Sword of Damocles: Job Security and Earnings Management [*]

Chen Cai
Department of Finance
Monte Ahuja College of Business
Cleveland State University

Xiaohua Fang
School of Accounting
College of Business
Florida Atlantic University

Di Li
HSBC Business School
Peking University

January 15, 2020

Abstract

Job security concerns can have a disciplinary or opportunistic effect on CEOs' behavior. We study these two effects in the setting of earnings management. We find that an increase in the CEO dismissal hazard is associated with smaller income-inflating accruals and less real earnings management, which is consistent with the disciplinary effect. In contrast, the opportunistic effect exists only when the dismissal risk is extremely high. Overall, our evidence supports the notion that forced turnover is an effective corporate governance measure that deters CEOs from engaging in misbehaviors.

JEL Classification: G3, M41
Keywords: Corporate governance, CEO turnover, job security, earnings management

[*] We thank Ron Masulis, Raluca Roman (discussant), Kandarp Srinivasan (discussant), Sujuan Xie (discussant), Bohui Zhang (discussant), and Haibei Zhao for their helpful comments. We also thank participants at the 2018 WRDS Advanced Research Scholar Program, 2018 Hong Kong-Shenzhen Greater Bay Finance Conference, 2nd China Finance and Accounting Research Conference, 18th China Economics Annual Meeting, 2017 Midwest Finance Association Annual Meeting, and 2017 Financial Management Association Annual Meeting, and seminar participants at Chinese University of Hong Kong (Shenzhen), Fudan University, Renmin University of China, Shanghai New York University, Shanghai University of Finance and Economics, and Southwestern University of Finance and Economics. This paper received the best paper award of the 2018 WRDS Advanced Research Scholar Program. Authors' e-mail addresses are: c.cai@csuohio.edu, fangx@fau.edu, and dili@phbs.pku.edu.cn. Address correspondence to Di Li, Peking University HSBC Business School, Room 611, Xili University Town, Nanshan District, Shenzhen City, 518055 China. Phone number: (+86) 755-2603-1509.

1 Introduction

The modern corporation features an organizational form that delegates management to specialized managers. This structure allows firms to be run by the most capable and professional talents so that more values can be created for the shareholders. However, agency problems arise from the separation of ownership and control, in which the managers engage in self-serving activities at the expense of the shareholders (Jensen and Meckling, 1976). A set of internal disciplines have been introduced to address agency issues in corporations. Forced CEO turnover is one of these internal corporate governance mechanisms that is used to punish managerial wrongdoings ex post and aims to deter such actions ex ante. Nevertheless, a concern emerges about the negative side effects due to the weakening managerial job security. Specifically, the threat of job termination may induce CEOs to act opportunistically, which harms shareholder interests, leading to a serious doubt on the effectiveness of this corporate governance mechanism. In this paper, we test the dual effects of the CEO dismissal risk in the setting of earnings management, a particular form of managerial decision that has significant economic relevance but is often suspected to be an opportunistic action related to the job security pressure. We aim to provide insight and evidence for the debate about the effectiveness of forced CEO turnover as an internal discipline.

Managerial career concerns have significant impacts on corporate financial reporting.[1] A natural conjecture is that the managerial job security concern motivates the manipulation of earnings information. Fudenberg and Tirole (1995) model the action of earnings smoothing as an outcome of weak managerial job security. This argument seems to be consistent with the findings of Datta, Iskandar-Datta, and Vivek (2013) and Ahmed, Lobo, and Zhou (2011), who show a higher propensity of earnings management in the firms facing fiercer product market competition or operating in more uncertain environments. However, earnings management is not risk- or cost-free. Aggressive earnings management can lead to misconducts and even frauds, subject the CEO to severe punishments. In line with this argument, Hazarika, Karpoff, and Nahata (2012) document a greater likelihood of forced CEO turnover following a higher degree

[1] Francis et al. (2008) show that reputed CEOs care about their own career enhancement and take actions of earnings management to mask poor performance. Ahmed, Lobo, and Zhou (2011), DeFond and Park (1997), and Mergenthaler, Rajgopal, and Srinivasan (2012) provide evidence suggesting that managerial career concerns induce more earnings management.

of earnings management. In addition, earnings management increases the difficulty of meeting performance targets in the future (Baber, Kang, and Li, 2011; Barton and Simko, 2002). These ex-post consequences hence reduce the appeal of earnings management as a choice to address the managerial job security concern.

With a parsimonious model, we show that the aforementioned ex-post disciplines effectively contain the managerial engagement in earnings management which is primarily motivated by the managers' pursuance for the performance-related compensation. More important, in most cases, a decrease in job security induces the CEO to improve the real performance. This alleviates the CEO's job situation and reduces the necessity of earnings manipulation, which also relaxes the constraint imposed by the ex-post punishments for earnings management. In contrast to such a disciplinary effect, the opportunistic effect of the managerial job security pressure exists only in the rare and extreme situations. That is, the CEO will adopt more earnings management to save his job only when the dismissal risk becomes imminent.

The prior literature attempts to explore the managerial opportunism related to the job security pressure by studying earnings management surrounding CEO turnovers, but the empirical evidence is so far mixed. For example, Murphy and Zimmerman (1993) and Pourciau (1993) find little evidence that departing CEOs engage in a greater degree of earnings management, while Guan, Wright, and Leikam (2005) document more aggressive use of discretionary accruals prior to non-routine CEO turnovers. There are some issues in these studies that hinder a complete exploration of the effects of the CEO job security pressure: First, these studies focus on the CEOs who are *ex post* identified being replaced. The sample selectivity thus overlooks a plausible *ex-ante* disciplinary effect of the job security concern in the normal situations. Second, the CEOs' job situation has been simplified as a binary status—secure or endangered. Therefore, the dynamics of CEO job security and its corresponding effects are neglected.

We extend the discussion by studying the dual effects of the CEO dismissal risk (i.e., discipline and opportunism) on corporate earnings management from an ex-ante perspective. To our best knowledge, the ex-ante "disciplinary effect" has not been empirically explored. To this end, we construct an ex-ante CEO job (in)security measure based on the estimated dismissal hazard from the survival analysis for the CEO job duration. This hazard can proxy the likelihood of a forced CEO turnover in the next year, given that the CEO survives as of the current time. Therefore, the greater the hazard, the worse the CEO job security. This measure has three important advantages. First, it can be estimated for a large sample of firm-CEOs, making our empirical evidence more representative than that of the prior research which relies on a sample surrounding the actual CEO turnovers. Second, this measure varies in both the cross-sectional and time-series dimensions. It allows us to take advantage of the panel-data techniques and control for various fixed effects. Our results are thus more immune to biases caused by the omitted variables that are invariant in certain dimensions. Last but not least, this measure is continuous and spans a wide range of the degree of CEO job security, which enables us to investigate the incremental effects of the CEO dismissal risk.

Following the prior literature, we use discretionary accruals as our primary measure of earnings management. Discretionary accruals are the difference between the reported accounting cash flows and the actual ones that are at the CEO's discretion and cannot be explained by normal economic factors. The magnitude of discretionary accruals manifests the extent to which the information about corporate earnings is manipulated, and its sign indicates the direction of earnings management. That is, the greater positive (negative) discretionary accruals, the higher the degree of income-inflating (-deflating) earnings management. For succinctness, hereinafter, we use the abbreviation "DA" to stand for discretionary accruals and use "hazard" to stand for the CEO dismissal hazard.

We relate DA to hazard to examine the effects of CEO job security on earnings management. Consistent with the discipline hypothesis, we show that a greater CEO dismissal risk is followed by lower DA. Moreover, we find that the coefficient of hazard is statistically significant only in the regression of positive DA, indicating that this relation is driven by the income-inflating earnings management.

We strengthen the identification using the following approaches. First, we use two instrumental variables in the estimation of hazard: CEO dismissals in the firm's industry over the past two years and change in the state-level non-compete enforceability index, respectively. Second, we adopt alternative measures of the CEO dismissal risk, constructed at the industry level, which are arguably less subject to the firm-level endogeneity. Third, we explore the effects of the CEO job security among the subsamples that are partitioned based on various external corporate governance mechanisms. The idea is that, if the negative relation between hazard and positive DA indeed indicates a disciplinary effect, it should be more pronounced when the external corporate governance mechanisms are weak. Overall, we find consistent and supporting evidence for the discipline hypothesis.

The discipline hypothesis posits that the deteriorating job security motivates a CEO to improve firm performance, which reduces the necessity to overstate earnings. For this mechanism to hold, we expect to observe better firm performance following a higher degree of the CEO dismissal risk. We regress three measures of firm performance—Tobin's Q, stock return, and return on assets (ROA) corrected for discretionary accruals—on hazard and find supporting evidence for this prediction.

We next examine several real corporate decisions to shed light on the channel through which the disciplinary mechanism affects firm performance. The results show that CEOs with weak job security tend to refrain from physical investment and acquisitions but increase expenditures on research and development. The contraction of investment and acquisitions allows a firm to refocus on its core business and avoid wasting valuable resources, especially when the firm is in trouble, while the increased input in innovation benefits the firm's long-term development. These actions can improve firm performance and in turn mitigate the CEO job insecurity.

In addition to managing accruals, CEOs can achieve similar objectives of manipulating financial information by engaging in the real activity-based earnings management (Roychowdhury, 2006). Given that the disciplinary effect drives the relation between the CEO job security and discretionary accruals, we expect a similar effect on real earnings management. Consistent with this prediction, we find that an increase in hazard is negatively associated with abnormal production costs and positively associated with abnormal discretionary expenditures, both of which suggest a lower degree of real earnings management.

Although we show that, on average, the disciplinary effect of the CEO job security pressure leads to lower earnings management, the opportunistic effect may still be possible. Manipulating earnings information is not costless, so CEOs distort the financial information only when the benefits exceed the costs. The opportunistic earnings manipulation is thus more likely when the CEO dismissal threat is imminent. To separate the opportunistic effect from the disciplinary effect, we introduce an interaction term between hazard and a dummy variable that indicates the severity of the threat. We indeed find that the coefficient of the interaction term is positive but is statistically significant only when the situation is severe, i.e., when the dismissal hazard is within the top ten percent or when the stock return is within the bottom twenty percent of the sample.

Finally, we show that our results are robust with respect to (a) different specifications and methods of hazard estimation, (b) various concerns such as changes around CEO turnover, reversal of earnings management, and analyst forecasts, and (c) additional controls including the Sarbanes-Oxley Act, CEO overconfidence, CEO compensation incentives, audit committee independence, and other measures of corporate governance.

Our work complements the literature on forced CEO turnover as an ex-post discipline. Lehn and Zhao (2006) find more incidences of forced CEO turnover following poor acquisition performance. Similarly, Hazarika, Karpoff, and Nahata (2012) find positive relationship between the degree of earnings management and the likelihood of CEO being fired. Different from these studies, we explore the ex-ante disciplinary effect of forced CEO turnover and find supporting evidence. Our findings imply that, as a corporate governance mechanism, forced turnover can discipline CEOs through ex-ante deterrence of misbehaviors.

This paper contributes to the discussion about how CEO turnover affects earnings management. Distinct from the traditional view of opportunism in the extant literature (e.g., Guan, Wright, and Leikam, 2005; Murphy and Zimmerman, 1993; Pourciau, 1993), our findings support the corporate governance view that the threat of job insecurity can discipline CEOs and reduce the inefficient income-inflating earnings management.

This study also adds to the emerging research about the effects of the CEO job security on corporate policies. Cziraki and Xu (2014) find that CEOs increase investment and leverage when their job is secure. Li and Zhao (2017) find a lower acquisition intensity but better acquisition performance when acquiring CEOs face a higher dismissal risk. Liu and Xuan (2014) document similar evidence for merger performance before the renewal of CEO employment contract.

2 Model and Hypotheses

In this section, we build a simple and stylized model to demonstrate the relation between CEO job security and earnings management. Based on the implications of the model, we develop the hypotheses regarding the disciplinary and opportunistic effects of CEO dismissal risk.

A risk-neutral CEO is hired to run a firm. He can exert effort and generate performance π_0. For simplicity, we assume $\pi_0 \geqslant 0$. However, the true performance π_0 is not observed by the shareholders who instead only observe the reported performance. Managers often have the flexibility to choose accounting methods to report financial information to the shareholders. They may craft information quality to serve their own objectives. Such managerial action is broadly referred as "earnings management." Earnings management has been extensively studied in accounting and finance. A comprehensive review about this literature can be found in Healy and Wahlen (1999) and Dechow, Ge, and Schrand (2010).

It is typically conjectured that managers have an incentive to overstate performance because their compensation and other benefits are closely tied to how well they perform. Sloan (1996) finds that managers can temporarily increase their firms' stock price by inflating current earnings using aggressive accruals assumptions. Beneish and Vargus (2002) find that abnormally high accruals are associated with the increase in insider sales of shares. Moreover, Bergstresser and Philippon (2006) and Cheng and Warfield (2005) document that earnings management is more prevalent in firms where managers' wealth is more closely tied to stock price, most notably via equity compensation.

Let the reported performance be $\pi = \pi_0 + m$, where $m \geqslant 0$ is earnings management. To be focused, we only discuss income-inflating earnings management. The CEO's compensation depends on the reported performance: $S = s_0 + s_1\pi$, where $s_0 \geqslant 0$ is the fixed component of salary and $s_1 \in (0, 1)$ represents the performance-based pay. The CEO suffers convex disutility, $c_1\pi_0^2/2$, to generate the true performance π_0, where $c_1 > 0$.

Distortion of earnings information is not cost-free. First, accelerating the recognition of future cash flows to boost current earnings will increase the difficulty of meeting performance targets in the future (e.g., Baber, Kang, and Li, 2011; Barton and Simko, 2002). Second, aggressive earnings management may lead to frauds, and managers will face severe punishments if such actions are detected and deemed unacceptable by the monitoring authorities such as the board of directors, the audit committee, and regulators. In fact, Hazarika, Karpoff, and Nahata (2012) find that a higher degree of earnings management leads to more incidences of forced CEO turnover.

We model the cost of earnings management in terms of its impact on CEO dismissal risk. Ex ante, the CEO faces a dismissal hazard index $h \geqslant 0$, and ex post, the probability of CEO dismissal is given by $F(h - a\Delta\pi + bm^2/2)$, where $a > 0$ and $b > 0$ are two constant coefficients, and $\Delta\pi = \pi - \pi^*$ with $\pi^* > 0$ being a performance benchmark picked by the board. We assume that the function $F(\cdot)$ is continuous, increasing, and twice differentiable. Here, the ex-ante hazard index is not a probability but an increasing transformation of the ex-ante dismissal likelihood. When the CEO chooses to meet the benchmark without earnings management, the ex-post dismissal probability is naturally equal to $F(h)$. The ex-post dismissal probability increases when the reported performance fails to meet the benchmark. Earnings management m has two opposite effects on CEO dismissal risk. On the one hand, earnings overstatement increases the reported performance and lowers the ex-post CEO dismissal probability. On the other hand, the use of earnings management increases the likelihood of the detection of fraud or misconduct, which increases the likelihood of CEO dismissal ex post (Hazarika, Karpoff, and Nahata, 2012). We assume the latter effect to be convex. That is, it is stronger when earnings are more overstated. Lastly, the CEO faces a substantial loss $c_2 > 0$ if dismissed.[2]

In this model, effort and earnings management are substitutes in generating the reported performance. The CEO chooses the pair (π_0, m) to maximize his utility, given the benefits and costs of effort and earnings management discussed above. In reality, the benefits and costs of earnings management vary with the degree of monitoring and discipline.[3] We abstract these

[2]Using an early sample (1974-1986), Jensen and Murphy (1990) estimate the loss of compensation and wealth for a dismissed CEO to range from hundreds of thousands to millions of dollars. This number ought to be much larger in recent years given the substantial increase in CEO compensation. Eckbo, Thorburn, and Wang (2016) show that the present value of compensation losses to the CEO of a bankrupt company who drops out from the executive labor market can be as high as $7 million (or five times his pre-departure annual compensation). In addition, a dismissed CEO may lose a substantial value in unexercised stock options (Dahiya and Yermack, 2008). These estimates do not even count the reputation damage and associated losses. Had a CEO not been fired, he could have had ample opportunities of serving as corporate directors after retirement (Brickley, Linck, and Coles, 1999).

[3]Klein (2002) shows that audit committee independence is related to a lower magnitude of discretionary accruals. Xie, Davidson, and DaDalt (2003) find that sophistication and financial expertise of board and audit committee members are important in constraining discretionary accruals. They also find that a higher frequency of board and audit committee meetings is associated with less earnings management. Cornett, Marcus, and Tehranian (2008) show that earnings management through discretionary accruals is lower when there is more monitoring of managerial discretion from sources such as institutions that own large blocks of shares, institutional representation on the board,

effects and focus on a representative model to demonstrate the effects of CEO job security on earnings management. Based on the aforementioned assumptions, the CEO's utility is given below:

$$U = s_0 + s_1(\pi_0 + m) - \frac{1}{2}c_1\pi_0^2 - c_2F\left(h - a\Delta\pi + \frac{1}{2}bm^2\right). \tag{1}$$

The CEO's choices of effort and earnings management are determined by the first order conditions:

$$\frac{\partial U}{\partial \pi_0} = s_1 - c_1\pi_0 + ac_2f = 0, \tag{2a}$$

$$\frac{\partial U}{\partial m} = s_1 + (a - bm)c_2f = 0, \tag{2b}$$

where $f = f(h - a\Delta\pi + bm^2/2)$ and $f(\cdot) = F'(\cdot) > 0$. The first order condition for effort (2a) indicates that an increase in π_0 can boost the compensation (s_1) and reduce the costs of being dismissed by lowering the ex-post dismissal probability (ac_2f); however, an increase in π_0 also increases the disutility ($c_1\pi_0$). Therefore, the CEO chooses π_0 so that the marginal benefits equal the marginal costs. Similarly, the choice of earnings management is also determined by the balance of its marginal benefits and costs.

