Severance pay, employment agreement, and managerial short-termism*

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Abstract

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Key words: employment agreement, severance pay, managerial myopia

JEL codes: G32, M40

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Abstract

Managerial short-termism is an important agency conflict. How to address this has been an important issue for companies, regulators, and researchers. In this paper we examine the impact of CEO protection in the form of severance pay and explicit employment agreement. We find that firms with CEO protection from either severance pay or employment agreement are less likely to cut R&D expenditures to avoid earnings decreases. The effect is both statistically and economically significant. We also find that the effect of CEO protection is stronger in cases when CEOs have stronger incentives to engage in myopic behavior, either due to job security concerns or due to short investment horizon of investors, and in cases when alternative contract mechanisms are lacking.

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1. Introduction

Managerial short-termism is one form of agency problems and it has attracted increasing attention from researchers and practitioners in the last couple of decades. Prior research argues that managers, especially chief executive officers (CEOs), cut discretionary expenditures and/or engage in earnings management to increase current earnings or to meet/beat short-term performance targets for private gains, such as increasing their compensation, reducing takeover pressure, and keeping their jobs.[1] The commonly recommended remedies include increasing the monitoring (e.g., by increasing board independence) and penalties to discourage myopic behavior (e.g., Farber 2005; Srinivasan 2005; Hennes et al. 2008). Such approaches increase the expected costs of myopic behavior to managers by increasing the likelihood and cost of being detected, and hopefully the increased costs will prevent managers from engaging in such behavior. If the effectiveness of monitoring is questionable or if managers' expectation of the penalty is low, such approaches may not be efficacious. Recent research that questions the overall effectiveness of board monitoring (e.g., Hwang and Kim 2009; Duchin et al. 2010) and the evidence of the prevalence of frauds despite potentially high penalty (e.g., Karpoff et al. 2008a, b) highlight such concerns.

Another approach that has not been well-explored in the literature is to reduce managers' incentives to engage in myopic behavior via contracting.[2] One way to ease the short-term pressure on managers is to use explicit contracting terms that can protect CEOs from short-term swing in performance. In this study, we examine whether the existence of such contracting terms

[1] See, for examples, Bhojraj and Libby (2005) on market pressure and myopic behavior (increasing earnings at the expense of cash flows), Matsunaga and Park (2001) and Comprix and Muller III (2006) on earnings management and executive compensation, DeFond and Park (1997) on earnings management related to job security, Stein (1988) on takeover pressure and earnings management, and Stein (1989) on the capital markets' fixation on current earnings and earnings management.

[2] An exception is Cheng and Farber (2008). They argue that after realizing the adverse consequences of the overuse of option grants, restatement firms should reduce the use of option grants as a form of CEO compensation in order to reduce CEOs' incentives to engage in earnings management. They find results consistent with their prection.

helps reduce managerial short-termism. We focus on two forms of such employment agreements: severance pay agreement and fixed-term, comprehensive employment agreement. Severance pay agreement stipulates the amount and terms of payments executives can receive when their employment is terminated. While some practitioners and academia argue that severance pay captures managerial entrenchment and poor corporate governance (e.g., Bebchuk and Fried 2004), others argue that the existence of *ex ante* severance pay agreement has the potential to ease the pressure on CEOs to deliver short-term performance (e.g., Almazan and Suarez 2003; Inderst and Mueller 2005). The board of directors will be less likely to terminate a CEO with short-term poor performance given the cost of severance payments. This implies that CEOs with severance pay agreement will be less concerned with losing their jobs. As a result, these CEOs are more likely to focus on long-term projects that maximize firm value (e.g., Rau and Xu 2010). Therefore, CEOs with severance pay are predicted to be less myopic.

Employment agreements for CEOs are explicit and comprehensive contracts between CEOs and firms that spell out both parties' obligations and responsibilities. A typical employment agreement has a fixed term of two to five years. The employment agreement can get renewed, amended or extended later on. It includes terms on compensation, benefits, confidentiality, and termination payments. Prior research finds that a firm tends to have an employment agreement with the CEO when it is unclear whether he or she is a good fit, such as when the uncertainty of the business environment is high (e.g., Schwab and Thomas 2006; Gillan et al. 2009). Basically, an employment agreement protects the CEO from being terminated within the contract term and the CEO cannot be fired unless for good cause, which usually does not include CEO incompetence or poor firm performance. In the event the CEO gets fired within the contract term, the CEO will receive the termination payments, the amount of which is clearly

specified in the majority of employment agreements; in the case that the termination payments are not specified in the employment agreement, the firm also compensates the CEO to avoid lawsuit.[3] Therefore, similar to severance pay, CEOs with employment agreements are under lower pressure to maintain high short-term performance and are thus less likely to engage in myopic behavior than those without employment agreements.

Given the similarity of severance pay and employment agreements in protecting CEO from short term swing in performance, in the main analyses we examine the two contracting forms together. Our proxy of myopic behavior is the likelihood of cutting R&D expenditures when facing potential earnings decreases (Bushee 1998). We predict that compared with other firms, firms with severance pay or fixed employment agreements (the CEO protection group) are less likely to cut R&D expenditures to maintain earnings increases. Since the existence of severance pay and employment agreements varies with firm characteristics (e.g., Gillan et al. 2009; Rau and Xu 2010), we control for this endogeneity in our empirical analyses using both an instrument variable approach and a Heckman approach, as commonly done in the literature (e.g., Doidge et al. 2004).

Our sample includes S&P 500 firms over the period 1995-2008. We hand collect CEO severance pay and employment agreement information from proxy statements. We find that, consistent with our prediction, firms with severance pay or fixed employment agreements are less likely to cut R&D expenditures than other firms when faced with potential earnings decreases. Compared to firms without CEO protection, the likelihood of cutting R&D for firms with CEO protection is lower by 13.5 to 22.9 percentage points, depending on the model specifications. This difference is economically significant given that within firms with small pre-

[3] For example, in April 2011Six Flags paid out $30 million to former chief financial officer Jeffrey Speed in an arbitration case. Speed won the ruling by arguing that his dismissal without cause violated his employment agreement with Six Flags (CFO Journal, November 11, 2011).

R&D earnings decrease group, only half of the firms cut R&D expenditures.

In an additional analysis, we separately examine the impact of severance pay and employment agreement on managerial short-termism. Ex-ante, it is unclear whether severance pay or employment agreements have a greater impact. On one hand, severance pay agreements usually do not have an expiration date, meaning that CEOs will be protected in the foreseeable future. Fixed-term employment agreements, in contrast, do have a definite term. This contrast suggests that CEOs can be better protected by severance pay than by fixed-term employment agreements. On the other hand, a fixed-term employment agreement is a more comprehensive contract and contains terms other than termination payments. Those additional terms (such as post-retirement benefits) can offer better protection to CEOs than a stand-alone severance payments agreement, pointing to an opposite prediction. Consistent with the mixed predictions, we find that severance pay and employment agreements have similar moderating effects on CEO myopic behavior.

In cross-sectional analyses, we examine whether the effect of CEO protection on managerial short-termism varies with industry and firm characteristics. First, when the firm is in a more homogenous industry, it is easier to find a suitable CEO candidate and the threat of CEO dismissal is higher. Accordingly, the CEOs without employment agreements might be more likely to resort to myopic behavior to increase their job security (e.g., Parrino 1997). This implies that the impact of CEO protection is expected to be greater for firms in more homogenous industries. We find evidence consistent with this prediction. Second, when shareholders have shorter investment horizon, CEOs are under greater pressure to deliver short-run performance (e.g., Shleifer and Vishny 1990). Thus, we predict that the protection from severance pay or employment agreements is more important in such cases. Using the percentage of shares held by

transient institutional investors to proxy for the short-term focus of shareholders, we find that, as expected, the impact of CEO protection on managerial short-termism is greater when transient institutional ownership is higher. Lastly, we examine the impact of CEO protection in the presence of another CEO contract feature that links CEO utility to firms' long-term performance, equity-based compensation. We find that the impact of CEO protection is lower when CEOs have relatively more equity-based compensation, consistent with CEO protection and equity-based compensation being alternative mechanisms in addressing CEOs' short-termism.

Our paper contributes to the literature in the following ways. First, we contribute to the literature on managerial short-termism by showing that CEOs' employment agreements can help address the issue of managerial myopia. This suggests that, apart from external monitoring and penalty, internal mechanisms are also important in addressing managerial myopia. Second, we contribute to the literature on severance pay and employment agreements. While prior literature often associates severance pay with agency problems and managerial entrenchment, our evidence is supportive of *ex ante* severance pay being used as a contracting tool to help expand managers' horizon. The emerging literature on employment agreement mainly focuses on the determinants of employment agreements. We extend this literature by examining the impact of CEO employment agreement on corporate decisions (e.g., Huang 2010; Xu 2011).[4]

The remainder of the paper is organized as follows. Section 2 provides a summary of prior research and develops hypotheses. Section 3 discusses the sample and data. Section 4 reports the empirical analyses. Section 5 concludes.

[4] Note that our paper differs from studies that examine the impact of severance pay or employment agreements on firms' risk-taking behavior. Those studies find that firms with CEO severance pay or employment agreements *on average* invest more in long-term projects, including R&D (e.g., Huang 2010; Xu 2011). In contrast, our paper identifies the situation where CEOs tend to be myopic (e.g., cutting R&D) and examines how the existence of severance pay and employment agreements reduces such myopic behavior, or the tendency to cut R&D. We predict and find that the existence of severance pay and employment agreements has no impact on corporate investment behavior in situation when myopic behavior is not expected.

2. Prior research and hypothesis development

2.1 Prior research on severance pay and executive employment agreement

Prior research on the determinant of severance pay offers two lines of thoughts. One line of thought is that severance pay is a manifestation of agency problems and represents rent extraction by powerful CEOs (e.g., Bebchuk and Fried 2004). The other view is that severance pay is part of the optimal contract between the firm and the CEO, for two reasons. First, the board of directors needs signals to continuously evaluate the CEO's human capital to base compensation upon. Future performance measures are informative signals and are thus valuable in contracting. Therefore an optimal contract should include delayed compensation based on future performance, and severance pay is one form of delayed compensation (Fama 1980). Second, the threat of dismissal can lead to moral hazard problems, such as avoiding risky but positive net present value projects or manipulating performance measures to hide unfavorable information. Severance pay is a mechanism that partially addresses these moral hazard problems (Almazan and Suarez 2003; Inderst and Mueller 2005). Consistent with both lines of thinking, Yermack (2006) and Rustics (2006) find that the use of severance pay is higher for firms with weak corporate governance, larger firms, firms in more uncertain operating environments, and firms with outside CEOs. Focusing on the *ex ante* use of severance pay, Rau and Xu (2010) find evidence largely consistent with the argument that severance pay is a form of risk compensation; they find that firms are more likely to use severance pay when executives' human capital is at risk and they do not find evidence suggesting that the use of severance pay reflects the entrenchment or rent extraction of CEOs. Cadman et al. (2011) find similar evidence.

