

Equity Vesting and Managerial Myopia*

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Abstract

This paper links the impending vesting of CEO equity to reductions in real investment. Existing studies measure the manager's short-term concerns using the sensitivity of his total equity to the stock price. However, in myopia theories, the driver of short-termism is not the CEO's overall incentives, but his incentives to increase the short-term stock price in particular. We use recent changes in compensation disclosure to introduce a new empirical measure that is tightly linked to theory - the price-sensitivity of equity vesting over the upcoming year. This sensitivity is determined by equity grants made several years prior, and thus unlikely to be driven by current investment opportunities. An interquartile increase is associated with a decline of 0.11% in the growth of R&D (scaled by total assets), 37% of the average R&D growth rate. Newly-vesting equity increases the likelihood of meeting or marginally beating analyst earnings forecasts. However, the market's reaction to doing so is lower, suggesting that it recognizes CEOs' myopic incentives. More broadly, by introducing a measure of incentives that is not driven by the current contracting environment, our paper suggests that CEO contracts affect real outcomes.

JEL classifications: G31; G34

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1. Introduction

This paper studies the link between real investment decisions and the CEO's short-term incentives. We find that research and development ("R&D") is negatively associated with the price-sensitivity of stock and options that vest¹ over the same year. This association continues to hold when including advertising and capital expenditure in the investment measure. CEOs with significant newly-vesting equity are also more likely to meet or marginally beat analyst consensus forecasts. These results provide empirical support for managerial myopia theories.

Many academics and practitioners believe that managerial myopia is a first-order problem faced by the modern firm. While the 20th century firm emphasized cost efficiency, Porter (1992) argues that "the nature of competition has changed, placing a premium on investment in increasingly complex and intangible forms", such as innovation, employee training, and organizational development. However, the myopia theories of Stein (1988, 1989) show that managers may fail to invest due to concerns with the firm's short-term stock price. Since the benefits of intangible investment are only visible in the long run, its immediate effect is to depress earnings and thus the current stock price. Therefore, a manager aligned with the short-term stock price may turn down valuable investment opportunities.

Despite its importance, myopia is very difficult to test for empirically. Standard measures of CEO incentives (e.g., Hall and Liebman (1998)) quantify the sensitivity of the manager's stock and option to the share price. However, in myopia models, the driver of short-termism is not the overall level of equity holdings, but the weighting of these holdings towards the short-term rather than long-term stock price. Equity that does not vest until the long-term may deter rather than induce myopia (Edmans, Gabaix, Sadzik, and Sannikov (2012)).

¹ Strictly speaking, options do not vest; they become exercisable. For brevity, we use the word "vest" to refer to options that change status from being unexercisable to exercisable.

Theory suggests that myopic incentives stem from the amount of equity that the manager sells in the short-term, as in the Stein (1989) model. However, operationalizing this concept empirically is tricky. Actual sales are an endogenous choice of the CEO, and likely correlated with omitted variables that also drive investment. For example, negative private information on firm prospects may cause the manager to sell equity and also cut investment. We introduce a new measure of myopic incentives that is both tightly linked to theory and not determined by the current contracting environment: the price-sensitivity of stock and options that are scheduled to vest over the upcoming year. We show that this sensitivity is highly correlated with actual sales, consistent with risk-averse managers selling some of their equity upon vesting. However, while actual sales are an endogenous decision, the amount of newly-vesting equity is largely driven by the magnitude and vesting schedule of equity grants made several years prior.² We identify the amount of equity scheduled to vest in a given year using a recently-available dataset from Equilar that takes advantage of the FAS 123R disclosure requirements, implemented in 2006.

We use the sensitivity of newly-vesting equity in two ways. First, we employ it as the explanatory variable of interest, relating it to changes in several measures of investment. Our primary measure is R&D scaled by total assets, but we also include advertising and capital expenditure. We control for determinants of investment opportunities and firms' ability to fund investment, firm and year fixed effects, and other components of CEO compensation – the CEO's unvested equity, already-vested equity, salary, and bonus.

We find a negative and significant relationship between nearly all measures of investment and the sensitivity of newly-vesting equity. An interquartile increase in this sensitivity is associated with a 0.11 percentage point decline in the growth of R&D scaled by lagged total

² Gopalan, Milbourn, Song, and Thakor (2014) show that most equity grants do not fully vest for three to five years.

assets, which corresponds to 37% of the average growth in R&D/assets, 2% of the average R&D/assets ratio, and an average decline of \$1 million per year. We also find that newly-vesting equity is positively associated with a measure of real earnings management developed by Roychowdhury (2006): the abnormal discretionary expenditure relative to industry peers. To our knowledge, these are the first results to link short-term equity incentives to real investment.

Understanding how investment responds to vesting is important, because boards can take this response into account when designing the contract. Similarly, they can estimate the CEO's incentives to cut investment in a given year and, if needed, counteract them. A broader question is how investment responds to equity sales in general. Such sales can stem from channels other than vesting equity – a CEO may voluntarily hold already-vested equity as a long-term investment, but later decides to rebalance his portfolio. Since actual equity sales are endogenous, we use newly-vesting equity as an instrument. The two properties of newly-vesting equity discussed earlier – its high correlation with equity sales and its determination by equity grants several years prior – are analogous to the relevance criterion and the exclusion restriction for a valid instrument. We find that an interquartile increase in equity sales is associated with a 0.25 percentage point decline in the growth of R&D/assets, 4.6% of the average R&D/assets ratio.

The negative association between investment and vesting equity can arise from two channels. First, vesting equity could cause managers to reduce investment. Second, there is no causal relationship but instead the link arises from an omitted variable – current investment opportunities – that our controls fail to capture. It may be that boards believe that vesting equity deters investment, and thus schedule equity to vest precisely when they forecast that investment opportunities will decline. This explanation requires boards to be able to forecast investment

opportunities several years in advance.³ Note that it is still consistent with myopia theories: boards ensure that equity does not vest while investment opportunities are strong because they believe that vesting equity induces myopia.

To provide further evidence of the first channel, we show that newly-vesting equity is associated with a higher likelihood of meeting or marginally beating analyst earnings forecasts. It is unrelated to the likelihood of beating the forecast by a wide margin, consistent with manipulation being more likely when close to the forecast. These results support the idea that vesting equity increases the CEO's stock price concerns, but not that it is correlated with investment opportunities. Similarly, we find that vesting equity is associated with cutting R&D to beat an earnings forecast, using a methodology similar to Bushee (1998).

Finally, we study the market's reaction to earnings announcements. While CEOs with high vesting equity are more likely to beat the earnings forecast, the market reaction to doing so is significantly lower for such CEOs. Thus, CEOs with myopic incentives do not succeed in achieving higher announcement returns. These findings are consistent with the Stein (1989) "signal-jamming" equilibrium, where the market is efficient and recognizes managers' myopic behavior, but managers are still trapped into acting myopically.