It is worth discussing the deterrence of earnings management by the ex-post dismissal threat. Two implications can be derived from the first order condition regarding earnings management (i.e., eq. (2b)). First, since s_1, c_2, and f are all positive, the existence of a solution for earnings management requires $a - bm < 0$, which implies that the level of earnings management is non-zero $m > a/b$. Second, however, the level of earnings management is finite because after a certain level (i.e., a/b) additional earnings management will lead to an increasing ex-post dismissal risk (i.e., $-(a - bm)f > 0$), which curtails the level of earnings management. Without this ex-post threat to balance the benefit from the increased compensation, the CEO would use earnings management unlimitedly.

We are interested in how the ex-ante job security index h affects the CEO's choices on effort and earnings management. Further derivation based on the first order conditions implies the

and independent outside directors.

following comparative statics:

$$\frac{\partial \pi_0}{\partial h} = \frac{abc_2^2 f f'}{a^2 bc_2^2 f f' + bc_1 c_2 f + c_1 c_2 (a - bm)^2 f'}, \tag{3a}$$

$$\frac{\partial m}{\partial h} = \frac{c_1 c_2 (a - bm) f'}{a^2 bc_2^2 f f' + bc_1 c_2 f + c_1 c_2 (a - bm)^2 f'}, \tag{3b}$$

where $f' = f'(h - a\Delta\pi + bm^2/2)$. We can derive a few observations from the above comparative statics. Above all, given the positiveness of a, b, c_1, c_2, and f, it is sufficient to get $\partial \pi_0 / \partial h > 0$ and $\partial m / \partial h < 0$ if $f' > 0$. The intuition can be obtained from the first order conditions. At the CEO's optimal choice of (π_0, m), suppose that a shock occurs that increases the ex-ante dismissal index h. The CEO can adjust his choices of π_0 and m as substitutes. Based on the first order condition regarding effort (2a), when $f' > 0$, the CEO can increase the marginal benefit by increasing π_0 (i.e., $ac_2 f' > 0$) to offset the negative impact from the increased dismissal hazard on his utility. Likewise, based on the first order condition regarding earnings management (2b), when $f' > 0$, the CEO should avoid undertaking additional earnings management since the overall effect of m on the ex-post dismissal probability is positive (i.e., $bm - a > 0$). Simply speaking, when $f' > 0$, the curtailing effect of the dismissal threat on earnings management discussed above is stronger, so the benefit of undertaking additional earnings management as a response to the increased ex-ante dismissal hazard is lower than the cost resulted from the increase of the ex-post dismissal risk. In this case, the CEO turns to improving the actual performance to alleviate his job security.

When is f' positive? Note that $f(\cdot)$ is a probability density function. Assume the distribution is single-modal. Then f' is positive when $h - a\Delta\pi + bm^2/2$ is below its mode, i.e., when the implied ex-post dismissal risk is mild. In reality, CEOs are rarely fired and the observed CEO dismissal rate is lower than 5% (Taylor, 2010). Therefore, in normal cases, the condition for a positive f' holds so an increase of CEO dismissal hazard (h) encourages managers to exert effort (i.e., $\partial \pi_0 / \partial h > 0$) and deters them from undertaking earnings management (i.e., $\partial m / \partial h < 0$). We call this effect the *disciplinary effect*.

Can $\partial m / \partial h$ be negative? Yes, but it requires f' to be negative and the denominator of the first order conditions to be positive. In other words, a necessary condition for an increase of CEO dismissal hazard to motivate managers to overstate earnings is that the implied ex-post dismissal risk is high enough (i.e., above the mode of the distribution). Intuitively, when the dismissal hazard is already very high so that normal operations (e.g., effort) cannot quickly turn the situation around, the CEO will have a strong incentive to manipulate earnings. We call this effect the *opportunistic effect*.

Note that a negative f' does not necessarily imply the opportunistic effect because it also requires the denominator of the first order conditions to be positive. Therefore, the disciplinary effect applies to a greater range of the distribution's support. We hence expect the disciplinary effect to dominate in the observed data, while the opportunistic effect is concentrated locally in a subsample where CEO dismissal hazard is extremely high.

We summarize the relation between CEO dismissal hazard and earnings management in the following statements of hypotheses.

Hypothesis 1a. (Discipline Hypothesis) *When the dismissal risk is mild, a decrease in job security has a disciplinary effect that motivates a CEO to reduce earnings management. Specifically, it curtails the incentives to overstate earnings.*

Hypothesis 1b. (Opportunism Hypothesis) *When the threat of dismissal is imminent, the continued increase of dismissal risk may entice a CEO to engage in earnings management, particularly overstating earnings.*

In reality, both the disciplinary and opportunistic motives exist. This paper aims to provide empirical evidence for these effects.

3 Data

3.1 Sample Description

Our main sample includes all firms from the Compustat Executive Compensation (ExecuComp) database for the period 1993 to 2011. We identify forced CEO turnovers based on the classification method of Parrino (1997). Specifically, for each record of CEO turnover in the ExecuComp database, we search through Google and Factiva for the reason. A CEO departure is classified as a forced turnover if the indicated reason is described as policy differences with the board, being forced out or fired, and/or resignation due to weak performance or fraud. In addition, for CEOs below age sixty, we also classify a turnover as forced if either we do not find the reason as death, poor health, or acceptance of another position or the report indicates that the CEO is retiring but there is no announcement at least six months prior to the departure. Following prior literature, we exclude CEO turnovers associated with bankruptcies, mergers, and spin-offs. In this study, only a forced CEO turnover triggers job termination, while a voluntary CEO departure is treated as the truncation of job duration.

In order to estimate CEO dismissal hazard, we further require firms in our sample to have stock return information from the Center for Research in Security Prices (CRSP) and board information from the Institutional Shareholder Services (ISS, formerly RiskMetrics). After imposing these restrictions, we end up with a sample of 16,148 firm-year observations.

For analysis of earnings management, we merge the sample with Compustat to construct discretionary accruals. This results in a sample of 13,790 observations, in which 6,227 firm-years have positive discretionary accruals. For an extended analysis of real earnings management, we require additional Compustat information to calculate abnormal production costs and abnormal discretionary expenses. This further reduces the sample size to 12,873 firm-year observations.

As for control variables, we retrieve firms' financial information from Compustat, analyst information from the Institutional Brokers' Estimate System (I/B/E/S), and institutional investor information from the Thomson Reuters database. The definitions of the variables are provided in Table A.1 of Appendix A. Summary statistics of the main variables are reported in Table 1, which are comparable to those in prior literature.

3.2 Measure of CEO Job Security

We measure CEO job security using the hazard of forced turnover ("hazard" in short). Since hazard is not observed, we estimate it based on a survival analysis of CEO job duration. To perform the estimation, we assume that CEO job duration follows a distribution that is characterized by a Weibull hazard function:

$$h_{t-1}^{t}(\tau_{i,t-1}, x_{i,t-1}) = p\tau_{i,t-1}^{p-1} \exp(\delta' x_{i,t-1}), \tag{4}$$

where h_{t-1}^{t} is hazard, which is determined by a baseline hazard function $h_0(\tau) = p\tau^{p-1}$ and a set of covariates x; τ is CEO job duration; p is an auxiliary parameter that controls the shape of baseline hazard; and δ is the coefficients of the covariates. h_{t-1}^{t} roughly indicates the likelihood of job termination during year t given that the CEO is still on the position in year $t-1$. Therefore, we can use it to measure CEO job insecurity. The baseline hazard function only depends on job duration τ and represents the natural evolution of hazard over time. We choose the Weibull model because it allows a flexible baseline hazard: $h_0(\tau)$ is increasing in τ when $p > 1$, decreasing when $p < 1$, and constant when $p = 1$. For a robustness check, in Section 5.2, we conduct a CEO job survival analysis based on various alternative models and estimate hazard accordingly. The implied results are qualitatively similar.

We allow hazard to depend on certain firm and CEO characteristics. The most important determinant of hazard is firm performance. Prior literature finds that CEOs are more likely to be replaced following poor performance (Jenter and Lewellen, 2014). Jenter and Kanaan (2015) find that a CEO who is close to retirement and who owns a large share of the firm's stock is less likely to be fired. We therefore include two dummy variables that indicate whether a firm's CEO is at the retirement age (between 63 and 66 years old) and whether the CEO owns more than 5% of the firm's stock. In addition, forced CEO turnover is affected by internal corporate governance structures. With the same performance, CEOs face a higher dismissal risk when the evaluation and discipline are more stringent. We hence include two continuous variables about board structures (board size and independence) and one dummy variable that indicates whether the CEO is also the chairman of the board (i.e., CEO-chairman duality) in the covariates.

We report the results of the survival analysis in Panel A of Table 2. In the baseline specification (column (1)), we use stock return as the proxy for firm performance, which is commonly used in the study of CEO turnover. Consistent with prior literature, a good stock performance significantly reduces CEO dismissal hazard. We also find that CEOs at the retirement age, with more than 5% of the firm's stock, and serving as the board chairman are indeed significantly less likely to be fired. However, in our analysis, the board structures do not seem to significantly affect CEO dismissal hazard. One plausible reason is that these board attributes may simultaneously impose opposing effects on forced CEO turnover.[4] The estimated Weibull auxiliary parameter, p, is smaller than one, indicating that the baseline hazard exhibits a decreasing pattern over CEO job duration.

Misspecification of the hazard model can give rise to biases in the estimation of hazard. One possible source of misspecification is the measure of firm performance. To address this concern, we adopt alternative measures of firm performance in the survival analysis, as shown in columns (2) and (3) of Table 2. In Section 5.1, we show that our results are robust to the performance measures in hazard estimation.

We estimate hazard for each firm-year observation based on the coefficients from the survival analysis reported in Panel A of Table 2. Hazard used in the subsequent analyses of this study is computed based on the baseline regression (i.e., column (1) of Table 2). Summary statistics of the estimated hazard are reported in Panel B of Table 2. We observe that, on average, CEOs face a low dismissal risk. The mean of hazard is 1.66%. The 75th percentile is only 2.25%. And the highest hazard is between 10% and 15%.

The low value of the average dismissal hazard is mainly due to the low frequency of CEO dismissal incidences in the data, which has been widely documented in the literature. It may cause some concern that low dismissal hazard does not have significant effects on CEO behaviors. However, a low hazard can translate into a substantially higher risk-neutral dismissal probability if CEOs are risk averse, especially when the dismissal of a CEO has a significant impact on his wealth. In Section 5.2, we conduct a series of robustness checks and estimate CEO dismissal hazard or probability using various alternative models. The range of the estimated hazard (probability) is wider. For example, when we use a Probit model that addresses the rare-event bias (see Table A.3 in Appendix C), the estimated dismissal probability has a similar mean and 75th percentile as the hazard estimated based on the baseline model, but the highest dismissal probability computed in this method reaches 80%. More important, these alternative methods all lead to similar results regarding the impact of CEO dismissal hazard on earnings management, which alleviates the aforementioned concern about the hazard measure.

[4]Taking board size as an example, on the one hand, a larger board can have more resources and manpower that help oversee the management more closely (e.g., Coles, Daniel, and Naveen, 2008); but on the other hand, a larger board may also be subject to a coordination difficulty and cause the free-rider problem (e.g., Yermack, 1996).

3.3 Measures of Earnings Management

Our primary measure of earnings management is discretionary accruals (DA). Since performance is related to CEO job security, we follow Kothari, Leone, and Wasley (2005) and use the performance-adjusted discretionary accruals to address the issue of the omitted correlated variables (see the review by Dechow, Ge, and Schrand, 2010). The model is given below:

$$\frac{TA_{i,t}}{Total\ Assets_{i,t-1}} = \beta_1 \frac{1}{Total\ Assets_{i,t-1}} + \beta_2 \frac{\Delta Sales_{i,t}}{Total\ Assets_{i,t-1}} + \beta_3 \frac{PPE_{i,t}}{Total\ Assets_{i,t-1}} + \beta_4 ROA_{i,t} + \varepsilon_{i,t}, \tag{5}$$

where we define total accruals (TA) as change in non-cash current assets minus change in current liabilities excluding current portion of long-term debt, minus depreciation and amortization; $\Delta Sales$ is change in sales net of change in accounts receivable; PPE is net property, plant and equipment; and ROA is return on assets. Here, we use lagged assets as the deflator to mitigate the issue of heteroscedasticity in residuals. We estimate the above model in each two-digit Standard Industrial Classification (SIC) industry-year group and use the residuals of these regressions as the measure of DA. The sign of DA indicates the direction of earnings manipulation. Large positive (negative) DA manifest a higher degree of income-inflating (-deflating) earnings management.

In addition to accrual-based earnings management, managers can also manipulate real activities to avoid reporting unfavorable outcomes without bending accounting rules. For example, Roychowdhury (2006) finds that managers can temporarily increase sales by offering more price discounts and more lenient credit terms, lower the average cost of goods sold by overproduction, and improve profit margin by reducing discretionary expenditures such as R&D and advertising expenses. In an extended analysis presented in Section 4.4, we investigate the effect of CEO job security on real earnings management.

4 Empirical Analysis

4.1 The Effect of CEO Job Security on Earnings Management

Before a thorough examination of the relation between CEO job security and earnings management, we provide straightforward evidence in a simple univariate analysis. In Table 3, we show that CEO dismissal hazard is negatively correlated with subsequent DA and the correlation is statistically significant at the 1% level. It indicates that, on average, CEOs with weak job security engage in less earnings management. It is interesting to note that such a correlation seems to be driven by positive DA: the correlation between hazard and positive DA is negative and statistically significant, while that between hazard and negative DA is small and insignificant. The results hence suggest that the disciplinary effect governs the relation between CEO job security and earnings management.

A caveat about the univariate analysis is that it ignores the effects of other attributes. In fact, Table 3 shows that DA, positive DA, and negative DA are highly correlated with many variables, such as firm size, leverage, market-to-book ratio, ROA, and analyst coverage etc. More important, these variables are also correlated with hazard. Therefore, in absence of these covariates, the relation between CEO job security and earnings management may be spurious.

To address the issue of omitted variables in the univariate analysis, we estimate the following multivariate regression:

$$EM_{i,t} = \alpha_0 + \alpha_1 h^t_{i,t-1} + \beta' z_{i,t-1} + \alpha_j + \alpha_t + \varepsilon_{i,t}, \tag{6}$$

where $EM_{i,t}$ is earnings management in year t measured either by DA, positive DA, or negative DA; $h^t_{i,t-1}$ is hazard in year t measured at the end of year $t-1$ (i.e., the beginning of year t); and $z_{i,t-1}$ is a vector of covariates including firm and CEO characteristics that affect earnings management. Specifically, we include firm characteristics such as firm size, firm age, leverage, and market-to-book ratio; because profitability affects managerial incentives to alter earnings information, we further control a set of firm performance measures, including ROA, sales growth, and operating cash flow. We also control a set of variables related to analysts, auditors, and institutional investors, since these disciplines may restrict earnings management. And finally we control variables related to internal disciplines, such as CEO-chairman duality, board size, and board independence. In regression (6), we control industry and year fixed effects (α_j and α_t) to mitigate potential concerns about omitted variables that are invariant either in an industry or in a year. For all analyses, we winsorize the top and bottom one percent of all continuous variables to control the influence of outliers, and we cluster the standard errors of regression coefficients at the firm-CEO pair level.

We present the baseline results in Table 4. First, we examine the relation between hazard and EM using an ordinary least squares (OLS) regression in which EM is measured with DA. The results show that, after controlling a multitude of covariates, hazard exhibits a negative association with subsequent DA. The coefficient is statistically significant (t-statistic $= -3.12$). Next, we run the OLS regression for positive and negative DA, respectively. And we continue to find that hazard is negatively related to income-inflating earnings management. The coefficient of hazard in the regression of positive DA is negative and statistically significant (t-statistic $= -2.84$), consistent with the finding in the univariate analysis. In contrast, the coefficient of hazard in the regression of negative DA is much smaller in magnitude and statistically insignificant (t-statistic $= -0.76$).

We also use the truncated regression to repeat the multivariate analysis of positive and negative DA, since the coefficients from the OLS regression may be biased for both subsamples.[5] The results are reported in the last two columns of Table 4. The findings are qualitatively similar to those from the OLS regressions. That is, an increase in hazard is associated with a significantly smaller positive DA (t-statistic $= -3.01$). To further assess economic significance, we compute the change in positive DA corresponding to a shift of hazard from its 25th to 75th percentiles, holding the covariates at their means in the positive-DA subsample. We find that positive DA decreases by 60% of the magnitude at its sample mean.[6] As for the truncated regression of negative DA, the coefficient of hazard is again statistically and economically insignificant (t-statistic $= -0.42$). The overall results suggest that a negative relation between hazard and the degree of

[5] In the positive-DA subsample, $E[\varepsilon_{i,t}|DA_{i,t} > 0, h^t_{i,t-1}, z_{i,t-1}]$ is in general nonzero given $E[\varepsilon_{i,t}|h^t_{i,t-1}, z_{i,t-1}] = 0$. The same applies to the negative-DA subsample.

[6] In the positive-DA subsample, the 25th and 75th percentiles of hazard are 0.0085 and 0.0224, respectively. Given the coefficient of hazard, -1.7168, from the truncated regression of positive DA, the change in positive DA following a shift in hazard from its 25th to 75th percentile is equal to $(0.0224 - 0.0085) \times (-1.7168) = -0.0239$, implying a 60% reduction of DA from its mean in the positive-DA subsample, 0.04.

subsequent earnings overstatement, consistent with the discipline hypothesis but not the opportunism hypothesis.

