measure of earnings management, we calculate the difference between the measure of earnings management in each year of the CEO's tenure and its value the first year of her tenure. Next, for each CEO, we calculate the time-series median and 75th percentile of each of the earnings management differences over the tenure of the CEO. Using each measure of earnings management, we then construct a dummy variable that is equal to one in year  $t$  if the difference between earnings management in year  $t$  and year one is greater than the time-series median (75th percentile) difference over the CEO's tenure, and zero otherwise. The dummy variables constructed using as the benchmark the time-series median of the earnings management differences over the CEO's tenure are: EM1Diff Median, EM2Diff Median, EM3Diff Median, EM4Diff Median. The dummy variables constructed using as the benchmark the 75th percentile of the time-series earnings management differences over the CEO's tenure are: EM1Diff 75th Percentile, EM2Diff 75th Percentile, EM3Diff 75th Percentile, EM4Diff 75th Percentile. All regressions exclude the year in which the CEO was appointed. Variable definitions are found in the Appendix. Variables are winsorized at the 1% level. All regressions include the constant term, but the coefficient is not reported. P-values are in parentheses. \* indicates significance at 1% (\*\*), 5% (\*\*), 10% (\*).

Panel A: Regressions with Firm Fixed Effect

|  | (1)                  | (2)                  | (3)                  | (4)                  | (5)                   | (6)                  | (7)                  | (8)                  |
|--|----------------------|----------------------|----------------------|----------------------|-----------------------|----------------------|----------------------|----------------------|
| EM1                                    | 0.6036***<br>(0.006) |                      |                      |                      | 0.6637***<br>(0.003)  |                      |                      |                      |
| EM1Diff Median                         | -0.0589**<br>(0.013) |                      |                      |                      |                       |                      |                      |                      |
| EM1Diff 75th Percentile                |                      |                      |                      |                      | -0.0700***<br>(0.003) |                      |                      |                      |
| EM2                                    |                      | 0.5326***<br>(0.007) |                      |                      |                       | 0.5078**<br>(0.014)  |                      |                      |
| EM2Diff Median                         |                      | -0.0480**<br>(0.039) |                      |                      |                       |                      |                      |                      |
| EM2Diff 75th Percentile                |                      |                      |                      |                      |                       | -0.0443**<br>(0.044) |                      |                      |
| EM3                                    |                      |                      | 0.5284**<br>(0.017)  |                      |                       |                      | 0.5199**<br>(0.022)  |                      |
| EM3Diff Median                         |                      |                      | -0.0412*<br>(0.075)  |                      |                       |                      |                      |                      |
| EM3Diff 75th Percentile                |                      |                      |                      |                      |                       |                      | -0.0402*<br>(0.072)  |                      |
| EM4                                    |                      |                      |                      | 0.4979**<br>(0.028)  |                       |                      |                      | 0.3127<br>(0.184)    |
| EM4Diff Median                         |                      |                      |                      | -0.0267*<br>(0.065)  |                       |                      |                      |                      |
| EM4Diff 75th Percentile                |                      |                      |                      |                      |                       |                      |                      | 0.0269*<br>(0.074)   |
| Tenure                                 | 0.0969***<br>(0.000) | 0.0971***<br>(0.000) | 0.0970***<br>(0.000) | 0.0975***<br>(0.000) | 0.0967***<br>(0.000)  | 0.0968***<br>(0.000) | 0.0969***<br>(0.000) | 0.0977***<br>(0.000) |
| Return on Assets                       | 0.4176***<br>(0.000) | 0.4188***<br>(0.000) | 0.4346***<br>(0.000) | 0.4112***<br>(0.001) | 0.4167***<br>(0.000)  | 0.4139***<br>(0.000) | 0.4312***<br>(0.000) | 0.3967***<br>(0.001) |
| Leverage                               | -0.1018<br>(0.574)   | -0.0938<br>(0.604)   | -0.0943<br>(0.601)   | -0.1057<br>(0.563)   | -0.1010<br>(0.575)    | -0.0947<br>(0.601)   | -0.0915<br>(0.611)   | -0.1126<br>(0.541)   |
| Market-to-Book Ratio                   | -0.0001<br>(0.680)   | -0.0001<br>(0.687)   | -0.0001<br>(0.713)   | -0.0001<br>(0.690)   | -0.0001<br>(0.718)    | -0.0001<br>(0.721)   | -0.0001<br>(0.724)   | -0.0001<br>(0.686)   |
| Firm Size                              | 0.1885***<br>(0.000) | 0.1870***<br>(0.000) | 0.1867***<br>(0.000) | 0.1882***<br>(0.000) | 0.1887***<br>(0.000)  | 0.1867***<br>(0.000) | 0.1870***<br>(0.000) | 0.1883***<br>(0.000) |
| Stock Turnover                         | 43.1101**<br>(0.047) | 44.4274**<br>(0.038) | 44.4125**<br>(0.040) | 42.4623*<br>(0.052)  | 42.9979**<br>(0.048)  | 44.2015**<br>(0.040) | 44.3231**<br>(0.040) | 42.6394*<br>(0.051)  |
| Stock Returns Volatility               | 0.5949<br>(0.104)    | 0.5936<br>(0.102)    | 0.6002*<br>(0.099)   | 0.5984<br>(0.102)    | 0.5846<br>(0.110)     | 0.6031*<br>(0.098)   | 0.5939<br>(0.103)    | 0.6008<br>(0.100)    |
| Past Stock Returns                     | -0.2323<br>(0.660)   | -0.2419<br>(0.645)   | -0.2352<br>(0.653)   | -0.2343<br>(0.662)   | -0.2435<br>(0.646)    | -0.2381<br>(0.650)   | -0.2415<br>(0.645)   | -0.2222<br>(0.679)   |
| Industry Dummies                       | YES                  | YES                  | YES                  | YES                  | YES                   | YES                  | YES                  | YES                  |
| Year Dummies                           | YES                  | YES                  | YES                  | YES                  | YES                   | YES                  | YES                  | YES                  |
| Errors Clustered at the Firm-CEO Level | YES                  | YES                  | YES                  | YES                  | YES                   | YES                  | YES                  | YES                  |
| Robust Errors                          | YES                  | YES                  | YES                  | YES                  | YES                   | YES                  | YES                  | YES                  |
| Observations                           | 6,416                | 6,444                | 6,451                | 6,416                | 6,416                 | 6,444                | 6,451                | 6,416                |
| R-squared                              | 0.517                | 0.517                | 0.517                | 0.517                | 0.518                 | 0.517                | 0.517                | 0.517                |
| Number of Firms                        | 929                  | 934                  | 934                  | 929                  | 929                   | 934                  | 934                  | 929                  |