CEO employment agreement (EA) refers to a comprehensive *written* agreement that

specifies the contract terms between the firm and CEO, including items such as the CEO's responsibilities, compensation, perquisites, termination conditions and payments, and restrictions on outside activities.[5] EA basically specifies a contract period during which the CEO cannot be dismissed without good cause. "Good cause," as specified in the contract, usually includes the breach of fiduciary duties and willful misconduct, and it usually does not include poor firm performance. Of the S&P 500 firms in 2000, Gillan et al. (2009) find that 225 firms have employment agreements with their CEOs and on average these EAs have a three-year fixed term. The main distinction between CEOs with EA and those without is that while the former are protected by EA, the latter are employed at will. For example, General Electric Company (GE) does not have an employment agreement with its CEO. In its 2006 annual proxy statement, GE states that "GE does not, in general, enter into employment agreements with our senior executive officers. They serve at the will of the Board. This enables the company to remove a senior executive officer prior to retirement whenever it is in the best interests of the company."

Therefore, EA benefits the CEO by offering protection over the duration of the contract. The benefit to the CEO is likely higher when it is uncertain whether the CEO is a good fit for the company and there is a higher likelihood of CEO dismissal (Schwab and Thomas 2006). Providing an employment agreement to the CEO also benefits the firm as it allows the firm to attract candidates who otherwise would not consider the position. However, employment agreement is costly to the firm because it is more difficult to renegotiate the contract terms or to terminate the contract without a cost. Gillan et al. (2009) studies the determinants of CEOs having an EA. They argue that when the uncertainty of the business environment is high, firms are less likely to know the talents they need from CEOs and are more likely to replace CEOs; therefore, CEOs are more likely to seek protection from an EA. Consistent with this prediction,

[5] Note that compensation contracts alone are not regarded as EAs.

they find that firms with higher volatility of sales growth, with lower market-adjusted returns, and in industries with lower survival rate, are more likely to have EAs. They also find that firms in industries with more homogeneous firms and firms with outside CEOs are more likely to have an EA, consistent with the likelihood of replacing CEOs being higher and CEOs having a greater demand for EA in such firms. When a CEO has higher salary and more incentive-based compensation, she has more to lose and has a greater need for a written contract to protect her benefits. Gillan et al. find evidence consistent with this argument.

2.2 Hypothesis development

Whether a CEO has a severance pay agreement or fixed-term, comprehensive employment agreement can have important implications for firm decisions. As discussed earlier, with severance pay and employment agreement, it is more costly for the firm to dismiss a CEO. Both types of agreements help protect the CEOs from the effect of the short-term performance swing on their job security. Accordingly, these agreements can reduce the pressure faced by the CEOs to increase current earnings via myopic behavior. As argued in Gillan et al. (2009), "CEOs facing less uncertainty are less likely to avoid risky positive net present value projects or to pursue overly conservative financing and dividend policies." This is also the argument companies with CEO agreements provide. For example, in the 2003 proxy statement, Sysco states that "Severance Agreements were in the best interest of the Company and its stockholders in [the sense] that they secure the continued services of these executive officers and ensure their undivided dedication to their duties without being influenced by the uncertainty of continued employment."

Extant studies provide evidence consistent with this argument. Rustics (2006) finds that the use of equity-based severance pay is negatively correlated with the likelihood of CEO turnover

and similarly, Xu (2010) finds that the existence of fixed-term employment agreements reduces the likelihood of CEO turnover. Huang (2010) finds that firms with severance pay agreements for the CEOs invest more on R&D than other firms. Xu (2011) find that CEOs with fixed term employment agreements invest more on R&D and CAPX.

In contrast, CEOs without severance pay or EAs are subject to higher risk of losing jobs after poor short-term performance. Under the pressure to deliver and to protect their personal benefits, these CEOs are more likely to engage in myopic behavior, provided that the board and/or investors cannot fully understand the implications of such activities (e.g., Fudenberg and Tirole 1995; DeFond and Park 1997). Thus, with the protection from severance pay or fixed-term employment agreements, CEOs are less likely to engage in myopic behavior.

The above discussions lead to our first hypothesis:

H1: Ceteris paribus, firms that have severance pay or employment agreements with CEOs are less likely to engage in myopic behavior than other firms.

The alternative view is that severance pay and EA are reflective of agency problems in the firm and capture CEO rent extraction. That is, severance pay and EA are negotiated by entrenched CEOs to enrich and protect themselves. If this is the case, we will not find evidence consistent with H1.

As discussed earlier, the existence of severance pay and employment agreements varies systematically with firm characteristics and these characteristics may be associated with the extent of myopic behavior, or proxies for it. We address this endogeneity issue in the empirical analysis.

2.3 Cross-sectional variation

In this section, we develop predictions about how the impact of severance pay and fixed-term employment agreements on CEO's myopic behavior varies cross-sectionally. As discussed

above, the two key elements underlying H1 are (1) the protection of CEO under severance pay and EA and (2) capital market pressures to deliver short-term performance. In this section, we focus on firm characteristics that affect the extent or importance of CEO protection and capital market pressure. Specifically, we examine the ease of finding an alternative CEO as proxied by industry homogeneity and the pressure on the CEO to deliver short-term performance as captured by shareholder ownership structure. In addition, we investigate how another CEO contracting feature, equity-based compensation, affects the impact of severance pay and EA on CEO's myopic behavior.

Homogeneous vs. heterogeneous industries

Parrino (1997) argues that the size of the candidate pool affects the likelihood that a CEO gets replaced. It is easier for firms in industries with more homogeneous firms to find a replacement and thus firms in these industries are more likely to replace CEOs. Parrino (1997) provides evidence consistent with this argument. As a result, without the protection from severance pay or fixed-term employment agreements, CEOs in homogeneous industries will have stronger incentives to deliver short-term performance to ensure that they can keep the job and these CEOs will be more likely to engage in myopic behavior, compared to CEOs in heterogeneous industries (e.g., DeFond and Park 1997). It thus follows that the protection from severance pay or EA is more important in curbing myopic behavior in industries with more homogeneous firms. Thus, we expect that,

H2: Ceteris paribus, the negative effect of severance pay or employment agreements on the extent of myopic behavior, as hypothesized in H1, is stronger in industries with homogeneous firms than in industries with heterogeneous firms.

Note that CEOs in homogeneous industries are more likely to seek protection of severance pay and employment agreement (Gillan et al. 2009). We control for this selection issue in our empirical tests.

Shareholder ownership structures

One of the underlying reasons for managerial short-termism is the fixation of capital market participants on short-term performance. For example, the Aspen Institute report on "Overcoming Short-termism" argues that the focus on short-term trading gains of fund managers and the focus on quarterly earnings of investors with short investment horizon can lead executives to pursue strategies to satisfy these fund managers and investors, jeopardizing the company's long-term value maximization. Shleifer and Vishny (1990) show analytically that shareholders with short investment horizon induce managers to focus on short-term performance. Empirically, Bushee (1998) documents that transient institutional investors have shorter investment horizons and thus are more likely to induce myopic behavior; Bushee and Noe (2000) further find that firms with high transient institutional ownership have high stock return volatility. Without protection from severance pay or employment agreements, CEOs in firms with high transient institutional ownership are likely under greater pressure to deliver short-term performance than those in other firms. Thus, we expect that the protection from EA and severance pay is more important in curbing myopic behavior in firms with high transient institutional ownership. That is, we expect that

H3: Ceteris paribus, the negative effect of severance pay or employment agreements on the extent of myopic behavior, as hypothesized in H1, is stronger in firms with higher transient institutional ownership than in other firms.

CEOs' stock-based compensation

Prior studies (e.g, Guay 1999) argue and empirically document that equity incentives, options in particular, can induce managers to focus on long-term performance. Dechow and Sloan (1991) and Cheng (2004) find that incentive-based compensation can reduce managers' incentives to engage in myopic behavior. Thus, stock-based compensation can be an alternative mechanism to address managerial short-termism. If this is the case, then other mechanisms that

help address managerial myopia, such as the protection from severance pay or employment agreement, will be less important. Thus, we expect the impact of severance pay and employment agreement to be weaker for CEOs with more stock-based compensation. That is, our last hypothesis is:

> *H4: Ceteris paribus, the negative effect of severance pay or employment agreements on the extent of myopic behavior, as hypothesized in H1, is weaker for CEOs with higher stock-based compensation.*

Alternatively, some prior studies have argued that equity incentives may actually induce managerial myopia, since equity incentives link manager's compensation to stock prices (e.g., Cheng and Warfield 2005). Under this view, a CEO with high stock-based compensation will be under pressure to deliver short-term performance, regardless of whether the CEO has severance pay / employment agreements or not. If this is the case, the impact of having severance pay and employment agreement on the extent of myopic behavior will not be associated with the level of stock-based compensation.

3. Sample, data, and research design

3.1 Sample and data

Our sample includes S&P 500 firms over the period 1995-2008. The Securities and Exchange Commission (SEC) requires that companies disclose material severance pay and employment agreements with top executives in their proxy statements (Regulation S-K, 17 CFR 299.601). For each firm-year, we hand collect information on severance pay and employment agreement for CEOs from the proxy statement. Table 1, Panel A describes our sample selection process. We start with 6,973 firm-years with proxy statements available from Edgar. Since our managerial myopia proxy is based on whether CEOs cut R&D expenditures to meet short-term

earnings goal, which is not feasible for firms with insignificant R&D expenditures, we drop those firm-years with missing R&D data and with insignificant R&D expenditure. Requiring that the firm has non-missing R&D in the current year, non-missing R&D in the prior year and R&D greater than 1% of sales in the current year reduces the sample size by 3,119 firm-years, 52 firm-years, and 1,119 firm-years, respectively. We exclude 100 firm-years that belong to industries with fewer than three firms to ensure that we have enough observations to calculate industry-based measures for the analyses (industries defined based on 2-digit SIC codes). We exclude another 386 firm-years because they do not have all the data to calculate the explanatory variables. As a result, our final sample includes 2,157 firm-years in the period 1995-2008.

Table 1, Panels B and C present the sample composition by year and industry. Panel B shows that on average, 69.5% of firm-years have CEO protection in the form of severance pay or employment agreements.[6] The percentage of firms with CEO protection is steadily increasing over time, from around 60% in the mid-1990s to more than 78% in the last several years of the sample period (i.e., 2006-2008). Panel C shows that the percentage of firms with CEO protection varies across industries. For instance, while about 92% of firms in the Construction Materials industry have CEO protection, only 58% of the firms in the Computers industry in the sample have CEO protection. Therefore we run regressions by industry when predicting the existence of CEO protection (see Appendix B for details).

