The Impact of Earnings Management on CEO Equity Incentives

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This paper investigates whether firms adjust CEO equity incentives in response to prior earnings management. I show that the risk-taking incentives from new equity grants are lower for firms with higher prior real earnings management (REM), but not for firms with higher prior accruals-based earnings management (AEM). These adjustments are associated with sustained earnings management over the three years before the grant, but not with transitory earnings management. Additionally, I show that firms with higher institutional ownership primarily drive the negative relationship between REM and AEM and risk-taking incentives from new equity grants. My results are consistent with firms altering compensation incentives to restrain managers' value-reducing behavior, in part, due to the monitoring of institutional investors.

Keywords: executive compensation, executive stock options, equity incentives, earnings management, accrual earnings management, real earnings management

INTRODUCTION

Prior research finds that earnings management has negative consequences, e.g., lower future stock and operating returns, and increased shareholder lawsuits (See DuCharme, Malatesta, and Sefcik (2004), Bhojraj, Hribar, Picconi, and McInnis (2009), Cohen and Zarowin (2010), Kothari, Mizik, and Roychowdhury (2016), and Bereskin, Hsu, and Rotenburg (2017)). One line of research examines the impact of executive equity incentives on earnings management, finding mixed results. That is, while several papers find that equity incentives are positively associated with earnings management and misreporting (Cheng and Warfield 2005; Bergstresser and Philippon 2006; Burns and Kedia 2006; Efendi, Srivastava, and Swanson 2007; Cheng and Farber 2008; Cornett, Marcus, and Tehranian 2008; Feng, Ge, Luo, and Shevlin 2011; and Armstrong, Larcker, Ormazabal, and Taylor 2013), other studies find no impact (Erickson, Hanlon, and Maydew 2006; Larcker, Richardson, and Tuna 2007; Armstrong, Jagolizer, and Larcker 2010; Mayberry, Park, and Xu 2021). Consistent with the former, prior research suggests that monitors, such as auditors and directors, act as if executive equity incentives lead to, or have the potential to lead to, adverse consequences. For example, Srinivasan (2005) and Brochet and Srinivasan (2014) document that boards suffer adverse consequences when earnings misstatements are uncovered. In addition, Chen, Gul, Veeraraghavan, and Zolotoy (2015) and Kim, Li, and Li (2015) find that audit fees increase as executive equity incentives increase. Similarly, Laux and Laux (2009) develop a model where board members of "directors adjust their oversight in response to a change in CEO incentives."

Crocker and Slemrod (2007) theoretically show that it is impossible to encourage productive effort and simultaneously eliminate incentives to manipulate the earnings based on a manager's pay. Similarly, Laux

(2014) explains that designing compensation contracts that rely on stock options leads to higher levels of manipulation and lower reporting quality, but that boards balance those "with the cost of inducing executive effort." Laux (2014) explicitly assumes that boards build an expectation of earnings management when designing compensation contracts. In theory, I should observe a board reaction when ex-post earnings management differs from the unobservable expected earnings management. This reaction can take many forms. For example, Hazarika, Karpoff, and Nahata (2012) find that the likelihood and speed of forced CEO turnover positively relates to firms' accruals-based earnings management. However, replacing the CEO can be very costly. Instead, modifying compensation incentives may be a more appropriate way to control managerial incentives. Theoretically, Laux (2010) suggests reducing "performance-based CEO pay to mitigate the CEO's ex ante incentive to engage in manipulation." However, to my knowledge, there is no empirical evidence on whether boards alter the executive equity incentives of CEOs who engage in earnings management. Cheng (2004) shows that changes in R&D spending are positively associated with the value of CEO annual option grants when potential horizon problems are present. This suggests that compensation committees act in anticipation of opportunistic reductions in R&D spending. One major distinction between Cheng (2004) and my study is that I investigate whether firms take corrective actions in response to realized earnings management activities. Cheng (2004) focuses on firms' preemptive activity to prevent potential underinvestment in R&D, a type of real earnings management strategy. Consequently, this study investigates whether boards adjust executives' risk-taking incentives from new equity grants in response to prior earnings management.

Core and Guay (1999) argue that executives' stock and option holdings can deviate from the optimal level over time, thereby resulting in sub-optimal behavior on the part of executives, e.g., excessive earnings management. Although earnings management can benefit shareholders, and not all earnings management attempts are due to executives' opportunism, aggressive earnings management often imposes costs on shareholders (e.g., Leuz, Nanda, and Wysocki 2003; Hazarika, Karpoff, and Nahata 2012). As noted above, research documents the negative consequences of earnings management on a firm's operating performance and value. Furthermore, real earnings management (REM) is likely to be costlier than accrual-based earnings management (AEM) because REM implies a deviation from otherwise optimal operating decisions, imposing a "real" cost on the firm (Cohen and Zarowin 2010; Kothari et al. 2016). Therefore, the board of directors may perceive the consequences of AEM and REM differently. In this paper, I investigate the impact of both AEM and REM on new equity grants.

Recent studies such as Anderson and Core (2018) and Boyallian and Ruiz-Verdu (2017) note that the widely used measure of risk-taking incentive – vega – focuses narrowly on the incentives generated by stock options and does not capture the risk-taking incentives generated by managers' stock holdings in levered firms. Because of their limited liability, equity holders are incentivized to increase equity value by shifting risk to debt holders (Jensen and Meckling 1976). Anderson and Core (2018) incorporate the risk-taking incentives from stock holdings and inside debt, calculating equity sensitivity and total sensitivity to firm volatility. As information on inside debt is not available prior to 2006, I use the first measure, equity sensitivity, as my proxy for risk-taking incentives to maximize my sample period. Anderson and Core (2018) show that their total sensitivity measure that includes the sensitivity of debt is 99% correlated with the equity sensitivity measure that ignores debt incentives. Thus, I use equity sensitivity to proxy for risk-taking incentives to maximize my sample period.

My initial analysis finds that the equity sensitivity associated with new equity grants is lower for firms with higher prior REM. This finding is consistent with boards lowering risk-taking incentives to limit value decreasing REM. In contrast, I find no significant impact of prior AEM on risk-taking incentives in new equity grants in the pooled sample. I also do not find any impact of AEM and REM on the new delta associated with equity grants.