Panel B: Regressions with CEO Fixed Effect

|  | (1)                   | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   | (7)                   | (8)                   |
|--|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| EM1                                    | 0.6297***<br>(0.002)  |                       |                       |                       | 0.7025***<br>(0.001)  |                       |                       |                       |
| EM1Diff Median                         | -0.0543**<br>(0.014)  |                       |                       |                       |                       |                       |                       |                       |
| EM1Diff 75th Percentile                |                       |                       |                       |                       | -0.0658***<br>(0.002) |                       |                       |                       |
| EM2                                    |                       | 0.6258***<br>(0.001)  |                       |                       |                       | 0.5744***<br>(0.004)  |                       |                       |
| EM2Diff Median                         |                       | -0.0463**<br>(0.032)  |                       |                       |                       |                       |                       |                       |
| EM2Diff 75th Percentile                |                       |                       |                       |                       |                       | -0.0386**<br>(0.042)  |                       |                       |
| EM3                                    |                       |                       | 0.5566**<br>(0.011)   |                       |                       |                       | 0.5223**<br>(0.019)   |                       |
| EM3Diff Median                         |                       |                       | -0.0416*<br>(0.041)   |                       |                       |                       |                       |                       |
| EM3Diff 75th Percentile                |                       |                       |                       |                       |                       |                       | -0.0305*<br>(0.083)   |                       |
| EM4                                    |                       |                       |                       | 0.4827**<br>(0.034)   |                       |                       |                       | 0.2327<br>(0.302)     |
| EM4Diff Median                         |                       |                       |                       | -0.0294*<br>(0.091)   |                       |                       |                       |                       |
| EM4Diff 75th Percentile                |                       |                       |                       |                       |                       |                       |                       | 0.0310*<br>(0.072)    |
| Tenure                                 | 0.0568***<br>(0.000)  | 0.0574***<br>(0.000)  | 0.0571***<br>(0.000)  | 0.0568***<br>(0.000)  | 0.0571***<br>(0.000)  | 0.0572***<br>(0.000)  | 0.0571***<br>(0.000)  | 0.0568***<br>(0.000)  |
| Return on Assets                       | 0.4156***<br>(0.000)  | 0.4215***<br>(0.000)  | 0.4316***<br>(0.000)  | 0.4084***<br>(0.000)  | 0.4173***<br>(0.000)  | 0.4169***<br>(0.000)  | 0.4272***<br>(0.000)  | 0.3892***<br>(0.001)  |
| Leverage                               | -0.1148<br>(0.547)    | -0.1129<br>(0.552)    | -0.1315<br>(0.489)    | -0.1311<br>(0.498)    | -0.1148<br>(0.546)    | -0.1148<br>(0.547)    | -0.1280<br>(0.501)    | -0.1436<br>(0.463)    |
| Market-to-Book Ratio                   | -0.0000<br>(0.936)    | -0.0000<br>(0.937)    | -0.0000<br>(0.967)    | -0.0000<br>(0.930)    | -0.0000<br>(0.979)    | -0.0000<br>(0.969)    | -0.0000<br>(0.972)    | -0.0000<br>(0.910)    |
| Firm Size                              | 0.4040***<br>(0.000)  | 0.4005***<br>(0.000)  | 0.3990***<br>(0.000)  | 0.4039***<br>(0.000)  | 0.4040***<br>(0.000)  | 0.4003***<br>(0.000)  | 0.3997***<br>(0.000)  | 0.4043***<br>(0.000)  |
| Stock Turnover                         | -12.5491<br>(0.616)   | -11.6923<br>(0.638)   | -11.7176<br>(0.641)   | -12.9368<br>(0.608)   | -12.6755<br>(0.613)   | -11.9531<br>(0.631)   | -11.6644<br>(0.641)   | -12.7512<br>(0.612)   |
| Stock Returns Volatility               | 1.5555***<br>(0.000)  | 1.5381***<br>(0.000)  | 1.5392***<br>(0.000)  | 1.5563***<br>(0.000)  | 1.5487***<br>(0.000)  | 1.5381***<br>(0.000)  | 1.5301***<br>(0.000)  | 1.5539***<br>(0.000)  |
| Past Stock Returns                     | -2.7101***<br>(0.000) | -2.7030***<br>(0.000) | -2.6967***<br>(0.000) | -2.7083***<br>(0.000) | -2.7154***<br>(0.000) | -2.6959***<br>(0.000) | -2.7019***<br>(0.000) | -2.6986***<br>(0.000) |
| Industry Dummies                       | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   |
| Errors Clustered at the Firm-CEO Level | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   |
| Robust Errors                          | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   |
| Observations                           | 6,416                 | 6,444                 | 6,451                 | 6,416                 | 6,416                 | 6,444                 | 6,451                 | 6,416                 |
| R-squared                              | 0.154                 | 0.153                 | 0.153                 | 0.153                 | 0.154                 | 0.153                 | 0.152                 | 0.152                 |
| Number of CEOs                         | 1,407                 | 1,415                 | 1,417                 | 1,407                 | 1,407                 | 1,415                 | 1,417                 | 1,407                 |