Table 1, Panel D reports firm characteristics, separately for firm-years with CEO protection and firm-years without CEO protection. The two groups of firms are not significantly different except that firms without CEO protection are larger, have higher Tobin's Q, lower leverage, and lower institutional ownership. We control for all these characteristics in our regression analyses.

[6] This ratio is higher than that reported in prior research because prior research focuses either on severance pay only or employment agreement only. Slightly less than half of the firm-years with CEO protection have only severance pay, and the rest have fixed-term employment agreements.

3.2 Research design

As mentioned earlier, we proxy managerial myopic behavior with CEOs' tendency to cut R&D expenditures to achieve short-term earnings goals. Following Bushee (1998), we compare the pre-tax, pre-R&D earnings between the current year and the prior year. If there is a decrease and the decrease is smaller than the prior year's R&D, it means that the firm can potentially avoid an earnings decrease by cutting the current year's R&D. This group of firm-years is referred to as the small earnings decrease group. Within this group, myopic managers have strong incentives to cut R&D and thus the likelihood of cutting R&D can be used as a proxy for the extent of managerial myopia. Our hypothesis H1 predicts that CEO protection through severance pay and employment agreements helps lower managers' tendency to cut R&D in the small earnings decrease group. To capture this effect, we estimate the following probit regression for the small earnings decrease group:

$$\begin{aligned} Prob(RD\_Decrease_{i,t} = 1) = {} & \alpha + \beta CEO\_Protection_{i,t} + \gamma_1 \Delta RD_{i,t-1} + \gamma_2 \Delta Ind\_RD_{i,t} \\ & + \gamma_3 \Delta GDP_{i,t} + \gamma_4 Tobin\_Q_{i,t} + \gamma_5 \Delta CAPX_{i,t} + \gamma_6 \Delta Sales_{i,t} + \gamma_7 Size_{i,t} \\ & + \gamma_8 Distance\_Goal_{i,t} + \gamma_9 Leverage_{i,t} + \gamma_{10} FCF_{i,t} + \gamma_{11} INST_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (1),$$

where :

$RD\_Decrease_{i,t}$	=	1 if R&D decreases relative to the prior year, 0 otherwise;
$CEO\_Protection_{i,t}$	=	1 if the CEO has severance pay or employment agreement, 0 otherwise;
$\Delta RD_{i,t-1}$	=	prior year's change in R&D;
$\Delta Ind\_RD_{i,t}$	=	change in industry R&D intensity, with industry defined based on 4-digit SICs;
$\Delta GDP_{i,t}$	=	change in gross domestic product (GDP);
$Tobin\_Q_{i,t}$	=	Tobin's Q;
$\Delta CAPX_{i,t}$	=	change in capital expenditures;
$\Delta Sales_{i,t}$	=	change in sales;
$Size_{i,t}$	=	firm size, measured as market value of equity;
$Distance\_Goal_{i,t}$	=	distance from earnings goal relative to the prior year's R&D, defined as the change in pre-tax, pre-R&D earnings divided by prior year's R&D;
$Leverage_{i,t}$	=	leverage;
$FCF_{i,t}$	=	free cash flows;
$Inst_{i,t}$	=	institutional ownership;
i,t	=	firm i, year t subscripts.

H1 predicts that β is negative. We control for the cross-sectional variation in the error terms by calculating standard errors adjusted for firm and year clustering.

The list and measurement of control variables follow Bushee (1998). Detailed variable measurement is described in Appendix A. We control for factors that can affect R&D investments and the likelihood of cutting R&D. Last year's change in R&D (Δ*R&D*) captures the trend in R&D investments. A continuation of the trend implies a negative coefficient on this variable, whereas a reversal of the trend implies a positive coefficient. The change in industry R&D (Δ*Ind_R&D*) intensity captures the R&D investment opportunity in the industry and the change in GDP (Δ*GDP*) captures the economy level of investment opportunity. Tobin's Q (*Tobin_Q*), change in capital expenditures (Δ*CAPX*), and change in sales (Δ*Sales*) capture the firm's growth opportunities. These investment opportunity and growth variables, therefore, are predicted to be negatively associated with the likelihood of cutting R&D. Firm size (*SIZE*) captures cash constraints. Smaller firms are more likely to suffer cash flow shortage that leads them to cut R&D. Thus the coefficient on size is predicted to be negative. Distance to earnings goal (*Distance_Goal*) captures the extent to which the firm has to cut R&D to avoid earnings decreases. The more negative this variable is, the more difficult it is for the firm to meet earnings goals by cutting R&D. This implies a positive coefficient on *Distance_Goal*. Leverage (*Leverage*) captures the firm's incentives to increase earnings to reduce debt contracting costs and is predicted to be positively correlated with the incentive to cut R&D. Free cash flows (*FCF*) captures fund availability and is predicted to be negatively correlated with the likelihood of cutting R&D. Institutional ownership (*Inst*) captures the monitoring by institutional investors and is predicted to have a negative coefficient.

Apart from the small earnings decrease group, the rest of the sample is split into two groups: the large earnings decrease group and the earnings increase group. The large earnings decrease group includes those firm-years whose pre-tax, pre-R&D earnings fall short of the prior year's by an amount greater than the prior year's R&D. Thus, these firm-years will not be able to avoid earnings decline by cutting R&D. The earnings increase group includes the firm-years whose pre-tax, pre-R&D earnings exceed the prior year's. Therefore they do not need to cut R&Ds to achieve earnings increases. For these two groups, cutting R&D is not helpful or necessary to achieve short-term earnings increase. Thus, the likelihood of cutting R&D should not be correlated with managerial myopia. If our argument is correct and CEO protection only affects the likelihood of cutting R&D through its impact on managerial myopia, we expect the CEO protection indicator to have insignificant coefficient for these two groups. Accordingly, we use these two groups as our control groups. This design choice will help alleviate the concern that our finding is driven by spurious correlations (For example, it can be argued that the firm or CEO innate characteristics affect both R&D investments and the existence of severance pay and employment agreement).

3.3 Control for the endogeneity of CEO protection

Given that firms self-select into using CEO protection or not, certain CEO and firm characteristics can be correlated with both managerial short-termism (as proxied by the incidence of cutting R&D investments) and the existence of severance pay and employment agreements. We use two approaches to address this potential endogeneity issue. First, in regression (1), we replace the CEO protection indicator with its predicted value from a first-stage regression where we use CEO and firm characteristics to predict the probability of firms with severance pay or fixed-term employment agreements with the CEO. Second, we control for the Inverse Mills

Ratio estimated from the first stage predication model in regression (1) (Heckman 1979). Both approaches are widely used in the literature to address endogeneity issue (e.g., Doidge et al. 2004).

Appendix B reports the results explaining the existence of CEO protection (severance pay agreement only or employment agreement). We follow prior research in the choice of the determinants (e.g., Yermack 2006; Gillan et al. 2009; Xu 2010).[7] In particular, we use state law on contracting as exogenous instrument variables. The first-stage regressions are estimated by industries to improve the fitness of the model, given that there is a large variation in the probability of CEO protection across industries (Table 1, Panel C).[8] Appendix B reports the average coefficients across the industries and the p-values based on the series of coefficient estimates across the industries. As shown in the table, the likelihood of CEO protection varies systematically with state level variables (lower in states that provide greater protection to employees employed at will and to companies from takeover pressure). Also, the likelihood of CEO protection is lower for founder CEOs and for firms with better performance and is greater for CEOs with abnormal compensation and for CEOs with more incentive-based compensation.

4. Empirical analyses

4.1 CEO protection and the likelihood of cutting R&D – univariate analyses

We first report the results for univariate analyses testing H1. H1 predicts that CEO protection, in the form of severance pay or employment agreement, will reduce CEO's incentives

[7] In sensitivity tests, we also include other variables (e.g., E-Index developed by Bebchuk et al. 2005), which are usually insignificant in the first-stage regression, and the results are similar.

[8] The sample used for the first-stage regression is not restricted to firm-years with material R&D and is thus larger. We drop industries with a small number of firm-years observations that make the estimation of the first-stage regression impractical and industries without variation in the existence of severance pay or employment agreements (e.g., when all firm-years in the industry have severance pay or employment agreement).

to engage in myopic behavior, specifically, cutting R&D to avoid earnings decreases. That is, H1 implies a negative correlation between the likelihood of cutting R&D and the existence of CEO protection for the small earnings decrease group. We use the other two groups, the large earnings decrease group and the earnings increase group, as control groups. We do not expect the likelihood of cutting R&D to be systematically related to CEO protection for those two groups.

The univariate results are reported in Table 2, one panel for each of the three groups. Panel A shows that, consistent with H1, the existence of CEO protection is negatively correlated with the probability of cutting R&D in the small earnings decrease group. While 64% of the firms without CEO protection cut R&D, only 48% of firms with CEO protection do. The difference of 16 percentage points is both economically and statistically significant (p-value of the Chi-Square test is 0.001).

In contrast, CEO protection is not significantly related to the likelihood of cutting R&D in the other two groups. In the large earnings decrease group (Panel B), the likelihood of cutting R&D is about 68 percent for firms with or without CEO protection. In the earnings increase group (Panel C), the likelihood of cutting R&D is about 24 percent, regardless of whether CEO protection is in place or not. The no-result finding for these two groups is consistent with our prediction and alleviates concerns that the significant results for the small earnings decrease group may be driven by firm characteristics that are correlated with both R&D investments and CEO contracting. For example, if the lower likelihood of cutting R&D for the small earnings group is due to the notion that CEOs with employment or severance pay agreements invest more on R&D, then we should observe similar results in the other two groups.

In sum, the univariate analyses provide evidence consistent with H1. We now turn to multivariate analyses to control for potentially confounding factors and to address the potential self-selection or endogeneity of CEO protection.

4.2 CEO protection and the likelihood of cutting R&D – multivariate analyses

In this section, we examine the impact of CEO protection on the likelihood of cutting R&D using regression analyses. Table 3 reports the results, first for the small earnings decrease group (Panel A) and then for the large earnings decrease (Panel B) and earnings increase groups (Panel C). In each of the panels, we first report logit regression without controlling for self-selection. We then use the predicted likelihood of CEO protection estimated from the first-stage prediction model in the logit regressions. Lastly, we use the Heckman approach by including the Inverse Mills Ratio estimated from the first-stage prediction model in the logit regressions.