This paper is related to a long literature on managerial myopia. In addition to the theories already cited, other models include Miller and Rock (1985), Narayanan (1985), Bebchuk and Stole (1993), Bizjak, Brickley, and Coles (1993), Goldman and Slezak (2006), Edmans (2009), and Benmelech, Kandel, and Veronesi (2010). Empirically, McConnell and Muscarella (1985)

³ This alternative explanation would suggest that options should predominantly exhibit cliff vesting, where they all vest on a particular date (that corresponds with the end of an investment cycle). However, Cadman, Rusticus, and Sunder (2013) show that 55% of the options granted during 1997 to 2008 exhibit straight-line vesting. This is particularly true during our sample period, as they also show that 40% of firms that previously granted cliff-vesting options switched to straight-line vesting after the adoption of FAS 123R in 2006.

document positive returns to the announcements of capital investments. This result may arise from selection: managers only announce projects whose value is immediately visible to the market. Graham, Harvey, and Rajgopal (2005) provide survey evidence that 78% of executives would sacrifice long-term value to meet earnings targets. Using standard measures of incentives that capture the CEO's overall sensitivity to the stock price, Cheng and Warfield (2005), Bergstresser and Philippon (2006), and Peng and Roell (2008) find a positive link with earnings management, but Erickson, Hanlon, and Maydew (2006) find no link with accounting fraud. These conflicting results may arise because, theoretically, it is the sensitivity to the *short-term* stock price that induces myopia. Bushee (1998) relates R&D to the horizon of a firm's shareholders rather than managers. Our results suggest that myopia can exist even if a firm's shareholders are long-term, and have implications for contract design. Finally, Healy (1985), Holthausen, Larcker, and Sloan (1995), and others show that managers manipulate accruals to increase their bonus payments. In contrast, we focus on incentives induced by equity compensation, and study how they affect investment rather than accounting choices.⁴

A small number of papers do consider the horizons of CEO equity incentives. Kole (1997) is the first to describe vesting horizons, but does not relate them to firm behavior. Johnson, Ryan, and Tian (2009) show that vested stock is related to corporate fraud, but do not study upcoming vesting. Cadman, Rusticus, and Sunder (2013), Cadman and Sunder (2014), and Gopalan, Milbourn, Song, and Thakor (2014) analyze the "duration" of CEO pay - the weighted average of the vesting periods of his different pay components. The first two papers study the

⁴ The incentives provided by bonuses are very low compared to equity in practice. Jensen and Murphy (1990) find that while the CEO loses \$3.25 for every \$1,000 fall in firm value, changes in salary and bonus comprise only \$0.02 of this total. Matsunaga and Park (2001) estimate that the CEO's bonus falls by only 0.4% of his salary if he reports a loss in one quarter, and that the bonus actually increases if he reports a loss for 2, 3, or 4 quarters. These results are based on time-series regressions: in contrast to equity, the level of the bonus provides little information about its *ex ante* sensitivity to short-term performance.

determinants of duration rather than its effects on firm behavior. The former study how duration responded to the adoption of FAS 123R; the latter show that duration is positively associated with institutional investors' investment horizons. Gopalan et al. (2014) document how duration varies across firms and its correlation with accruals, but do not examine real outcomes. In contrast, our goal is to investigate whether CEOs' myopic incentives affect investment. In this context, newly-vesting equity has two key advantages over duration. First, it measures more directly the CEO's dollar gain from increasing the short-term stock price. Second, it is designed to minimize its correlation with current investment opportunities. While duration is affected by current equity grants and CEO sales, which may be correlated with current investment opportunities, newly-vesting equity depends primarily on grants made several years prior.

A contemporaneous paper by Ladika and Sautner (2013) shows that, in response to the adoption of FAS 123R, some firms chose to accelerate option vesting, and that such accelerated vesting was associated with a reduction in capital expenditure.⁵ Our papers are complementary in that they employ different empirical strategies to analyze the relation between vesting and investment, and find consistent results. While Ladika and Sautner focus on a one-time shock, we study a panel of firms. This broader setting allows us to quantify the responsiveness of investment to expected equity sales, rather than the more specific question of how investment responded to an accounting change that may have induced vesting acceleration. We also analyze the relation between vesting and the firms' propensity to beat earnings forecasts.

Our paper also contributes to the broader literature on CEO compensation, beyond the specific topic of short-termism. Even though this literature is substantial, very few papers show

⁵ FAS 123R required firms to expense all equity-based pay after 2006, including options. Some firms responded to this rule by accelerating option vesting, to avoid recognizing option expenses after 2006. Thus, the decision whether to accelerate vesting is endogenous to individual firms. Those with worse performance and investment opportunities may be the most expense-conscious, and so may both accelerate vesting and cut investment.

that incentive contracts affect managers' behavior, i.e., that CEO pay actually matters. The survey of Frydman and Jenter (2010) notes that "compensation arrangements are the endogenous outcome of a complex process ... this makes it extremely difficult to interpret any observed correlation between executive pay and firm outcomes as evidence of a causal relationship." This paper takes a step towards addressing the identification challenge, by introducing a measure of CEO incentives that is unlikely to be driven by the current contracting environment. Thus, our results suggest that executive compensation has real effects.⁶

This paper is organized as follows. Section 2 describes the data, in particular our measure of myopic incentives. Section 3 presents the investment results, and Section 4 analyzes earnings announcements. Section 5 concludes.

2. Data and Empirical Specification

This section describes the measurement and calculation of the variables used in our empirical analysis; a detailed description is in Appendices A and B.

2.1 Measurement of myopic incentives

Our measure of myopic incentives is motivated by standard models of managerial myopia. In such models, the CEO's wealth in year t is typically given by:

$$W_t = S_t + \alpha_t[\omega_t P_t + \sum_{s=1}^T \omega_{t+s} E(P_{t+s})], \quad (1)$$

where W_t is the manager's wealth, S_t is cash salary (which does not depend on the stock price), P_t is the stock price in year t , and α_t is the manager's total number of shares, of which a fraction ω_t

⁶ Shue and Townsend (2013) also aim to show a causal effect of incentives. They use features of multi-year grant cycles as an instrument for option grants. They study the different question of whether options induce risk-taking.

vests and is sold in year t .⁷ We have $\sum_{s=0}^T \omega_{t+s} = 1$. For example, the objective function in Stein (1989) model is similar to a two-period version of (1).

The manager's myopic incentives, i.e., incentives to increase P_t , are captured by $\alpha_t \omega_t P_t$.⁸ Appendix A presents a simple myopia model which shows that the manager's incentives to cut investment in year t is positively related to $\alpha_t \omega_t P_t$. This quantity is the dollar change in wealth W for a 100% increase in P_t , and also equals the value of shares that vest in year t . Our goal is to measure this variable empirically.