The results are possibly driven by a mechanical relation between earnings management and risk-taking incentive measures rather than capturing the boards' intentional responses to earnings management. The risk-taking measure used in this study is a positive function of stock price. Thus, if a manager responds to a decline in stock market performance by engaging in greater earnings management activities, I could mechanically observe higher earnings management leading to lower measured risk-taking incentives due

to the lower stock price. Note that this negative relation can be observed without the board's intentional intervention to reduce CEO risk-taking incentives if, for example, firms tend to grant the same number of options each year (see Shue and Townsend 2016). To address this possibility, I investigate the relation between prior earnings management and new equity grants using the number of options/shares granted instead of their dollar value. Consistent with a reduction in risk-taking incentives, I find that prior REM is positively associated with stock grants and negatively associated with option grants.

In the subsequent analysis, I examine how institutional investor ownership affects the relation between prior earnings management and the adjustment of risk-taking incentives. Large institutional investors have the incentive and ability to monitor, discipline, and influence managers, reducing managers' opportunistic behavior. Hartzell and Starks (2003) prove that institutional investors influence executive compensation. Further, prior studies suggest that the presence of institutional investors constrains real earnings management (Bushee 1998; Roychowdhury 2006; Zang 2012). I show that firms with higher institutional ownership drive the negative relation between REM and risk-taking incentives from new equity grants. In addition, I also observe a negative association between AEM and risk-taking incentives from new equity grants in firms with high institutional holdings.

I contribute to the compensation, corporate governance, and earnings management literature. First, I shed light on using equity incentives to mitigate CEOs' earnings management incentives. This result complements and extends the work of Core and Guay (1999) who provide evidence that firms set optimal equity incentive levels and use new equity grants to adjust those incentives. Second, consistent with the literature suggesting that REM is costlier than AEM (e.g., Cohen and Zarowin 2010; Kothari et al. 2016), the results imply that the board considers the costs of REM to be more severe than those of AEM. Third, I add to the literature, e.g., David, Kochhhar, and Levitas (1998); Hartzell and Starks (2003), suggesting that institutional investors influence CEO compensation incentives.

This paper is organized as follows. Section 2 discusses the related literature and develops my hypotheses. Section 3 describes data and variable measurement. Section 4 describes my research design. The results are presented in Section 5. Section 6 concludes.

RELATED LITERATURE AND HYPOTHESES DEVELOPMENT

Equity Compensation and Earnings Management

Equity incentives are designed to align the interests of the CEO with those of shareholders, limiting the CEO's opportunistic behavior (Jensen and Meckling 1976). Theoretically, CEOs with higher equity incentives should be more likely to act in the interests of shareholders. However, "high-powered" equity incentives could incentivize CEOs to manage earnings to boost stock prices in the short run. In addition, if poor performance can result in a forced CEO turnover (Coughlan and Schmidt 1985), the expected benefits of engaging in earnings management are even higher. If a CEO believes that the expected benefit s/he can extract from earnings management is greater than the expected cost, e.g., the decrease in long-term firm value, then the CEO will manage earnings. As discussed in the introduction, while significant literature examines the impact of equity incentives on AEM, the overall findings are mixed.

Armstrong et al. (2013) argue that financial misreporting increases equity value and risk. Consequently, a risk-averse CEO will trade off the expected *reward* and *risk* associated with the misreporting decision. In that case, the sensitivity of the CEO's wealth to changes in the company's stock price – portfolio delta – captures the two countervailing effects, making the theoretical relation between portfolio delta and misreporting ambiguous. They suggest that the mixed evidence in the prior literature is attributable to these two countervailing effects. In contrast, the sensitivity of the CEO's wealth to changes in risk – they used portfolio vega – will unambiguously encourage the CEO's misreporting decisions. Armstrong et al. (2013) document results consistent with their prediction.

Consequences of Earnings Management

Healy and Wahlen (1999) claim, "Earnings management occurs when managers use judgment in financial reporting, and in structuring transactions to alter financial reports to either mislead some

stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting practices." According to this definition, while CEOs may manage earnings for opportunistic reasons, they may also manage earnings to achieve better contractual outcomes for shareholders. For example, Dechow, Sloan, and Sweeney (1996) show that CEOs manage earnings to avoid debt covenant violation and lower the cost of capital. Similarly, Bartov, Givoly, and Hayn (2002) report that firms that meet or beat current analysts' earnings expectations (MBE) enjoy a higher return than those that fail to meet expectations, even when meeting or beating analysts' earnings expectations is achieved through earnings management. Graham, Harvey, and Rajgopal (2005) document that executives in their survey believe that meeting benchmarks builds credibility with the capital market. In addition, Shivakumar (2000) argues that earnings management before equity offerings is not intended to mislead investors but is instead the issuers' rational response to anticipated market behavior at offering announcements. That is, since issuers cannot credibly signal the absence of earnings management, investors treat all firms announcing an offering as having overstated prior earnings, and consequently discount their stock prices.

In contrast, other studies document the negative consequences of earnings management. Rangan (1998) finds evidence that earnings management activities around seasoned equity offerings (SEOs), as measured by discretionary accruals, are associated with subsequent poor operating and stock performance. Similarly, Teoh, Welch, and Wong (1998) find that initial public offerings (IPOs) associated with earnings management experience subsequent declines in stock performance. Bhojraj et al. (2009) find that firms that beat analyst forecasts using REM and AEM subsequently have worse operating and stock market performance than firms that miss analyst forecasts.