Regarding control variables, consistent with the literature (e.g., Ali and Zhang, 2015; Watts and Zimmerman, 1986), the coefficient of firm size is significantly negative for DA and positive DA and are significantly positive for negative DA, suggesting that larger firms are subject to greater political costs and thus use less income-inflating earnings management to distort information quality. In consonance with the argument that growth firms are more likely to inflate earnings to meet or beat benchmarks (Frankel, Johnson, and Nelson, 2002), the coefficient on market-to-book (M/B) is significantly positive for positive DA. Meanwhile, we find that the coefficient of M/B is also significantly negative for negative DA. In a similar vein, the coefficient of firm age is significantly negative for positive DA but positive for negative DA. Lastly, we find that the coefficient of board independence in the regression of positive DA is negative and statistically significant, suggesting that an independent board helps restrain earnings overstatement.

Intriguingly, our evidence indicates that the hazard-EM relation is important only for firms with positive DA. Therefore, CEO dismissal risk is relevant only to the incentive of overstating performance. To confirm this finding, we conduct the quantile regression for each percentile of DA. We then plot the estimated coefficient of hazard and the 95% confidence intervals in Figure 1. The effect of hazard is overall negative for every percentile of DA. However, the coefficient is not significantly different from zero to the left end, where earnings exaggeration is most unlikely. For DA below the median, the coefficient of hazard is small and barely significant. As DA gradually increases in the range above the median, the coefficient of hazard becomes larger in magnitude and more statistically significant. Clearly, the average effect of hazard on DA is driven by its effect on the high quantiles of DA where income-inflating earnings management is prominent. This finding is not surprising because the overstatement and understatement of earnings arise from different incentives. Overstating performance is more relevant to compensation and career-related concerns. In contrast, firms underreport performance to build a cushion for the future (i.e., "big bath"), especially when a new CEO takes the job, but this motive may not be directly relevant to the concern of job security. Since our primary results indicate that CEO job security is mainly related to income-inflating earnings management, in the remainder of the paper, we only focus on the effect of hazard on positive DA.

4.2 Is the Effect Causal?

Endogeneity can arise in the examination of the hazard-EM relation. One potential concern is that some of the determinants (e.g., firm performance) in the hazard model might affect earnings management decision. We address this issue by including measures of firm performance as control variables in the main regression (as shown in Table 4). In addition, Hazarika, Karpoff, and Nahata (2012) show that earnings management results in more incidences of CEO dismissal subsequently. This leads to a second concern that our results may be driven by a reverse-causality effect. However, the main explanatory variable (e.g., hazard) is measured at the beginning of the year. Therefore, by properly matching of the timing of hazard and DA, we alleviate the concern of reverse causality. Nevertheless, we implement additional tests to make more robust inferences about the impact of CEO job security on earnings management. Specifically, we adopt the following approaches to further alleviate the remaining endogeneity concerns.

Instrumental Variables

First, we use the CEO dismissals in the firm's two-digit SIC industry for the past two years as an instrumental variable (IV). A number of prior studies use industry-level characteristics as instrumental variables (e.g., Coles, Li, and Wang, 2018; Kale, Reis, and Venkateswaran, 2009). These IVs can measure the industry-level shocks that affect corporate decisions in the focal company. For example, the dismissal of a peer CEO may induce the focal company to inspect its CEO for potential issues, thus increasing the likelihood of CEO dismissal. In the regression of EM, we include the industry fixed effects to control for the concern that some common factors in the industry affect hazard and EM simultaneously through this instrumental variable.[7] We report the results of the first-stage estimation in column (1) of Table A.2 in Appendix C. Indeed, the industry-level CEO dismissal has a positive and statistically significant relation with the focal CEO's dismissal

[7] A valid instrument has to satisfy the following two conditions (Larcker and Rusticus, 2010; Roberts and Whited, 2013): (a) it is correlated with the CEO dismissal hazard (the relevance condition), and (b) it is not directly related to earnings management other than through the hypothesized channel conditional on the full set of control variables (the exclusion condition). Including the industry fixed effects in the control variables filters the correlation between earnings management and the industry-level CEO dismissal intensity since such a correlation is mainly driven by the industry specific characteristics.

hazard. It is, however, unlikely to have a *direct* impact on the focal firm's earnings management after controlling the industry fixed effects. The second-stage results for the truncated regression of positive DA based on the hazard estimated using this instrumental variable are presented in column (1) of Table 5. We find that the coefficient of hazard remains negative and statistically significant (t-statistic $= -3.22$), which is both qualitatively and quantitatively similar to that from the baseline regression in column (4) of Table 4.

A second instrumental variable is the change in the state-level non-compete enforceability index. A non-compete clause is often included in employment contracts, which restricts employees to "compete" with the employer for some specified period after employment termination. These agreements lower the firing costs of employers because they alleviate the concern about leakage of business secrets and upfront competition from departing employees. Therefore, non-compete agreements make firms more willing to dismiss an employee. In practice, however, the effect of non-compete agreements relies on the enforceability within the legal system, which is governed by the state courts. Garmaise (2011) constructs an index to measure the state-level enforceability of non-compete agreements for the period from 1992 to 2004, and Kini, Williams, and Yin (2018) update the index through 2014 closely following his methodology. An increase (decrease) of non-compete enforceability strengthens (weakens) the effect of non-compete agreements and hence increases (decreases) dismissal hazard ceteris paribus. More important, the change in non-compete enforceability should be exogenous to corporate policies of individual firms.

We hence use the change in non-compete enforceability index as an instrumental variable in the estimation of CEO dismissal hazard. The results are reported in column (2) of Table A.2. As expected, it is positively correlated with CEO dismissal hazard and the effect is statistically significant. In addition, the instrumented hazard exhibits a negative correlation with earnings overstatement (column (2) of Table 5): its coefficient is negative and statistically significant (t-statistic $= -3.46$) with a magnitude even greater than that in the baseline regression.

Alternative Measures of Dismissal Risk

Industry-level measures are less subject to firm-level endogeneity, especially after controlling industry and year fixed effects. For example, Agrawal and Knoeber (1998) use M&A intensity of a firm's industry to measure takeover threat. Therefore, we construct alternative measures of a CEO's dismissal risk based on CEO dismissal intensity in the firm's industry. As shown above, industry-level CEO dismissal is positively associated with CEO dismissal hazard in home firm. Therefore, it is a suitable proxy.

The first measure is CEO dismissal intensity of a firm's two-digit SIC industry in the previous year, computed as the number of CEO dismissal incidences divided by the total number of CEOs in the industry. As shown in column (1) of Table 6, the coefficient of this proxy is indeed negative and statistically significant (t-statistic $= -1.68$) in the regression of positive DA.

It is possible that the spillover effect of CEO dismissal increases with the tenure of the fired CEO, because the dismissal of a long-time CEO may have greater influence in the industry. With tenure-weighted industry-level intensity of CEO dismissal as a proxy, we find a negative and statistically significant relation (t-statistic $= -1.78$) between CEO dismissal risk and positive DA (see column (2) of Table 6). It is also possible that it takes a firm some time to digest the information from a peer dismissal. In columns (3) to (6) of Table 6, we further measure CEO dismissal risk using the average of industry-level dismissal intensity for the previous three years, the average of tenure-weighted industry-level dismissal intensity for the past three years, the inverse-time-weighted average of industry-level dismissal intensity for the past three years,[8] and the inverse-time-weighted average of tenure-weighted industry-level intensity for the past three years, respectively. For all these specifications, we consistently find a negative and significant relation between CEO dismissal risk and positive DA.

The Effect of Dismissal Hazard in Subsamples

Our results so far show that hazard has a negative relation with income-inflating earnings management, suggesting that the discipline hypothesis is prominent. However, in addition to forced CEO turnover, there are other corporate governance mechanisms that also discourage managers from undertaking earnings management. If our results can indeed be interpreted as a disciplinary effect, then this effect should be more pronounced for firms where other governance mechanisms are weak. Therefore, we can strengthen the identification of our results by conduct-

[8] We assign a higher weight to an incidence that is closer in time and a lower weight to an incidence that is far away because the influence of peer dismissals fades out when time elapses.

ing subsample analysis based on alternative measures of corporate governance. We focus on external corporate governance mechanisms because internal ones (e.g., board structures) themselves may be determinants of CEO dismissal hazard.

Large firms often draw more attention from the media and are followed by more analysts. Miller (2006) and Blankespoor, Miller, and White (2014) suggest that investors have a low-cost access to information about highly visible firms (usually large firms) because these firms tend to receive a broad news coverage. Therefore, we expect that large firms are more subject to external monitoring than small ones. Following this idea, we consider two subsamples of firms whose size is above (below) the median value of their industry in the year. We then repeat the baseline regression of positive DA on hazard in each subsample. The results are in Panel A of Table 7. Consistent with our expectation, the coefficient of hazard is negative and statistically significant (t-statistic $= -2.87$) in the subsample of small firms, while it is small and statistically insignificant (t-statistic $= -1.28$) in the subsample of large firms.

Previous research suggests that financial analysts play an external monitoring role. For example, Yu (2008) finds that firms with a high analyst coverage engage less in the opportunistic earnings management. In Panel B of Table 7, we repeat the baseline regression of positive DA in two subsamples based on the number of financial analysts who follow the firm. We find that the coefficient of hazard is significantly negative (t-statistic $= -2.71$) in the subsample of firms with the least coverage of financial analysts, while the coefficient of hazard in the other subsample is small and statistically insignificant (t-statistic $= -0.96$).

Product market competition can serve as an external governance mechanism that mitigates incentive misalignment between managers and shareholders. Giroud and Mueller (2010, 2011) find that the superior return for firms with fewer anti-takeover provisions documented by Gompers, Ishii, and Metrick (2003) exists only in concentrated industries, suggesting that product market competition can substitute other corporate governance mechanisms in disciplining managers. To properly characterize product market competition, we use the Herfindahl (1950) and Hirschman (1945) index (HHI) of sales in the text-based network (TNIC) industries (Hoberg and Phillips, 2010, 2016) to measure the concentration of industries.[9] We repeat the baseline regres-

[9]The TNIC industries are classified using the firm-pairwise similarity from a textual analysis of the firms' 10-K product descriptions. Hoberg and Phillips (2010, 2016) show that the TNIC industry classifications are more accurate than

sion of positive DA for the subsamples of the firms whose TNIC industry's sales HHI is above or below the median sales HHI in the year. The results, shown in Panel C of Table 7, indicate that the coefficient of hazard is negative in both subsamples but is statistically significant (t-statistic $= -2.58$) only in the subsample of firms operating in concentrated industries, where the sales HHI is high. Thus, this finding indicates a disciplinary effect of CEO job security.

Overall, we document a negative association between hazard and the degree of earnings overstatement. The results are robust to instrumental-variable methods, alternative measures of dismissal risk, and various subsample analyses, providing evidence for the discipline hypothesis. However, it remains unanswered how the disciplinary effect effectively curtails earnings management. In the next subsection, we provide complementary evidence that job security concerns stimulate CEOs to improve real firm performance, thus reducing the necessity for them to overstate earnings.

4.3 Understanding the Disciplinary Effect

The discipline hypothesis argues that weak job security can stimulate a CEO to exert greater efforts to improve firm performance so as to mitigate job insecurity. Meanwhile, improved firm performance reduces the necessity of earnings overstatement. Therefore, the key to establish a negative relation between hazard and positive DA is to show that better firm performance is associated with a higher dismissal hazard. To further test the discipline hypothesis, we run the following OLS regression:

$$PFM_{i,t} = \alpha_0 + \alpha_1 h^t_{i,t-1} + \alpha_2 PFM_{i,t-1} + \beta' w_{i,t-1} + \alpha_i + \alpha_t + \varepsilon_{i,t}, \tag{7}$$

where $PFM_{i,t}$ is a measure of firm performance, $w_{i,t-1}$ is a vector of firm and CEO characteristics that are related to firm performance, and α_i and α_t are firm and year fixed effects. Because performance measures tend to exhibit a strong serial correlation in the annual frequency and firm performance affects CEO dismissal hazard, we include lagged firm performance as a control variable, and we use the Arellano and Bond (1991) approach to carry out the linear dynamic

the traditional fixed industry classifications (e.g., SIC) in capturing a firm's competitive environment in the product market.

panel-data regression.

We first consider the Tobin's Q of firm assets, the ratio between market value and book value of a firm's total assets. We use the Q ratio as the primary measure of firm performance because it is stock-market-based and less subject to managerial manipulation. The results are in column (1) of Table 8. Consistent with the discipline hypothesis, we find that the coefficient of hazard is positive and statistically significant (t-statistic $= 11.41$).

In column (2) of Table 8, we use annual stock return as a performance measure. Similarly, stock return is market-based and less affected by managerial manipulation. In addition, stock return is the rate of change of the market capitalization, which appropriately measures the improvement of firm performance. We again find a positive and statistically significant coefficient (t-statistic $= 6.14$) for hazard.

Firm performance is also often measured using accounting-based metrics, such as return on assets (ROA). However, because of earnings management, the accounting-based measures can be contaminated. Nevertheless, it is still worth checking whether the relation between CEO job security and firm performance remains robust if we instead examine the accounting-based measures. In column (3) of Table 8, we introduce the corrected ROA as a performance measure, subtracting DA from the raw ROA that is presumably "managed." Again, we find a positive and statistically significant coefficient (t-statistic $= 4.13$) for hazard.

The evidence so far supports the argument of the discipline hypothesis. That is, the disciplinary effect reduces earnings management through improving firm performance. Yet, it may be argued why a CEO allows his job situation to deteriorate in the first place if he can improve firm performance to alleviate job insecurity. In reality, the dynamics of firm performance and CEO job situation are determined not only by a CEO's effort but also many factors out of his control, such as macro and industry economic factors. Moreover, managerial slackness may lead to the deterioration of firm performance.[10] Regardless of the reason for the declined performance and job security, it is a positive and proactive response to take actions to improve the situation.

Improvement of firm performance must be traced to changes in real corporate decisions. The channel through which CEO job security affects earnings management cannot be fully established

[10] One possible explanation for managerial slackness is the high marginal cost (and/or low marginal benefit) of effort when firm performance is good or normal. A second possibility is the behavior weakness of human beings.

until we can show that hazard indeed affects certain firm decisions that are associated with firm performance. Therefore, to better understand the positive relation between firm performance and CEO dismissal hazard, we examine a series of firm decisions, including physical-capital investment, research and development, mergers and acquisitions, and cost control. The results are reported in Table 9.

We find that the coefficients of hazard are negative and statistically significant in both regressions of investment and M&As ($t = -6.48$ and -3.36, respectively). The findings suggest that an increase in hazard is associated with a subsequent contraction of investment in physical assets and with a reduction in mergers and acquisitions. In practice, shareholder activists (e.g., activist hedge funds) commonly require targeted firms to cut down redundant investment projects, sell off non-core subsidiaries, refrain from unnecessary merger deals (i.e., empire building), and refocus on their core business. These reforms help firms avoid wasting valuable resources, enhance efficiency, and eventually improve performance. Therefore, our evidence here exemplifies CEOs' efforts to improve firm performance when they observe an adverse signal from the increased dismissal hazard.

We also find that hazard has a significantly positive association with subsequent R&D expenditures (t-statistic $= 3.32$). Combined with the evidence discussed above, this finding suggests that, though firms cut inefficient physical investment, they simultaneously increase input in innovation, which benefits their long-term development.

When firms take actions to improve their performance, cost control is a typical aspect for consideration. We therefore study the relation between hazard and sales, general, and administrative expenses (SG&A) which comprises much of a firm's fixed costs. However, we do not find a statistically significant coefficient (t-statistic $= 0.63$) for hazard in the regression of SG&A. One possible reason is that SG&A includes various cost and expense items. For example, a significant part of R&D expenses (e.g., labor costs in R&D) may be recorded in SG&A. The relations of different cost items with hazard can be opposite, leading to an ambiguous net relation and an insignificant coefficient in the regression.

In sum, we find a positive relation between hazard and the subsequent firm performance. And, following an increase of hazard, physical investment and M&As decline but R&D increases.

These findings provide a strong support for the discipline hypothesis.

4.4 Real Earnings Management

In the discussion of CEO job security and firm performance, we show that firms change real corporate policies when CEOs face an adverse job outlook. This leads to a possibility that CEOs manipulate real activities to boost near-term firm performance at the expense of long-run development. In fact, accrual-based earnings management is not the only way in which managers can mislead the shareholders. Roychowdhury (2006) document that managers can distort real activities to achieve similar outcomes. Specifically, firms can temporarily increase sales by offering price discounts and more lenient credit terms, lower average cost of goods sold by engaging in overproduction, and improve profit margin by reducing discretionary expenditures such as R&D and advertising expenses. A natural question is whether CEO job security has a similar disciplinary effect on real-activity based earnings management.

Recent studies suggest that managers use real-activity manipulation and accrual-based earnings management as substitutes. Graham, Harvey, and Rajgopal (2005) imply that managers prefer real activity-based to accruals-based earnings management because they believe that real earnings management is less likely to be detected or scrutinized by auditors and regulators. Consistent with this argument, Cohen, Dey, and Lys (2008) find that managers have shifted away from accrual-based to real earnings management in the post Sarbanes-Oxley Act (SOX) period because of higher litigation risk imposed by regulators. Similarly, Cohen and Zarowin (2010) and Zang (2012) show that the choice between real and accrual-based earnings management methods depends on their relative costs. Therefore, we expect CEO job security to affect real earnings manipulation as well.

We follow the literature (e.g., Cohen, Dey, and Lys, 2008; Cohen and Zarowin, 2010; Roychowdhury, 2006) to estimate abnormal production costs (Ab PROD) and abnormal discretionary expenses such as advertising, R&D, and SG&A (Ab DISCEXP) as the measures of real earnings management.[11] The construction of these two measures can be found in Appendix B. Firms

[11] We do not study abnormal cash flows from operations because real-activity manipulations have different effects on this item, as discussed by Roychowdhury (2006). Specifically, price discounts and overproduction decrease cash flows from operations but cutting discretionary expenses increases them. The net effect is thus ambiguous. For the

that engage in real earnings management are likely to have either abnormally high production costs or abnormally low discretionary expenses. If CEO job security has a disciplinary effect on real earnings management, then an increase in hazard should lead to a decrease in abnormal production costs and an increase in abnormal discretionary expenses.