Note that our measure is distinct from the duration measures of Cadman and Sunder (2014) and Gopalan et al. (2014), who calculate the weighted average horizon of the different pay components (salary and bonus, which have a zero horizon, and the CEO's various equity tranches). Their measure equals $\frac{\alpha_t P_t \sum_{s=1}^T s \omega_{t+s-1}}{\alpha_t P_t + S}$ in the above framework. Cadman, Rusticus, and Sunder (2013) study the duration of equity only, i.e. exclude S , which simplifies the formula to $\sum_{s=1}^T s \omega_{t+s-1}$. Both formulas measure the average length of time until the manager's equity vests rather than the manager's gain from increasing P_t . This difference reflects the papers' contrasting goals. The above papers study the *determinants* of the manager's overall incentive horizon, and thus wish to measure the average horizon across all his equity tranches. In contrast, we study the *consequences* of short-term incentives – how they affect his investment choices.

In our context, newly-vesting equity has two advantages as a measure of myopic incentives (see Appendix A for further detail). First, the benefit of a myopic investment cut to the CEO is that it will increase the short-term stock price and thus the value at which he can sell his newly-

⁷ For simplicity, equation (1) assumes that the manager sells his equity when it vests. This assumption is not necessary – all we require is that the CEO sells some vesting equity, which we document empirically.

⁸ Note that, unlike in the consumer myopia literature (e.g. Gabaix and Laibson (2006)), managerial myopia is fully rational – the manager trades off the increase in his $\alpha_t \omega_t P_t$ of newly-vesting equity with any loss in his other equity holdings when deciding to cut investment.

vesting equity. This benefit is measured by $\alpha_t \omega_t P_t$. However, the effect of the investment cut on the *future* price, and thus the manager's future-vesting equity, is more ambiguous. Depending on how long the price inflation caused by myopia persists and whether the resulting value erosion manifests before or after year $t+s$, the myopic action could either increase or decrease the stock price in year $t+s$, and thus the value of an equity tranche vesting in $t+s$. Duration calculates the average horizon across all newly- and future-vesting equity tranches, and so is a less clear measure of myopic incentives in our setting.

Second, using newly-vesting equity as a measure of myopic incentives helps address endogeneity concerns. Duration depends on the CEO's overall equity portfolio and is thus affected by current equity grants and sales, both of which are likely correlated with changes in the firm's investment opportunities, and thus investment. For example, superior investment opportunities may induce a firm to grant equity with longer vesting horizons (as found by Cadman, Rusticus, and Sunder (2013)) and also lead to the manager investing more. Similarly, good investment opportunities increase the optimal level of incentives (Holmstrom and Milgrom (1987)) and so the firm may grant new equity. Since this new equity will likely have a long vesting period, duration again rises. In contrast, *NEWLYVESTING* is driven by equity grants made several years prior, and is thus unlikely correlated with current shocks to investment opportunities. This endogeneity is not a concern for Cadman, Rusticus, and Sunder (2013), Cadman and Sunder (2014), or Gopalan et al. (2014) who primarily study the determinants of the CEO's horizon, but is a concern for analyzing its effect on investment.

2.2 *Data and Sample*

Since the implementation of FAS 123R in 2006, companies are required to disclose grant-level (rather than merely aggregate-level) information on each stock and option award held by a

top executive in their proxy statements, including whether they are vested or unvested. We can thus track option vesting by studying changes in the numbers of vested and unvested options with the same exercise price and expiration date. Separately, Equilar directly reports the number of shares that vest in a given year.

Given the short time series over which the grant-level vesting status is available, we require a wide cross-section to maximize power. While the data is available in Execucomp for the S&P 1500, we use Equilar as it covers all firms in the Russell 3000. The initial sample consists of 9,385 firm-CEO-years from 2006-2010. After merging with financial statement data from Compustat and stock return data from the Center for Research in Security Prices (CRSP), and removing financial and utilities firms, we obtain the final sample of 2,047 firms and 6,730 firm-CEO-years (see Table 1, Panel A).⁹ The analysis of earnings forecasts uses the Institutional Brokers' Estimate System (I/B/E/S) database and covers 1,498 firms and 17,173 firm-quarters.

2.3 *Measurement of vesting equity*

We obtain the number of shares that vest in a given year directly using the variable “Shares Acquired on Vesting of Stock” for each year-CEO. Such vesting may come from previously restricted stock or Long-Term Incentive Plans (“LTIPs”). To calculate the number of newly-vesting options, we collect information, grant-by-grant, on the exercise price (*EXERPRC*), expiration date (*EXPDATE*), and number of securities (*NUM*) for a given CEO’s newly-awarded options in year $t+1$, and his unvested options at the end of year t and year $t+1$. We group these options by *EXERPRC* and *EXPDATE* and infer the number of newly-vesting options using:

⁹ In the final sample, we have 28 firm-years with more than one CEO, due either to dual CEOs or a change of CEO. In these cases, the firm-year observation appears once for each CEO. The results are robust to deleting these observations or keeping the CEO with higher newly-vesting equity.

$$\begin{aligned}
& \text{NEWLYVESTINGOPTIONNUM} (\text{EXERPRC}_p, \text{EXPDATE}_d)_{t+1} = \text{UNVESTEDOPTIONNUM} \\
& (\text{EXERPRC}_p, \text{EXPDATE}_d)_t + \text{NEWOPTIONNUM} (\text{EXERPRC}_p, \text{EXPDATE}_d)_{t+1} - \\
& \text{UNVESTEDOPTIONNUM} (\text{EXERPRC}_p, \text{EXPDATE}_d)_{t+1}, \tag{2}
\end{aligned}$$

where p and d denote an exercise price-expiration date pair, *NEWLYVESTINGOPTIONNUM* is the number of newly-vesting options for this pair, *UNVESTEDOPTIONNUM* is the number of unvested options, and *NEWOPTIONNUM* is the number of newly-awarded options.¹⁰

Having identified the number of vesting securities, we then calculate their delta: the dollar change in value for a \$1 change in the stock price. The delta equals the number of shares a security is equivalent to, from an incentive standpoint. The delta of a share is 1; we calculate the delta of an option using the Black-Scholes formula.¹¹

We sum across the deltas of all of the CEO’s vesting stock and options. The aggregate delta measures the dollar change in vesting equity for a \$1 change in the stock price. It reflects the effective *number* of vesting shares and corresponds to $\alpha_t \omega_t$ in equation (1). To make this measure comparable across firms with different stock price levels and immune to stock splits, we multiply the aggregate delta by P_t to calculate the effective *value* of vesting equity, which corresponds to $\alpha_t \omega_t P_t$. We call the resulting measure “sensitivity”, and it represents the dollar change in vesting

¹⁰ *NEWLYVESTING* thus directly estimates the number of shares and options that vest. In contrast, calculating the duration of the CEO’s entire equity portfolio requires additional assumptions – e.g., whether grants with graded vesting exhibit straight-line, front-loaded, or back-loaded vesting, and on the vesting schedule of pre-2006 grants.