Hypotheses Development

The above discussion suggests that the CEOs' equity risk-taking incentives increase earnings management (Armstrong et al. 2013). Thus, my research question is: do boards alter equity incentives to mitigate earnings management? Crocker and Slemrod (2007) show that encouraging productive effort and eliminating the incentives to manipulate earnings is impossible. Consequently, one might argue that CEO compensation is endogenously determined and that boards have designed optimal compensation contracts in anticipation and acceptance of some level of earnings management. However, ex-post earnings management can differ from that expected by the board ex-ante, motivating an adjustment of CEO incentives. Core and Guay (1999) show that the executives' stock and options holdings can deviate over time from their optimal levels, and that firms adjust their compensation grants to reoptimize those incentives. If the board feels that earnings management is excessive, they could reduce the CEOs' earnings management incentives. Thus, my first hypothesis is:

H1: *Boards reduce CEOs' risk-taking incentives in response to prior earnings management.*

Prior research suggests that REM is costlier to firms and their shareholders than AEM. AEM does not involve altering operations and does not have a first-order effect on cash flows. In contrast, REM implies deviation from optimal operating decisions, imposing a "real" cost and resulting in direct cash flow consequences. For example, Graham, et al. (2005) report that executives prefer to engage in REM via a reduction in R&D, advertising, and maintenance, which can adversely affect current and future operations. Despite the greater costs of REM, CEOs may engage in REM to avoid the regulatory scrutiny and personal penalties associated with AEM (Cohen et al. 2008; Kothari et al. 2016). Consistent with the negative consequences of REM, Cohen and Zarowin (2010) and Kothari et al. (2016) find that while both AEM and REM are associated with a decline in post-SEO operating performance, the negative association is stronger for REM. Kim and Sohn (2013) find that their proxy for the cost of capital is positively associated with AEM and REM, but this association is greater for REM. Badertscher (2011) finds that CEOs engage in AEM in the early stages of overvaluation before moving to REM to sustain their overvalued equity. He interprets this finding as firms choosing to engage in more costly forms of earnings management, i.e., REM, as a last resort, and only when they are restricted in their ability to engage in further AEM. Bereskin et al.

(2017) investigate the direct consequences of REM, showing that R&D cuts related to earnings management are associated with fewer patents, less influential output, and lower innovative efficiency.

In sum, REM is likely to be costlier than AEM. Consequently, board responses to REM are likely to be stronger than to AEM. Thus, my second hypothesis is:

H2: *The reduction in CEO risk-taking incentives in response to prior REM is greater than that in response to AEM.*

Whether CEO compensation incentives are modified in response to prior earnings management is up to the board. The board is more likely to do so when faced with strong external monitoring. Institutional owners can be those monitors by virtue of their ability to vote for or against the board. McChery, Sautner, and Starks (2016) identify executive compensation as a trigger for institutional investor intervention, while David et al. (1998) and Hartzell and Starks (2003) find that institutional investors influence executive compensation. As prior literature suggests that institutional investors are concerned with/constrain REM (Bushee 1998; Roychowdhury 2006; Zang 2012), it is more likely that the board will take action to reduce CEO risk-taking incentives when there is high institutional ownership. Thus, my third hypothesis is:

H3: *The reduction in CEO risk-taking incentives in response to prior earnings management will be greater for firms with higher institutional ownership.*

DATA AND VARIABLE MEASUREMENT

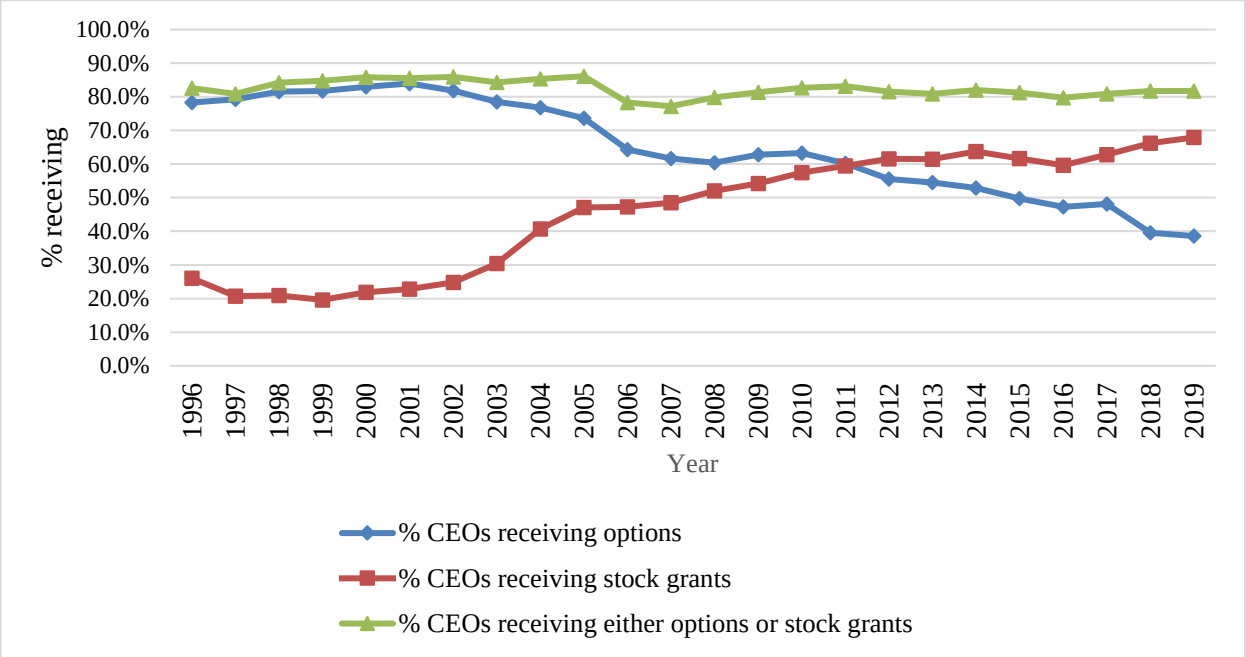
Sample

I obtain executive compensation data from Standard & Poor's (S&P's) Execucomp, financial statement data from S&P's Compustat Fundamental Annual, stock market-related data from the Center for Research in Security Prices (CRSP), and institutional ownership data from Thomson Reuters Institutional (13f) Holdings. Following prior literature, I exclude finance (SIC codes between 6000 and 6999) and utility firms (SIC codes between 4400 and 5000) because of their different regulatory environment. The sample covers 1996–2019, comprising 17,846 CEO-years and 1,831 unique firms. I begin with 1996, as my measure of risk-taking incentives – equity sensitivity (Anderson and Core 2018) – requires information on the number of options outstanding (optosey), which is first available on Compustat in 1995. I begin with 1996 rather than 1995, using lagged variables in my regressions.