For the small earnings decrease group, as reported in column (1) of Panel A, CEO protection significantly reduces the likelihood of cutting R&D. The one-sided p-value is 0.006. The impact of CEO protection is also economically significant. CEO protection reduces the likelihood of cutting R&D by 13.5 percentage points. This is significant given that the average likelihood of cutting R&D in this group is around 54 percent (Table 2, Panel A). Judged by the marginal effect of explanatory variables, CEO protection is the second most important variable in explaining the likelihood of cutting R&D. Change in sales has the highest marginal effect; a standard deviation increase in sales reduces the likelihood of cutting R&D by 18.1 percentage points. Following change in sales and CEO protection, the next two important factors in explaining the likelihood of cutting R&D are Tobin's Q and prior year's change in R&D. Firms with higher Tobin's Q are more likely to cut R&D to avoid earnings decreases; a standard deviation increase in Tobin's Q increases the likelihood of cutting R&D by 10.4 percentage

points. A standard deviation increase in prior year's change in R&D increases the likelihood of cutting R&D by 9.1 percentage points, consistent with mean reversion in R&D investments. We also find that firms in industries with a contemporaneous increase in R&D intensity and firms with an increase in capital expenditures are less likely to cut R&D, consistent with investment opportunities leading to increases in R&D expenditures.

In Column (2) of Panel A, we replace CEO protection with its predicted value to control for the self-selection of CEO protection. We find that the results become even stronger for CEO protection. Firms with CEO protection are less likely to cut R&D than firms without CEO protection; the marginal effect of CEO protection is 25.2 percentage points. This marginal effect is the highest among all explanatory variables, including change in sales. The results on control variables are qualitatively the same as in the first column. In the last column of Panel A, we use the Heckman approach to address self-selection of CEO protection. The results are similar to those reported in Column (2). Firms with CEO protection are less likely to cut R&D than those without CEO protection; the marginal effect is 26.3 percentage points. The coefficient on Lamda is significant.

Panel B reports the regression results for the large earnings decrease group and Panel C reports the results for the earnings increase group. As mentioned above, we do not expect to find results for these two groups of firms, since CEOs' incentive to cut R&D to avoid earnings decrease is low or non-existent and accordingly CEO protection is not expected to influence the probability of cutting R&D. Consistent with our predictions, the coefficient on CEO protection is insignificant in both panels, regardless of whether we control for endogeneity or not. In a untabulated sensitivity test, we also estimate the regression for firms with small earnings increases to ensure that our results are not driven by the small magnitude of the change in

earnings. Focusing on firm-years with performance in the bottom tercile within the earnings increase group, we find that the coefficient on the CEO protection variable is insignificant in all three specifications.

Overall, we find that firms with CEO protection are less likely to cut R&D to avoid earnings decreases, compared with those without CEO protection. This indicates that CEO protection, in the form of severance pay or employment agreement, alleviates CEOs' short-termism. The inference is reinforced by the finding that CEO protection has no impact on the likelihood of cutting R&D in cases where the incentive to cut R&D to meet earnings goal is low.

4.3 Severance pay, employment agreement, and the likelihood of cutting R&D

In the last section, we pool severance pay and employment agreements together because they both potentially protect CEOs from short-term performance swing. In this section, we separate the two protection mechanisms and investigate whether the results reported above apply to both mechanisms. For this purpose, we construct two indicator variables, *Severance_Pay and Employment_Agreement*. *Severance_Pay* (*Employment_Agreement*) is one for firm-years when the CEO has a severance pay package (fixed-term employment agreement) and zero otherwise. Thus, the regression model is as follows:

$$Prob(RD\_Decrease_{i,t} = 1) = \alpha + \beta_1 Severance\_Pay_{i,t} + \beta_2 Employment\_Agreement_{i,t} + \gamma_1 \Delta RD_{i,t-1} + \gamma_2 \Delta Ind\_RD_{i,t} + \gamma_3 \Delta GDP_{i,t} + \gamma_4 Tobin\_Q_{i,t} + \gamma_5 \Delta CAPX_{i,t} + \gamma_6 \Delta Sales_{i,t} + \gamma_7 Size_{i,t} + \gamma_8 Distance\_Goal_{i,t} + \gamma_9 Leverage_{i,t} + \gamma_{10} FCF_{i,t} + \gamma_{11} INST_{i,t} + \varepsilon_{i,t} \quad (2).$$

The regression results are reported in Table 4. As in Table 3, we present the results for the three subsamples, the small earnings decrease group, the large earnings decrease group, and the earnings increase group, in Panels A, B, and C, respectively.

As reported in Column (1) in Panel A, both *Severance_Pay* and *Employment_Agreement* have significantly negative coefficients. The one-sided p-values are 0.005 and 0.038,

respectively. Again, the effects are economically significant. Having a severance pay agreement reduces the likelihood of cutting R&D by 16.0 percentage points and having an explicit employment agreement reduces the likelihood of cutting R&D by 11.6 percentage points. The next two columns of this panel reports the results after controlling for the endogeneity of having severance pay and employment agreement by using the predicted values from the first stage model or including Inverse Mills Ratio from the first stage model. The first stage model is run separately for the incidence of severance pay and that of employment agreement using the same model specification as the model presented in Appendix B. As reported in the table, the results on *Severance_Pay* and *Employment_Agreement* become even stronger, both statistically and economically. For example, in Column (3), having a severance pay package reduces the likelihood of cutting R&D by 23.5 percentage points and having an employment agreement reduces the likelihood of cutting R&D by 18.6 percentage points. The results on the control variables are similar to those reported in Table 3.

We also conduct F-tests to compare the coefficients on *Severance_Pay* and *Employment_Agreement* (untabulated). As discussed earlier, *ex ante* we do not have prediction of which mechanism will have a greater impact. On one hand, severance pay package usually does not have an expiration date, meaning that the CEO knows that he or she can have this package in the foreseeable feature. In contrast, an employment agreement is only valid for the duration of the agreement, implying that the CEO does not have protection after the agreement expires. The longer validation period of severance pay therefore suggests that the impact of severance pay is greater than that of employment agreement. On the other hand, CEO employment agreement is a comprehensive contract, including terms not only on severance payments but also on pensions and other benefits. The comprehensiveness of employment agreement potentially offers CEOs

better protection and thus implies a greater impact for employment agreement than for severance pay. For all the three columns, the F-tests indicate that the coefficients on the two mechanisms are not significantly different from each other (two-sided p=0.652, 0.410, and 0.578 for the three model specifications, respectively). This result indicates that the influence of the two contracting mechanisms is comparable to each other.

Panels B and C report the regression results for the large earnings decrease and earnings increase groups, respectively. To save space, we do not report results on control variables in these two panels. As reported in the table, the coefficients on *Severance_Pay* and *Employment_Agreement* are insignificantly different from zero. The lack of results for these two groups, where we do not expect to find results reinforces our main inferences.

Overall, the results in Table 4 indicate that both severance pay and employment agreement can protect the CEOs from short-term performance swing and reduce their incentives to engage in myopic behavior. Severance pay and employment agreement appears to have similar effects.

4.4 CEO protection and the likelihood of cutting R&D – cross-sectional analyses

In this section, we report cross-sectional analyses that test our hypotheses H2, H3, and H4. We use similar research design as before except that we add to the regressions the main effect of the conditioning variable and its interaction with CEO protection. Since the previous section indicates that the impact of severance pay and employment agreement is similar to each other, we again combine severance pay and employment agreement together as CEO protection. The regression model is as follows:

$$\begin{aligned} &Prob(RD\_Decrease_{i,t} = 1) \\ &= \alpha + \beta_1 CEO\_Protection_{i,t} + \beta_2 Cond\_Var_{i,t} + \beta_3 CEO\_Protection_{i,t} \times Cond\_Var_{i,t} \\ &+\gamma_1 \Delta RD_{i,t-1} + \gamma_2 \Delta Ind\_RD_{i,t} + \gamma_3 \Delta GDP_{i,t} + \gamma_4 Tobin\_Q_{i,t} + \gamma_5 \Delta CAPX_{i,t} + \gamma_6 \Delta Sales_{i,t} \\ &+\gamma_7 Size_{i,t} + \gamma_8 Distance\_Goal_{i,t} + \gamma_9 Leverage_{i,t} + \gamma_{10} FCF_{i,t} + \gamma_{11} INST_{i,t} + \varepsilon_{i,t} \end{aligned} \quad (3).$$

The conditioning variable, *Cond_Var*, is one of the following three indicator variables:

Industry_Homogeniety, *Transient_Inst*, and *Equity_Compensation*. They correspond to our three hypotheses H2-H4. *Industry_Homogeniety* is 1 if the firm operates in an industry that is more homogeneous than the sample median, and zero otherwise. The extent of homogeneity in an industry (based on two-digit SICs) is measured as the median of the percentage of the variation in monthly stock returns that is explained by an equal-weighted industry index over the previous ten years across all firms in the industry. Basically, the more the stock prices of firms in the industry move together, the more homogeneous the industry is. *Transient_Inst* is one if the ownership by transient institutional investors in the firm is higher than the sample median, and zero otherwise. *Equity_Compensation* is one if the CEO's equity-based compensation as a proportion of total compensation is higher than the sample median, and zero otherwise.[9] Our hypotheses predict that the effect of CEO protection on the likelihood of cutting R&D is more negative for firms in more homogenous industries and firms with higher transient institutional ownership and is less negative for firms with high CEO equity-based compensation.

To save space, we only report the results for the small earnings decrease group. As expected, none of the variables of interest (CEO protection, the conditioning variables, and their interactions) have significant coefficients for the large earnings decrease and earnings increase groups; In addition, as reported in Table 3 and Table 4, the two approaches of addressing the endogeneity of CEO protection, using the predicted value of CEO protection or the Heckman approach, lead to very similar results. For simplicity, we only tabulate the regression results based on the Heckman approach. The regression results without adjusting for self-selection and those using the predicted value of CEO protection are qualitatively similar.

The results are reported in Table 5. We first include the conditioning variables one at a

[9] We use indicator variables to facilitate result interpretation and to allow for non-linear relationship. In an untabulated analysis, we also use standardized decile ranks for the cross-sectional variables and the inferences remain the same.

time and then include all of them together in the last column. The first column of Table 5 shows that consistent with H2, the impact of CEO protection is greater for firms in more homogeneous industries. The main effect of CEO protection is significantly negative (p=0.001) and the marginal effect is 22.1 percentage points, indicating that the influence of CEO protection is significant even in more heterogonous industries. The main effect of industry homogeneity is significantly positive (p=0.036), suggesting that without CEO protection, industry homogeneity can induce myopic behavior, likely because of the higher threat of CEO dismissal in more homogeneous industries. This is consistent with findings in DeFond and Park (1997). More importantly, the existence of CEO protection has a greater mitigating effect on the tendency to cut R&D in homogeneous industries; the interaction of CEO protection and industry homogeneity is significantly negative (p-value=0.019) and the marginal effect is 26.0 percentage points.