Panel C: IV GLS Regressions - Altonji and Shakotko (1987)

|                          | (1)                   | (2)                   | (3)                   | (4)                   | (5)                   | (6)                   | (7)                   | (8)                   |
|--------------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| EM1                      | 0.5719***<br>(0.003)  |                       |                       |                       | 0.6106***<br>(0.003)  |                       |                       |                       |
| EM1Diff Median           | -0.0601***<br>(0.001) |                       |                       |                       |                       |                       |                       |                       |
| EM1Diff 75th Percentile  |                       |                       |                       |                       | -0.0669***<br>(0.001) |                       |                       |                       |
| EM2                      |                       | 0.5455***<br>(0.003)  |                       |                       |                       | 0.5087***<br>(0.008)  |                       |                       |
| EM2Diff Median           |                       | -0.0488***<br>(0.007) |                       |                       |                       |                       |                       |                       |
| EM2Diff 75th Percentile  |                       |                       |                       |                       |                       | -0.0437**<br>(0.032)  |                       |                       |
| EM3                      |                       |                       | 0.5084**<br>(0.011)   |                       |                       |                       | 0.4529**<br>(0.028)   |                       |
| EM3Diff Median           |                       |                       | -0.0446**<br>(0.011)  |                       |                       |                       |                       |                       |
| EM3Diff 75th Percentile  |                       |                       |                       |                       |                       |                       | -0.0365*<br>(0.065)   |                       |
| EM4                      |                       |                       |                       | 0.4782**<br>(0.018)   |                       |                       |                       | 0.2632<br>(0.214)     |
| EM4Diff Median           |                       |                       |                       | -0.0358*<br>(0.076)   |                       |                       |                       |                       |
| EM4Diff 75th Percentile  |                       |                       |                       |                       |                       |                       |                       | 0.0311*<br>(0.088)    |
| Tenure                   | 0.0921***<br>(0.000)  | 0.0919***<br>(0.000)  | 0.0917***<br>(0.000)  | 0.0925***<br>(0.000)  | 0.0922***<br>(0.000)  | 0.0917***<br>(0.000)  | 0.0918***<br>(0.000)  | 0.0928***<br>(0.000)  |
| Return on Assets         | 0.4019***<br>(0.000)  | 0.4079***<br>(0.000)  | 0.4164***<br>(0.000)  | 0.3980***<br>(0.000)  | 0.3996***<br>(0.000)  | 0.4023***<br>(0.000)  | 0.4088***<br>(0.000)  | 0.3809***<br>(0.000)  |
| Leverage                 | -0.3416***<br>(0.000) | -0.3239***<br>(0.000) | -0.3289***<br>(0.000) | -0.3443***<br>(0.000) | -0.3341***<br>(0.000) | -0.3185***<br>(0.001) | -0.3248***<br>(0.000) | -0.3500***<br>(0.000) |
| Market-to-Book Ratio     | -0.0001<br>(0.707)    | -0.0001<br>(0.698)    | -0.0001<br>(0.715)    | -0.0001<br>(0.700)    | -0.0001<br>(0.739)    | -0.0001<br>(0.728)    | -0.0001<br>(0.720)    | -0.0001<br>(0.684)    |
| Firm Size                | 0.1192***<br>(0.000)  | 0.1180***<br>(0.000)  | 0.1158***<br>(0.000)  | 0.1178***<br>(0.000)  | 0.1154***<br>(0.000)  | 0.1150***<br>(0.000)  | 0.1145***<br>(0.000)  | 0.1167***<br>(0.000)  |
| Stock Turnover           | 30.1477***<br>(0.003) | 31.1784***<br>(0.002) | 31.3866***<br>(0.002) | 30.3179***<br>(0.003) | 30.5039***<br>(0.003) | 31.4343***<br>(0.002) | 31.6985***<br>(0.002) | 30.7975***<br>(0.002) |
| Stock Returns Volatility | 0.2326<br>(0.295)     | 0.2249<br>(0.310)     | 0.2191<br>(0.322)     | 0.2339<br>(0.293)     | 0.2032<br>(0.361)     | 0.2185<br>(0.324)     | 0.2063<br>(0.352)     | 0.2271<br>(0.307)     |
| Past Stock Returns       | 0.0640<br>(0.803)     | 0.0649<br>(0.799)     | 0.0920<br>(0.719)     | 0.0707<br>(0.782)     | 0.1021<br>(0.691)     | 0.1050<br>(0.681)     | 0.1048<br>(0.682)     | 0.0984<br>(0.701)     |
| Industry Dummies         | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   |
| Year Dummies             | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   | YES                   |
| Observations             | 6,416                 | 6,444                 | 6,451                 | 6,416                 | 6,416                 | 6,444                 | 6,451                 | 6,416                 |
| Number of CEO-Firms      | 1,419                 | 1,427                 | 1,429                 | 1,419                 | 1,419                 | 1,427                 | 1,429                 | 1,419                 |