We run the baseline OLS regression (6) with EM substituted by either of the two measures of the real earnings management. Table 10 presents the estimation results, with column (1) for abnormal production costs and column (2) for abnormal discretionary expenses. Consistent with the discipline hypothesis, we find that the coefficient of hazard is significantly negative (t-statistic $= -2.15$) in the regression of abnormal production costs and significantly positive (t-statistic $= 2.01$) in the regression of abnormal discretionary expenses.

In sum, we find a negative relation between hazard and real earnings management, therefore providing the further support for the discipline hypothesis.

4.5 Opportunistic Earnings Management

So far, our empirical evidence strongly supports the discipline hypothesis. However, we cannot completely rule out the opportunistic motives. In fact, Guan, Wright, and Leikam (2005) find that CEOs who depart for non-routine reasons engage in more income-inflating earnings management in the year prior to the departure. Liu and Xuan (2014) document higher discretionary accruals for CEOs with a fixed-term contract around the contract renewal years. Their evidence suggests that CEOs may behave opportunistically by undertaking income-inflating earnings management when they face an immediate threat of job termination. In this section, we explore the opportunistic effect and separate it from the disciplinary effect.

First, we augment the baseline regression (6) of positive DA with an interaction term between hazard and a dummy variable that indicates whether hazard is among the top P percent of the firms in the year, where we allow P to be respectively 50, 40, 30, 20, and 10 to demonstrate different degrees of the opportunistic effect when CEO job security varies. In presence of the interaction term, the coefficient of hazard represents the average effect of CEO dismissal risk, and the coefficient of the interaction term shows the incremental effect when the likelihood of

same reason, Zang (2012) also only examines abnormal production costs and abnormal discretionary expenses.

job termination is high. We expect the coefficient of hazard to remain negative, in line with the dominant disciplinary effect, but the coefficient of the interaction term to be positive, especially when *P* is low (i.e., when the dismissal risk is high).

The results are presented in Panel A of Table 11. Consistent with our prediction, we find that the coefficient of hazard indeed remains negative and statistically significant after including the interaction term in the regression. More important, the coefficient of the interaction term is mostly positive, implying that, when CEO job security is poor, a continued increase in hazard weakens the disciplinary effect. This effect becomes even stronger and statistically significant (t-statistic $= 2.62$) in the last column, where the interacting dummy variable indicates a very high dismissal risk (top 10 percent). This result is largely consistent with the findings of Guan, Wright, and Leikam (2005) and Liu and Xuan (2014), since their samples likely comprise CEOs whose dismissal hazard is among the top quantiles of the population.

Poor firm performance is the most important reason for a forced CEO turnover. When firm performance is poor, the likelihood of CEO dismissal is high, and meanwhile, opportunistic earnings management becomes more likely. Thus, we augment the baseline regression (6) of positive DA with an interaction term between hazard and a dummy variable that indicates whether the firm's stock return is in the bottom *P* percent of the firms in the year. We allow *P* to take the respective values of 10, 20, 30, 40, and 50 to show differences in the opportunistic effect when firm performance varies. We expect the coefficient of hazard to be negative but the coefficient of the interaction term to be positive, especially when *P* is small (i.e., when firm performance is very poor).

Again, the results reported in Panel B of Table 11 are consistent with our prediction. While hazard has a negative effect on income-inflating earnings management, this effect is greatly weakened when the firm performance is so poor that the threat of CEO dismissal becomes imminent. Intriguingly, we find that the coefficient of the interaction term (i.e., the opportunistic effect) is positive, large in magnitude, and statistically significant in the first two columns when the interacting dummy variable indicates inferior performance; and it gradually becomes smaller and statistically insignificant with the declining t-statistic when the indicated firm performance improves.

In short, our evidence suggests that both the discipline hypothesis and the opportunism hypothesis can be valid. However, the disciplinary effect of CEO job security is universal and dominant, while the opportunistic effect is local and is important only when CEOs face a severe and immediate dismissal risk.

5 Robustness

In this section, we show that our results are robust to alternative performance measures, alternative methods for the estimation of CEO dismissal hazard (probability), inclusion of additional control variables that may affect earnings management, and others.

5.1 Alternative Performance Measures

In the baseline analysis, we adopt a Weibull model to estimate hazard, in which firm performance is measured using stock return. One concern is that mismeasurement of firm performance can bias hazard estimation, which in turn leads to biases in the study of earnings management. To address this concern, we use alternative measures of firm performance in the estimation of hazard and show that our results are robust to the choices of performance measures.

Jenter and Kanaan (2015) find that forced CEO turnover is not only driven by a firm's own performance but also affected by industry performance. In column (2) of Table 2, we follow their method to decompose a firm's stock return into two components: the industry-induced stock return (the component of stock return predicted by the industry's average stock return) and the firm's idiosyncratic stock return (i.e., the residual of the prediction regression). We then use these two stock-return components as the measures of firm performance in the CEO job survival analysis. The results are in column (2) of Table 2. Indeed, both the industry-induced stock return and the idiosyncratic stock return are negatively associated with hazard. In Panel B of Table 2, we show that the distribution of hazard based on this specification is similar to that based on the baseline model, both qualitatively and quantitatively. More important, when we use this alternative hazard in the regression of positive DA, its coefficient remains negative and statistically significant (t-statistic $= -2.29$), as shown in column (1) of Table 12.

Fee et al. (2018) challenge the robustness of the relation between the industry-induced stock return and forced CEO turnover. They claim that the results of Jenter and Kanaan (2015) are sensitive to the choice of data timing. In addition, some studies also consider accounting measures (e.g., Engel, Haye, and Wang, 2003; Weisbach, 1988). Therefore, in column (3) of Table 2, we use stock return and ROA as the performance measures and find that they are both negatively and significantly associated with hazard. Hazard estimated using this specification also exhibits a similar distribution as the baseline one (Panel B of Table 2), and its coefficient remains negative and statistically significant (t-statistic $= -2.84$) in the regression of positive DA (column (2) of Table 12).

Overall, the results from this section suggest that the choice of performance measures does not materially change our findings regarding the effect of CEO job security on earnings management.

5.2 Alternative Methods of Hazard Estimation

Another source of bias in the estimation of hazard is the choice of model. In the baseline study, we estimate hazard based on a survival analysis using the Weibull model. Below we show that our results are robust to various alternative methods of hazard estimation.

We first use the Gompertz model, another widely used model in the survival analysis, in place of the Weibull model. Specifically, we assume a Gompertz hazard function: $h_{t-1}^{t}(\tau_{i,t-1}, x_{i,t-1}) = \exp(\gamma\tau_{i,t-1})\exp(\delta_0 + \delta' x_{i,t-1})$, where γ is an auxiliary parameter that controls the shape of baseline hazard. The results of hazard estimation based on the Gompertz model are in column (1) of Table A.3, which are very similar to the baseline results. In the regression of positive DA (column (3) of Table 12), we continue to find a negative and statistically significant coefficient for the Gompertz hazard (t-statistic $= -2.91$).

Though the parametric hazard models (such as Weibull and Gompertz) are flexible, they still depend on the assumptions of certain functional forms. Misspecification of the functional form may cause a bias in the estimation. To address this concern, we follow Cox (1972) to assume a semiparametric hazard model which leaves the baseline hazard unspecified: $h_{t-1}^{t}(\tau_{i,t-1}, x_{i,t-1}) = h_0(\tau_{i,t-1})\exp(\delta' x_{i,t-1})$, where $h_0(\tau)$ is a nonparametric baseline hazard function. The results of the Cox hazard estimation (column (2) of Table A.3) are similar to those of the baseline model.

Because of the semiparametric functional form, we can only estimate the hazard ratio (i.e., relative hazard) that does not include the baseline hazard. However, since we control CEO tenure in the regression of positive DA, the effect of the missing baseline hazard can be largely absorbed. In column (4) of Table 12, we use the estimated hazard ratio to proxy for CEO dismissal risk and find that the coefficient of the Cox hazard ratio is negative and statistically significant (t-statistic $= -3.07$) in the regression of positive DA, consistent with the baseline results. This finding also alleviates the concern that the relation between hazard and EM may be driven by the fact that EM varies with the CEO tenure (Ali and Zhang, 2015) since the hazard in the baseline model is a function of the CEO tenure only.

One advantage of the survival analysis is that it considers the evolution and path dependence of job termination hazard over time, while other simpler methods (such as the Probit model and the linear probability model) treat the probability of job termination in different years indifferently. However, these simpler methods allow more flexible econometric specifications such as the fixed effects.[12] To check robustness of our results, we also consider the Probit and linear probability (OLS) models in the estimation of CEO dismissal probability (columns (3) and (4) of Table A.3). Using the estimated probability to proxy for CEO dismissal risk, we again find a negative and statistically significant coefficient in the regression of positive DA (column (5) and (6) of Table 12). To partly address the potential problem of neglecting hazard evolution over time, we control for the CEO tenure in the estimation of the Probit and linear probability models (column (5) and (6) of Table A.3). The regressions of positive DA based on the probabilities estimated from these models exhibit very similar results (see columns (7) and (8) of Table 12).

Finally, forced CEO turnover incidences are rare in the data. Estimating the tails of a distribution using regular methods like the ones we use above can lead to inaccurate estimates (King and Zeng, 2001). In fact, as shown in Panel B of Table 2 and Panel B of Table A.3, the highest dismissal hazard (probability) computed in these regular methods is not high enough,[13] which may cause some doubt about the credibility of the threat. To address this concern, we esti-

[12]Hazard regressions allow for certain heterogeneity in the coefficients (strata). However, the estimation may run into numerical difficulties (such as non-convergence) when the number of strata increases substantially. It is numerically infeasible to introduce the industry or firm strata in hazard regressions.

[13]The linear probability models do not guarantee an estimate of dismissal probability within $(0, 1)$. We manually truncate the upper bound at one.

mate the Probit model with a bias-reduced technique (i.e., BRGLM algorithm designed by Staub (2017)). As shown in column (7) of Table A.3, the estimated probability based on this model has a very similar mean, 25th, 50th, and 75th percentiles, but its upper bound can reach about 0.8. More important, in the regression of positive DA, the coefficient of the estimated probability of CEO dismissal based on the bias-reduced Probit model is negative and statistically significant (t-statistic $= -1.93$), consistent with the baseline results. This also suggests that our findings are not driven by the extreme values of CEO dismissal risk.

Given the studies above, we conclude that our results are robust to alternative methods of CEO dismissal hazard (probability) estimation.

5.3 Other Concerns and Additional Controls

In this part, we provide evidence for robustness of our results with respect to various concerns and additional control variables, including changes around CEO turnover, reversal of earnings management, analyst forecast, Sarbanes-Oxley Act (SOX), CEO overconfidence, compensation incentives, audit committee independence, other corporate governance measures, and controls for different fixed effects.

Changes Around CEO Turnover

One may argue that our results can be driven by CEO turnovers. That is, following a high dismissal hazard, the incumbent CEO may depart, and the new CEO may reduce the degree of earnings overstatement and even undertake income-deflating manipulation (i.e., “big bath"). This leads to a negative correlation between hazard and subsequent positive DA. We deal with this concern by excluding the firm-year observations in which CEO turnover occurs. Column (1) of Table 13 reports the results of the positive-DA regression after excluding CEO turnover events. The coefficient of hazard remains negative and statistically significant (t-statistic $= -2.67$), and its magnitude is similar to that in the baseline regression. Therefore, our results are not driven by CEO turnovers.

Reversal of Earnings Management

Another bias may arise from the reversal of earnings management. Barton and Simko (2002) and Baber, Kang, and Li (2011) show that earnings management in prior periods may constrain managers' ability to achieve earnings objectives in the future. Meanwhile, Hazarika, Karpoff, and Nahata (2012) document a positive relation between earnings management and subsequent incidences of CEO dismissal. Therefore, the negative coefficient of hazard in the regression of positive DA may be due to the reversal of earnings management. To address this concern, we include two controls of past earnings management in the regression of positive DA. In column (2) of Table 13, we control DA from the previous year; and in column (3), we include a dummy variable that equals one if DA is higher in the previous year and zero otherwise. We indeed find that the coefficients of these two additional controls are both negative and statistically significant, suggesting a reversal of earnings management. However, after controlling the reversal of earnings management, the coefficients of hazard remain negative and statistically significant, with t-statistics of -2.95 and -3.05, respectively. Our results thus cannot be explained by the reversal of earnings management.

Analyst Forecast

A firm has stronger incentives to overstate earnings when it fails to meet analysts' forecasts, and failure to meet earnings forecast also has an adverse effect on CEO job security. Thus, it may create a spurious correlation between hazard and positive DA if we do not control for whether a firm meets analysts' forecasts of earnings. However, this effect, if exists, should only bias against our findings. Nevertheless, in column (4) of Table 13, we include a dummy that equals one if the firm meets analyst forecast of earnings and zero otherwise. The coefficient of this dummy is negative and statistically significant (t-statistic $= -1.69$), indicating that firms reduce income-inflating accruals if they already meet analyst forecast. More important, the coefficient of hazard remains negative, similar in magnitude as in the baseline regression, and statistically significant (t-statistic $= -3.07$). Therefore, our results is robust to the issue of analyst forecast.

Sarbanes-Oxley Act

Cohen, Dey, and Lys (2008) show that accrual-based earnings management increased steadily until the passage of the Sarbanes-Oxley Act in 2002 and then declined afterwards. Since our sample spans the pre- and post-SOX periods, one may be curious about how our results are affected by this legislation change. We augment the baseline regression by adding a dummy variable that equals one if the year is after 2001 and zero otherwise. Consistent with the findings of Cohen, Dey, and Lys (2008), we also find a negative coefficient for the SOX dummy (column (5) of Table 13), indicating that accrual-based earnings management indeed declines after the SOX. However, the coefficient of hazard is still negative and statistically significant (t-statistic $= -3.01$). Therefore, our results are not a SOX effect.

CEO Overconfidence

The turnover hazard perceived by the CEO may be different from that estimated by the econometrian. For example, an overconfident CEO may underestimate his own turnover hazard, and meanwhile the same CEO can undertake more earnings management (e.g., Hsieh, Bedard, and Johnstone, 2014). We use the Malmendier and Tate (2005) option-based measure for CEO overconfidence, following the construction method of Humphery-Jenner et al. (2016). In column (6) of Table 13, we control both the measure of CEO overconfidence and its interaction with hazard to address the potential bias due to this concern. We find that CEO overconfidence indeed has a positive association with earnings overstatement. However, the coefficient of the interaction term is negative and statistically insignificant, suggesting that overconfidence does not make a CEO to increase earnings management when his job security weakens. More important, after controlling CEO overconfidence, hazard continues to have a negative and statistically significant effect on earnings management (t-statistic $= -2.09$).

In untabulated tests, we also repeat the baseline regression with the CEO and firm-CEO fixed effects to further examine the concern of CEOs' subjective perception about their turnover hazard. The results are similar to those from the baseline regression. Therefore, our results are not driven by the effect of CEO overconfidence or the subjective hazard perception.

Compensation Incentives

CEOs' incentives to manipulate earnings can be affected by their compensation structures. For example, a CEO whose compensation is more sensitive to firm performance may have a stronger incentive to overstate earnings. In column (7) of Table 13 we control for CEO pay-performance sensitivity (delta) and CEO wealth sensitivity to stock volatility (vega), computed following the method of Coles, Daniel, and Naveen (2006). We find that a CEO with a higher delta tends to engage in more income-inflating earnings management. Nevertheless, the coefficient of hazard remains negative and statistically significant (t-statistic $= -3.08$) in the regression of positive DA.

Audit Committee Independence

In the baseline regression of positive DA, we include board independence as a control variable. However, one may argue that the audit committee matters more for earnings management. We thus control audit committee independence (i.e., the proportion of independent members on the audit committee) in column (8) of Table 13, but we do not find a significant effect for it. However, after controlling audit committee independence, the coefficient of hazard is still negative and statistically significant (t-statistic $= -2.99$) in the regression of positive DA.

Other Governance Measures

One may argue that other corporate governance mechanisms, such as the discipline from the market of corporate control, could also have an impact on firms' decision about earnings management. In columns (9) and (10) of Table 13, we control the governance index (i.e., G-index of Gompers, Ishii, and Metrick, 2003) and the entrenchment index (i.e., E-index of Bebchuk, Cohen, and Ferrell, 2009). We do not find a significant effect for these indices. However, the coefficients of hazard remain significantly negative in the regression of positive DA, with t-statistics of -2.33 and -2.34, respectively.

Other Fixed Effects

We include industry and year fixed effects in the baseline regression to control for the determinants of earnings management that are invariant in a industry or in a certain year. One potential concern is that some common factors may be both industry- and time-specific and some may be firm-specific. In column (11) of Table 13, we include the industry-by-year fixed effects, and in column (12) of the table, we control firm fixed effects. With these alternative fixed effects, hazard continue to have a negative and statistically significant relation with earnings management (with t-statistics of -2.75 and -3.33, respectively). Therefore, our results are robust to alternative specifications of the fixed effects.

In summary, our finding that hazard has a negative association with income-inflating earnings management is robust, supporting the disciplinary effect of CEO job security.