The results in the second column of Table 5 present a similar picture with respect to transient institutional ownership. The main effect of CEO protection is significantly negative (p-value = 0.002) and the marginal effect is 21.8 percentage points, indicating that CEO protection has significant influence over managerial myopia even in firms with lower than median transient institutional ownership. The main effect of transient institutional ownership is significantly positive (p=0.037). This result is consistent with transient institutional investors' short horizon incentivizing managers to deliver short-run performance (Bushee 1998). More importantly, consistent with our hypothesis H3, the impact of CEO protection is greater in firms with higher transient institutional ownership. The interaction of CEO protection and transient institutional ownership is significantly negative (p=0.064), with a negative marginal effect of 20.3 percentage points.

The next column in Table 5 presents the results with respect to stock-based compensations. The results are consistent with our hypothesis H4; CEO protection and stock-based compensations appear to be alternative mechanisms in alleviating managerial myopia. The standalone effects of both are significantly negative, with p-value of 0.001 and 0.012, respectively, and the marginal effects are 31.4 percentage points and 18.9 percentage points, respectively. The interactive effect is significantly positive, with p-value of 0.014 and a marginal effect of 22.1 percentage points. This suggests that the incremental effect of CEO protection is lower when high stock-based compensation is high.

The last column of Table 5 reports the regression results when all of the three conditioning variables and their interactions with CEO protection are included. The results are similar to those reported in the first three columns, suggesting that the effects of these three variables are largely independent of each other.

In sum, the cross-sectional analyses in this section suggest that consistent with our hypotheses H2-H4, the impact of CEO protection on the likelihood of cutting R&D for the small earnings decrease group varies systematically with industry and firm characteristics. Specifically, the impact is greater in more homogeneous industries, for firms with higher transient institutional ownership, and for firms with lower CEO stock-based compensation. These results suggest that the impact of CEO protection on managerial myopia is stronger when CEOs have stronger incentives to engage in myopic behavior, either because of job security concerns or because of shareholders' short investment horizon, and when alternative mechanism to curb myopic behavior is weaker.

5. Additional and sensitivity analyses

5.1 Analysis of switch firms

In the analysis above, we include all firm-years that we are able to obtain proxy statements and the information about severance pay and employment agreements. During the data collection process, we noticed that while some firms are consistent in the use of severance pay or employment agreements throughout the sample period (either using it or not using it), other firms switch back and forth in the use of severance pay and employment agreements. In this section, we analyze this group of switch firms. The benefit of this analysis is that we can better control for time-invariant firm characteristics, but the disadvantage of focusing on this group is that the sample size is much smaller, reducing the power of the statistical tests.

Table 6 reports the regression results, Column (1) for the regular logit regression, Column (2) using the predicted value of the use of severance pay or employment agreements, and Column (3) using the Heckman approach by controlling for the effect of Inverse Mills Ratio. For the sake of brevity, we do not tabulate the results on control variables. As reported in the table, the coefficient on the CEO protection dummy is significantly negative for the small earnings decrease group. The magnitude of the coefficient is comparable to that reported in Table 3, although the significance level is lower, likely due to the smaller sample size. Also as reported above, the coefficient on CEO protection is insignificant for the other two groups regardless of model specifications.

5.2 Alternative explanation: differential investment opportunities

An alternative explanation for the results reported above is that when firms have small earnings decreases, they have fewer investment opportunities, and for some reason, firms without CEO protection have even fewer investment opportunities and are thus more likely to cut R&D than those with CEO protection. We do not believe that this alternative explanation can

explain our results as there are no obvious reasons why given the same level of performance, firms without CEO protection have fewer investment opportunities than those with CEO protection. Nevertheless, we conduct an additional analysis to address this concern. If firms have fewer investment opportunities due to poor performance, they should invest less on other long-term investments, and then we should observe that firms with CEO protection are less likely to cut capital expenditures (CAPX) than other firms. However, because cutting CAPX does not increase accounting earnings in the same period, our argument based on CEO protection reducing the extent of myopic behavior would imply that firms with and without CEO protection do not differ in the likelihood of cutting CAPX.

To test these two alternative explanations, we replace the incidence of cutting R&D in equation (1) with the incidence of cutting CAPX. (The model specification remains the same except that we replace the change in CAPX on the right-hand side with the lagged change in CAPX.) The untabulated analysis indicates that the CEO protection dummy has an insignificant coefficient in all model specifications. This result indicates that our results are not driven by the differential investment opportunities between firms with and without CEO protection.

5.3 Alternative explanation: a quiet life story

Another alternative explanation for the results documented above is that CEOs with protection from severance pay or employment agreements enjoy the "quiet life" and do not bother to manage earnings by cutting R&D. Focusing on the takeover setting, Bertrand and Mullainathan (2003) argue that without takeover pressure, entrenched CEOs will enjoy the quiet life by avoid activities that involve "difficult decisions and costly efforts." Consistent with this argument, Zhao and Chen (2008) find that firms with staggered boards, which reduce takeover pressure, are less likely to engage in earnings management via accounting accruals. One might

generalize Zhao and Chen's results to our setting and argue that CEOs with severance pay or employment agreements enjoy the quiet life by not engage in real earnings management, or specifically by not cutting R&D. The problem with this alternative explanation is that it is inconsistent the essence of the quiet life argument. Under the quiet life argument, managers tend to avoid complex and difficult activities. However, not cutting R&D involves actively managing the currently high level of R&D activities. That is, not cutting R&D actually involves "difficult decisions and costly efforts" and is not what a person enjoying the quiet life prefers. Also, this argument would apply to all CEOs with protection, not just those in the small earnings decrease group. As shown above, we do not find consistent results for firms with large earnings decreases or earnings increases. An additional implication of the quiet life argument is that CEOs with protection will on average engage in a lower level of R&D. This is inconsistent with the findings in Huang (2010) and Xu (2011) and our own untabulated analysis of the difference in the level of R&D intensity between firms with and those without severance pay or employment agreements.

Overall, the above discussion and the additional analysis indicate that our results are not consistent with the quiet life argument.

6. Conclusion

In this paper, we examine whether severance pay and employment agreement, two forms of CEO contracting protection, helps reduce managerial myopia. Managers have incentives to boost short term performance to increase their job security, potentially at the expense of long term value creation. Both severance pay and employment agreement help lower this incentive. Severance pay specifies the condition and amount of payments CEOs receive if they are fired. An employment agreement protects the CEO being fired without good cause and it often clearly

spells out the amount and terms of severance or termination payments. With severance pay or employment agreement in place, it is more costly for the firm to fire the CEO, leading to increased CEO job security and as a result, reduced managerial myopia.

We hand collect severance pay and employment agreement information from the proxy statements. Our proxy of managerial myopia is cutting R&D to avoid earnings decreases. The sample includes 2,197 firm-years from S&P 500 firms over the period 1995-2008 that have proxy statement information and material R&D expenditures (greater than 1% of sales). We split our sample into three groups. The small earnings decrease group includes firm-years which have a decrease in pre-R&D, pre-tax earnings compared to the previous year but the decease is smaller than the prior year's R&D expenditures. For these firm-years, CEOs have incentives to cut R&D to avoid earnings decline. Hence CEO protection is predicted to lower the likelihood of cutting R&D for this group. For firm-years that have a large decrease or an increase in the pre-tax, pre-R&D earnings, CEOs do not have incentives to cut R&D to avoid earnings decreases since it is not feasible or necessary to do so. They serve as our control groups.

We find evidence consistent with our prediction. For the small earnings decrease group, the influence of CEO protection in lowering the likelihood of cutting R&D is both statistically and economically significant. For example, after addressing the potential endogeneity, the marginal impact of CEO protection is 22.9 percentage points; that is, the proportion of firms cutting R&D is 22.9 percentage points lower for firms with CEO protection than for those without CEO protection. Also as expected, the impact of CEO protection is insignificant for the control groups; this further helps address the concern that the finding for the small earnings decrease group is driven by omitted variables. In an additional analysis, we find that severance pay and employment agreement have similar impact in reducing managerial myopia.

Lastly, we predict and find that the impact of CEO protection is greater for firms in more homogenous industries, for firms with higher transient institutional ownership, and for firms with lower CEO equity-based compensation. These results suggest that the impact of CEO protection on managerial myopia is stronger when CEOs have stronger incentives to engage in myopic behavior and when alternative mechanism to curb myopic behavior is weaker.

Our paper contributes to the literature by examining how CEO contracting affects managerial short-termism. Our finding suggests that CEO protection is systematically correlated with managers' myopic behavior. Therefore, our study complements prior studies that investigate how outside monitoring and penalty address managerial myopia as well as advances an emerging literature that examine the effects of CEO contracting on corporate decisions.

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Appendix A: Variable Definitions and Measurements

$RD\_Decrease_{i,t}$ = 1 if R&D decreases relative to the prior year, 0 otherwise;

$CEO\_Protection_{i,t}$ = 1 if the CEO has severance pay or employment agreement, 0 otherwise;

$\Delta RD_{i,t-1}$ = prior year's change in R&D, calculated as the difference in the logarithm of R&D between the prior year and the year before;

$\Delta Ind\_RD_{i,t}$ = change in industry R&D to sales ratio, calculated as the difference in the ratio of total industry R&D /total industry sales between the current year and the prior year, where the industry measures are based on all the firms in the same 4-digit SIC as firm i (excluding firm i);

$\Delta GDP_{i,t}$ = change in GDP, calculated as the difference in the logarithm of GDP between the current year and the prior year;

$Tobin\_Q_{i,t}$ = Tobin's Q, calculated as sum (market value of common equity, book value of preferred stocks, book value of debt) divided by total assets;

$\Delta CAPX_{i,t}$ = change in capital expenditures, calculated as the difference in the logarithm of capital expenditures between the current year and the prior year;

$\Delta Sales_{i,t}$ = change in sales, calculated as the difference in the logarithm of sales between the current year and the prior year;

$Size_{i,t}$ = logarithm of market value of equity;

$Distance\_Goal_{i,t}$ = distance from earnings goal relative to the prior year's R&D, defined as the change in pre-tax, pre-R&D earnings divided by prior year's R&D;

$Leverage_{i,t}$ = leverage, calculated as total debt divided by total assets;

$FCF_{i,t}$ = free cash flows, calculated as cash flows from operations minus capital expenditures, scaled by total assets;

$Inst_{i,t}$ = institutional ownership, measured as the percentage of shares held by institutional investors;

i,t = firm i, year t subscripts.