**Table 5 - CEO Compensation, Earnings Management and Tenure – CEOs with Contracts versus CEOs without Contracts**

This Table reports multivariate analyses for the relationship between CEO compensation and earnings management over the CEO's tenure for CEOs with an explicit employment agreement (CEOs with Contracts) and CEOs that have been appointed without a contract (CEOs without Contracts). The Table shows instrumental variables regressions estimated using generalized least square (IV-GLS) in which the independent variables are constructed following the methodology of Altonji and Shakotko (1987). In each regression, the dependent variable is the logarithm of total compensation (Total Compensation), while two different measures of earnings management are used as independent variables: a) the Performance-augmented Modified Jones Model (EM1) in column (1) and column (2) and the Performance-augmented Modified Jones Model with years dummies (EM4) in column (3) and column (4). All the variables of earnings management are unsigned. All regressions exclude the year in which the CEO was appointed. Variable definitions are found in the Appendix. Variables are winsorized at the 1% level. All regressions include the constant term, but the coefficient is not reported. P-values are in parentheses. \* indicates significance at 1% (\*\*), 5% (\*\*), 10% (\*).

| IV GLS Regressions - Altonji and Shakotko (1987) |                       |                       |                       |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
|  | CEOs with Contracts   | CEO without Contracts | CEOs with Contracts   | CEO without Contracts |
|  | (1)                   | (2)                   | (3)                   | (4)                   |
| EM1  | 0.9812<br>(0.201)     | 1.1698**<br>(0.011)   |                       |                       |
| EM1*Tenure                                       | -0.5437<br>(0.152)    | -0.4606**<br>(0.044)  |                       |                       |
| EM1*Tenure Squared                               | 0.0706*<br>(0.082)    | 0.0295<br>(0.211)     |                       |                       |
| EM4  |                       |                       | 0.9296<br>(0.284)     | 1.5350***<br>(0.002)  |
| EM4*Tenure                                       |                       |                       | -0.4703<br>(0.293)    | -0.4676*<br>(0.075)   |
| EM4*Tenure Squared                               |                       |                       | 0.0422<br>(0.390)     | 0.0253<br>(0.364)     |
| Tenure   | 0.0685**<br>(0.033)   | 0.0386*<br>(0.091)    | 0.0590*<br>(0.061)    | 0.0404*<br>(0.089)    |
| Tenure Squared                                   | -0.0050<br>(0.121)    | -0.0004<br>(0.818)    | -0.0030<br>(0.353)    | 0.0003<br>(0.880)     |
| Return on Assets                                 | 0.3732***<br>(0.000)  | 0.2793**<br>(0.014)   | 0.3347***<br>(0.002)  | 0.2996***<br>(0.008)  |
| Leverage   | 0.0797<br>(0.613)     | -0.1641<br>(0.223)    | 0.0805<br>(0.599)     | -0.1182<br>(0.373)    |
| Market-to-Book Ratio                             | -0.0001<br>(0.733)    | 0.0002<br>(0.742)     | -0.0001<br>(0.788)    | 0.0001<br>(0.832)     |
| Firm Size  | 0.4456***<br>(0.000)  | 0.4284***<br>(0.000)  | 0.4486***<br>(0.000)  | 0.4285***<br>(0.000)  |
| Stock Turnover                                   | 88.6403***<br>(0.000) | -28.8811**<br>(0.036) | 88.1994***<br>(0.000) | -26.3910*<br>(0.054)  |
| Stock Returns Volatility                         | 1.0272**<br>(0.011)   | 1.2545***<br>(0.000)  | 1.0544***<br>(0.009)  | 1.2403***<br>(0.000)  |
| Past Stock Returns                               | -2.8635***<br>(0.000) | -1.8196***<br>(0.000) | -2.8514***<br>(0.000) | -1.8536***<br>(0.000) |
| Industries Dummies                               | YES                   | YES                   | YES                   | YES                   |
| Year Dummies                                     | YES                   | YES                   | YES                   | YES                   |
| Observations                                     | 2,010                 | 4,101                 | 2,010                 | 4,101                 |
| Number of CEO-Firms                              | 502                   | 863                   | 502                   | 863                   |