¹¹ For options that vest in year $t+1$, we use Black-Scholes inputs from Equilar, as of the end of year t . The rationale is that, when making his investment decisions at the start of year $t+1$, the CEO will take into account the delta of his options at the start of the year. If these are unavailable, we use the inputs associated with a firm’s newly-awarded options in year $t+1$ from Equilar, followed by year t ’s inputs from ExecuComp, and year t ’s inputs from Compustat, in that order. If the inputs cannot be located directly in the three databases, we fill in the volatility by calculating past three-year price volatility using the CRSP daily files, the risk-free rate with the Treasury Constant Maturity Rate with the closest term to a given option, and the dividend yield by calculating past five-year average dividend yield using the Compustat annual files. If the expiration date is missing from Equilar, we delete the option.

equity for a 100% change in the stock price. It is analogous to the Hall and Liebman (1998) incentive measure, but focuses on vesting equity rather than the entire equity portfolio.

We sum the sensitivities of newly-vesting stock ($NEWLYVESTINGSTOCK_{t+1}$) and options ($NEWLYVESTINGOPTION_{t+1}$) to create $NEWLYVESTING_{t+1}$, the total sensitivity of all newly-vesting equity in year $t+1$. We analogously calculate $VESTED_t$, the sensitivity of all stock and options that had vested by the end of year t , and $UNVESTED_t$, the sensitivity of unvested equity. We then create $UNVESTEDADJ_t = UNVESTED_t - NEWLYVESTING_{t+1}$, which excludes equity that vests in year $t+1$; we set this variable to zero if it is negative.¹² Appendix C gives a sample calculation for one CEO-year.¹³

We typically include $UNVESTEDADJ_t$ and $VESTED_t$ as controls to test whether newly-vesting equity is related to investment after taking into account the CEO's other equity holdings. The direction and strength of any correlation between these two variables and investment are unclear. As discussed in Section 2.1 and in more detail in Appendix A, unvested equity may increase or decrease myopia, depending on whether the myopic action is expected to increase or decrease the stock price in the period in which the equity will vest. Separately, Laux (2012) shows theoretically that unvested equity may exacerbate myopia because the CEO takes short-term actions to avoid being fired and forfeiting his unvested equity. While already-vested equity could induce short-termism since the CEO can often sell it at any time, he may be voluntarily holding it for the long-term, e.g. for control, investment, or signaling purposes.

¹² In rare cases, $NEWLYVESTING_{t+1}$ can exceed $UNVESTED_t$ because some unvested options have been canceled during the year, rather than having vested. Equilar does not record such cancelations, but they are very rare.

¹³ Besides Equilar, information on vesting schedules (by year in which equity grants are awarded) can be obtained from footnotes to the Form 4 filings with the Securities and Exchange Commission (SEC). Unlike Equilar, using this source to construct $NEWLYVESTING$ for a given year would require accurate vesting schedule data on a full history of previously awarded grants that are still held by the CEO. If one filing is missing, then $NEWLYVESTING$ will be incorrectly calculated. Indeed, prior research reports that this dataset contains significant data errors, missing filings, and in particular inconsistencies with Execucomp (see, for example, van Bakkum and Zhu (2013)).

As an alternative measure of myopic incentives, we construct the ratio of *NEWLYVESTING* to the sum of *NEWLYVESTING* and *UNVESTEDADJ* (*RATIO*). This ratio measures the CEO's concerns for the stock price over the upcoming year relative to future years. One drawback is that the direction of the relationship between investment and the scaling variables *UNVESTEDADJ* and *VESTED* is ambiguous, as described above. Moreover, the ratio does not account for the dollar amount of vesting equity and thus the magnitude of myopic incentives. Nevertheless, we include tests using *RATIO* as a robustness check. Similarly, we calculate *RATIOALL*, which equals *NEWLYVESTING* divided by the sum of *NEWLYVESTING*, *UNVESTEDADJ*, and *VESTED*, i.e., the total sensitivity across all equity holdings.

2.4 Measurement of investment

Theoretically, myopia comprises any actions that increase current earnings at the expense of long-term value, but this cost cannot be observed immediately by the market. Our first measure is the change in R&D (ΔRD), scaled by lagged total assets. R&D is generally expensed and thus immediately reduces earnings. However, the cash flows created by R&D typically only arise in the long-term, and so it is difficult for even a forward-looking market to assess them immediately and incorporate them in the stock price. While many firms expense R&D separately on the income statement, and so the market can identify if an earnings increase was caused by a cut in R&D, the income statement can only report the level of R&D and not its quality. Thus, the market may interpret an R&D cut as efficient rather than myopic.¹⁴ For these reasons, prior literature finds that managers use R&D cuts as a way to increase short-run earnings.¹⁵

¹⁴ Cohen, Diether, and Malloy (2013) find that “the stock market appears unable to distinguish between “good” and “bad” R&D investment”.

¹⁵ Graham, Harvey, and Rajgopal (2005) report that 80% of managers would cut discretionary expenditure on R&D, advertising, and maintenance to meet an earnings target. Bushee (1998) finds that investors who trade on earnings

In our final sample, 2,531 firm-CEO-years (37.6% of our sample) have missing R&D, because R&D is either included within Selling, General, and Administrative expenses (“SG&A”) or indeed zero. Following Himmelberg, Hubbard, and Palia (1999), we set missing R&D values to zero. The results are slightly stronger if we remove observations with missing R&D.

Based on a similar reasoning, we also calculate $\Delta RDAD$, the change in the sum of R&D and advertising expenditures, scaled by lagged total assets, setting missing advertising expenditures to zero. Chan, Lakonishok, and Sougiannis (2001) provide evidence that both advertising and R&D are underpriced by the market, suggesting that a cut in these expenditures could boost the short-term stock price.

We also calculate the change in capital expenditure ($\Delta CAPEX$) and total tangible investment ($\Delta CAPEXALL$), scaled by lagged total assets. While $CAPEX$ is taken directly from the cash flow statement, $CAPEXALL$ is the increase in gross fixed assets from the balance sheet. The latter is more comprehensive as it captures investment not fully reflected on the cash flow statement, such as capitalized leases. While capital expenditure is not directly expensed, and thus has a smaller effect on earnings than R&D or advertising, it does depress earnings through raising depreciation. In addition, it is typically financed by reducing cash or increasing debt. This increases a firm’s net interest expense, reducing earnings, and also worsens the firm’s solvency ratios which may enter into market valuations. As two additional measures, we consider the change in the sum of scaled R&D, advertising, and capital expenditure ($\Delta RDADCAPEX$ and $\Delta RDADCAPEXALL$), which aggregates all of these “discretionary” expenditures.

induce managers to cut R&D to meet earnings targets. Roychowdhury (2006) shows that firms manipulate earnings through real activities, including cuts in discretionary spending, to avoid reporting losses. Bhojraj, Hribar, Picconi, and McInnis (2009) find that firms that beat analyst forecasts by reducing discretionary spending enjoy a short-term stock price gain that is reversed in the long-run. These results are inconsistent with the hypothesis that a cut in R&D signals poor investment opportunities (Bebchuk and Stole (1993)). Any such effect would bias our tests against finding a negative association between R&D and vesting equity.