6 Conclusion

In this paper, we empirically examine the relation between CEO job security and earnings management. Specifically, we test two plausible hypotheses: (1) the discipline hypothesis that predicts a lower degree of earnings management following an increase of CEO dismissal hazard, and (2) the opportunism hypothesis which predicts the opposite. Using discretionary accruals as the measure of earnings management, we find that the disciplinary effect of CEO job security is dominant on average, especially for income-inflating manipulation. However, we find that the opportunistic effect also emerges when managers face an immediate threat of job termination. We further show that job security concerns stimulate CEOs to exert efforts to improve firm performance, which helps reduce the necessity of earnings overstatement. A similar effect is also found for real activity-based earnings management. Our results hence lend a strong support for the notion that forced turnover can serve as an effective disciplinary mechanism that induces CEOs to undertake rightful actions and deters misconducts.

References

Agrawal, Anup and Charles R. Knoeber. 1998. "Managerial Compensation and the Threat of Takeover." *Journal of Financial Economics* 47 (2):219–239.

Ahmed, Anwer S., Gerald Lobo, and Jian Zhou. 2011. "Job Security and Income Smoothing: An Empirical Test of the Fudenberg and Tirole (1995) Model." Working paper, Texas A&M University, University of Houston, and University of Hawaii at Manoa.

Ali, Ashiq and Weining Zhang. 2015. "CEO Tenure and Earnings Management." *Journal of Accounting and Economics* 59 (1):60–79.

Arellano, Manuel and Stephen Bond. 1991. "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies* 58 (2):277–297.

Baber, William R., Sok-Hyon Kang, and Ying Li. 2011. "Modeling Discretionary Accrual Reversal and the Balance Sheet as an Earnings Management Constraint." *The Accounting Review* 86 (4):1189–1212.

Barton, Jan and Paul J. Simko. 2002. "The Balance Sheet as an Earnings Management Constraint." *The Accounting Review* 77 (Supplement):1–27.

Bebchuk, Lucian, Alma Cohen, and Allen Ferrell. 2009. "What Matters in Corporate Governance?" *Review of Financial Studies* 22 (2):783–827.

Beneish, Messod D. and Mark E. Vargus. 2002. "Insider Trading, Earnings Quality, and Accrual Mispricing." *The Accounting Review* 77 (4):755–791.

Bergstresser, Daniel and Thomas Philippon. 2006. "CEO Incentives and Earnings Management." *Journal of Financial Economics* 80 (3):511–529.

Blankespoor, Elizabeth, Gregory S. Miller, and Hal D. White. 2014. "The Role of Dissemination in Market Liquidity: Evidence from Firms' Use of Twitter." *The Accounting Review* 89 (1):79–112.

Brickley, James A., James S. Linck, and Jeffery L. Coles. 1999. "What Happens to CEOs after They Retire? New Evidence on Career Concerns, Horizon Problems, and CEO Incentives." *Journal of Financial Economics* 52 (3):341–377.

Bushee, Brian J. 2001. "Do Institutional Investors Prefer Near-Term Earnings over Long-Run Value?" *Contemporary Accounting Research* 18 (2):207–246.

Cheng, Qiang and Terry D. Warfield. 2005. "Equity Incentives and Earnings Management." *The Accounting Review* 80 (2):411–476.

Cohen, Daniel A., Aiyesha Dey, and Thomas Z. Lys. 2008. "Real and Accrual-Based Earnings Management in the Pre- and Post-Sarbanes-Oxley Periods." *The Accounting Review* 83 (3):757–787.

Cohen, Daniel A. and Paul Zarowin. 2010. "Accrual-Based and Real Earnings Management Activities around Seasoned Equity Offerings." *Journal of Accounting and Economics* 50 (1):2–19.

Coles, Jeffery L., Naveen D. Daniel, and Lalitha Naveen. 2008. "Boards: Does One Size Fit All?" *Journal of Financial Economics* 87 (2):329–356.

Coles, Jeffery L., Zhichuan Li, and Yan Wang. 2018. "Industry Tournament Incentives." *Review of Financial Studies* 31 (4):1418–1459.

Coles, Jeffrey L., Naveen D. Daniel, and Lalitha Naveen. 2006. "Managerial Incentives and Risk-Taking." *Journal of Financial Economics* 79 (2):431–468.

Cornett, Marcia Millon, Alan J. Marcus, and Hassan Tehranian. 2008. "Corporate Governance and Pay-for-Performance: The Impact of Earnings Management." *Journal of Financial Economics* 87 (2):357–373.

Cox, David. R. 1972. "Regression Models and Life Tables." *Journal of the Royal Statistical Society. Series B (Methodological)* 34 (2):187–220.

Cziraki, Peter and Moqi Xu. 2014. "CEO Job Security and Volatility." Working paper, University of Toronto and London School of Economics.

Dahiya, Sandeep and David Yermack. 2008. "You Can't Take It with You: Sunset Provisions for Equity Compensation when Managers Retire, Resign, or Die." *Journal of Corporate Finance* 14 (5):499–511.

Datta, Sudip, Mai Iskandar-Datta, and Singh Vivek. 2013. "Product Market Power, Industry Structure, and Corporate Earnings Management." *Journal of Banking & Finance* 37 (8):3273–3285.

Dechow, Patricia M., Weili Ge, and Catherine Schrand. 2010. "Understanding Earnings Quality: A Review of the Proxies, Their Determinants and Their Consequences." *Journal of Accounting and Economics* 50 (2-3):344–401.

DeFond, Mark L. and Chul W. Park. 1997. "Smoothing Income in Anticipation of Future Earnings." *Journal of Accounting and Economics* 23 (2):115–139.

Eckbo, B Espen, Karin S. Thorburn, and Wei Wang. 2016. "How Costly Is Corporate Bankruptcy for the CEO?" *Journal of Financial Economics* 121 (1):210–229.

Engel, Ellen, Rachel M. Haye, and Xie Wang. 2003. "CEO Turnover and Properties of Accounting Information." *Journal of Accounting and Economics* 36 (1-3):197–226.

Fee, C. Edward, Charles J. Hadlock, Jing Huang, and Joshua R. Pierce. 2018. "Robust Models of CEO Turnover: New Evidence on Relative Performance Evaluation." *Review of Corporate Finance Studies* 7 (1):70–100.

Francis, Jennifer, Allen H. Huang, Shivaram Rajgopal, and Amy Y. Zang. 2008. "CEO Reputation and Earnings Quality." *Contemporary Accounting Research* 25 (1):109–147.

Frankel, Richard M., Marilyn F. Johnson, and Karen K Nelson. 2002. "The Relation between Auditors' Fees for Nonaudit Services and Earnings Management." *The Accounting Review* 77:71–105. Supplement: Quality of Earnings Conference.

Fudenberg, Drew and Jean Tirole. 1995. "A Theory of Income and Dividend Smoothing Based on Incumbency Rents." *Journal of Political Economy* 103 (1):75–93.

Garmaise, Mark J. 2011. "Ties that Truly Bind: Noncompetition Agreements, Executive Compensation, and Firm Investment." *Journal of Law, Economics, and Organization* 27 (2):376–425.

Giroud, Xavier and Holger M. Mueller. 2010. "Does Corporate Governance Matter in Competitive Industries?" *Journal of Financial Economics* 95 (3):312–331.

———. 2011. "Corporate Governance, Product Market Competition, and Equity Prices." *Journal of Finance* 66 (2):563–600.

Gompers, Paul, Joy Ishii, and Andrew Metrick. 2003. "Corporate Governance and Equity Prices." *Quarterly Journal of Economics* 118 (1):107–156.

Graham, John R., Campbell R. Harvey, and Shiva Rajgopal. 2005. "The Economic Implications of Corporate Financial Reporting." *Journal of Accounting and Economics* 40 (1-3):3–73.

Guan, Liming, Charlotte J. Wright, and Shannon L. Leikam. 2005. "Earnings Management and Forced CEO Dismissal." *Advances in Accounting* 21:61–81.

Hazarika, Sonali, Jonathan M. Karpoff, and Rajarishi Nahata. 2012. "Internal Corporate Governance, CEO Turnover, and Earnings Management." *Journal of Financial Economics* 104 (1):44–69.

Healy, Paul M. and James M. Wahlen. 1999. "A Review of the Earnings Management Literature and Its Implications for Standard Setting." *Accounting Horizons* 13 (4):365–383.

Herfindahl, Orris C. 1950. *Concentration in the U.S. Steel Industry*. Dissertation, Columbia University.

Hirschman, Albert O. 1945. *National Power and the Structure of Foreign Trade*. Berkeley and Los Angeles, CA: University of California Press.

Hoberg, Gerard and Gordon M. Phillips. 2010. "Product Market Synergies and Competition in Mergers and Acquisitions: A Text-Based Analysis." *Review of Financial Studies* 23 (10):3773–3811.

———. 2016. "Text-Based Network Industries and Endogenous Product Differentiation." *Journal of Political Economy* 124 (5):1423–1465.

Hsieh, Tien-Shin, Jean C. Bedard, and Karla M. Johnstone. 2014. "CEO Overconfidence and Earnings Management During Shifting Regulatory Regimes." *Journal of Business Finance & Accounting* 41 (9):1243–1268.

Humphery-Jenner, Mark, Ling Lei Lisic, Vikram Nanda, and Sabatino Dino Silveri. 2016. "Executive Overconfidence and Compensation Structure." *Journal of Financial Economics* 119 (3):533–558.

Jensen, Michael C. and William H. Meckling. 1976. "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics* 3 (4):305–360.

Jensen, Michael C. and Kevin J. Murphy. 1990. "Performance Pay and Top-Management Incentives." *Journal of Political Economy* 98 (2):225–264.

Jenter, Dirk and Fadi Kanaan. 2015. "CEO Turnover and Relative Performance Evaluation." *Journal of Finance* 70 (5):2155–2183.

Jenter, Dirk and Katharina Lewellen. 2014. "Performance-Induced CEO Turnover." Working paper, Stanford University and Dartmouth.

Kale, Jayant R., Ebru Reis, and Anand Venkateswaran. 2009. "Rank-Order Tournaments and Incentive Alignment: The Effect on Firm Performance." *Journal of Finance* 64 (3):1479–1512.

King, Gary and Langche Zeng. 2001. "Logistic Regression in Rare Events Data." *Political Analysis* 9 (2):137–163.

Kini, Omesh, Ryan Williams, and David Yin. 2018. "Restrictions on CEO Mobility, Performance-Turnover Sensitivity, and Compensation: Evidence from Non-Compete Agreements." Working paper, Georgia State University and University of Arizona.

Klein, April. 2002. "Audit Committee, Board of Director Characteristics, and Earnings Management." *Journal of Accounting and Economics* 33 (3):375–400.

Kothari, S.P., Andrew J. Leone, and Charles E. Wasley. 2005. "Performance Matched Discretionary Accrual Measures." *Journal of Accounting and Economics* 39 (1):163–197.

Larcker, David F. and Tjomme O. Rusticus. 2010. "On the Use of Instrumental Variables in Accounting Research." *Journal of Accounting and Economics* 49 (3):186–205.

Lehn, Kenneth M. and Mengxin Zhao. 2006. "CEO Turnover after Acquisitions: Are Bad Bidders Fired?" *Journal of Finance* 61 (4):1759–1811.

Li, Di and Haibei Zhao. 2017. "Does Job Security Concern Acquiring Managers?" Working paper, Peking University and Lehigh University.

Liu, Ping and Yuhai Xuan. 2014. "The Contract Year Phenomenon in the Corner Office: An Analysis of Firm Behavior During CEO Contract Renewals." Working paper, University of Illinois-Urbana-Champaign.

Malmendier, Ulrike and Geoffrey Tate. 2005. "CEO Overconfidence and Corporate Investment." *Journal of Finance* 60 (6):2661–2700.

Mergenthaler, Richard, Shivaram Rajgopal, and Suraj Srinivasan. 2012. "CEO and CFO Career Penalties to Missing Quarterly Analysts Forecasts." Working paper, University of Iowa, Emory University, and Harvard Business School.

Miller, Gregory S. 2006. "The Press as a Watchdog for Accounting Fraud." *Journal of Accounting Research* 44 (5):1001–1033.

Murphy, Kevin J. and Jerold L. Zimmerman. 1993. "Financial Performance surrounding CEO Turnover." *Journal of Accounting and Economics* 16 (1-3):273–315.

Parrino, Robert. 1997. "CEO Turnover and Outside Succession: A Cross-Sectional Analysis." *Journal of Financial Economics* 46 (2):165–197.

Pourciau, Susan. 1993. "Earnings Management and Nonroutine Executive Changes." *Journal of Accounting and Economics* 16 (1-3):317–336.

Roberts, Michael R. and Toni M. Whited. 2013. *Endogeneity in Empirical Corporate Finance*, *Handbook of the Economics of Finance*, vol. 2, chap. 7. Elsevier, 493–572.

Roychowdhury, Sugata. 2006. "Earnings Management through Real Activities Manipulation." *Journal of Accounting and Economics* 42 (3):335–370.

Sloan, Richard G. 1996. "Do Stock Prices Fully Reflect Information in Accruals and Cash Flows about Future Earnings?" *The Accounting Review* 71 (3):289–315.

Staub, Kevin. 2017. "BRGLM: Stata Module to Perform Bias-Eeduced Estimation of Binary Response Models." Working paper, University of Melbourne.

Taylor, Lucian A. 2010. "Why Are CEOs Rarely Fired? Evidence from Structural Estimation." *Journal of Finance* 65 (6):2051–2087.

Watts, Ross L. and Jerold L. Zimmerman. 1986. *Positive Accounting Theory*. Prentice-Hall, 1st ed. ed.

Weisbach, Michael S. 1988. "Outside Directors and CEO Turnover." *Journal of Financial Economics* 20 (January-March):431–460.

Xie, Biao, Wallace N. Davidson, and Peter J. DaDalt. 2003. "Earnings Management and Corporate Governance: The Role of the Board and the Audit Committee." *Journal of Corporate Finance* 9 (3):295–316.

Yermack, David. 1996. "Higher Market Valuation of Companies with A Small Board of Directors." *Journal of Financial Economics* 40 (2):185–211.

Yu, Fang (Frank). 2008. "Analyst Coverage and Earnings Management." *Journal of Financial Economics* 88 (2):245–271.

Zang, Amy Y. 2012. "Evidence on the Trade-Off between Real Activities Manipulation and Accrual-Based Earnings Management." *The Accounting Review* 87 (2):675–703.

Appendix

A Variable Definition

All continuous variables are winsorized at 1% and 99%. All dollar values are in millions and are adjusted by the Consumer Price Index to year 2011 dollars.

Table A.1: : Definition of Important Variables Used in the Analysis

Variable	Source	Detailed Explanation
A: Earnings Management Measures		
Ab DISCEXP	Compustat	Abnormal discretionary expenses calculated as the difference between the actual discretionary expense and the estimated values from the corresponding industry-year regression in Roychowdhury (2006).
Ab PROD	Compustat	Abnormal production costs calculated as the difference between the actual production costs and the estimated values from the corresponding industry-year regression in Roychowdhury (2006).
DA	Compustat	Discretionary accruals: The difference between total accruals and the estimated values calculated as in Kothari, Leone, and Wasley (2005).
Positive DA	Compustat	Positive discretionary accruals.
Negative DA	Compustat	Negative discretionary accruals.
B: Firm Characteristics		
Analyst number	I/B/E/S	Number of analysts following the firm.
Analyst tenure	I/B/E/S	Number of years since the current auditor works with the firm.
Audit comm. ind.	ISS	Percentage of independent members on the audit committee.
Big 4 auditors	Compustat	Dummy variable indicating whether the company is audited by a big 4 auditor.
Board independence	ISS	Percentage of independent directors on the board.
Board size	ISS	Number of directors on the board.
Dedicated ownership	Thomson Reuters	Ownership of the dedicated institutional investors as classified in Bushee (2001).
Discretionary expenses	Compustat	Sum of R&D (data 46), advertising (data 45), and selling, general and administrative (SG&A) expenses (data 189) divided by the book value of total assets (data 6). Advertising and R&D are set to zero if they are missing as long as SG&A is available.
Firm age	CRSP	Number of years since the firm was listed on a stock exchange.
Idiosyncratic return	CRSP	Residual value of the regression of firm stock return on two-digit SIC industry returns (Jenter and Kanaan, 2015).
Industry-induced return	CRSP	Predicted value of the regression of firm stock return on the two-digit Standard Industrial Classification (SIC) industry return (Jenter and Kanaan, 2015).
Industry dismissals	ExecuComp	Number of forced CEO turnover events in peer firms of the same two-digit SIC industry in the past two years.
Industry volatility	CRSP	The standard deviation of stock return in the two-digit SIC industry.
Institutional ownership	Thomson Reuters	Sum of all institutional investors' ownership
Investment	Compustat	Capital Expenditures (data 128) divided by book value of total assets (data 6).

Continued on next page

Table A.1 Continued

Variable	Source	Detailed Explanation
Leverage	Compustat	Long-term debt (data 9) plus debt in current liabilities (data 34) divided by book value of total assets (data 6).
Variable	**Source**	**Detailed Explanation**
M/B (Q)	Compustat	Market value of assets (data 6 + data 199×data 25 − data 60 − data 74) divided by book value of total assets (data 6).
Ownership HHI	Thomson Reuters	The Herfindahl (1950) and Hirschman (1945) index of institutional ownership.
Operating CF	Compustat	Cash flow from operations (data 308) divided by book value of total assets (data 6).
Production costs	Compustat	Cost of goods sold (data 44) plus change in inventory (Δdata 3) divided by book value of total assets (data 6).
R&D	Compustat	Research and development expenditures (data 46) divided by book value of total assets.
ROA	Compustat	Net income divided (data 172) by book value of total assets (data 6).
Sales growth	Compustat	Annual percentage change in sales (data 12).
Size	Compustat	Natural logarithm of book value of total assets (data 6).
Stock return	CRSP	Annual stock return.
Stock volatility	CRSP	Annual stock return volatility.
Top 5 ownership	Thomson Reuters	Sum of the 5 largest institutional investors' ownership.
Total accruals	Compustat	Income before extraordinary items (data 18) minus cash flow from operations (data 308) divided by book value of total assets (data 6).
C: CEO Characteristics		
CEO duality	ISS	A dummy variable that is equal to one if the CEO is also the chairperson of the board.
CEO ownership	ExecuComp	Shares held by the CEO divided by the number of shares outstanding.
CEO tenure	ExecuComp	Number of year on the position of the CEO.
Ownership $\geqslant$ 5%	ExecuComp	A dummy variable that is equal to one if the CEO owns at least 5% of the shares outstanding.
Retirement age	ExecuComp	A dummy variable that is equal to one if the CEO is between 63 and 66 years old.