**Table 6 - CEO Compensation, Earnings Management and Tenure – Insider CEOs with and without Contracts**

This Table reports multivariate analyses for the relationship between CEO compensation and earnings management over the CEO's tenure for insider CEOs with an explicit employment agreement (Insider CEOs with Contracts) and insider CEOs that have been appointed without a contract (Insider CEOs without Contracts). An insider CEO is a CEO that has spent at least 5 years in the firm before being appointed. The Table shows instrumental variables regressions estimated using generalized least square (IV-GLS) in which the independent variables are constructed following the methodology of Altonji and Shakotko (1987). In each regression, the dependent variable is the logarithm of total compensation (Total Compensation), while two different measures of earnings management are used as independent variables: a) the Performance-augmented Modified Jones Model (EM1) in column (1) and column (2) and the Performance-augmented Modified Jones Model with years dummies (EM4) in column (3) and column (4). All the variables of earnings management are unsigned. All regressions exclude the year in which the CEO was appointed. Variable definitions are found in the Appendix. Variables are winsorized at the 1% level. All regressions include the constant term, but the coefficient is not reported. P-values are in parentheses. \* indicates significance at 1% (\*\*\*), 5% (\*\*), 10% (\*).

IV GLS Regressions - Altonji and Shakotko (1987)

|                          | Insider CEOs<br>with Contracts | Insider CEOs<br>without Contracts | Insider CEOs<br>with Contracts | Insider CEOs<br>without Contracts |
|--------------------------|--------------------------------|-----------------------------------|--------------------------------|-----------------------------------|
|                          | (1)                            | (2)                               | (3)                            | (4)                               |
| EM1                      | -0.1404<br>(0.911)             | 2.0135***<br>(0.001)              |                                |                                   |
| EM1*Tenure               | 0.2650<br>(0.649)              | -0.7883***<br>(0.006)             |                                |                                   |
| EM1*Tenure Squared       | -0.0199<br>(0.710)             | 0.0589**<br>(0.039)               |                                |                                   |
| EM4                      |                                |                                   | 0.3725<br>(0.820)              | 2.3273***<br>(0.002)              |
| EM4*Tenure               |                                |                                   | -0.3442<br>(0.701)             | -1.0318***<br>(0.003)             |
| EM4*Tenure Squared       |                                |                                   | -0.0393<br>(0.681)             | 0.0796**<br>(0.021)               |
| Tenure                   | 0.0475<br>(0.107)              | 0.0686*<br>(0.078)                | 0.0425<br>(0.129)              | 0.0651**<br>(0.012)               |
| Tenure Squared           | -0.0004<br>(0.928)             | -0.0040*<br>(0.086)               | -0.0009<br>(0.842)             | -0.0039*<br>(0.091)               |
| Return on Assets         | 0.9601***<br>(0.004)           | 0.5466***<br>(0.000)              | 0.9705***<br>(0.003)           | 0.3806**<br>(0.013)               |
| Leverage                 | 0.2647<br>(0.444)              | -0.2219<br>(0.270)                | 0.3056<br>(0.386)              | -0.0711<br>(0.702)                |
| Market-to-Book Ratio     | 0.0002<br>(0.880)              | 0.0002<br>(0.669)                 | 0.0003<br>(0.821)              | 0.0001<br>(0.911)                 |
| Firm Size                | 0.4133***<br>(0.000)           | 0.3822***<br>(0.000)              | 0.4085***<br>(0.000)           | 0.3989***<br>(0.000)              |
| Stock Turnover           | 25.1846<br>(0.479)             | 8.5648<br>(0.648)                 | 48.3398<br>(0.179)             | 16.4547<br>(0.362)                |
| Stock Returns Volatility | 1.6304**<br>(0.022)            | 0.4764<br>(0.186)                 | 1.4269**<br>(0.044)            | 0.5488<br>(0.135)                 |
| Past Stock Returns       | -2.8497***<br>(0.000)          | -1.2778***<br>(0.003)             | -2.6764***<br>(0.001)          | -1.3227***<br>(0.002)             |
| Industries Dummies       | YES                            | YES                               | YES                            | YES                               |
| Year Dummies             | YES                            | YES                               | YES                            | YES                               |
| Observations             | 565                            | 1,952                             | 565                            | 1,952                             |
| Number of CEO-Firms      | 131                            | 409                               | 131                            | 409                               |