We use “investment” as an umbrella term to encapsulate the six different measures of long-term behavior: *RD*, *RDAD*, *CAPEX*, *CAPEXALL*, *RDADCAPEX*, or *RDADCAPEXALL*. Since R&D and advertising have a more negative effect on current earnings than capital expenditure, the first two are our primary measures of investment.

2.5 Control variables

In addition to *UNVESTEDADJ* and *VESTED*, we include *SALARY_t* and *BONUS_t* to control for potential incentive effects created by the other components of CEO pay. We also include the variables used in the investment regressions of Asker, Farre-Mensa, and Ljungqvist (2014), plus some additional controls. The first five proxy for investment opportunities: Tobin’s Q at the end of year *t* and *t+1* (*Q_t*, *Q_{t+1}*), the compounded monthly market-adjusted stock return over year *t* (*MOMENTUM_t*), the log of market equity (*MV_t*), and firm age (*AGE_t*).¹⁶ The next set of controls measure profitability and financial strength: cash and short-term investments (*CASH_t*), book leverage (*BOOKLEV_t*), retained earnings (*RETEARN_t*), and the return-on-assets ratio (*ROA_t*).

2.6 Descriptive statistics

Summary statistics for our sample firms are in Table 1, Panel B. Our key dependent variables are changes in investment scaled by lagged total assets. An average firm exhibits a 0.3% year-on-year change in R&D. This figure becomes 0.4% when adding advertising and 1% when further adding capital expenditure inferred from the balance sheet.

The sensitivity of newly-vesting equity, *NEWLYVESTING* has a mean (median) of \$3.6 million (\$1.3 million), with a mean of \$2.5 million (\$1 million) coming from newly-vesting options (shares). The sample means for *RATIO* and *RATIOALL* are 0.43 and 0.12, respectively,

¹⁶ As in Asker et al. (2014), our results are robust to using sales growth rates between year *t* and *t+1*, and *t-1* and *t*, as an alternative proxy for growth opportunities to *Q_t* and *Q_{t+1}*.

and the medians are 0.39 and 0.09. The coefficient of variation (standard deviation divided by the mean) of *NEWLYVESTING* is 0.7 when computed separately for each CEO and then averaged, suggesting significant within-firm variation in the *NEWLYVESTING* measure.¹⁷

3. Investment

3.1 Equity vesting: main tests

To test our hypothesis that newly-vesting equity is associated with managerial myopia, we run the following panel regression (omitting the firm subscript for brevity):

$$\begin{aligned} \Delta INVESTMENT_{t+1} = & \alpha + \beta_1 NEWLYVESTING_{t+1} + \beta_2 UNVESTEDADJ_t + \beta_3 VESTED_t + \\ & \gamma OTHER_CONTROLS_t + \varepsilon_t, \end{aligned} \quad (3)$$

where $\Delta INVESTMENT_{t+1}$ is the change in one of the six investment variables from year t to $t+1$. We measure *NEWLYVESTING* over year $t+1$, the same time period as $\Delta INVESTMENT$, because the CEO knows at the start of year $t+1$ how much equity will vest over that year, and so may cut investment accordingly. Our hypothesis is that $\beta_1 < 0$: newly-vesting equity is associated with a fall in investment. As control variables, we include *UNVESTEDADJ_t*, *VESTED_t*, and *OTHER_CONTROLS_t*, a vector of the additional controls described in Section 2.5.

We use firm fixed effects to control for both firm-level heterogeneity in investment opportunities and CEO preferences towards investment, use year fixed effects to control for common shocks to investment opportunities, and cluster standard errors at the firm level. The

¹⁷ To obtain another estimate of the within-firm variation of *NEWLYVESTING*, we run a regression of *NEWLYVESTING* on firm fixed effects. The standard deviation of the residuals from this regression – our measure of within-firm variation – is \$3.3 million compared to the sample standard deviation of \$6.4 million.

inclusion of firm fixed effects means that our identification is based on the time-series variation in *NEWLYVESTING* within a firm, which is sizable as discussed in Section 2.6.

Table 2, Panel A presents the core result of the paper. It shows that impending vesting of equity is significantly negatively associated with growth in five of the six investment measures – all except *CAPEX*. A stronger effect for the investment measures that contain R&D is consistent with the fact that it is directly expensed, and so cutting R&D is a more effective way of increasing earnings than reducing *CAPEX*. These results are also economically significant. For example, an interquartile increase in *NEWLYVESTING* is associated with a 0.11 percentage point decline in ΔRD (the growth in R&D/assets), which corresponds to 37% of the average growth in R&D/assets, 2% of the average R&D/assets ratio, and an average decline in R&D of \$1 million per year based on the median total assets of \$882 million. To our knowledge, these results are the first to link a measure of the CEO's myopic incentives to real investment decisions.

The coefficient on *UNVESTEDADJ* is insignificant in all specifications, consistent with the ambiguous effect of unvested equity on investment. *VESTED* is positive and significant in two specifications, weakly consistent with the idea that at least some of the already-vested equity represents long-term holdings. *SALARY* and *BONUS* are insignificant in all specifications. Thus, *NEWLYVESTING* captures myopic incentives over and above those provided by salaries and bonuses, and induces disinvestment even though we consider the potential deterrent to myopia provided by unvested equity holdings.

Other control variables load with the expected signs. Investment growth is positively related to investment opportunities, as measured by Tobin's Q and momentum, and negatively related to market equity and age. It is positively related to measures of the firm's ability to fund

investment, as measured by cash holdings, retained earnings, the negative of book leverage, and the return-on-assets ratio.

3.2 *Equity vesting: robustness tests*

In Table 2, Panel A, we have the level of $NEWLYVESTING_{t+1}$ as the explanatory variable of interest and include firm fixed effects. The regression thus tests whether investment falls from the previous year's level when newly-vesting equity is high relative to the firm mean. Alternatively, one could ask whether investment falls when newly-vesting equity is high relative to the previous year's level. In Table 2, Panel B, we replace equity incentive variables as well as controls with the changes in these variables from the previous year. The results are very similar.

Our main specifications convert options to share equivalents using their deltas. The delta depends on the options' time-to-maturity. However, if CEOs exercise their options shortly after they vest, the options' time-to-maturity overestimate their effective horizons. In Panel C of Table 2, we repeat the main tests using intrinsic values rather than deltas to calculate the sensitivities of newly-vesting options. Thus, we assign a delta of one to all in-the-money options, and zero to all out-of-the-money options, because only the former would be exercised immediately upon vesting. The results are unchanged. We use deltas in our main specification as, even if an option is out of the money at the start of the year (when we calculate our deltas), it may become in the money later in the year when it vests, and the delta captures this likelihood. In the Online Appendix Table OA1, Panel A, we repeat the main tests using option deltas but assume that all options have the same (short) time to maturity of one year, and again obtain consistent results.