CEO Incentives

Following Anderson and Core (2018), I use equity sensitivity to proxy for risk-taking. I use equity sensitivity rather than vega because, as noted above, vega does not capture the risk-taking incentives arising from stock holdings. Stock holdings incentivize risk-taking as a unit of stock in a levered firm can be viewed as a call option on firm value with an exercise price equal to the face value of debt. Incorporating the risk-taking incentives associated with stock holdings has become more important over the sample period, as while the percentage of firms granting equity compensation to their CEO has remained close to 80 percent per year, the percentage granting stock option has dropped precipitously, peaking at 83.9% in 2001 and dropping to 38.6% in 2019 (see Figure 1). Acknowledging this shortcoming of vega, Anderson and Core (2018) derive and calculate a measure of equity sensitivity to firm volatility that considers the manager's stock holdings and option holdings. Thus, I calculate a CEO's portfolio equity sensitivity as the dollar change in the value of the CEO's equity portfolio for a 1% change in firm volatility. As noted above, I do not use their "total sensitivity" measure, which includes inside debt, to maximize sample size and time frame, as data on inside debt was unavailable before 2006. Given the importance of controlling for delta to isolate the effect of vega (Armstrong and Vashishtha 2012; Armstrong et al. 2013), I also include delta and cash compensation in my models. Following Core and Guay (2002), I calculate a CEO's delta as the dollar change in the value of the CEO's equity portfolio for a 1% change in stock price.

FIGURE 1
CEO RECEIVING OPTION/STOCK GRANT BY YEAR



This plot shows the percentage of CEOs receiving option/stock grants by year. The vertical axis plots % of CEOs receiving equity grants. The horizon axis indicates the year of equity grant. The diamond line is the percentage of CEOs receiving options. The square line is the percentage of CEOs receiving stock grants. The triangle line is the percentage of CEOs receiving either options or stock grants.

Real Earnings Management (REM)

To capture REM, I focus on opportunistic reductions in discretionary expenses. Graham et al. (2005) report that reducing discretionary expenses such as R&D, advertising, and selling, general and administrative expenses (SG&A), is the preferred method for earnings management by executives. Bushee (1998) terms the reduction of R&D expenditure, which is one of my measures of discretionary expenses along with SG&A and advertising expenses, to meet earnings benchmarks as "myopic." Likewise, Bereskin et al. (2017) find that R&D cuts related to earnings management are negatively associated with future innovation-related outputs, adversely affecting firms' long-term profitability.

To measure the normal level of discretionary expenses, I start with Roychowdhury's (2006) model, which includes sales as an explanatory variable. Kothari et al. (2016) point out that models ignoring firm fixed effects suffer from model misspecification. That is, sales and size may not well describe firms' real operating processes. Thus, such firms could be habitually misclassified as having unusually high or low discretionary expenses due to, for example, their growth strategies. This problem can persist even with industry and year fixed effects because firms can often deviate from industry-year norms to differentiate themselves (Owens, Wu, and Zimmerman 2013). I include firm fixed effects to mitigate this issue by allowing the residual to reflect how far the firm's expenses deviated from the firm's own average. My model for discretionary expenses is thus:

$$\frac{DiscExp_{it}}{Assets_{it-1}} = \alpha_0 + \alpha_1 \frac{1}{Assets_{it-1}} + \beta \frac{Sales_{it}}{Assets_{it-1}} + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + u_{it-1}, \quad (1)$$

where *DiscExp* is the sum of R&D, SG&A, and advertising expenses.

In addition, following Kothari et al. (2016), I include data from years beyond year *t* in the estimation of REM. According to Kothari et al. (2016), this "estimation technique allows for data from years beyond the SEO to be incorporated in the measurement of earnings management at the time of the SEO, which offers two distinct advantages. First, by taking advantage of the full time-series available for every firm, my method addresses the possibility that there may not be enough data available during the SEO to detect real activities that are significant departures from the firm's normal operations. Second, my technique has the intuitively appealing feature that it yields measures of earnings management that cannot necessarily be constructed at the time of the SEO and, thus, would be opaque to investors." This technique takes advantage of the full time-series data for each firm for more accurate estimations and addresses the possibility that there may not be enough data as of year *t* to detect REM. The model is estimated with a pooled regression. The residual (u_{it}) from Equation (1) captures the deviation of discretionary expenses from expected expenses. I multiply the residual by the negative one so that higher values indicate income-increasing REM.

Accruals-Based Earnings Management (AEM) Measure

My measure of AEM is based on a modified Jones model augmented for net income following Kothari et al. (2016). The model for total accruals is:

$$\frac{TA_{it}}{Assets_{it-1}} = \alpha_0 + \alpha_1\left(\frac{1}{Assets_{it-1}}\right) + \alpha_2\left(\frac{TA_{it-1}}{Assets_{it-2}}\right) + \beta_1\left(\frac{\Delta REV_{it}-\Delta AR_{it}}{Assets_{it-1}}\right) + \beta_2\frac{PPE_{it}}{Assets_{it-1}} + \beta_3\frac{NI_{it}}{Assets_{it-1}} + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + v_{it-1}, \quad (2)$$

where *TA* is total accruals, defined as income before extraordinary items minus cash flow from operations; *ΔAR* is the change in accounts receivable; *ΔREV* is the change in revenue; and *PPE* is net property, plant, and equipment. The residual (v) from Equation (2) is discretionary accruals, i.e., AEM. The model includes firm and year fixed effects as in the REM model (Eq. (1)). as described in the estimation of REM, I include data from years beyond year *t.* The model is estimated with a pooled regression.

RESEARCH DESIGN

The Impact of Earnings Management on Annual Grants of CEO Equity Incentives

In my analysis, I examine whether firms grant new equity incentives to adjust the delta levels and equity sensitivity to volatility in response to prior earnings management. I use a Tobit regression model for Eq. (3) because the value of a new equity grant is left-censored at zero, as firms can, but do not have to grant new equity incentives each year. However, Figure 1 does show that about 80% CEOs receive either a share or option grant in any given year. I estimate the following regression:

$$LnNewDelta_{i,t}\ (or\ LnNewEquitySens_{it}) = \alpha + \beta_1\ AvgAEM_{it-1,t-3} + \beta_2\ AvgREM_{it-1,t-3} + \gamma_1\ LnCashComp_{it-1} + \gamma_2\ LnExcessDelta_{it-1}\ (or\ LnExcessEquitySens_{it-1}) + \boldsymbol{\delta}\ Controls_{it-1} + Year\ Fixed\ Effects + Firm\ Fixed\ Effects + u_{it}, \quad (3)$$