Appendix B: Determinants of CEO protection

This table reports the results from first-stage prediction models – logit regressions that explain the likelihood of the overall CEO protection. The sample includes 3,047 firm-years from S&P 500 firms in the period 1995-2008. We require that the proxy statement is available and the data is available to calculate the control variables. (The sample size is larger than in the R&D related analyses because here we do not require that R&D is material). The logit regressions are run by industries (based on Fama and French industries). We report the average coefficients across the industries and the two-sided p-values based on the series of coefficient estimates across the industries.

	Estimate	p-value
Intercept	0.912	0.886
State policy variables		
Public policy	1.853	0.108
Implied contract	1.066	0.254
Good faith and fair dealing	-4.791	0.004
Anti-takeover regulations	-1.330	0.011
Garmaise index	-0.075	0.294
Firm characteristics		
Board independence	-0.279	0.963
Founder CEO	-3.024	0.048
Market-adjusted return	-0.405	0.212
Outside CEO	0.029	0.976
Abnormal compensation	2.918	0.001
Incentive compensation	2.100	0.006
Leverage	1.495	0.126
Natural log of assets	-0.821	0.138
ROA	-16.602	0.052
Market to book ratio	-0.446	0.774
# of observations	3,047	
# of industries	34	
Average of Pseudo R^2	0.590	

Appendix B (Cont'd)

Variable measurement:

Public policy =	1 for firms with headquarters in the states that have a public policy at will exception, 0 otherwise;
Implied contract =	1 for firms with headquarters in the states that have an implied contract at will exception, 0 otherwise;
Good faith and fair dealing =	1 for firms with headquarters in the states that have a good faith and fair dealing at will exception, 0 otherwise;
Anti-takeover regulations =	1 for firms with headquarters in the states that have business combination laws according to Bertrand and Mullainathan (1999), 0 otherwise;
Garmaise index =	Index of non-competition enforcement constructed by Garmaise (2007);
Board independence =	The percentage of directors on the board being independent directors;
Founder CEO =	1 if the CEO one of the founders of the firm;
Market-adjusted return =	Market-adjusted one-year cumulative stock return;
Outside CEO =	1 if the CEO was appointed to the position within one year of joining the firm;
Abnormal compensation =	Abnormal cash compensation measured as the residual from a regression model that regresses the natural log of cash compensation on natural log of firm asset, ROA, the market-to-book ratio, CEO tenure, and industry and year indicators;
Incentive compensation =	Ratio of the value of CEO stock and option grants to CEO total compensation for the year;
Leverage =	Total liabilities over total assets;
Natural log of assets =	Natural logarithm of total assets in millions;
ROA =	Net income over total assets;
Market to book ratio =	The market value of equity over the book value of equity.

TABLE 1
Sample selection, composition and descriptive statistics

This table reports the sample selection, composition, and descriptive statistics for our sample of 2,197 firm-years from S&P 500 firms in the period 1995-2008.

Panel A: Sample selection

Restriction		Sample size
Firm-years with proxy statements available in the period 1995-2008 from S&P 500 firms		6,973
Less:		
Firm-years with missing information on research and development expenditures (R&D) in the current year from Compustat	3,119	
Firm-years with missing information on R&D in the previous year	52	
Firm-years with immaterial R&D in the current year (i.e., R&D/sales <1%)	1,119	
Firm-years in industries (defined based on 2-digit SIC codes) with fewer than 3 firms	100	
Firm-years with missing data to calculate independent variables	386	
Final sample		2,197

TABLE 1 (cont'd)

Panel B: Yearly distribution

Year	Number of obs.	# of obs. with CEO protection	Percentage of obs. with CEO protection	Type of CEO protection	
				# of obs. with severance pay	# of obs. with employment agreements
1995	141	85	60.3%	49	36
1996	133	79	59.9%	41	38
1997	137	82	60.9%	45	37
1998	151	92	61.6%	45	47
1999	159	98	66.7%	44	54
2000	162	108	70.7%	50	58
2001	164	116	72.9%	49	67
2002	166	121	72.0%	54	67
2003	164	118	73.5%	54	64
2004	166	122	74.8%	51	71
2005	163	122	76.6%	53	69
2006	158	121	78.6%	62	59
2007	159	125	78.6%	67	58
2008	174	137	78.7%	71	66
Total	2,197	1,526	69.5%	735	791

TABLE 1 (cont'd)

Panel C: Industry distribution

Industry	# of obs.	# of obs. with CEO protection	Percentage of obs. with CEO protection	Type of CEO protection: # of obs. with severance pay	Type of CEO protection: # of obs. with employment agreements
Food Products	68	48	70.6%	36	12
Consumer Goods	113	89	78.8%	46	43
Medical Equipment	129	92	71.3%	67	25
Pharmaceutical Products	283	196	69.3%	68	128
Chemicals	156	115	73.7%	72	43
Construction Materials	60	55	91.7%	40	15
Machinery	171	132	77.2%	51	81
Electrical Equipment	57	45	78.9%	26	19
Aircraft	56	34	60.7%	11	23
Business Services	250	161	64.4%	34	127
Computers	144	84	58.3%	37	47
Electronic Equipment	341	208	61.0%	95	113
Measuring and Control Equipment	111	84	75.7%	38	46
All others*	258	183	70.9%	114	69
Total	2,197	1,526	69.5%	735	791

* All other industries include the following 13 industries: Agriculture, Tobacco Products, Recreational Products, Entertainment, Apparel, Rubber and Plastic Products, Steel Works, Automobiles and Trucks, Defense, Petroleum and Natural Gas, Business Supplies, Retail, and Other.

TABLE 1 (cont'd)

Panel D: Firm characteristics
Please see Appendix A for variable measurement.

	N	Mean	Std. Dev.	Q1	Median	Q3
The sample with CEO protection						
Indicator for cut in R&D	1,526	0.372	0.483	0.000	0.000	1.000
Prior year's change in R&D	1,526	0.013	0.298	-0.083	0.055	0.154
Change in industry R&D intensity	1,526	0.003	0.145	-0.069	-0.003	0.075
Change in GDP	1,526	0.026	0.019	0.014	0.029	0.037
Tobin's Q	1,526	2.356	1.761	1.155	1.747	2.867
Change in CAPX	1,526	-0.014	0.456	-0.133	0.009	0.127
Change in sales	1,526	0.042	0.471	-0.061	0.063	0.172
Firm size	1,526	8.871	1.159	7.986	8.780	9.592
Distance from earnings goal	1,526	0.111	1.709	-0.659	0.292	0.978
Leverage	1,526	0.209	0.144	0.097	0.205	0.300
Free cash flow	1,526	0.275	0.215	0.153	0.260	0.390
Institutional ownership	1,526	0.703	0.163	0.617	0.729	0.819
The sample without CEO protection						
Indicator for cut in R&D	671	0.414	0.493	0.000	0.000	1.000
Prior year's change in R&D	671	0.010	0.326	-0.105	0.058	0.162
Change in industry R&D intensity	671	0.011	0.143	-0.058	0.001	0.078
Change in GDP	671	0.030	0.019	0.019	0.030	0.040
Tobin's Q	671	3.023**	2.014	1.524	2.401**	3.819
Change in CAPX	671	-0.033	0.495	-0.143	0.009	0.124
Change in sales	671	0.018	0.549	-0.103	0.057	0.167
Firm size	671	9.460**	1.398	8.344	9.369**	10.565
Distance from earnings goal	671	0.106	1.500	-0.592	0.237	0.850
Leverage	671	0.190**	0.169	0.021	0.175**	0.297
Free cash flow	671	0.299	0.224	0.173	0.307**	0.422
Institutional ownership	671	0.637**	0.161	0.532	0.657**	0.757

** significantly different between the two sub-samples at the 0.01 level.

TABLE 2
Univariate analysis – CEO protection and the likelihood of cutting R&D

The sample includes 2,197 firm-years from S&P 500 firms over the period 1995-2008. We require that the proxy statement is available and R&D/sales is higher than 1%. The sample is split into three groups: the small earnings decrease group, the large earnings decrease group, and the earnings increase group. The small earnings decrease group includes firm-years which have a decrease in the pre-tax, pre-R&D earnings from the prior year to the current year and the decrease is less than the prior year's R&D. The large earnings decrease group includes firm-years where there is a decrease in the pre-tax, pre-R&D earnings from the prior year to the current year and the decrease is greater than the prior year's R&D. The earnings decrease group includes firm-years which have an increase in the pre-tax, pre-R&D earnings from the prior year to the current year. Firm-years with CEO protection refer to those where CEOs have severance pay or employment agreement.

Panel A: The small earnings decrease group (N=463)

	Without CEO protection	With CEO protection	Total
Cut R&D	104	145	249
(% of firms cutting R&D)	(64%)	(48%)	(54%)
Increase R&D	58	156	214
(% of firms increasing R&D)	(36%)	(52%)	(46%)
P-value of Chi-sq test	0.001		

Panel B: The large earnings decrease group (N=421)

	Without CEO protection	With CEO protection	Total
Cut R&D	78	204	282
(% of firms cutting R&D)	(68%)	(67%)	(67%)
Increase R&D	37	102	139
(% of firms increasing R&D)	(32%)	(33%)	(33%)
P-value of Chi-sq test	0.822		

Panel C: The earnings increase group (N=1,313)

	Without CEO protection	With CEO protection	Total
Cut R&D	96	218	314
(% of firms cutting R&D)	(24%)	(24%)	(24%)
Increase R&D	298	701	999
(% of firms increasing R&D)	(76%)	(76%)	(76%)
P-value of Chi-sq test	0.802		

TABLE 3
CEO protection and the likelihood of cutting R&D

The sample includes 2,197 firm-years from S&P 500 firms over the period 1995-2008. We require that the proxy statement is available and R&D intensity (R&D/Sales) is higher than 1%. The sample is split into three groups: the small earnings decrease group, the large earnings decrease group, and the earnings increase group. The small earnings decrease group includes firm-years where there is a decrease in the pre-tax, pre-R&D earnings from the prior year to the current year and the decrease is less than the prior year's R&D. The large earnings decrease group includes firm-years where there is a decrease in the pre-tax, pre-R&D earnings from the prior year to the current year and the decrease is greater than the prior year's R&D. The earnings decrease group includes firm-years where there is an increase in the pre-tax, pre-R&D earnings from the prior year to the current year. The following logit regression is run separately for the three groups:

$$Prob(RD\_Decrease_{i,t} = 1) = \alpha + \beta CEO\_Protection_{i,t} + \gamma_1 \Delta RD_{i,t-1} + \gamma_2 \Delta Ind\_RD_{i,t} + \gamma_3 \Delta GDP_{i,t} + \gamma_4 Tobin\_Q_{i,t} + \gamma_5 \Delta CAPX_{i,t} + \gamma_6 \Delta Sales_{i,t} + \gamma_7 Size_{i,t} + \gamma_8 Distance\_Goal_{i,t} + \gamma_9 Leverage_{i,t} + \gamma_{10} FCF_{i,t} + \gamma_{11} INST_{i,t} + \varepsilon_{i,t} \quad (1),$$

where *RD_Decrease* is one if the firm cuts R&D compared with the prior year, 0 otherwise; and *CEO_Protection* is one if CEO has severance pay or employment agreement in place, 0 otherwise. See Appendix A for the measurement of control variables. In column (1), we report the logit regression results. In column (2), we replace *CEO_Protection* with its predicted value from the first-stage regression model (Appendix B). In column (3), we add to the regression the lamda from the first-stage regression model (Appendix B). The p-values are based on standard errors adjusted for firm and year clustering and are one-sided for *CEO_Protection* in Panel A and two-sided otherwise. The marginal effect is calculated as the change in the probability of cutting R&D, when there is a change of one standard deviation in the respective explanatory variable (from 0 to 1 for indicator variables), with the other explanatory variables being held at the sample means.