Another concern is that $NEWLYVESTING_{t+1}$ is correlated with P_t and thus investment opportunities at the start of year $t+1$. Such correlation could stem from two sources. First, $NEWLYVESTING$ is the delta of the CEO's vesting equity multiplied by P_t . The multiplication is

necessary to obtain an incentive measure that reflects the CEO's wealth gain from increasing the stock price by a percentage (rather than dollar) amount; without it, our results become stronger.¹⁸ Second, the delta of vesting options is itself increasing in the stock price. Increases in the stock price may both augment *NEWLYVESTING* and reflect superior investment opportunities. Such a channel will lead to a positive correlation between *NEWLYVESTING* and investment, which is the opposite of what we find. In addition, Table 2, Panel A already includes the price-based controls Q_t , Q_{t+1} , $MOMENTUM_t$, and MV_t . In the Online Appendix, we conduct additional robustness checks to address any residual correlation. In Table OA1, Panel B, rather than using an option's actual delta, we assume a delta of 0.7, which is the mean delta in our sample. In Panel C, we assume that all options are at-the-money, which removes the dependence of the estimated delta on the current stock price, but still allows for deltas to vary across firms according to volatility and other inputs. Both panels show that the results are unchanged.

As a final robustness test, Panel D includes a duration measure used by Gopalan et al. (2014) as an additional control. *DURATION* is the weighted average of the vesting periods of a CEO's total equity holdings, with each equity grant's weight being the ratio of its delta to the aggregate delta.¹⁹ The coefficient on *NEWLYVESTING* remains significantly negative in the same five out of the six regressions, while the coefficient on *DURATION* is negative and insignificant. These results are consistent with our discussion in Section 2.1: *NEWLYVESTING* captures more directly a CEO's incentives to increase the current stock price.

¹⁸ An alternative measure of incentives that is independent of the stock price would be to divide *NEWLYVESTING* by the firm's market capitalization, to give the CEO's effective equity stake in the firm as a percentage of shares outstanding (rather than as a dollar value), as in the Jensen and Murphy (1990) incentives measure. This measure captures the dollar change in the CEO's wealth for a \$1 increase in firm value, and is thus not comparable across firms of different size: a \$1 increase in firm value is much less significant in a large firm than in a small firm.

¹⁹ The results are similar when using three other calculations of duration featured in Gopalan et al. (2014). One takes into account all components of compensation (salary, bonus, and equity), weighting each tranche by its dollar value (also as in Cadman and Sunder (2014)). The two other calculations are analogous to the first two but excluding pre-2006 grants, as these grants require additional assumptions. We thank Radha Gopalan for kindly providing this data.

3.3 *Equity vesting: alternative measures of equity incentives and investment*

In Table 2, we control for *UNVESTEDADJ* and *VESTED* by including them as additional regressors. An alternative specification is to use them to scale *NEWLYVESTING* and have *RATIO* or *RATIOALL* as the key explanatory variables.

Table 3, Panel A shows that *RATIO* is significantly negatively related to changes in R&D, scaled by lagged total assets. An interquartile increase in *RATIO* is associated with a 0.16% fall in ΔRD , 53% of the sample mean ΔRD , and 3% of the sample mean *RD*. This result remains significant when adding changes in advertising but not capital expenditure to the dependent variable. Panel B shows similar results using *RATIOALL*. Table OA2 repeats the robustness tests described in Section 3.2 with the two equity ratios, and obtains consistent results.

While Tables 2 and 3 study changes in investment, Table 4 uses a measure of abnormal discretionary expenditure developed in Roychowdhury (2006). To construct this measure, we regress discretionary expenses (the sum of R&D, advertising, and SG&A) on the lagged sales-to-assets ratio and the inverse of lagged assets for each fiscal year and 2-digit SIC industry. The abnormal expense *ABDISEXP* – a measure of a firm’s real earnings management – is the residual from this regression. Unlike $\Delta INVESTMENT$, which measures the change in investment from the previous year, *ABDISEXP* is a deviation of expenditure from an industry benchmark. The coefficients on all three vesting measures – *NEWLYVESTING*, *RATIO*, and *RATIOALL* – are negative, and are statistically significant for the first two measures. An inter-quartile increase in *NEWLYVESTING* is associated with a 0.3% decline in abnormal discretionary expenses.

3.4 *Equity sales*

The analysis in Section 3.1 studies the responsiveness of investment to newly-vesting equity. A broader question is how investment responds to the CEO’s anticipated equity sales, which can

stem from channels other than vesting. In Stein (1989), the manager's myopic incentives arise because he expects to sell equity soon, but the model is ambivalent about the cause of such sales. Anticipated sales could arise when a CEO voluntarily holds already-vested equity as a long-term investment, but later decides to sell it to rebalance his portfolio or meet an anticipated liquidity need. Since such sales are endogenous, we estimate the effect of sales on investment using a two-stage least squares ("2SLS") procedure with *NEWLYVESTING* as an instrument for sales.

We calculate *STOCKSOLD*, the dollar value of the actual equity sold by the CEO, from the Thomson Financial Insider Trading database, which is compiled from Form 4 filed with the SEC. We classify an insider trade as "sale" if the transaction is flagged as "Disposition" in Table 1 of Form 4. We multiply the number of shares sold during year $t+1$ by P_t .

Table 5, Panel A shows that the sensitivity of newly-vesting equity is highly correlated with equity sales. *STOCKSOLD* has a Pearson (Spearman) correlation of 0.377 (0.393) with *NEWLYVESTING*, both significant at the 1% level. Panel B presents the 2SLS results. The left-hand side gives the first-stage results and, consistent with Panel A, shows that our instrument satisfies the relevance criterion: *NEWLYVESTING* is significantly related to *STOCKSOLD* at the 1% level. The right-hand side presents the second-stage results. Predicted equity sales (*FIT_STOCKSOLD*) are positively and significantly associated with reductions in the same five measures of investment as in Table 2, Panel A – all except $\Delta CAPEX$. An interquartile increase in *STOCKSOLD* is associated with a 0.25 percentage point decline in the growth of R&D/assets, 84% of the average growth of R&D/assets and 4.6% of the average R&D/assets ratio.

4. Earnings Announcements

4.1 Meeting or beating analyst forecasts

If vesting equity increases the CEO's stock price concerns, he may engage in myopic actions (such as cutting investment) to avoid announcing earnings per share (EPS) below analyst expectations, since missing earnings targets typically leads to a large price decline (Bartov, Givoly, and Hayn (2002)). This section therefore investigates the relationship between newly-vesting equity and the likelihood that a firm beats the analyst consensus. (For brevity, we use the verb "beat" to refer to weakly beating analyst consensus.)

Finding a positive relationship would provide further evidence – separate to that in Section 3 – that vesting equity is associated with myopic actions. Moreover, it would help distinguish between the two potential explanations for the results of Section 3. A positive relationship would be consistent with vesting equity causing managers to inflate earnings, potentially through reductions in investment, but could not be explained by boards designing contracts so that equity vests when investment opportunities decline.