where my test variables are *AvgAEM* (*AvgREM*), which are *AEM* (*REM*) averaged over the period *t-1* to *t-3*. I use three-year lagged windows to capture sustained earnings management following Tucker and Zarowin (2006) and Demerjian, Lewis-Western and McVay (2020). My results are robust to longer, e.g., four-year, windows, but not shorter windows. Following Core and Guay (1999) to control for the adjustment of incentives over time, that are not related to earnings management, I include *ExcessDelta* and *ExcessEquitySens,* which are residuals from the optimal delta model and equity sensitivity models described in Appendix B. *Controls* are vector of control variables derived from the prior literature on compensation determinants (e.g., Core, Holthausen and Larcker 1999), i.e., CEO tenure (*Tenure*), CEO age (*Age*), firm size (*MVE*), growth opportunities (*BTM*), financial leverage (*Leverage*), R&D expenditures (*R&D*), investment expenditures (*Investment*), accounting performance (*ROA*), and stock performance (*Annret*). All control variables are lagged by one year, and all scalars are logged. All variables are winsorized at the 1

and 99 percent levels. I include the year and firm fixed effects, and my inferences are based on firm-level clustered standard errors.

Cross-Sectional Analysis: The Role of Institutional Investors

To investigate whether institutional investors influence the relation between prior earnings management and the adjustment of risk-taking incentives, I augment equation (3) by adding an indicator variable for high institutional holdings (*InstInvestor_Dum*)and an interaction between the high institutional investor indicator variable with *AvgAEM* and *AvgREM*, where *InstInvestor_Dum* is equal to one if the percentage of institutional investor holdings in the firm is higher than the median of institutional investor holdings for that fiscal year, and zero otherwise. In contrast to my prior models, I include industry rather than firm fixed effects, as institutional holdings are likely highly correlated within a firm across years. As in my prior models, myindependent variables are measured with a lag, scalars are logged, and I include year fixed effects. The regression models take the following form:

$$LnNewDelta_{i,t}\ (or\ LnNewEquitySens_{it}) = \alpha + \beta_1\ AvgAEM_{it-1,t-3} * H\_InstInvest\_dum_{it-1} + \beta_2\ AvgREM_{it-1,t-3} * H\_InstInvest\_dum_{it-1} + \beta_3\ AvgAEM_{it-1,t-3} + \beta_4\ AvgREM_{it-1,t-3} + \beta_5\ H\_InstInvest\_dum_{it-1} + \gamma_1\ LnCashComp_{it-1} + \gamma_2\ LnExcessDelta_{it-1}(or\ LnExcessEquitySens_{i,t-1}) + \boldsymbol{\delta}\ Controls_{it-1} + Year\ Fixed\ Effects + Industry\ Fixed\ Effects + u_{it} \quad (4)$$

RESULTS

Descriptive Statistics

Table 1 presents descriptive statistics for the sample. Panel A reports descriptive statistics for CEO equity incentive measures. Table 1 shows values before log-transformation for Delta, NewDelta, EquitySens, NewEquitySens, NewEquitySens, CashComp, MVE, and FirmAge for ease of interpretation. The mean (median) CEO portfolio delta is $543,200 ($216,200), and the mean (median) portfolio CEO equity sensitivity is $73,800 ($37,300). The mean (median) delta for new equity grants is $42,100 ($19,200), and the mean (median) equity sensitivity for new equity grants is $11,400 ($3,700). Mean (median) cash compensation is $1,915,800 ($1,495,200). Panel B reports descriptive statistics for earnings management measures. The mean (median) AEM is 0.1(0.5)% of total assets, and the mean (median) REM is 2.1(1.2)% of total assets. These numbers are significantly smaller than those reported in prior studies that do not control for firm- and year-fixed effects. Still, they are similar in magnitude to those reported in Kothari et al. (2016). Panel C reports descriptive statistics for control variables.

TABLE 1
DESCRIPTIVE STATISTICS (17,846 FIRM-YEARS, 1,831 UNIQUE FIRMS)

Panel A: CEO incentive variables

Variable	*Mean*	*Std Dev*	*25th*	*Median*	*75th*
Delta (in thousands)	543.2	945.8	84.5	216.2	576.1
NewDelta (in thousands)	42.1	63.9	4.1	19.2	50.9
EquitySens (in thousands)	73.8	103.3	13.3	37.3	88.3
NewEquitySens (in thousands)	11.4	18.8	0.0	3.7	14.7
CashComp (in thousands)	1,915.8	1,478.0	901.4	1,495.2	2,449.9
Opt Grant # (in thousands)	140.5	232.8	0.0	56.9	175.0
Stk Grant # (in thousands)	36.5	75.6	0.0	0.0	40.0
Opt Grant # / CSHO	0.14%	0.23%	0.00%	0.06%	0.19%
Stk Grant # / CSHO	0.05%	0.10%	0.00%	0.00%	0.05%

Panel B: Earnings management variables

Variable	*Mean*	*Std Dev*	*25th*	*Median*	*75th*
AEM	0.001	0.056	-0.026	0.005	0.033
REM	0.021	0.104	-0.030	0.012	0.062

Panel C: Control variables

Variable	*Mean*	*Std Dev*	*25th*	*Median*	*75th*
MVE	7,881.4	18,596.6	728.8	1,901.2	5,799.9
BTM	0.47	0.36	0.24	0.39	0.61
Lev	0.52	0.22	0.37	0.52	0.64
R&D	0.03	0.05	0.00	0.01	0.05
Investment	0.07	0.07	0.03	0.05	0.09
ROA	0.05	0.09	0.02	0.05	0.09
Annret	0.14	0.46	-0.14	0.09	0.35
Tenure	7.55	6.17	3.00	6.00	10.00
Age	55.71	6.79	51.00	56.00	60.00
CF Shortfall	-0.17	0.12	-0.24	-0.17	-0.11
σ (Ret)	0.12	0.05	0.08	0.10	0.14
σ (Idio Risk)	0.02	0.01	0.01	0.02	0.03
Free CF Prob	0.00	0.02	0.00	0.00	0.00
InstOwn	0.79	0.19	0.69	0.82	0.92

This table presents descriptive statistics for firms in my sample. My sample is constructed from the intersection of Execucomp (compensation) and CRSP/Compustat (accounting and stock price data), and Thomson Reuters Institutional (13f) Holdings (institutional ownership) for the time period 1996 to 2019. Panel A reports descriptive statistics for measures of CEO incentives. Panel B reports descriptive statistics for measures of earnings management. Panel C reports descriptive statistics for control variables. All variables are winsorized at the 1 and 99 percent levels. All CEO incentive and earnings management variables are measured at the end of year t and all firm characteristics variables are measured at the end of year *t-1*. All variables are as defined in Appendix A.