**Table 7- CEO Compensation, Earnings Management, Tenure, and CEO's age**

This Table reports multivariate analyses for the relationship between CEO compensation and earnings management over the CEO's tenure for young CEOs (Young CEOs) and old CEOs (Old CEOs). A CEO is defined as young if she was no older than 56 years when appointed and old if she was more than 57 years old when appointed as CEO. The Table shows instrumental variables regressions estimated using generalized least square (IV-GLS) in which the independent variables are constructed following the methodology of Altonji and Shakotko (1987). In each regression, the dependent variable is the logarithm of total compensation (Total Compensation), while two different measures of earnings management are used as independent variables: a) the Performance-augmented Modified Jones Model (EM1) in column (1) and column (2) and the Performance-augmented Modified Jones Model with years dummies (EM4) in column (3) and column (4). All the variables of earnings management are unsigned. All regressions exclude the year in which the CEO was appointed. Variable definitions are found in the Appendix. Variables are winsorized at the 1% level. All regressions include the constant term, but the coefficient is not reported. P-values are in parentheses. \* indicates significance at 1% (\*\*\*), 5% (\*\*), 10% (\*).

| IV GLS Regressions - Altonji and Shakotko (1987) |                       |                       |                       |                       |
|--|-----------------------|-----------------------|-----------------------|-----------------------|
|  | Young CEOs            | Old CEOs              | Young CEOs            | Old CEOs              |
|  | (1)                   | (2)                   | (3)                   | (4)                   |
| EM1  | 0.8922**<br>(0.046)   | 0.7113<br>(0.263)     |                       |                       |
| EM1*Tenure                                       | -0.3869*<br>(0.070)   | -0.2383<br>(0.541)    |                       |                       |
| EM1*Tenure Squared                               | 0.0342<br>(0.110)     | 0.0175<br>(0.722)     |                       |                       |
| EM4  |                       |                       | 1.4302***<br>(0.002)  | 0.8130<br>(0.205)     |
| EM4*Tenure                                       |                       |                       | -0.5477**<br>(0.016)  | -0.3317<br>(0.420)    |
| EM4*Tenure Squared                               |                       |                       | 0.0410*<br>(0.079)    | 0.0362<br>(0.492)     |
| Tenure   | 0.0409**<br>(0.029)   | 0.0307*<br>(0.089)    | 0.0439*<br>(0.070)    | 0.0216<br>(0.104)     |
| Tenure Squared                                   | -0.0022<br>(0.186)    | 0.0027<br>(0.530)     | -0.0022<br>(0.137)    | 0.0022<br>(0.561)     |
| Return on Assets                                 | 0.4175***<br>(0.000)  | 0.1517<br>(0.188)     | 0.4957***<br>(0.000)  | 0.1625<br>(0.154)     |
| Leverage   | -0.0062<br>(0.959)    | -0.5896***<br>(0.005) | -0.1932<br>(0.160)    | -0.6483***<br>(0.002) |
| Market-to-Book Ratio                             | -0.0001<br>(0.718)    | 0.0014<br>(0.133)     | -0.0001<br>(0.673)    | 0.0014<br>(0.117)     |
| Firm Size  | 0.4223***<br>(0.000)  | 0.3745***<br>(0.000)  | 0.3987***<br>(0.000)  | 0.3430***<br>(0.000)  |
| Stock Turnover                                   | 15.4674<br>(0.201)    | 36.5180<br>(0.127)    | 8.0238<br>(0.533)     | 34.9329<br>(0.147)    |
| Stock Returns Volatility                         | 1.1545***<br>(0.000)  | 0.0269<br>(0.952)     | 1.1429***<br>(0.000)  | -0.0752<br>(0.865)    |
| Past Stock Returns                               | -2.1269***<br>(0.000) | -1.3606***<br>(0.005) | -2.0071***<br>(0.000) | -1.2343**<br>(0.011)  |
| Industries Dummies                               | YES                   | YES                   | YES                   | YES                   |
| Year Dummies                                     | YES                   | YES                   | YES                   | YES                   |
| Observations                                     | 5,221                 | 1,398                 | 5,221                 | 1,398                 |
| Number of CEO-Firms                              | 1,121                 | 352                   | 1,121                 | 352                   |

**Table 8 - CEO Compensation, Earnings Management, Tenure and Firms' Corporate Governance**

This Table reports multivariate analyses for the relationship between CEO compensation and earnings management over the CEO's tenure for firms with different internal and external corporate governance. Panel A reports results for firms with high and low institutional ownership, while Panel B shows results for firms with strong and weak boards of directors. A firm is defined as a firm with high institutional ownership if in the year of the CEO's appointment the total percent of share outstanding held by the institutional investors is equal to or larger than the median of institutional ownership calculated over all the CEO's appointment years (Firms with High Institutional Ownership), otherwise the firm is defined as a firm with low institutional ownership (Firms with Low Institutional Ownership). A firm is classified as a firm with a weak board of directors (Firms with Weak Boards) if the total number of directors on the board is equal to or larger than the time-series cross sectional median number of directors in the sample, otherwise the firm is classified as a firm with a strong board of directors (Firms with Strong Boards). Both Panels show instrumental variables regressions estimated using generalized least square (IV-GLS) in which the independent variables are constructed following the methodology of Altonji and Shakotko (1987). In each regression, the dependent variable is the logarithm of total compensation (Total Compensation), while two different measures of earnings management are used as independent variables: a) the Performance-augmented Modified Jones Model (EM1) in column (1) and column (2) and the Performance-augmented Modified Jones Model with years dummies (EM4) in column (3) and column (4). All the variables of earnings management are unsigned. All regressions exclude the year in which the CEO was appointed. Variable definitions are found in the Appendix. Variables are winsorized at the 1% level. All regressions include the constant term, but the coefficient is not reported. P-values are in parentheses. \* indicates significance at 1% (\*\*\*), 5% (\*\*), 10% (\*).