B Construction of Real Earnings Management Measures

We consider two types of real earnings management that are manifested respectively in abnormal levels of production costs and discretionary expenses, and we follow Roychowdhury (2006) to construct the measures as follows.

Production costs (PROD) are defined as the sum of cost of goods sold and change in inventory during the year. Abnormal production costs (Ab PROD) is the actual production costs minus the *normal* production costs calculated using the estimated coefficients from the following regression for each two-digit SIC industry-year group:

$$\frac{PROD_{i,t}}{Total\ Assets_{i,t-1}} = \beta_1 \frac{1}{Total\ Assets_{i,t-1}} + \beta_2 \frac{Sales_{i,t}}{Total\ Assets_{i,t-1}} + \beta_3 \frac{\Delta Sales_{i,t}}{Total\ Assets_{i,t-1}} + \beta_4 \frac{\Delta Sales_{i,t-1}}{Total\ Assets_{i,t-1}} + \varepsilon_{i,t}.$$

Discretionary expenses (DISCEXP) are defined as the sum of R&D expenses, advertising expenses, and selling, general and administrative expenses (SG&A). R&D expenses and advertising expenses are set to zero if they are missing as long as SG&A is available. Abnormal discretionary expenses (Ab DISCEXP) is the actual discretionary expenses minus the *normal* discretionary expenses calculated using the estimated coefficients from the following regression for each two-digit SIC industry-year group:

$$\frac{DISCEXP_{i,t}}{Total\ Assets_{i,t-1}} = \beta_1 \frac{1}{Total\ Assets_{i,t-1}} + \beta_2 \frac{Sales_{i,t}}{Total\ Assets_{i,t-1}} + \varepsilon_{i,t}.$$

C Results for Alternative Hazard Estimation

Table A.2: Instrumented Hazard Estimation

The table reports the estimation of CEO dismissal hazard based on an instrumental-variable approach. Panel A reports the estimation results. Penal B reports summary statistics of the estimated CEO dismissal hazard. Column (1) repeats the baseline CEO job survival analysis (column (1) of Table 2) based on a Weibull model using Ind. dismissal (CEO dismissals of the firm's two-digit SIC industry over the past two years) as an instrumental variable; column (2) repeats the baseline CEO job survival analysis based on a Weibull model using Change in NCI (change in non-compete enforceability index of the firm's headquarter state) as an instrumental variable. The standard errors are clustered at the firm-CEO pair level. The t-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at 0.01, 0.05, and 0.10, respectively.

Panel A: Instrumented Hazard Estimation		
	(1) Weibull 1	(2) Weibull 1
Stock return	-1.2226^{***}	-1.2226^{***}
	(-6.43)	(-6.30)
Retirement age	-1.0667^{**}	-1.0515^{**}
	(-2.13)	(-2.10)
Ownership $\geqslant$ 5%	-2.8746^{***}	-2.8557^{***}
	(-2.86)	(-2.84)
CEO duality	-0.3555^{***}	-0.3421^{***}
	(-2.80)	(-2.64)
Board size	0.0380^{*}	0.0166
	(1.74)	(0.73)
Board independence	-0.0631	0.0962
	(-0.17)	(0.25)
Ind. dismissal	0.0845^{***}	
	(4.20)	
Change in NCI		0.5519^{***}
		(4.35)
Constant	-3.3135^{***}	-2.9879^{***}
	(-7.38)	(-6.55)
$\ln(p)$	-0.3654^{***}	-0.3801^{***}
	(-3.52)	(-3.56)
Observations	16,148	15,876
Panel B: Summary Statistics of Hazard		
Mean	0.0166	0.0166
Std. dev.	0.0117	0.0119
25th percentile	0.0086	0.0089
50th percentile	0.0147	0.0152
75th percentile	0.0222	0.0223
Max	0.1362	0.4057

Table A.3: Alternative Methods of Hazard Estimation

The table reports the estimation of CEO dismissal hazard or probability using alternative methods. Panel A reports the estimation results. Penal B reports summary statistics of the estimated CEO dismissal hazard or probability. Column (1) assumes a Gompertz hazard: $h^t_{t-1}(\tau_{i,t-1}, x_{i,t-1}) = \exp(\gamma\tau_{i,t-1})\exp(\delta_0 + \delta' x_{i,t-1})$, where γ is an auxiliary parameter that controls the shape of baseline hazard, τ is CEO job duration, x is a vector of firm and CEO characteristics, δ_0 is the constant coefficient, and δ is a vector of the coefficients of x; column (2) assumes a semiparametric hazard following Cox (1972): $h^t_{t-1}(\tau_{i,t-1}, x_{i,t-1}) = h_0(\tau_{i,t-1})\exp(\delta' x_{i,t-1})$, where $h_0(\tau)$ is a nonparametric baseline hazard function; column (3) estimates CEO dismissal probability using a Probit model; column (4) estimates CEO dismissal probability using a linear probability model; column (5) estimate CEO dismissal probability using a Probit model that controls for CEO tenure; column (6) estimates CEO dismissal probability using a linear probability model that controls for CEO tenure; and column (7) estimates CEO dismissal probability using a Probit model with a bias-reduced technique (i.e., BRGLM algorithm designed by Staub, 2017) to address the potential rare-event bias (King and Zeng, 2001). In columns (3) to (7), we control for industry dummies in the estimation. We do not report summary statistics of the estimated hazard for the Cox model because its baseline hazard is unspecified. The standard errors are clustered at the firm-CEO pair level. The t-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at 0.01, 0.05, and 0.10, respectively.

Panel A: Dismissal Hazard (Probability) Estimation							
	(1) Gompertz	(2) Cox	(3) Probit	(4) OLS	(5) Probit with CEO Tenure	(6) OLS with CEO Tenure	(7) Rare-Event Probit
Stock return	−1.2585***	−1.2430***	−0.5981***	−0.0193***	−0.6019***	−0.0194***	−0.5793***
	(−6.52)	(−6.50)	(−6.61)	(−7.65)	(−6.59)	(−7.69)	(−6.72)
Retirement age	−1.0297**	−0.9920**	−0.4763**	−0.0110***	−0.3842**	−0.0080***	−0.3351**
	(−2.05)	(−1.98)	(−2.54)	(−3.89)	(−2.03)	(−2.85)	(−2.19)
Ownership $\geqslant$ 5%	−2.7380***	−2.6422***	−1.1046***	−0.0146***	−0.9738***	−0.0092***	−0.7903***
	(−2.72)	(−2.62)	(−3.73)	(−7.61)	(−3.26)	(−4.76)	(−5.43)
CEO duality	−0.3348***	−0.2779**	−0.2523***	−0.0105***	−0.1848***	−0.0073***	−0.1784***
	(−2.63)	(−2.18)	(−4.47)	(−4.20)	(−3.15)	(−2.84)	(−3.31)
Board size	0.0176	0.0146	0.0338***	0.0011**	0.0313***	0.0009*	0.0303***
	(0.79)	(0.65)	(3.11)	(2.25)	(2.79)	(1.90)	(2.90)
Board independence	−0.1235	−0.1190	0.4804***	0.0174**	0.3865**	0.0124	0.3694**
	(−0.33)	(−0.32)	(2.68)	(2.33)	(2.17)	(1.64)	(2.28)
ln(CEO tenure)					−0.2487***	−0.0095***	−0.2399***
					(−6.01)	(−5.73)	(−6.38)
Constant	−3.3501***		−2.4531***	−0.0178***	−1.8878***	0.0103	0.3557*
	(−9.40)		(−7.00)	(−2.63)	(−5.09)	(1.22)	(1.73)
γ	−0.0602***						
	(−4.77)						
Industry dummies			Yes	Yes	Yes	Yes	Yes
Year dummies			Yes	Yes	Yes	Yes	Yes
Observations	16,148	16,148	15,030	16,148	15,030	16,148	16,148
Panel B: Summary Statistics of Hazard (Probability)							
Mean	0.0168	.	0.0186	0.0174	0.0186	0.0174	0.0196
Std. dev.	0.0120	.	0.0203	0.0188	0.0219	0.0197	0.0234
25th percentile	0.0081	.	0.0045	0.0061	0.0037	0.0053	0.0043
50th percentile	0.0151	.	0.0123	0.0174	0.0112	0.0172	0.0120
75th percentile	0.0232	.	0.0257	0.0287	0.0255	0.0295	0.0268
Max	0.0990	.	0.2093	1.0000	0.2402	1.0000	0.7957

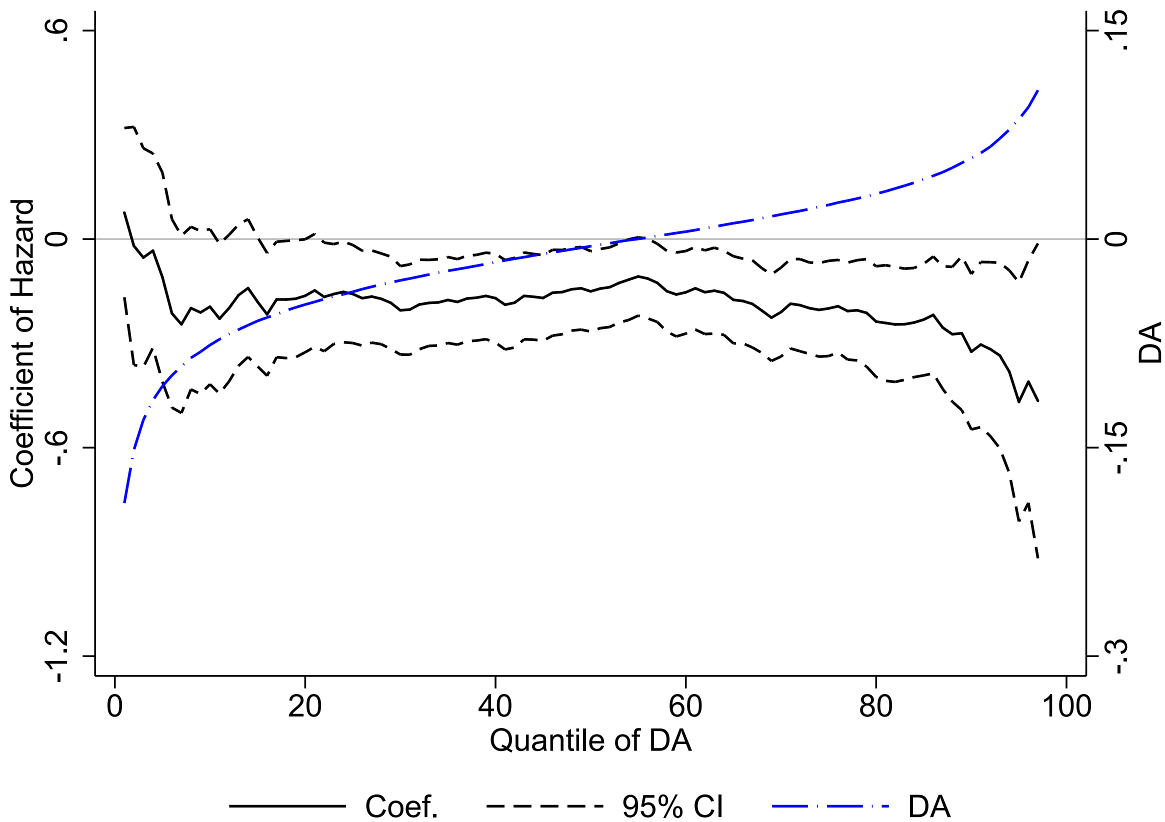

Figure 1: Effects of CEO Job Security on Quantiles of Discretionary Accruals

The figure presents the coefficients of CEO dismissal hazard in the quantile regression of discretionary accruals (DA). The solid line depicts the estimated coefficient of hazard and the dashed lines indicate the 95% confidence intervals of the coefficient at each quantile of DA. The dash-dot line presents the values of discretionary accruals at each quantile. The scale of the coefficients is given on the vertical axis on the left-hand side, and the scale of discretionary accruals is given on the vertical axis on the right-hand side.

Table 1: Summary Statistics

The table reports summary statistics. DA is discretionary accruals, Positive DA and Negative DA are the positive and negative values of discretionary accruals, respectively, Ab PROD and Ab DISCEXP are respectively abnormal production costs and abnormal discretionary expenses (Roychowdhury, 2006), Size is the logarithm of book value of total assets, Leverage is long-term debt plus debt in current liabilities divided by book value of total assets, M/B is market value of assets dividend by book value of total assets, ROA is net income divided by book value of total assets, Sales growth is change in sales divided by lagged sales, Operating cash flow is operating cash flows divided by book value of total assets, Firm age is the number of years since the firm was listed on a stock exchange, Analyst number is the number of analysts following the firm, Auditor tenure is the number of years since the current auditor works for the firm, Big 4 auditors is a dummy variable that indicates that the auditor is one of the four largest auditing firms. CEO tenure is the number of years since the CEO assumes the position. CEO ownership is the percentage of shares outstanding held by the CEO. Institutional ownership is the sum of all institutional investors' ownership. CEO duality is a dummy variable that indicates whether the CEO is also the chairman of the board. Board size is the number of directors on the board. Board independence is the proportion of independent directors on the board.

Variable	*N*	Mean	Std. Dev.	25%	Median	75%
Accrual-Based Earnings Management						
DA	13,790	−0.01	0.06	−0.04	−0.01	0.02
Positive DA	6,227	0.04	0.04	0.01	0.03	0.05
Negative DA	7,563	−0.05	0.04	−0.06	−0.03	−0.02
Real Earnings Management						
Ab PROD	12,873	−0.06	0.19	−0.17	−0.06	0.04
Ab DISCEXP	12,873	0.00	0.22	−0.11	0.01	0.10
Firm and CEO Characteristics						
Size	13,790	7.62	1.46	6.56	7.47	8.56
Leverage	13,790	0.21	0.17	0.06	0.21	0.33
M/B	13,790	2.07	1.40	1.21	1.61	2.37
ROA	13,790	0.11	0.09	0.06	0.10	0.15
Sales growth	13,790	0.10	0.24	−0.02	0.06	0.17
Operating cash flow	13,790	0.13	0.09	0.07	0.12	0.17
Firm age	13,790	27.00	16.86	12.00	22.00	42.00
Analyst number	13,790	10.70	7.40	5.00	9.00	15.00
Auditor tenure	13,790	14.27	9.27	6.00	12.00	23.00
Big 4 auditors	13,790	0.96	0.20	1.00	1.00	1.00
CEO tenure	13,790	8.44	7.16	3.00	6.00	11.00
CEO ownership (%)	13,790	1.56	0.20	0.02	0.20	0.81
Institutional ownership	13,790	0.67	0.25	0.57	0.74	0.86
CEO duality	13,790	0.55	0.50	0.00	1.00	1.00
Board size	13,790	9.14	2.35	7.00	9.00	11.00
Board independence	13,790	0.70	0.17	0.60	0.73	0.83

Table 2: Forced CEO Turnover and Dismissal Hazard

The table reports the estimation of CEO dismissal hazard. We assume that CEO job duration follows a distribution that is characterized by a Weibull hazard function: $h^t_{t-1}(\tau_{i,t-1}, x_{i,t-1}) = p\tau^{p-1}_{i,t-1} \exp(\delta' x_{i,t-1})$, where p is an auxiliary parameter that controls the shape of baseline hazard, τ is CEO job duration, x is a vector of firm and CEO characteristics, and δ is a vector of the coefficients of x. Panel A presents the results of CEO job survival analysis. Panel B reports summary statistics of the estimated CEO dismissal hazard. In column (1), firm performance is proxied by stock return. In column (2), firm performance is proxied by the industry-induced stock return and the idiosyncratic stock return following Jenter and Kanaan (2015). In column (3), firm performance is proxied by both stock return and return on assets (ROA). Retirement age is a dummy variable that is equal to one if the CEO is between 63 and 66 years old and zero otherwise, Ownership $\geqslant$ 5% is a dummy variable that is equal to one if the CEO owns at least 5% of the shares outstanding and zero otherwise, CEO duality is a dummy variable that is equal to one if the CEO is also the chairman of the board and zero otherwise, Board size is the number of directors on the board, and Board independence is the proportion of independent directors on the board. The standard errors are clustered at the firm-CEO pair level. The t-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at 0.01, 0.05, and 0.10, respectively.