The Impact of Earnings Management on Annual Grants of CEO Equity Incentives

Hypothesis 1 predicts that firms will lower risk-taking incentives from new equity grants in response to prior earnings management, while hypothesis 2 predicts the reduction will be greater for real earnings management. In Table 2 I present the estimating equation (3) results, which addresses these questions. I begin with Panel A. In column (1) where the dependent variable is new delta, the coefficients on both *AvgAEM* and *AvgREM* are statistically insignificant. In column (2) where the dependent variable is new equity sensitivity the coefficient on *AvgAEM* is statistically insignificant, while that on *AvgREM* is negative and significant ($p<0.01$) as predicted.

TABLE 2
THE IMPACT OF EARNINGS MANAGEMENT ACTIVITIES ON ANNUAL CEO EQUITY INCENTIVE GRANTS

Panel A: Test variable – average AEM and REM

	(1)	(2)
	LnNewDelta	*LnNewEquitySens*
AvgAEM	0.348	-0.372
AvgREM	-0.183	-0.473***
LnCashComp	0.131***	0.0147
LnExcessDelta	0.00703	
LnExcessEquitySens		0.161***
LnTenure	0.0302	0.0376*
LnAge	-0.959***	-0.842***
LnMVE	0.183***	0.289***
BTM	-0.0252	-0.0552
Leverage	-0.222*	0.173
R&D	0.225	-1.070
Investment	-0.178	-0.126
CF Shortfall	-1.134***	-0.819***
ROA	0.0498	-0.160
Annret	0.0234	-0.0395
σ (Ret)	0.724*	3.620***
Intercept	1.489***	1.328***
Firm Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
N	17,846	17,846
pseudo R-sq	0.142	0.182

This table presents results from Tobit regression models that estimate the impact of earnings management activities on annual CEO equity incentive grants. Dependent variables are measured in year *t* and independent variables are measured in year *t-1*. All variables are as defined in Appendix A. All models include firm and year fixed effects. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tail), respectively. Sample includes a total of 17,846 firm-years (1,831 firms) from 1996 to 2019.

Panel B: Test variable – indicator variable taking the value of 1 if AvgAEM (AvgREM) is positive, zero otherwise.

	(1)	(2)
	LnNewDelta	*LnNewEquitySens*
PosAEM	-0.0126	-0.00910
PosREM	-0.0637**	-0.0622**
LnCashComp	0.106***	0.00254
LnExcessDelta	0.0231	
LnExcessEquitySens		0.183***
LnTenure	-0.0641***	-0.0368*
LnAge	-1.081***	-0.950***
LnMVE	0.440***	0.418***
BTM	-0.105*	-0.107**
Leverage	-0.213*	0.230**
R&D	0.361	-0.0780
Investment	-0.0729	0.00358
CF Shortfall	-1.033***	-0.838***
ROA	-0.392**	-0.130
Annret	0.330***	-0.0559*
σ (Ret)	0.171	3.510***
Intercept	1.452***	1.317***
Firm Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
N	17,846	17,846
pseudo R-sq	0.152	0.185

Panel C: Test variable – indicator variable taking the value of 1 if AvgAEM (AvgREM) is in upper quartile, zero otherwise.

	(1)	(2)
	LnNewDelta	*LnNewEquitySens*
Extreme_H_AEM	-0.0115	-0.0338
Extreme_H_REM	-0.0607*	-0.0669**
LnCashComp	0.106***	0.00247
LnExcessDelta	0.0234	
LnExcessEquitySens		0.183***
LnTenure	-0.0652***	-0.0377**
LnAge	-1.082***	-0.950***
LnMVE	0.439***	0.417***
BTM	-0.106*	-0.107**
Leverage	-0.217*	0.224**
R&D	0.378	-0.116
Investment	-0.0587	0.0248
CF Shortfall	-1.035***	-0.794***
ROA	-0.393**	-0.136
Annret	0.329***	-0.0560*

σ (Ret)	0.207	3.539***
Intercept	1.452***	1.317***
Firm Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
N	17,846	17,846
pseudo R-sq	0.152	0.185

If the amount of equity incentives equals what was anticipated at the time of the original compensation contract, then firms need not alter CEO equity compensation in response to earnings management. However, if earnings management is greater than expected, then I would expect a revision in compensation incentives. Although my metrics of earnings management are deviations from an average by definition, that does not necessarily mean they are higher than anticipated by the board. Consequently, in panels B and C I use alternative proxies that are more likely isolate the situations where the board feels earnings management is excessive, and consequently is more likely to alter equity incentives. In my first alternative measure in Panel B, I created and use indicator variables taking the value of 1 if AvgAEM (AvgREM) is positive and zero otherwise, while in my second alternative I create indicator variables taking the value of 1 if AvgAEM (AvgREM) are in the upper quartile of their respective distributions and zero otherwise.

In Panel B I see similar results in columns (1) and (2). That is, the existence positive AvgAEM is insignificantly related to new delta or new equity sensitivity, while positive AvgREM is negative and statistically significantly associated with both new delta and new equity sensitivity ($p<0.05$ and $p<0.05$, respectively). The findings in Panel C are qualitatively identical to those of Panel B, i.e., extreme AvgAEM does not affect either new delta or new equity sensitivity, while extreme AvgREM is negative and statistically significantly associated with both new delta and new equity sensitivity ($p<0.10$ and $p<0.05$, respectively).

In sum, the results in Table 2 support both my first and second hypothesis that firms will reduce CEO's risk-taking incentives via new equity grants in response to prior earnings management (H1), and that they do so more strongly in response to REM than to AEM (H2). This is because, unlike AEM, REM imposes a "real" cost, resulting in direct cash flow consequences.