Panel A: Firms with High Institutional Ownership versus Firms with Low Institutional Ownership

|                     | Firms with<br>High Institutional<br>Ownership | Firms with<br>Low Institutional<br>Ownership | Firms with<br>High Institutional<br>Ownership | Firms with<br>Low Institutional<br>Ownership |
|---------------------|---|--|---|--|
|                     | (1)   | (2)  | (3)   | (4)  |
| EM1                 | 0.4568<br>(0.477)                             | 1.1406**<br>(0.010)                          |   |  |
| EM1*Tenure          | 0.0051<br>(0.988)                             | -0.5171**<br>(0.014)                         |   |  |
| EM1*Tenure Squared  | -0.0085<br>(0.817)                            | 0.0472**<br>(0.022)                          |   |  |
| EM4                 |   |  | 1.9167***<br>(0.007)                          | 1.2177***<br>(0.005)                         |
| EM4*Tenure          |   |  | -0.6505<br>(0.123)                            | -0.4503**<br>(0.033)                         |
| EM4*Tenure Squared  |   |  | 0.0511<br>(0.292)                             | 0.0354*<br>(0.091)                           |
| Tenure              | 0.0257<br>(0.141)                             | 0.0438**<br>(0.031)                          | 0.0366*<br>(0.088)                            | 0.0428**<br>(0.045)                          |
| Tenure Squared      | -0.0035<br>(0.173)                            | -0.0018<br>(0.324)                           | -0.0063**<br>(0.012)                          | -0.0005<br>(0.752)                           |
| Return on Assets    | 0.6364***<br>(0.000)                          | 0.2271***<br>(0.007)                         | 0.6764***<br>(0.000)                          | 0.2729***<br>(0.001)                         |
| Leverage            | -0.4096**<br>(0.020)                          | 0.0154<br>(0.899)                            | -0.5330***<br>(0.003)                         | -0.1296<br>(0.331)                           |
| Firm Size           | 0.3024***<br>(0.000)                          | 0.3920***<br>(0.000)                         | 0.2742***<br>(0.000)                          | 0.3622***<br>(0.000)                         |
| Industries Dummies  | YES   | YES  | YES   | YES  |
| Year Dummies        | YES   | YES  | YES   | YES  |
| Observations        | 1,943   | 4,766  | 1,943   | 4,766  |
| Number of CEO-Firms | 461   | 989  | 461   | 989  |

Panel B: Firms with Strong Boards of Directors versus Firms with Weak Boards of Directors

|                     | Firms with<br>Strong Boards | Firms with<br>Weak Boards | Firms with<br>Strong Boards | Firms with<br>Weak Boards |
|---------------------|-----------------------------|---------------------------|-----------------------------|---------------------------|
|                     | (1)                         | (2)                       | (3)                         | (4)                       |
| EM1                 | -0.4433<br>(0.632)          | 2.0110*<br>(0.053)        |                             |                           |
| EM1*Tenure          | -0.0980<br>(0.842)          | -0.8574*<br>(0.083)       |                             |                           |
| EM1*Tenure Squared  | 0.0376<br>(0.484)           | 0.0751<br>(0.147)         |                             |                           |
| EM4                 |                             |                           | -0.2637<br>(0.821)          | 2.9387**<br>(0.017)       |
| EM4*Tenure          |                             |                           | 0.0450<br>(0.942)           | -1.2002**<br>(0.036)      |
| EM4*Tenure Squared  |                             |                           | -0.0108<br>(0.876)          | 0.0892<br>(0.118)         |
| Tenure              | 0.0382<br>(0.132)           | 0.1084**<br>(0.014)       | 0.0407<br>(0.124)           | 0.1083***<br>(0.006)      |
| Tenure Squared      | -0.0000<br>(1.000)          | -0.0089*<br>(0.061)       | 0.0013<br>(0.704)           | -0.0080*<br>(0.051)       |
| Return on Assets    | 0.1826<br>(0.529)           | 0.0926<br>(0.555)         | 0.1960<br>(0.498)           | 0.0670<br>(0.667)         |
| Leverage            | 0.0650<br>(0.761)           | 0.1094<br>(0.546)         | 0.0696<br>(0.744)           | 0.1062<br>(0.558)         |
| Firm Size           | 0.3891***<br>(0.000)        | 0.4197***<br>(0.000)      | 0.3882***<br>(0.000)        | 0.4198***<br>(0.000)      |
| Industries Dummies  | YES                         | YES                       | YES                         | YES                       |
| Year Dummies        | YES                         | YES                       | YES                         | YES                       |
| Observations        | 1,718                       | 2,003                     | 1,718                       | 2,003                     |
| Number of CEO-Firms | 564                         | 675                       | 564                         | 675                       |