Figure 1 plots the frequency of the earnings surprise – the difference between reported earnings and the mean analyst consensus forecast – separately for firms with *NEWLYVESTING* in the top and the bottom tercile of the sample. Analyst forecasts and reported EPS are taken from I/B/E/S. To calculate analyst consensus, we delete stale forecasts made at least 90 days prior to the fiscal quarter end, as is standard, and require a firm to have at least three analysts after this deletion. For each analyst, we take the most recent forecast before the announcement.

The number of quarters in which the reported EPS beats (misses) the analyst consensus is markedly higher (lower) for firms in the top *NEWLYVESTING* tercile than the bottom tercile. The difference is greatest for earnings announcements that beat the forecast by a small margin,

consistent with the manager's incentives to inflate earnings being strongest when earnings were close to the forecast. For the bottom tercile of *NEWLYVESTING*, 9.5% of announcements beat the forecast by less than one cent. This figure is 12.0% for the top tercile, an increase of 25.8%.

We now run the following regression on a panel of quarterly earnings announcements:

$$BEAT_{t+1} = \alpha + \beta_1 NEWLYVESTING_{t+1} + \beta_2 UNVESTEDADJ_t + \beta_3 VESTED_t + \gamma OTHER_CONTROLS2_t + \varepsilon_t. \quad (4)$$

*BEAT*_{*t*+1} is one for quarters in which the firm's reported EPS beats the analyst consensus and zero otherwise. We also rerun (4) using the dependent variables *BEATBELOW*_{*t*+1}, which equals 1 if the firm beats the consensus forecast by 1 cent or less, and *BEATABOVE*_{*t*+1}, which equals 1 if the firm beats the consensus forecast by more than 1 cent. We predict that the coefficient on *NEWLYVESTING* is especially strong for *BEATBELOW*_{*t*+1}.

*OTHER_CONTROLS2*_{*t*} is a vector of additional controls previously shown to affect the likelihood of beating earnings forecasts (e.g., Matsumoto (2002), Davis, Soo, and Trompeter (2009)). We use *Q*, *MV*, *ROA*, and *AGE*, as in the investment regressions. We also include *INSTIPCT*, percentage institutional ownership from Thomson's CDA/Spectrum database (form 13F); *ALY_N*, the log of one plus the number of analysts covering the firm; *HORIZON*, the log of one plus the mean average forecasting horizon (the number of days between an analyst forecast date and the earnings announcement date), to measure forecast staleness; *ALY_DISP*, analyst forecast dispersion, the standard deviation of analyst forecasts scaled by the absolute value of the mean consensus forecast; and *POSUE* (positive seasonal unexpected earnings), a dummy

variable that equals one if the reported EPS exceeds that of the same quarter in the prior fiscal year, and zero otherwise. We also include Fama-French 12-industry fixed effects.

Table 6 presents the results. Column (1) shows that newly-vesting equity is positively associated with the likelihood of beating analyst forecasts, with the coefficient on *NEWLYVESTING* significant at the 10% level. The significance increases to 5% in column (2) for *BEATBELOW1*, the likelihood of beating the analyst forecast by up to one cent. In contrast, *BEATABOVE1* is unrelated to vesting. Table OA3 in the Online Appendix finds similar results using 2 cents and 3 cents as the cutoff.²⁰

A potential alternative explanation for the results in Table 6 is reverse causality. Some of the manager's equity may exhibit performance-based vesting, and good earnings announcements may cause the stock price to rise and trigger vesting.²¹ This mechanism would suggest a particularly strong relationship between vesting equity and the likelihood of beating earnings forecasts by a wide margin, contrary to our results. We conduct further analyses to address this explanation. Gopalan et al. (2014) report that 35.3% of stock in the Equilar dataset exhibits performance-based vesting, compared with only 1.9% of options, and so the concern is significant for stock but not options. The summary statistics of Table 1, Panel B show that the mean and median values of newly-vesting options are over 2.5 and 5 times larger than those of newly-vesting stock. Thus, *NEWLYVESTING* is predominantly comprised of options, for which performance-based vesting is rare. Columns (4) and (5) of Table 6 replace *NEWLYVESTING*

²⁰ Matsunaga and Park (2001) find that missing an earnings benchmark is associated with a small decline in the CEO's ex-post bonus, but do not study the clustering of earnings announcements just above the consensus forecast (or real outcomes such as investment).

²¹ Note that performance-based vesting is not a plausible explanation for the investment results in Tables 2-5 because it suggests a positive relation between vesting and investment, contrary to our findings. Performance-based vesting is triggered after high stock returns, when investment opportunities are also likely to be high. Moreover, all regressions in Tables 2-5 control for past stock returns. See Bettis, Bizjak, Coles, and Kalpathy (2010) for a study of equity with performance-based vesting.

with the separate variables *NEWLYVESTINGSTOCK* and *NEWLYVESTINGOPTION*. Column (4) shows that in the regression with *BEATBELOW1* as the dependent variable, only the coefficient on *NEWLYVESTINGOPTION* is significant. Thus, our results are not driven by performance-vesting stock. Column (5) shows that *BEATABOVE1* is unrelated to both components of vesting equity.

Overall, the results of Table 6 show that vesting equity is positively associated with marginally beating earnings forecasts, supporting the hypothesis that vesting causes managers to act myopically but inconsistent with the idea that boards of directors set vesting periods to coincide with investment opportunity cycles.

4.2 *Linking R&D cuts to meeting or beating analyst forecasts*

So far we show in two separate tests that vesting equity is associated with reductions in R&D and other discretionary expenses (Sections 3.1 and 3.3) and a higher likelihood that a firm marginally beats the consensus forecast (Section 4.1). In this section, we explore the extent to which the two pieces of evidence are related: whether CEOs with vesting equity are more likely to cut R&D if it allows them to meet the forecast.

We define *CUTANDBEAT* as a firm-quarter in which the firm beats the forecast but would have missed it if its R&D expense were the same as in the same quarter of the previous year. We start by computing a hypothetical EPS (*HEPS*) for each quarter defined as:

$$HEPS_t = EPS_t + (R\&D_t(1-\tau) - R\&D_{t-4}(1-\tau))/Shares\ Outstanding_t \quad (5)$$

Subscripts t and $t-4$ denote quarters, and τ is the firm's after-interest marginal tax rate in the fiscal year of quarter t from Blouin, Core, and Guay (2010). A firm-quarter is defined as $CUTANDBEAT=1$ if $HEPS_t < Forecast_t$ and $EPS_t \geq Forecast_t$, and 0 otherwise.