Analysis of the Number of Options/Shares Granted

To address the concern that the negative relation between prior earnings management and risk-taking incentives from new equity grants mechanically arises from changes in stock prices, in Table 3, I run additional analyses where I replace *LnNewDelta* and *LnNewEquitySens* as dependent variables with the natural logarithm of the number of new restricted shares granted (column 1), the natural logarithm of the number of new stock option granted (column 2), the number of new restricted shares granted scaled by the firm's total shares outstanding (column 3), and the number of new stock option granted scaled by the firm's total shares outstanding (column 4). Comparable to the results from table 2, I find that *AvgREM* is negatively associated with both *LnOPTS_GRNT* (#) in column (2) and *OPTSGRNT* (%) in column (4). In contrast, prior REM results in additional stock grants, i.e., positive and significant coefficients in columns (1) and (3) respectively. These coefficients are consistent with firms shifting equity compensation from options, which provide higher risk-taking incentives, to shares in response to prior REM. Examining AEM I find weaker/mixed results. That is, while I find the coefficient on *AvgAEM* negative and significantly ($p<0.01$) associated with *LnOPTS_GRNT(#)* in column (2), I find the coefficients insignificantly different from zero in the other columns. Together these confirm my expectations that future compensation based risk-taking incentives are modified in response to prior earnings management, in particular REM.

TABLE 3
THE IMPACT OF EARNINGS MANAGEMENT ACTIVITIES ON THE NUMBER OF CEO STOCK/OPTIONS GRANTED

	(1) LnRSTK_GRNT (#)	(2) LnOPTS_GRNT (#)	(3) RSTK (%)	(4) OPTSGRNT (%)
AvgAEM	1.066	-2.396***	-0.000174	-0.00111
AvgREM	1.084***	-0.579*	0.000383**	-0.000991***
LnCashComp	0.231***	-0.140**	0.000128***	-0.0000839
LnExcessDelta	-0.291***	-0.123***	-0.0000600***	-0.000117***
LnExcessEquitySens	0.119***	0.396***	0.0000329**	0.000251***
LnTenure	-0.0637	0.0407	-0.0000229	0.000106***
LnAge	-0.886***	-1.470***	-0.000190	-0.00127***
LnMVE	-0.462***	0.338***	-0.000423***	-0.000330***
BTM	0.443***	-0.0884	0.000180***	-0.000116
Leverage	0.287	-0.186	0.000231**	0.00000245
R&D	1.201	-1.253	0.000366	-0.00513***
Investment	-1.178**	0.184	-0.000442*	-0.000535
CF Shortfall	-0.893**	-0.353	-0.000448**	-0.000389
ROA	0.454	-1.289***	0.0000455	-0.00132***
Annret	0.154**	-0.203***	0.0000639**	-0.000153**
σ *(Ret)*	-5.916***	3.562***	-0.00198***	0.00190***
Intercept	2.492***	2.678***	0.00115***	0.00247***
Firm Fixed Effects	Yes	Yes	Yes	Yes
Time Fixed Effects	Yes	Yes	Yes	Yes
N	17,846	17,846	17,846	17,846
pseudo R-sq	0.180	0.157	-0.128	-0.106

This table presents results from Tobit regression models that estimate the impact of earnings management activities on annual CEO equity grants. Model (1) and (2) use the natural logarithm of the number of stock grants and the natural logarithm of options grants as a dependent variable, respectively. Model (3) and (4) use the percentage of the number of stock grants over common shares outstanding and the percentage of the number of option grants over common shares outstanding as a dependent variable, respectively. Dependent variables are measured in year *t* and independent variables are measured in year *t-1*. All variables are as defined in Appendix A. All models include firm and year fixed effects. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tail), respectively. Sample includes a total of 17,846 firm-years (1,831 firms) from 1996 to 2019.

Cross-Sectional Analysis: The Role of Institutional Investors

In Table 4, I examine how institutional investor monitoring, as proxied by the percentage of institutional ownership, affects the relation between prior earnings management and the adjustment of risk-taking incentives. As discussed above, I interact *AvgAEM* and *AvgREM* with *InstInvestor_Dum*, where *InstInvestor_Dum* is a dummy variable equal to one if the percentage of institutional investor holdings in the firm is higher than the median of institutional investor holdings for that fiscal year, and zero otherwise. The coefficient on the institutional investor indicator, *InstInvestor_Dum*, is positive and significant in both models, indicating that firms with higher institutional holdings, on average, grant more annual equity incentives in terms of both delta (*p<0.01*) and equity sensitivity (p<0.01). Interestingly, however, I find that the negative relation between *AvgREM* and *NewEquitySens* observed in Table 2 remains significant only among firms with higher institutional ownership, i.e., the coefficient on *AvgREM * InstInvestor_Dum*

is negative and significant (*p<0.05*). In contrast, the coefficient on *AvgREM* is insignificantly different from zero. Consequently, the result in Table 2 appears to be driven by firms with higher institutional holdings. In addition, the insignificant relation between *AvgAEM* and *NewEquitySens* shown in Table 2 becomes significant among firms with higher institutional ownership ($p<0.01$).

In contrast, I find no effect of *AvgAEM* on *LnNewDelta* but a positive effect of *AvgREM* on *LnNewDelta.* Collectively, the result suggests that firms with higher institutional ownership tend to grant more equity incentives than firms with lower institutional ownership, and that institutional investors actively monitor CEOs' opportunistic behavior and restructure equity incentives if earnings management behavior is observed. This result is consistent with the idea large institutional investors having the ability and incentive to monitor, discipline, and influence managers, reducing managers' opportunistic behavior.