Panel A: Hazard Estimation

	(1) Weibull 1	(2) Weibull 2	(3) Weibull 3
Stock return	-1.2546^{***}		-1.1923^{***}
	(-6.50)		(-6.05)
Industry induced stock return		-0.5056^{**}	
		(-2.06)	
Idiosyncratic stock return		-1.7353^{***}	
		(-6.80)	
ROA			-1.0132^{**}
			(-2.07)
Retirement age	-1.0821^{**}	-1.0694^{**}	-1.0756^{**}
	(-2.16)	(-2.13)	(-2.14)
Ownership $\geqslant$ 5%	-2.8854^{***}	-2.8879^{***}	-2.8682^{***}
	(-2.87)	(-2.87)	(-2.86)
CEO duality	-0.3567^{***}	-0.3446^{***}	-0.3482^{***}
	(-2.80)	(-2.70)	(-2.73)
Board size	0.0185	0.0176	0.0223
	(0.83)	(0.78)	(1.02)
Board independence	-0.0092	0.0028	-0.0181
	(-0.02)	(0.01)	(-0.05)
Constant	-2.9122^{***}	-3.0662^{***}	-2.8477^{***}
	(-6.52)	(-6.75)	(-6.41)
$\ln(p)$	-0.3862^{***}	-0.3929^{***}	-0.3918^{***}
	(-3.61)	(-3.65)	(-3.65)
Observations	16,148	16,148	16,061

Panel B: Summary Statistics of Hazard

	(1)	(2)	(3)
Mean	0.0167	0.0167	0.0167
Std. dev.	0.0113	0.0121	0.0118
25th percentile	0.0090	0.0082	0.0089
50th percentile	0.0152	0.0149	0.0151
75th percentile	0.0225	0.0227	0.0223
Max	0.1009	0.1308	0.1462

Table 3: Univariate Analysis—Pearson Correlation

The table presents the Pearson correlation among main variables used in the analysis. Hazard is the estimated CEO dismissal hazard (see Section 3.2 for details), DA is discretionary accruals, Positive DA (PDA) and Negative DA (NDA) are the positive and negative values of discretionary accruals, respectively, Ab PROD (ABP) and Ab DISCEXP (ABD) are respectively abnormal production costs and abnormal discretionary expenses (Roychowdhury, 2006), Size is the logarithm of book value of total assets, Leverage is long-term debt plus debt in current liabilities divided by book value of total assets, M/B is market value of assets dividend by book value of total assets, ROA is net income divided by book value of total assets, Sale growth is change in sales divided by lagged sales, Operating cash flow is operating cash flows divided by book value of total assets, Firm age is the number of years since the firm was listed on a stock exchange, Analyst number is the number of analysts following the firm, Auditor tenure is the number of years since the current auditor works for the firm, Big 4 auditor is a dummy variable that indicates that the auditor is one of the four largest auditing firms, CEO tenure is the number of year since the CEO takes the position, Institutional ownership is the share of stock held by institutional investors, CEO duality is a dummy variable that equals one if the CEO is also the chairman of the board and zero otherwise, Board size is the number of directors on the board, and Board independence is the proportion of independent directors on the board. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	Hazard	DA	PDA	NDA	ABP	ABD
Hazard	1.00					
DA	−0.03***	1.00				
Positive DA	−0.06***	1.00***	1.00			
Negative DA	0.01	1.00***	.	1.00		
Ab PROD	0.06***	0.15***	0.09***	0.11***	1.00	
Ab DISCEXP	−0.03***	−0.07***	0.03**	−0.12***	−0.74***	1.00
Size	0.06***	0.01	−0.20***	0.17***	0.08***	−0.14***
Leverage	0.08***	0.04***	−0.11***	0.11***	0.10***	−0.10***
M/B	−0.22***	−0.06***	0.13***	−0.14***	−0.36***	0.25***
ROA	−0.16	0.00	0.03***	0.01	−0.27***	−0.05***
Sales growth	−0.14***	0.01	0.09***	−0.09***	−0.05***	0.08***
Operating cash flow	−0.16***	−0.07***	0.03**	−0.06***	−0.30***	0.06***
ln(Firm age)	0.06***	0.03***	−0.16***	0.17***	0.11***	−0.15***
ln(Analyst number)	−0.02***	−0.02**	−0.08***	0.04***	−0.11***	0.04***
ln(Auditor tenure)	0.04***	−0.01	−0.05***	0.06***	0.02**	−0.06***
Big 4 auditors	0.07***	−0.01	−0.03**	0.02	0.02***	−0.02**
ln(CEO tenure)	−0.49***	0.02***	0.05***	0.00	−0.01	0.03***
Institutional ownership	−0.02	0.01*	−0.02*	0.05***	−0.01	0.00
CEO duality	−0.35***	0.03***	−0.02	0.04***	0.00	−0.03***
Board size	0.11***	0.01	−0.13***	0.15***	0.06***	−0.10***
Board independence	0.08***	−0.02**	−0.12***	0.07***	0.01	−0.02***

Table 4: CEO Job Security and Accrual-Based Earnings Management—Multivariate Analysis

The table presents the results of the multivariate analysis on the effect of CEO job security on accrual-based earnings management. Columns (1) to (3) are based on the ordinary least squares (OLS) regression, and columns (4) and (5) are based on the truncated regression. In column (1), the whole sample is used for the analysis. In columns (2) and (4), the analysis is carried out for the subsample of positive discretionary accruals. In columns (3) and (5), the analysis is conducted for the subsample of negative discretionary accruals. The definition of the regressors can be found in Table A.1. The standard errors are clustered at the firm-CEO pair level. The *t*-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	OLS			Truncated Regression	
	(1) DA	(2) Positive DA	(3) Negative DA	(4) Positive DA	(5) Negative DA
Hazard	−0.2137***	−0.1749***	−0.0505	−1.7168***	−0.1424
	(−3.12)	(−2.84)	(−0.76)	(−3.01)	(−0.42)
Size	−0.0018**	−0.0038***	0.0019**	−0.0432***	0.0148***
	(−2.43)	(−5.47)	(2.45)	(−5.49)	(3.39)
Leverage	0.0016	−0.0050	0.0069*	−0.0745**	0.0598**
	(0.40)	(−1.43)	(1.69)	(−2.35)	(2.56)
M/B	−0.0016***	0.0015**	−0.0020***	0.0035	−0.0032**
	(−2.84)	(2.26)	(−2.86)	(1.63)	(−2.42)
ROA	0.0654***	−0.0069	0.0492***	−0.0094	0.1452***
	(5.18)	(−0.58)	(4.87)	(−0.13)	(3.83)
Sale growth	0.0020	0.0008	−0.0051*	0.0072	−0.0133
	(1.09)	(0.70)	(−1.93)	(1.24)	(−1.62)
Operating CF	−0.0754***	−0.0138	−0.0344***	−0.0875	−0.1164***
	(−6.10)	(−1.45)	(−3.15)	(−1.35)	(−2.74)
ln(Firm age)	0.0021*	−0.0026**	0.0030***	−0.0271**	0.0252***
	(1.71)	(−2.28)	(2.66)	(−2.36)	(3.74)
ln(Analyst number)	0.0008	−0.0001	0.0004	0.0098	−0.0024
	(0.61)	(−0.05)	(0.28)	(0.89)	(−0.37)
ln(Auditor tenure)	−0.0006	0.0001	−0.0001	0.0028	−0.0038
	(−0.66)	(0.13)	(−0.07)	(0.34)	(−0.72)
Big 4 auditors	−0.0003	0.0023	−0.0001	0.0131	0.0088
	(−0.10)	(0.78)	(−0.03)	(0.59)	(0.52)
Institutional ownership	0.0013	−0.0012	0.0038	0.0059	0.0188
	(0.46)	(−0.51)	(1.44)	(0.26)	(1.26)
ln(CEO tenure)	−0.0000	−0.0007	0.0010	−0.0041	0.0052
	(−0.03)	(−0.80)	(0.97)	(−0.49)	(0.94)
CEO duality	−0.0009	−0.0000	−0.0017	−0.0039	−0.0028
	(−0.62)	(−0.01)	(−1.16)	(−0.33)	(−0.34)
Board size	0.0004	0.0002	0.0009***	0.0013	0.0049**
	(1.15)	(0.60)	(3.01)	(0.45)	(2.50)
Board independence	−0.0138***	−0.0099***	−0.0063	−0.0800***	−0.0323
	(−3.18)	(−2.65)	(−1.47)	(−2.59)	(−1.43)
Constant	−0.0276***	0.0750***	−0.0844***	0.1581***	0.2879***
	(−2.79)	(8.18)	(−6.25)	(2.93)	(6.43)
Industry dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
R-squared	0.037	0.102	0.114		
Observations	13,790	6,227	7,563	6,227	7,563

Table 5: The Effect of Dismissal Hazard—Tests Based on Instrumental-Variable Approach

The table presents the effect of CEO dismissal hazard on accrual-based earnings management, where hazard is estimated based on an instrumental-variable (IV) approach. The dependent variable is the positive value of discretionary accruals (positive DA). All regressions are conducted based on the truncated specification (i.e., column (4) of Table 4) using the subsample of positive DA. In column (1), the IV is CEO dismissals of the firm's two-digit SIC industry over the past two years (Ind. Dismissal), and in column (2) the IV is the change in non-compete enforceability index of the state where the firm's headquarter is located (Change in NCI). Details of the instrumented hazard estimation are reported in Table A.2. The definition of the regressors can be found in Table A.1. The standard errors are clustered at the firm-CEO pair level. The *t*-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	(1) Ind. Dismissal	(2) Change in NCI
Hazard	−1.6805***	−2.0985***
	(−3.22)	(−3.46)
Size	−0.0429***	−0.0408***
	(−5.51)	(−5.24)
Leverage	−0.0804**	−0.0790**
	(−2.52)	(−2.46)
M/B	0.0036*	0.0033
	(1.67)	(1.52)
ROA	−0.0154	−0.0029
	(−0.21)	(−0.04)
Sale growth	0.0073	0.0078
	(1.26)	(1.34)
Operating CF	−0.0874	−0.0872
	(−1.36)	(−1.32)
Ln (Firm age)	−0.0277**	−0.0302***
	(−2.44)	(−2.61)
Ln(Ananlyst number)	0.0106	0.0053
	(0.97)	(0.49)
Ln(Auditor tenure)	0.0028	0.0021
	(0.35)	(0.27)
Big 4 auditors	0.0117	0.0158
	(0.54)	(0.71)
Institutional ownership	0.0055	0.0030
	(0.24)	(0.13)
Ln (CEO tenure)	−0.0042	−0.0080
	(−0.52)	(−0.95)
CEO duality	−0.0042	−0.0063
	(−0.37)	(−0.53)
Board size	0.0016	0.0013
	(0.55)	(0.46)
Board independence	−0.0780**	−0.0746**
	(−2.55)	(−2.36)
Constant	0.1568***	0.1683***
	(2.95)	(3.10)
Observations	6,227	6,132
Industry Dummies	Yes	Yes
Year Dummies	Yes	Yes

Table 6: The Effect of Dismissal Risk—Tests Based on Industry-Level Measures

The table presents the effect of CEO dismissal risk (Risk) on accrual-based earnings management, where Risk is proxied by alternative industry-level measures. The dependent variable is the positive value of discretionary accruals (positive DA). All regressions are conducted based on the truncated specification (i.e., column (4) of Table 4) using the subsample of positive DA. In column (1), Risk is proxied by industry-level CEO dismissal intensity (i.e., the number of CEO dismissals divided by the number of CEOs in the industry) in the previous year. In column (2), Risk is proxied by industry-level CEO dismissal intensity in the previous year, where CEO dismissals are weighted by CEO tenure. In column (3), Risk is proxied by the average industry-level CEO dismissal intensity over the previous three years. In column (4), Risk is proxied by the three-year average of tenure-weighted industry-level CEO dismissal intensity. In column (5), Risk is proxied by the inverse-time-weighted average of industry-level CEO dismissal intensity over the previous three years. In column (6), Risk is proxied by the inverse-time-weighted average of tenure-weighted average industry-level CEO dismissal intensity over the previous three years. The definition of the regressors can be found in Table A.1. The standard errors are clustered at the firm-CEO pair level. The *t*-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	(1) Ind. Dismissal Intensity	(2) Tenure-Weighted Ind. Intensity	(3) Three-Year Avg. Ind. Dismissal Intensity	(4) Three-Year Avg. Tenure-Weighted. Ind. Dismissal Intensity	(5) Three-Year Time-Weighted Avg. Ind. Dismissal Intensity	(6) Three-Year Time- & Tenure-Weighted Avg. Ind. Dismissal Intensity
Risk	-0.6069^{*}	-0.7153^{*}	-0.9238^{*}	-1.7664^{**}	-0.9144^{*}	-1.5638^{**}
	(-1.68)	(-1.68)	(-1.65)	(-2.26)	(-1.74)	(-2.27)
Size	-0.0667^{***}	-0.0665^{***}	-0.0666^{***}	-0.0661^{***}	-0.0666^{***}	-0.0661^{***}
	(-4.23)	(-4.21)	(-4.24)	(-4.24)	(-4.24)	(-4.23)
Leverage	-0.1280^{**}	-0.1270^{**}	-0.1274^{**}	-0.1261^{**}	-0.1278^{**}	-0.1265^{**}
	(-2.33)	(-2.31)	(-2.32)	(-2.31)	(-2.33)	(-2.32)
M/B	0.0132	0.0134	0.0135	0.0138	0.0133	0.0136
	(1.16)	(1.18)	(1.19)	(1.22)	(1.17)	(1.20)
ROA	-0.0011	-0.0001	-0.0030	-0.0002	-0.0020	0.0003
	(-0.01)	(-0.00)	(-0.03)	(-0.00)	(-0.02)	(0.00)
Sale growth	0.0106	0.0108	0.0105	0.0108	0.0104	0.0108
	(1.28)	(1.30)	(1.27)	(1.31)	(1.26)	(1.31)
Operating CF	-0.1120	-0.1104	-0.1125	-0.1156	-0.1127	-0.1137
	(-1.05)	(-1.04)	(-1.06)	(-1.09)	(-1.06)	(-1.08)
Ln(Firm age)	-0.0487^{**}	-0.0487^{**}	-0.0488^{**}	-0.0485^{**}	-0.0489^{**}	-0.0488^{**}
	(-2.36)	(-2.35)	(-2.37)	(-2.37)	(-2.37)	(-2.38)
Ln(Ananlyst number)	0.0127	0.0122	0.0127	0.0121	0.0128	0.0121
	(0.69)	(0.66)	(0.69)	(0.66)	(0.70)	(0.66)
Ln(Auditor tenure)	0.0057	0.0056	0.0056	0.0052	0.0056	0.0053
	(0.44)	(0.43)	(0.43)	(0.40)	(0.43)	(0.41)
Big 4 auditors	0.0213	0.0205	0.0211	0.0203	0.0211	0.0203
	(0.62)	(0.60)	(0.62)	(0.60)	(0.62)	(0.60)
Institutional ownership	0.0080	0.0074	0.0077	0.0070	0.0079	0.0071
	(0.21)	(0.20)	(0.21)	(0.19)	(0.21)	(0.19)
Ln (CEO tenure)	0.0104	0.0104	0.0103	0.0094	0.0103	0.0096
	(0.88)	(0.87)	(0.87)	(0.79)	(0.87)	(0.81)
CEO duality	0.0112	0.0113	0.0110	0.0104	0.0108	0.0104
	(0.62)	(0.62)	(0.61)	(0.58)	(0.60)	(0.58)
Board size	0.0009	0.0009	0.0009	0.0010	0.0009	0.0010
	(0.19)	(0.19)	(0.19)	(0.22)	(0.20)	(0.22)
Board independence	-0.1264^{**}	-0.1280^{**}	-0.1254^{**}	-0.1263^{**}	-0.1255^{**}	-0.1271^{**}
	(-2.43)	(-2.45)	(-2.42)	(-2.45)	(-2.42)	(-2.46)
Constant	0.1427^{*}	0.1391^{*}	0.1476^{*}	0.1509^{*}	0.1482^{*}	0.1490^{*}
	(1.70)	(1.66)	(1.76)	(1.80)	(1.77)	(1.78)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,227	6,227	6,227	6,227	6,227	6,227

Table 7: CEO Job Security and Accrual-Based Earnings Management—Subsample Analysis

The table presents the effect of CEO job security on accrual-based earnings management when firms face different levels of discipline from other corporate governance mechanisms. The dependent variables is positive discretionary accruals, and all results are based on the truncated regression. In Panel A, the subsamples are partitioned based on firm size; in Panel B, the subsamples are partitioned based on the number of analysts who follow the firm; in Panel C, the subsamples are based on product market competition which is measured by the Herfindahl (1950) and Hirschman (1945) index (HHI) of sales for the text-based network industries (TNIC), where the TNIC industry classification is designed by Hoberg and Phillips (2010, 2016). In all panels, the subsample cutoff point is the median of the variable on which the analysis is based and is industry-year specific. In all analyses, the control variables (including industry and year dummies) of the baseline regression (column (4) of Table 4) are included, and their definition can be found in Table A.1. For brevity, the control variables are omitted from the table. The standard errors are clustered at the firm-CEO pair level. The *t*-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	Panel A: Firm Size		Panel B: Number of Analysts	
	Bottom Half	Top Half	Bottom Half	Top Half
Hazard	-2.3468^{***}	-0.8702	-2.3118^{***}	-0.6146
	(-2.87)	(-1.28)	(-2.71)	(-0.96)
Observations	3,129	3,092	3,093	3,128
	Panel C: TNIC Sales HHI			
	Bottom Half	Top Half		
Hazard	-1.1629	-2.1063^{**}		
	(-1.63)	(-2.58)		
Observations	3,113	3,103		
	Regression Control Variables			
Control variables	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes

Table 8: CEO Job Security and Subsequent Firm Performance

The table presents the effects of CEO job security on subsequent firm performance. In column (1), firm performance is measured by the Tobin's Q of firm assets; in column (2), firm performance is measured by annual stock return; and in column (3) firm performance is measured by the corrected return on assets (ROA), where ROA is adjusted for discretionary accruals. Lagged dep. var. is the value of the dependent variable in the previous year, R&D is research and development expenditures divided by book value of assets, and Stock volatility is annual volatility of stock return. The definition of the other variables can be found in Table A.1. We use the Arellano and Bond (1991) approach for the linear dynamic panel-data estimation. The standard errors are clustered at the firm-CEO pair level. The t-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	(1) Tobin's Q	(2) Stock Return	(3) Corrected ROA
Hazard	15.6231***	3.7140***	0.4532***
	(11.41)	(6.14)	(4.13)
Lagged dep. var	0.4405***	−0.1545***	0.2633***
	(11.71)	(−10.62)	(8.39)
Size	−0.2796***	−0.2666***	−0.0751***
	(−3.89)	(−8.66)	(−8.80)
Leverage	0.6638***	0.2791***	0.0072
	(4.00)	(3.81)	(0.44)
Sale growth	−0.0135	−0.0705***	0.0017
	(−0.30)	(−3.34)	(0.37)
Operating CF	0.5029***	−0.7172***	−0.4281***
	(3.04)	(−8.87)	(−12.48)
ln(Firm age)	−0.8336***	0.2391***	0.0242
	(−6.11)	(3.14)	(1.42)
R&D	−1.3394	−0.8078***	−0.1226*
	(−1.38)	(−3.70)	(−1.73)
Stock volatility	−0.9936***	0.4791***	−0.0302***
	(−13.11)	(12.91)	(−3.83)
Institutional ownership	1.1454***	−0.9099***	0.0223
	(8.11)	(−10.85)	(1.37)
ln(CEO tenure)	0.1335***	0.0798***	−0.0055
	(2.88)	(3.28)	(−1.05)
CEO duality	0.1343***	−0.0008	−0.0009
	(4.98)	(−0.05)	(−0.27)
Board size	−0.0132*	0.0010	0.0009
	(−1.82)	(0.23)	(0.85)
Board independence	−0.0504	−0.1546**	0.0187
	(−0.44)	(−2.44)	(1.39)
Constant	4.8878***	1.8037***	0.6079***
	(8.70)	(7.94)	(11.45)
Firm dummies	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes
Observations	12,022	11,712	10,383

Table 9: CEO Job Security and Real Corporate Decisions

The table presents the effects of CEO job security on real corporate decisions. Column (1) shows the results for investment intensity (capital expenditure divided by book value of assets); column (2) shows the results for R&D intensity (R&D expenses divided by book value of assets); column (3) shows the results for M&A intensity (total value of M&A deals undertaken divided by book value of assets); and column (4) shows the results for SG&A (sales, general, and administrative expenditures divided by book value of assets). The definition of the independent variables can be found in Table A.1. The standard errors are clustered at the firm-CEO pair level. The *t*-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	(1) Investment	(2) R&D	(3) M&A	(4) SG&A
Hazard	−0.4159***	0.2861***	−0.5303***	0.0358
	(−6.48)	(3.32)	(−3.36)	(0.63)
Size	−0.0019**	−0.0004	−0.0058***	−0.0004
	(−2.19)	(−0.46)	(−4.58)	(−0.56)
Leverage	−0.0208***	−0.0443***	0.0091	−0.0076
	(−4.21)	(−6.47)	(0.95)	(−1.57)
M/B	0.0014**	0.0103***	−0.0076**	0.0015***
	(2.35)	(4.33)	(−2.45)	(3.70)
ROA	−0.0096	−0.1394***	0.0445	0.0302***
	(−0.75)	(−5.71)	(1.11)	(2.74)
Sale growth	0.0082***	0.0028	0.0109**	−0.0024**
	(2.94)	(0.73)	(2.14)	(−2.04)
Operating CF	0.1534***	0.0077	0.1812***	0.0047
	(9.15)	(0.48)	(3.09)	(0.56)
ln(Firm age)	−0.0054***	−0.0065***	−0.0102***	−0.0014
	(−3.59)	(−4.03)	(−3.92)	(−0.77)
Stock volatility	0.0267***	0.0294***	0.0039	0.0033
	(5.00)	(4.06)	(0.38)	(0.92)
Institutional ownership	0.0001	0.0074*	0.0082	0.0027
	(0.03)	(1.70)	(1.47)	(0.88)
ln(CEO tenure)	−0.0017	0.0040***	−0.0095***	0.0000
	(−1.43)	(2.85)	(−4.58)	(0.04)
CEO duality	−0.0030*	−0.0053***	0.0003	−0.0004
	(−1.89)	(−2.63)	(0.11)	(−0.33)
Board size	0.0005	−0.0005	0.0010	0.0005
	(1.13)	(−1.08)	(1.20)	(1.51)
Board independence	0.0004	0.0189***	−0.0139	−0.0027
	(0.07)	(3.30)	(−1.45)	(−0.50)
Constant	0.1610***	0.0403**	0.0638***	−0.0027
	(13.52)	(2.25)	(3.02)	(−0.33)
Firm dummies	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
R-squared	0.442	0.435	0.052	0.207
Observations	14,000	14,000	14,000	14,000

Table 10: CEO Job Security and Real Earnings Management

The table presents the effects of CEO job security on real earnings management. In column (1), the dependent variable is abnormal production costs (Ab PROD); and in column (2), the dependent variable is abnormal discretionary expenses (Ab DISCEXP). The definition of the independent variables can be found in Table A.1. The standard errors are clustered at the firm-CEO pair level. The t-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	(1) Ab PROD	(2) Ab DISCEXP
Hazard	−0.5647**	0.6230**
	(−2.15)	(2.01)
Size	0.0168***	−0.0282***
	(3.68)	(−5.20)
Leverage	0.0014	−0.0848**
	(0.05)	(−2.35)
M/B	−0.0185***	0.0305***
	(−5.82)	(6.28)
ROA	−0.2199***	−0.5672***
	(−4.53)	(−9.52)
Sale growth	0.0240**	0.0049
	(2.25)	(0.78)
Operating CF	−0.2829***	0.1351***
	(−7.00)	(3.11)
ln(Firm age)	0.0102	−0.0235***
	(1.32)	(−2.62)
ln(Analyst number)	−0.0242***	0.0450***
	(−3.03)	(4.85)
ln(Auditor tenure)	−0.0060	0.0048
	(−1.06)	(0.75)
Big 4 auditors	0.0211	−0.0179
	(1.42)	(−0.99)
Institutional ownership	−0.0033	0.0159
	(−0.14)	(0.61)
ln(CEO tenure)	−0.0022	0.0101*
	(−0.41)	(1.66)
CEO duality	−0.0056	−0.0032
	(−0.75)	(−0.38)
Board size	−0.0002	0.0001
	(−0.08)	(0.07)
Board independence	−0.0407	0.0546*
	(−1.53)	(1.83)
Constant	−0.0596	0.1066
	(−0.96)	(1.48)
Industry dummies	Yes	Yes
Year dummies	Yes	Yes
R-squared	0.168	0.174
Observations	12,873	12,873

Table 11: CEO Job Security and Accrual-Based Earnings Management—Opportunistic Motives

The table presents the results of multivariate analysis about the effect of CEO job security on accrual-based earnings management when dismissal risk is high and when firm performance is poor. The dependent variable is positive discretionary accruals, and the results are based on the truncated regression. In Panel A, Top 50%, Top 40%, Top 30%, Top 20%, and Top 10% are dummy variables that indicate the CEO's dismissal hazard is among the top 50%, 40%, 30%, 20%, and 10% in the year, respectively. In Panel B, Bottom 10%, Bottom 20%, Bottom 30%, Bottom 40%, and Bottom 50% are dummy variables that indicate the firm's stock return is among the bottom 10%, 20%, 30%, 40%, and 50% in the year, respectively. The control variables are the same as in Table 4. For brevity, the control variables are omitted from the table. The standard errors are clustered at the firm-CEO pair level. The t-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	Panel A: Based on Hazard				
	(1)	(2)	(3)	(4)	(5)
Hazard	−1.1267	−3.0558***	−2.5968***	−2.2301***	−2.8221***
	(−0.96)	(−2.89)	(−2.82)	(−2.71)	(−3.73)
Hazard×Top 50%	−0.5092				
	(−0.57)				
Hazard×Top 40%		1.1793			
		(1.53)			
Hazard×Top 30%			0.8149		
			(1.27)		
Hazard×Top 20%				0.5301	
				(0.90)	
Hazard×Top 10%					1.4997***
					(2.62)
	Panel B: Based on Stock Return				
	(1)	(2)	(3)	(4)	(5)
Hazard	−2.1696***	−2.4625***	−2.3296***	−2.1860***	−2.0652**
	(−3.28)	(−3.29)	(−2.98)	(−2.67)	(−2.26)
Hazard×Bottom 10%	0.9484*				
	(1.69)				
Hazard×Bottom 20%		1.0055*			
		(1.86)			
Hazard×Bottom 30%			0.6909		
			(1.31)		
Hazard×Bottom40%				0.5014	
				(0.92)	
Hazard×Bottom 50%					0.3645
					(0.59)
	Regression Control Variables				
Control variables	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes
Observations	6,227	6,227	6,227	6,227	6,227

Table 12: Robustness—Alternative Estimation Methods for CEO Dismissal Hazard or Probability

The table shows robustness of the effect of CEO job security on accrual-based earnings management with respect to alternative estimation methods for CEO dismissal hazard or probability. The dependent variable is positive discretionary accruals, and the results are based on the truncated regression. In columns (1) and (2), hazard is estimated based on a Weibull model in the specifications of columns (2) and (3) in Table 2, respectively. In column (3), hazard is estimated based on a Gompertz model. In column (4), hazard is estimated based on the Cox model. In column (5), CEO dismissal probability is estimated based on a Probit model. In column (6), CEO dismissal probability is estimated based on a linear probability model. In column (7), CEO dismissal probability is estimated based on a Probit model with control of CEO tenure. In column (8), CEO dismissal probability is estimated based on a linear probability model with control of CEO tenure. In column (9), CEO dismissal probability is estimated based on a Probit model with a bias-reduced algorithm to address the potential rare-event bias (King and Zeng, 2001). The hazard and probability used in columns (3) to (9) are based on the specifications of columns (2) to (8) of Table A.3 in Appendix C, respectively. The definition of the control variables can be found in Table A.1. The standard errors are clustered at the firm-CEO pair level. The *t*-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Weibull 2	Weibull 3	Gompertz	Cox	Probit	OLS	Probit with CEO Tenure	OLS with CEO Tenure	Rare-Event Probit
Hazard	−1.1568**	−1.6704***	−1.6248***	−0.0380***					
	(−2.29)	(−2.84)	(−2.91)	(−3.07)					
Probability					−0.6601**	−0.8909**	−0.4893*	−0.8809**	−0.3873*
					(−2.04)	(−2.19)	(−1.71)	(−2.07)	(−1.93)
Size	−0.0434***	−0.0433***	−0.0433***	−0.0429***	−0.0421***	−0.0429***	−0.0319***	−0.0428***	−0.0326***
	(−5.47)	(−5.49)	(−5.50)	(−5.47)	(−5.22)	(−5.48)	(−5.66)	(−5.48)	(−6.00)
Leverage	−0.0747**	−0.0749**	−0.0745**	−0.0736**	−0.0695**	−0.0785**	−0.0499**	−0.0789**	−0.0580**
	(−2.34)	(−2.35)	(−2.34)	(−2.32)	(−2.15)	(−2.45)	(−2.07)	(−2.46)	(−2.43)
M/B	0.0039*	0.0037*	0.0036*	0.0035	0.0041*	0.0036*	0.0031	0.0036*	0.0030*
	(1.76)	(1.72)	(1.65)	(1.64)	(1.67)	(1.69)	(1.61)	(1.69)	(1.78)
ROA	−0.0047	−0.0351	−0.0088	−0.0107	−0.0255	0.0046	−0.0180	0.0046	−0.0090
	(−0.07)	(−0.48)	(−0.12)	(−0.15)	(−0.34)	(0.06)	(−0.32)	(0.07)	(−0.17)
Sale growth	0.0070	0.0071	0.0073	0.0070	0.0075	0.0065	0.0066	0.0065	0.0071
	(1.21)	(1.22)	(1.26)	(1.21)	(1.31)	(1.14)	(1.46)	(1.14)	(1.59)
Operating CF	−0.0868	−0.0873	−0.0872	−0.0871	−0.0682	−0.0909	−0.0469	−0.0903	−0.0564
	(−1.33)	(−1.34)	(−1.34)	(−1.34)	(−0.99)	(−1.40)	(−0.92)	(−1.39)	(−1.18)
ln(Firm age)	−0.0273**	−0.0271**	−0.0271**	−0.0272**	−0.0330***	−0.0289**	−0.0235***	−0.0291**	−0.0203**
	(−2.36)	(−2.36)	(−2.36)	(−2.38)	(−2.73)	(−2.51)	(−2.68)	(−2.53)	(−2.40)
ln(Analyst number)	0.0093	0.0098	0.0098	0.0099	0.0076	0.0105	0.0063	0.0103	0.0054
	(0.84)	(0.89)	(0.89)	(0.91)	(0.75)	(0.95)	(0.81)	(0.94)	(0.73)
ln(Auditor tenure)	0.0027	0.0026	0.0028	0.0027	0.0076	0.0030	0.0047	0.0030	0.0036
	(0.33)	(0.32)	(0.35)	(0.34)	(0.86)	(0.37)	(0.72)	(0.37)	(0.58)
Big 4 auditors	0.0129	0.0130	0.0130	0.0140	0.0123	0.0127	0.0081	0.0122	0.0125
	(0.58)	(0.59)	(0.59)	(0.63)	(0.49)	(0.57)	(0.42)	(0.56)	(0.70)
Institutional ownership	0.0064	0.0061	0.0059	0.0064	0.0067	0.0075	0.0051	0.0073	0.0064
	(0.27)	(0.26)	(0.26)	(0.28)	(0.28)	(0.32)	(0.28)	(0.32)	(0.36)
ln(CEO tenure)	−0.0003	−0.0037	−0.0066	0.0033	0.0090	0.0045	0.0037	−0.0029	0.0016
	(−0.03)	(−0.44)	(−0.76)	(0.43)	(1.16)	(0.60)	(0.58)	(−0.34)	(0.27)
CEO duality	0.0003	−0.0032	−0.0026	−0.0024	−0.0034	−0.0033	−0.0009	−0.0003	0.0015
	(0.02)	(−0.28)	(−0.22)	(−0.21)	(−0.27)	(−0.28)	(−0.10)	(−0.02)	(0.18)
Board size	0.0012	0.0014	0.0013	0.0012	0.0026	0.0018	0.0020	0.0017	0.0019
	(0.42)	(0.49)	(0.44)	(0.43)	(0.83)	(0.63)	(0.83)	(0.58)	(0.83)
Board independence	−0.0823***	−0.0809***	−0.0827***	−0.0811***	−0.0829**	−0.0689**	−0.0679***	−0.0748**	−0.0604***
	(−2.64)	(−2.61)	(−2.67)	(−2.63)	(−2.48)	(−2.15)	(−2.75)	(−2.38)	(−2.58)
Constant	0.1443***	0.1594***	0.1642***	0.1421***	0.1055**	0.1151**	0.0997**	0.1368***	0.0941**
	(2.67)	(2.92)	(2.99)	(2.71)	(1.98)	(2.25)	(2.41)	(2.61)	(2.36)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,227	6,227	6,227	6,227	5,732	6,227	5,732	6,227	6,227

Table 13: Robustness—Additional Control Variables

The table presents robustness of the effect of CEO job security on accrual-based earnings management with respect to exclusion of CEO turnover events and to inclusion of various control variables. The dependent variable is positive discretionary accruals, and the results are based on the truncated regression. In column (1), we exclude firm-year observations with occurrence of CEO turnovers; in column (2), we control discretionary accruals in the previous year; in column (3), we control a dummy variable that indicates whether discretionary accruals in the previous year are greater; in column (4), we control a dummy variable that indicates whether earnings meet analyst forecast; in column (5), we control the SOX dummy that equals one if the year is after 2001 and zero otherwise; in column (6), we control CEO overconfidence and its interaction with hazard, where CEO overconfidence is measured by the Malmendier and Tate (2005) option-based measure, constructed following the method of Humphery-Jenner et al. (2016); in column (7), we control CEO pay-performance sensitivity (delta) and CEO wealth sensitivity to stock volatility (vega), computed following the method of Coles, Daniel, and Naveen (2006); in column (8), we control the proportion of independent members on the audit committee; in column (9), we control the governance index (G-index), constructed following Gompers, Ishii, and Metrick (2003); in column (10), we control the entrenchment index (E-index), constructed following Bebchuk, Cohen, and Ferrell (2009); in column (11), we control industry-by-year fixed effects; and in column (12), we control firm fixed effects. In all analyses, the control variables (including industry and year dummies) of the baseline regression (column (4) of Table 4) are included, and their definition can be found in Table A.1. For brevity, the baseline control variables are omitted from the table. The standard errors are clustered at the firm-CEO pair level. The *t*-statistics are presented in the parentheses. The superscripts ***, **, and * indicate the statistical significance at the 0.01, 0.05, and 0.10, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Hazard	−1.6457***	−1.6040***	−1.0647***	−1.7397***	−1.7160***	−1.6028**	−1.8634***	−1.8270***	−1.3755**	−1.3773**	−1.6784***	−2.1772***
	(−2.67)	(−2.95)	(−3.05)	(−3.07)	(−3.01)	(−2.09)	(−3.08)	(−2.99)	(−2.33)	(−2.34)	(−2.75)	(−3.33)
Lagged DA		−0.2135**										
		(−2.41)										
Dummy ($DA_{t-1} > DA_t$)			−0.1956***									
			(−10.91)									
Meet forecast				−0.0167*								
				(−1.69)								
SOX dummy (Year ⩾ 2002)					−0.1387*							
					(−1.86)							
CEO overconfidence						0.0385**						
						(2.13)						
Hazard×CEO overconfidence						−0.6059						
						(−0.71)						
Delta							0.0004***					
							(2.92)					
Vega							−0.0214					
							(−0.86)					
Audit comm. ind.								0.0153				
								(0.45)				
G-index									0.0015			
									(0.70)			
E-Index										0.0043		
										(0.97)		
Control variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes
Industry-year dummies											Yes	
Firm dummies												Yes
Observations	5,140	6,211	6,211	6,098	6,227	6,137	5,900	5,554	5,411	5,411	6,227	6,227