**Table 9 - CEO Compensation, Earnings Management, Tenure and Product Market Competition**

This Table reports multivariate analyses for the relationship between CEO compensation and earnings management over the CEO's tenure for firms in industries with different product market competition. To identify competitive industries, for each industry in the sample, we calculate the time-series average of its Herfindhal Index over the entire sample period. We then compare each industry's time-series average Herfindhal Index with the cross-sectional median Herfindhal Index in the sample. An industry is classified as competitive if its time-series average Herfindhal Index is below the median Herfindhal Index in the sample (Industries with High Market Competition), otherwise the industry is classified as an industry with low market competition completion (Industries with Low Market Competition). Industries are defined using Fama and French 48 industries definition. The Table shows instrumental variables regressions estimated using generalized least square (IV-GLS) in which the independent variables are constructed following the methodology of Altonji and Shakotko (1987). In each regression, the dependent variable is the logarithm of total compensation (Total Compensation), while two different measures of earnings management are used as independent variables: a) the Performance-augmented Modified Jones Model (EM1) in column (1) and column (2) and the Performance-augmented Modified Jones Model with years dummies (EM4) in column (3) and column (4). All the variables of earnings management are unsigned. All regressions exclude the year in which the CEO was appointed. Variable definitions are found in the Appendix. Variables are winsorized at the 1% level. All regressions include the constant term, but the coefficient is not reported. P-values are in parentheses. \* indicates significance at 1% (\*\*), 5% (\*\*), 10% (\*).

IV GLS Regressions - Altonji and Shakotko (1987)

|                          | Firms in Industries with<br>Low Market Competition | Firms in Industries with<br>High Market Competition | Firms in Industries with<br>Low Market Competition | Firms in Industries with<br>High Market Competition |
|--------------------------|--|---|--|---|
|                          | (1)  | (2)   | (3)  | (4)   |
| EM1                      | -1.4132*<br>(0.093)                                | 1.6791***<br>(0.000)                                |  |   |
| EM1*Tenure               | 0.2634<br>(0.562)                                  | -0.5598***<br>(0.003)                               |  |   |
| EM1*Tenure Squared       | -0.0164<br>(0.749)                                 | 0.0453**<br>(0.018)                                 |  |   |
| EM4                      |  |   | -0.6626<br>(0.478)                                 | 1.7492***<br>(0.000)                                |
| EM4*Tenure               |  |   | 0.3860<br>(0.442)                                  | -0.7080***<br>(0.001)                               |
| EM4*Tenure Squared       |  |   | -0.0433<br>(0.430)                                 | 0.0567**<br>(0.010)                                 |
| Tenure                   | 0.0203*<br>(0.091)                                 | 0.0420**<br>(0.013)                                 | 0.0174<br>(0.127)                                  | 0.0411**<br>(0.011)                                 |
| Tenure Squared           | -0.0030<br>(0.458)                                 | -0.0014<br>(0.348)                                  | -0.0024<br>(0.501)                                 | -0.0013<br>(0.346)                                  |
| Return on Assets         | 0.5803***<br>(0.000)                               | 0.2498***<br>(0.003)                                | 0.6032***<br>(0.000)                               | 0.2259***<br>(0.007)                                |
| Leverage                 | 0.6173**<br>(0.013)                                | -0.3679***<br>(0.001)                               | 0.6497***<br>(0.008)                               | -0.4067***<br>(0.000)                               |
| Market-to-Book Ratio     | 0.0000<br>(0.977)                                  | -0.0001<br>(0.863)                                  | 0.0000<br>(0.999)                                  | -0.0001<br>(0.852)                                  |
| Firm Size                | 0.3633***<br>(0.000)                               | 0.4428***<br>(0.000)                                | 0.3724***<br>(0.000)                               | 0.4399***<br>(0.000)                                |
| Stock Turnover           | -2.2000<br>(0.937)                                 | 31.2418***<br>(0.005)                               | -0.2351<br>(0.993)                                 | 31.4006***<br>(0.006)                               |
| Stock Returns Volatility | 0.9139*<br>(0.088)                                 | 0.9427***<br>(0.000)                                | 0.9609*<br>(0.074)                                 | 0.9523***<br>(0.000)                                |
| Past Stock Returns       | -2.8047***<br>(0.000)                              | -1.7201***<br>(0.000)                               | -2.9130***<br>(0.000)                              | -1.6836***<br>(0.000)                               |
| Industries Dummies       | YES  | YES   | YES  | YES   |
| Year Dummies             | YES  | YES   | YES  | YES   |
| Observations             | 1,650  | 4,969   | 1,650  | 4,969   |
| Number of CEO-Firms      | 387  | 1,086   | 387  | 1,086   |