TABLE 4
THE IMPACT OF INSTITUTIONAL INVESTORS ON THE RELATION BETWEEN EARNINGS MANAGEMENT AND EQUITY INCENTIVES

	(1) *LnNewDelta*	(2) *LnNewEquitySens*
*AvgAEM * InstInvestor_Dum*	0.284	-1.665**
*AvgREM * InstInvestor_Dum*	-0.283	-0.675**
AvgAEM	-0.632	-0.221
AvgREM	0.464*	-0.0598
InstInvestorI_Dum	0.262***	0.125***
LnCashComp	0.234***	0.123***
LnExcessDelta	0.0299	
LnExcessEquitySens		0.175***
LnTenure	-0.00875	-0.0177
LnAge	-0.994***	-0.733***
LnMVE	0.399***	0.397***
BTM	-0.0112	-0.00740
Leverage	0.0661	0.414***
R&D	2.699***	1.261***
Investment	-0.738**	-0.914***
CF Shortfall	-0.559***	-0.334*
ROA	-0.0980	-0.0743
Annret	-0.0401	-0.0839**
σ (Ret)	0.0109	2.780***
Intercept	1.769***	1.652***
Industry Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
N	14,396	14,396
Pseudo R-sq	0.053	0.068

This table presents results from Tobit regression models that estimate the impact of earnings management activities on annual CEO equity grants. Dependent variables are measured in year *t* and independent variables are measured in year *t-1*. All variables are as defined in Appendix A. All models include firm and year fixed effects. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tail), respectively. Sample includes a total of 14,396 firm-years (1,640 firms) from 1996 to 2019.

CONCLUSION

In this study, I investigate how prior AEM and REM affect new equity grants. I show that the risk-taking incentives from new equity grants are lower for firms with higher prior REM, but not for firms with higher AEM. In addition, I show that firms with higher institutional ownership drive the negative relation between REM and risk-taking incentives from new equity grants, suggesting that institutional investors play an important role in structuring executive compensation contracts to restrain costly REM. The results are consistent with firms altering compensation incentives to restrain managers' value-reducing behavior.

My findings contribute to the compensation, corporate governance, and earnings management literature. First, they shed light on using equity incentives as an internal governance mechanism to limit CEOs' earnings management activities. I show that boards limit CEOs' value-reducing activities by reducing equity incentives. Second, my results imply that the costs of REM perceived by the board are more severe than those of AEM. Lastly, I provide indirect evidence that institutional investors play an important monitoring role by influencing CEO compensation incentives.

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APPENDIX 1: VARIABLE DEFINITIONS

Incentive variables	
LnCashComp	Natural logarithm of one plus the cash compensation received by the CEO during the fiscal year.
LnDelta	Natural logarithm of one plus the sensitivity of the CEO's stock and option holdings to a 1% change in stock price (Core and Guay 2002).
LnEquitySens	Natural logarithm of one plus the sensitivity of the CEO's stock and option holdings to a 1% change in firm volatility (Anderson and Core 2018).
LnExcessDelta	Residuals from the optimal delta model (see Appendix B).
LnExcessEquitySens	Residuals from the optimal equity sensitivity model (see Appendix B).
LnNewDelta	Natural logarithm of one plus the sensitivity of stock and options granted to the CEO in year *t* to a 1% change in stock price.
LnNewEquitySens	Natural logarithm of one plus the sensitivity of stock and options granted to the CEO in year *t* to a 1% change in firm volatility.
Earnings management variables	
AEM	Signed discretionary accruals (Kothari, Mizik, and Roychowdhury 2016; see Eq. (2)).
REM	Abnormal discretionary expenses, which are the sum of R&D, SG&A, and advertising expenses, multiplied by -1 (see Eq. (1)).
Control variables	
LnMVE	Natural logarithm of market value of equity.
BTM	Book-to-market value of equity.
Leverage	Total liabilities divided by total assets.
R&D	Research and development expenses scaled by total assets.
Investment	The three-year average of the sum of capital expenditures plus acquisitions
ROA	Net income before extraordinary items scaled by total assets.
Annret	Buy-and-hold annual return.
LnTenure	Natural logarithm of one plus CEO tenure.
LnAge	Natural logarithm of one plus CEO age.
CF Shortfall	The three-year average of [(common and preferred dividends + cash flow from investing - cash flow from operations)/total assets].
σ(Ret)	Standard deviation of daily returns over the year.
σ(Idio Risk)	Standard deviation of the residuals of the market model, estimated with daily returns, over the year.
Free CF Prob	1 if the book-to-market ratio is less than 1, and is the three-year average of [(cash flow from operations - common and preferred stock dividends)/total assets], otherwise.
PosAEM (REM)	1 if AvgAEM (AvgREM) is positive, and zero otherwise
Extreme_H_AEM (REM)	1 if AvgAEM (AvgREM) is in the upper quartile of the distribution, and zero otherwise
Instown	The percentage of total intuitional ownership over common shares outstanding.
InstInvestor_Dum	1 if the percentage of institutional investor holdings in the firm is higher than the median of institutional investor holdings by fiscal year, and zero otherwise.

APPENDIX 2: OPTIMAL CEO EQUITY INCENTIVES

	(1) *LnDelta*	(2) *LnEquitySens*
LnCashComp	0.0893***	0.143***
Annret	0.155***	-0.0305
LnMVE	0.665***	0.254***
BTM	-0.424***	0.0342
Levearge	-0.218***	0.689***
R&D	-0.327	-1.448**
Investment	0.132	0.0318
σ (Idio Risk)	0.380	-1.125
Free CF prob	0.854**	-1.165**
LnTenure	0.481***	0.371***
LnAge	0.218	-0.756***
Intercept	-2.694***	1.398
Firms Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
N	17,846	17,846
adj. R-sq	0.824	0.650

This table presents results from OLS regressions that estimate the optimal level of CEO equity incentives in terms of delta and equity sensitivity. I estimate the following regression models: $LnDelta_{it-1}$ (or $LnEquitySens_{it-1}$) = $\beta_0 + \beta_1 LnCashComp_{it-1} + \beta_2 Annret_{it-1} + \beta_3 LnMVE_{it-1} + \beta_4 BTM_{it-1} + \beta_5 Leverage_{it-1} + \beta_6 R\&D_{it-1} + \beta_7 Investment_{it-1} + \beta_8 \sigma(Idio\ Risk)_{it-1} + \beta_9 LnTenure_{it-1} + \beta_{10} LnAge_{it-1} + Firm\ Fixed\ Effects + Year\ Fixed\ Effects + u_{it-1}$ (or v_{it-1}). The residual, u_{it-1} (v_{it-1}), is $ExcessDelta_{it-1}$ ($ExcessEquitySens_{it-1}$). All dependent and independent variables are measured one year prior to new equity incentive grants (year *t-1*). All variables are winsorized at the 1 and 99 percent levels. All variables are as defined in Appendix A. All models include firm fixed effects and firm-level clustered standard errors are used. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels (two-tail), respectively. t-values are reported in parentheses.