TABLE 3 (Cont'd)

Panel A: Analysis of the small earnings decrease group

	(1) Logit regression			(2) Two-stage regression (using predicated value of CEO protection)			(3) Two-stage regression (using Heckman approach)		
	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect
Intercept	0.117	0.834		0.575	0.371		0.610	0.343	
CEO protection	**-0.346**	**0.006**	**-0.135**	**-0.647**	**0.001**	**-0.252**	**-0.683**	**0.001**	**-0.263**
Prior year's change in R&D	0.742	0.001	0.091	0.783	0.001	0.096	0.768	0.001	0.094
Change in industry R&D intensity	-0.823	0.081	-0.047	-0.884	0.063	-0.050	-0.857	0.075	-0.049
Change in GDP	1.278	0.712	0.010	-2.363	0.517	-0.018	-2.182	0.545	-0.016
Tobin's Q	0.123	0.000	0.104	0.046	0.279	0.037	0.047	0.276	0.038
Change in CAPX	-0.417	0.012	-0.078	-0.590	0.001	-0.109	-0.594	0.001	-0.109
Change in sales	-0.955	0.000	-0.181	-1.006	0.000	-0.184	-0.996	0.000	-0.182
Firm size	-0.056	0.283	-0.028	-0.069	0.223	-0.035	-0.074	0.188	-0.037
Distance from earnings goal	-0.133	0.581	-0.015	-0.109	0.684	-0.013	-0.100	0.706	-0.012
Leverage	0.118	0.767	0.007	-0.184	0.684	-0.011	-0.159	0.723	-0.009
Free cash flow	0.200	0.535	0.016	0.239	0.516	0.019	0.250	0.493	0.019
Institutional ownership	0.229	0.552	0.016	0.376	0.402	0.025	0.417	0.354	0.028
Inverse Mills Ratio							0.339	0.036	0.069
N	463			408			408		
R^2	0.169			0.169			0.171		

TABLE 3 (Cont'd)

Panel B: Analysis of the large earnings decrease group

	(1) Logit regression			(2) Two-stage regression (using predicated value of CEO protection)			(3) Two-stage regression (using Heckman approach)		
	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect
Intercept	-0.621	0.411		-0.426	0.603		-0.470	0.558	
CEO protection	0.147	0.361	0.048	0.085	0.770	0.028	0.170	0.311	0.056
Prior year's change in R&D	0.074	0.741	0.007	0.058	0.819	0.005	0.073	0.771	0.007
Change in industry R&D intensity	-0.991	0.053	-0.049	-1.136	0.038	-0.055	-1.131	0.040	-0.055
Change in GDP	-3.276	0.383	-0.023	-3.460	0.396	-0.024	-3.961	0.320	-0.028
Tobin's Q	0.161	0.007	0.099	0.158	0.019	0.093	0.170	0.012	0.101
Change in CAPX	-0.439	0.012	-0.070	-0.425	0.028	-0.064	-0.481	0.014	-0.072
Change in sales	-1.264	0.000	-0.229	-1.167	0.000	-0.209	-1.132	0.000	-0.203
Firm size	0.001	0.985	0.001	0.003	0.966	0.001	0.018	0.801	0.007
Distance from earnings goal	0.171	0.013	0.065	0.137	0.056	0.051	0.138	0.054	0.052
Leverage	0.388	0.485	0.019	0.417	0.505	0.020	0.496	0.433	0.024
Free cash flow	1.082	0.003	0.087	1.028	0.006	0.084	1.004	0.008	0.082
Institutional ownership	0.649	0.117	0.038	0.343	0.462	0.019	0.257	0.593	0.014
Inverse Mills Ratio							0.444	0.394	0.022
N	421			376			376		
R^2	0.256			0.237			0.240		

TABLE 3 (Cont'd)

Panel C: Analysis of the earnings increase group

	(1) Logit regression			(2) Two-stage regression (using predicated value of CEO protection)			(3) Two-stage regression (using Heckman approach)		
	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect
Intercept	0.281	0.513		0.154	0.765		0.155	0.763	
CEO protection	-0.069	0.470	-0.021	-0.072	0.557	-0.021	-0.068	0.572	-0.020
Prior year's change in R&D	0.435	0.005	0.040	0.470	0.008	0.042	0.468	0.008	0.042
Change in industry R&D intensity	-0.364	0.241	-0.015	-0.358	0.284	-0.015	-0.371	0.270	-0.015
Change in GDP	3.537	0.115	0.019	2.901	0.221	0.015	2.883	0.227	0.015
Tobin's Q	-0.005	0.870	-0.003	-0.046	0.210	-0.022	-0.047	0.202	-0.023
Change in CAPX	-0.509	0.000	-0.066	-0.548	0.000	-0.067	-0.555	0.000	-0.068
Change in sales	-0.731	0.000	-0.083	-0.668	0.000	-0.074	-0.670	0.000	-0.074
Firm size	-0.084	0.041	-0.031	-0.062	0.181	-0.022	-0.061	0.187	-0.022
Distance from earnings goal	-0.035	0.455	-0.010	-0.036	0.472	-0.010	-0.036	0.462	-0.010
Leverage	0.344	0.280	0.016	-0.009	0.979	0.000	-0.066	0.848	-0.003
Free cash flow	-0.258	0.299	-0.016	-0.134	0.629	-0.008	-0.137	0.628	-0.008
Institutional ownership	-0.146	0.605	-0.007	-0.074	0.829	-0.003	-0.028	0.935	-0.001
Inverse Mills Ratio							-0.124	0.225	-0.019
N	1,313			1,126			1,126		
R^2	0.083			0.076			0.079		

TABLE 4
Severance pay, employment agreement, and the likelihood of cutting R&D

The sample includes 2,197 firm-years from S&P 500 firms over the period 1995-2008. We require that the proxy statement is available and R&D intensity (R&D/Sales) is higher than 1%. The sample is split into three groups: the small earnings decrease group, the large earnings decrease group, and the earnings increase group. The small earnings decrease group includes firm-years where there is a decrease in the pre-tax, pre-R&D earnings from the prior year to the current year and the decrease is less than the prior year's R&D. The large earnings decrease group includes firm-years where there is a decrease in the pre-tax, pre-R&D earnings from the prior year to the current year and the decrease is greater than the prior year's R&D. The earnings decrease group includes firm-years where there is an increase in the pre-tax, pre-R&D earnings from the prior year to the current year. The following logit regression is run separately for the three groups:

$$Prob(RD\_Decrease_{i,t} = 1) = \alpha + \beta_1 Severance\_Pay_{i,t} + \beta_2 Employment\_Agreement_{i,t} + \gamma_1 \Delta RD_{i,t-1} + \gamma_2 \Delta Ind\_RD_{i,t} + \gamma_3 \Delta GDP_{i,t} + \gamma_4 Tobin\_Q_{i,t} + \gamma_5 \Delta CAPX_{i,t} + \gamma_6 \Delta Sales_{i,t} + \gamma_7 Size_{i,t} + \gamma_8 Distance\_Goal_{i,t} + \gamma_9 Leverage_{i,t} + \gamma_{10} FCF_{i,t} + \gamma_{11} INST_{i,t} + \varepsilon_{i,t} \quad (2),$$

where *RD_Decrease* is one if the firm cuts R&D compared with the prior year, 0 otherwise; *Severance_Pay* is one if CEO has severance pay, 0 otherwise; and *Employment_Agreement* is one is CEO has employment agreement, and 0 otherwise. See Appendix A for the definition and measurement of control variables. In column (1), we report the logit regression results. In column (2), we replace *Severance_Pay* and *Employment_Agreement* with its predicted value from the first-stage regression model, which has the same specification as the model reported in Appendix B. In column (3), we add to the regression the lamda from the first-stage regression model. The p-values are based on standard errors adjusted for firm and year clustering and are one-sided for *Severance_Pay* and *Employment_Agreement* in Panel A and two-sided otherwise. The marginal effect is calculated as the change in the probability of cutting R&D, when there is a change of one standard deviation in the respective explanatory variable (from 0 to 1 for indicator variables), with the other explanatory variables being held at the sample means. To save space, results on the control variables are not reported in panels B and C.

TABLE 4 (Cont'd)

Panel A: Analysis of the small earnings decrease group

	(1) Logit regression			(2) Two-stage regression (using predicated value of severance pay and employment agreement)			(3) Two-stage regression (using Heckman approach)		
	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect
Intercept	0.096	0.866		0.499	0.440		0.408	0.531	
Severance Pay	**-0.406**	**0.005**	**-0.160**	**-0.599**	**0.004**	**-0.235**	**-0.599**	**0.004**	**-0.235**
Employment Agreement	**-0.293**	**0.038**	**-0.116**	**-0.403**	**0.041**	**-0.160**	**-0.470**	**0.019**	**-0.186**
Prior year's change in R&D	0.754	0.001	0.092	0.785	0.001	0.097	0.766	0.001	0.094
Change in industry R&D intensity	-0.820	0.081	-0.047	-0.847	0.076	-0.048	-0.843	0.082	-0.048
Change in GDP	1.278	0.711	0.010	-2.231	0.542	-0.017	-2.242	0.531	-0.017
Tobin's Q	0.125	0.000	0.106	0.052	0.227	0.042	0.052	0.239	0.042
Change in CAPX	-0.416	0.012	-0.078	-0.582	0.001	-0.107	-0.593	0.001	-0.109
Change in sales	-0.955	0.000	-0.181	-1.012	0.000	-0.185	-0.974	0.000	-0.178
Firm size	-0.056	0.280	-0.029	-0.066	0.248	-0.033	-0.066	0.235	-0.033
Distance from earnings goal	-0.123	0.609	-0.014	-0.083	0.759	-0.010	-0.085	0.749	-0.010
Leverage	0.160	0.695	0.010	-0.103	0.823	-0.006	-0.020	0.965	-0.001
Free cash flow	0.228	0.491	0.018	0.304	0.411	0.024	0.322	0.383	0.025
Institutional ownership	0.246	0.527	0.018	0.262	0.549	0.017	0.441	0.325	0.029
Inverse Mills Ratio_Severance Pay							0.045	0.819	0.008
Inverse Mills Ratio_EA							0.142	0.397	0.030
N	463			408			408		
R^2	0.169			0.163			0.168		

TABLE 4 (Cont'd)

	(1) Logit regression			(2) Two-stage regression (using predicated value of severance pay and employment agreement)			(3) Two-stage regression (using Heckman approach)		
	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect
Panel B: Analysis of the large earnings decrease group									
Severance Pay	0.090	0.634	0.029	0.029	0.935	0.009	0.147	0.467	0.047
Employment Agreement	0.202	0.277	0.064	0.054	0.885	0.018	0.188	0.342	0.059
Control variables	YES			YES			YES		
N	421			376			376		
R^2	0.256			0.237			0.242		
Panel C: Analysis of the earnings increase group									
Severance Pay	-0.082	0.452	-0.024	-0.165	0.212	-0.047	-0.132	0.335	-0.038
Employment Agreement	-0.058	0.604	-0.017	-0.149	0.286	-0.043	-0.141	0.329	-0.041
Control variables	YES			YES			YES		
N	1,313			1,126			1,126		
R^2	0.083			0.078			0.078		

TABLE 5
CEO protection and the likelihood of cutting R&D: Cross-sectional analysis for the small earnings decrease group

The sample includes 2,197 firm-years from S&P 500 firms over the period 1995-2008. We require that the proxy statement is available and R&D intensity (R&D/Sales) is higher than 1%. The regression is only reported for the small earnings decrease group, which includes firm-years that have a decrease in the pre-tax, pre-R&D earnings from the prior year to the current year and the decrease is less than the prior year's R&D. The following logit regression is run for this group:

$$Prob(RD\_Decrease_{i,t} = 1) = \alpha + \beta_1 CEO\_Protection_{i,t} + \beta_2 Cond\_Var_{i,t} + \beta_3 CEO\_Protection_{i,t} \times Cond\_Var_{i,t} + \gamma_1 \Delta RD_{i,t-1} + \gamma_2 \Delta Ind\_RD_{i,t} + \gamma_3 \Delta GDP_{i,t} + \gamma_4 Tobin\_Q_{i,t} + \gamma_5 \Delta CAPX_{i,t} + \gamma_6 \Delta Sales_{i,t} + \gamma_7 Size_{i,t} + \gamma_8 Distance\_Goal_{i,t} + \gamma_9 Leverage_{i,t} + \gamma_{10} FCF_{i,t} + \gamma_{11} INST_{i,t} + \varepsilon_{i,t} \quad (3),$$

where *RD_Decrease* is one if the firm cuts R&D compared with the prior year, 0 otherwise; *CEO_Protection* is one if CEO has severance pay or employment agreement in place, 0 otherwise; and *Cond_Var* is one of the following three indicator variables: *Industry_Homogeniety*, *Transient_Inst*, and *Equity_Compensation*. *Industry_Homogeniety* is 1 if the firm operates in an industry that is more homogeneous than the sample median, and zero otherwise. The extent of homogeneity in an industry (based on 2-digit SICs) is measured as the median of the percentage of variation in monthly stock returns that is explained by an equal-weighted industry index over the previous ten years across all firms in the industry. *Transient_Inst* is one if the ownership by transient institutional investors in the firm is higher than the sample median, and zero otherwise. *Equity_Compensation* is one if the CEO's equity-based compensation as a proportion of total compensation is higher than the sample median, and zero otherwise. See Appendix A for the measurement of control variables. We add to the regression the lamda from the first-stage regression model (Appendix B). The p-values are based on standard errors adjusted for firm and year clustering. They are one-sided for *CEO_Protection*, conditional variables, and the interaction terms; otherwise, they are two-sided. The marginal effect is calculated as the change in the probability of cutting R&D, when there is a change of one standard deviation in the respective explanatory variable (from 0 to 1 for indicator variables), with the other explanatory variables being held at the sample means.

TABLE 5 (Cont'd)

	Industry Homogeneity			Transient_Inst			Equity_Compensation			All included		
	Coef.	p-value	marginal effect	Coef.	p-value	marginal effect	Coef.	p-value	marginal effect	Coef.	p-value	marginal effect
Intercept	0.539	0.402		0.330	0.629		0.640	0.319		0.238	0.724	
CEO protection	**-0.571**	**0.001**	**-0.221**	**-0.562**	**0.002**	**-0.218**	**-0.827**	**0.001**	**-0.314**	**-0.555**	**0.003**	**-0.215**
CEO protection × Industry_Homogeneity	**-0.672**	**0.019**	**-0.260**							**-0.811**	**0.007**	**-0.309**
CEO protection × Transient_Inst				**-0.515**	**0.064**	**-0.203**				**-0.618**	**0.032**	**-0.241**
CEO protection × Equity_Compensation							**0.587**	**0.014**	**0.221**	**0.662**	**0.008**	**0.246**
Industry_Homogeneity	0.542	0.036	0.206							0.701	0.013	0.260
Transient_Inst				0.503	0.037	0.193				0.577	0.015	0.219
Equity_Compensation							-0.478	0.012	-0.189	-0.549	0.010	-0.216
Prior year's change in R&D	0.772	0.001	0.095	0.807	0.001	0.099	0.764	0.001	0.094	0.816	0.000	0.100
Δindustry R&D intensity	-0.878	0.073	-0.050	-0.922	0.058	-0.052	-0.803	0.097	-0.046	-0.886	0.074	-0.050
Change in GDP	-1.139	0.767	-0.009	-2.452	0.491	-0.018	-1.859	0.609	-0.014	-0.513	0.896	-0.004
Tobin's Q	0.049	0.245	0.039	0.047	0.283	0.038	0.063	0.140	0.051	0.070	0.120	0.056
Change in CAPX	-0.586	0.001	-0.108	-0.594	0.001	-0.109	-0.603	0.001	-0.111	-0.588	0.001	-0.108
Change in sales	-0.984	0.000	-0.180	-0.984	0.000	-0.180	-0.995	0.000	-0.182	-0.968	0.000	-0.177
Firm size	-0.085	0.135	-0.043	-0.056	0.350	-0.028	-0.077	0.182	-0.039	-0.072	0.246	-0.036
Distance from earnings goal	-0.094	0.725	-0.011	-0.131	0.619	-0.015	-0.121	0.653	-0.014	-0.149	0.580	-0.017
Leverage	-0.104	0.826	-0.006	-0.125	0.783	-0.007	-0.152	0.737	-0.009	-0.022	0.964	-0.001
Free cash flow	0.241	0.505	0.019	0.270	0.462	0.021	0.297	0.424	0.023	0.309	0.411	0.024
Institutional ownership	0.465	0.299	0.031	0.384	0.400	0.025	0.500	0.254	0.033	0.521	0.239	0.034
Inverse Mills Ratio	0.356	0.031	0.073	0.342	0.037	0.070	0.312	0.059	0.064	0.328	0.056	0.067
N	408			408			408			408		
R^2	0.178			0.177			0.178			0.178		

TABLE 6
CEO protection and the likelihood of cutting R&D – Analysis of the switch group

The sample includes 964 firm-years from S&P 500 firms over the period 1995-2008 that switch in the use of CEO protection agreements. We require that the proxy statement is available and R&D intensity (R&D/Sales) is higher than 1%. The sample is split into three groups: the small earnings decrease group, the large earnings decrease group, and the earnings increase group. The small earnings decrease group includes firm-years where there is a decrease in the pre-tax, pre-R&D earnings from the prior year to the current year and the decrease is less than the prior year's R&D. The large earnings decrease group includes firm-years where there is a decrease in the pre-tax, pre-R&D earnings from the prior year to the current year and the decrease is greater than the prior year's R&D. The earnings decrease group includes firm-years where there is an increase in the pre-tax, pre-R&D earnings from the prior year to the current year. The following logit regression is run separately for the three groups:

$$Prob(RD\_Decrease_{i,t} = 1) = \alpha + \beta CEO\_Protection_{i,t} + \gamma_1 \Delta RD_{i,t-1} + \gamma_2 \Delta Ind\_RD_{i,t} + \gamma_3 \Delta GDP_{i,t} + \gamma_4 Tobin\_Q_{i,t} + \gamma_5 \Delta CAPX_{i,t} + \gamma_6 \Delta Sales_{i,t} + \gamma_7 Size_{i,t} + \gamma_8 Distance\_Goal_{i,t} + \gamma_9 Leverage_{i,t} + \gamma_{10} FCF_{i,t} + \gamma_{11} INST_{i,t} + \varepsilon_{i,t} \quad (1),$$

where *RD_Decrease* is one if the firm cuts R&D compared with the prior year, 0 otherwise; and *CEO_Protection* is one if CEO has severance pay or employment agreement in place, 0 otherwise. See Appendix A for the measurement of control variables. In column (1), we report the logit regression results. In column (2), we replace *CEO_Protection* with its predicted value from the first-stage regression model (Appendix B). In column (3), we add to the regression the lamda from the first-stage regression model (Appendix B). The p-values are based on standard errors adjusted for firm and year clustering and are one-sided for *CEO_Protection* in Panel A and two-sided otherwise. The marginal effect is calculated as the change in the probability of cutting R&D, when there is a change of one standard deviation in the respective explanatory variable (from 0 to 1 for indicator variables), with the other explanatory variables being held at the sample means. The results for the control variable (and for Lamda in column 3) are not reported to save space.

TABLE 6 (Cont'd)

	(1) Logit regression			(2) Two-stage regression (using predicated value of CEO protection)			(3) Two-stage regression (using Heckman approach)		
	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect	Estimate	p-value	marginal effect
Panel A: Analysis of the small earnings decrease group									
CEO protection	**-0.330**	**0.047**	**-0.129**	**-0.399**	**0.088**	**-0.156**	**-0.498**	**0.049**	**-0.193**
Control variables	Yes			Yes			Yes		
N	217			189			189		
R^2	0.171			0.178			0.186		
Panel B: Analysis of the large earnings decrease group									
CEO protection	0.047	0.817	0.016	0.111	0.684	0.037	0.218	0.395	0.073
Control variables	Yes			Yes			Yes		
N	168			152			152		
R^2	0.334			0.314			0.317		
Panel C: Analysis of the earnings increase group									
CEO protection	-0.014	0.916	-0.005	-0.157	0.411	-0.048	-0.081	0.663	-0.025
Control variables	Yes			Yes			Yes		
N	579			505			505		
R^2	0.092			0.076			0.079		