We conduct logistic regressions on a panel of firm-quarters with the dependent variable equal to one for quarters classified as *CUTANDBEAT*, and zero otherwise:

$$Prob(CUTANDBEAT_t) = \alpha + \beta_1 NEWLYVESTING_y + \beta_2 UNVESTEDADJ_{y-1} + \beta_3 VESTED_{y-1} + \gamma OTHER_CONTROLS_t + \varepsilon_t, \quad (6)$$

The regression is estimated on three different panels for robustness: the full panel of 15,667 firm-quarters with non-missing I/B/E/S data and the full set of controls, a subset of 6,695 firm-quarters in which the firm has positive R&D in the previous year ($R\&D_{t-4} > 0$), and a subset of 2,435 firm-quarters in which the firm has positive R&D in the previous year and cuts R&D relative to quarter $t-4$ ($R\&D_{t-4} > 0$ and $\Delta R\&D_t < 0$ with $\Delta R\&D_t = (R\&D_t - R\&D_{t-4})/AT_{t-4}$). In each panel, 582 firm-quarters have *CUTANDBEAT*=1. The controls are similar to those in the main tests in Table 2, except that the variables with a subscript $t-1$ are computed for the prior fiscal quarter using Compustat quarterly files, and those with a subscript y are computed for the fiscal year of quarter t using Compustat annual files. We also include $R\&D_{t-4}$, since a higher level may provide greater scope to cut.

Table 7 shows that *NEWLYVESTING* is significantly positively associated with the probability of *CUTANDBEAT* in all three panels. For example, column (3) shows that, within firm-quarters with R&D cuts, the frequency of *CUTANDBEAT* increases from 20.8% to 25.1% (21% increase in odds) when *NEWLYVESTING* rises by one standard deviation around its mean.

As a robustness check, we conduct a slightly modified test which restricts the sample to firm-quarters in which (1) the firm would have missed the analyst forecast if its R&D expense remained at the same level as in the same quarter of the prior year ($t-4$), and (2) the firm would

have beaten the forecast by cutting its R&D expense relative to that quarter.²² Table OA4 in the Online Appendix shows a positive relationship between R&D cuts and *NEWLYVESTING* within this subsample, but no relationship for a subsample of firms for which an R&D cut would have no impact on beating the forecast.

4.3 *Market reaction to earnings announcements*

Our results thus far show that managers with significant vesting equity are more likely to reduce investment and marginally beat earnings forecasts. In this section, we study the separate question of whether the market rationally takes into account managers' myopic tendencies. In the Stein (1989) "signal-jamming" equilibrium, myopic managers inflate earnings in an attempt to increase the stock price, but the market correctly discounts the reported earnings and all firms are efficiently priced. Thus, managers with higher vesting equity should not enjoy higher earnings announcement returns on average. Even though managers do not succeed in misleading the market, they are trapped into inflating earnings as the market discounts whatever earnings they report. Hence, the market is efficient and managers rationally, but inefficiently, underinvest. An alternative scenario is one in which the market does not anticipate the managers' myopic behavior – either because it lacks information on managers' incentives, or because it has information but is inefficient.²³ Then, the market would respond positively on average to earnings announcements by myopic managers, since they beat analyst forecasts more frequently and the market does not realize that positive surprises may be due to inflation.

²² The test is similar to Bushee (1998) except that he investigates whether firms cut R&D to prevent earnings falling below the previous year's level (rather than to beat analyst forecasts).

²³ von Lilienfeld-Toal and Ruenzi (2014) find that the stock market does not incorporate information contained in standard measures of CEO incentives.

We distinguish between these two scenarios by testing whether, controlling for the earnings surprise, the market's response is less positive for CEOs with significant vesting equity, because it believes the earnings have been inflated. We run the following regression:

$$CAR_{t+1} = \alpha + \beta_1 NEWLYVESTING_{t+1} + \beta_2 UNVESTEDADJ_t + \beta_3 VESTED_t + \gamma_1 BEAT_{t+1} + \gamma_2 NEWLYVESTING_{t+1} \times BEAT_{t+1} + \gamma_3 DIF_{t+1} + \delta OTHER_CONTROLS_t + \varepsilon_t, (7)$$

CAR_{t+1} is the (-1, +1) three-day market-adjusted return to a quarterly earnings announcement in year $t+1$. In our previous regressions, the dependent variable was a $t+1$ decision affected by the manager, such as investment or earnings, and the manager knows $NEWLYVESTING_{t+1}$ at the time of this decision since he observes his own contract. Here, it is investors who determine CAR_{t+1} , and they are typically unable to calculate $NEWLYVESTING_{t+1}$ accurately using our equation (1) until the year $t+1$ proxy statement is disclosed. FAS 123R only requires firms to disclose the amounts of vested and unvested equity holdings, but not the vesting schedules of the unvested holdings. However, investors may be able to estimate how much equity will vest in the coming year, for example, using information in past proxy statements (see Gopalan et al. (2014) for a possible methodology) and the footnote to Form 4. Also, in some cases, firms voluntarily disclose the vesting schedule of each equity grant in their proxy filings – i.e., the filings contain additional information not in Equilar. To account for this, we divide the equity variables $NEWLYVESTING_{t+1}$, $UNVESTEDADJ_t$, and $VESTED_t$ into terciles and use the ranks instead of the raw variables in the regressions. This specification assumes that the market can estimate which tercile of vesting equity a firm will fall into, even though it may be unable to predict exactly where within a tercile it will fall. Our results remain robust to using quintiles or deciles.

The regressions also include $BEAT_{t+1}$ and DIF_{t+1} , the earnings surprise. $OTHER_CONTROLS4$ is a vector of control variables previously shown to be correlated with announcement returns, taken predominantly from Savor and Wilson (2013). $LEVERAGE$ is the ratio of total debt to the sum of total debt and book equity. $PASTRET(1Y)$ is the cumulative monthly industry-adjusted return over the year prior to the announcement and $PASTRET(1M)$ is the industry-adjusted return in the month prior to the announcement. We include $Q4$, a dummy variable for the last quarter of a fiscal year, because the Q4 announcement sometimes coincides with the release of a proxy statement. $ANNRET(LAG1)$, $ANNRET(LAG2)$, $ANNRET(LAG3)$, and $ANNRET(LAG4)$ are earnings announcement returns for quarters -1 to -4, to control for serial correlation in announcement returns (Abarbanell and Bernard (1992)). We include industry fixed effects and cluster standard errors by announcement day.

Table 8 presents the results. Column (1) omits the explanatory variables involving $BEAT$ and DIF , i.e., does not control for the magnitude of the earnings announcement. $NEWLYVESTING$ is insignificant, suggesting that the market does not respond more positively to earnings announcements from CEOs with more vesting equity. While Table 6 shows that such CEOs are more likely to beat analyst expectations, column (1) of Table 8 shows that the market does not respond any more favorably to their earnings reports, potentially because it expects that they have been inflated. The result also suggests market efficiency: an investor cannot earn abnormal returns by trading a stock prior to an earnings announcement based on its $NEWLYVESTING$ tercile. Column (2) adds $BEAT$ and DIF as additional controls. Consistent with the literature, $BEAT$ is positive and highly significant. Interestingly, $NEWLYVESTING$ is now significantly negative: for a given earnings surprise, the market responds less positively if the CEO has

significant newly-vesting equity. Increasing the *NEWLYVESTING* tercile rank by one lowers the announcement return by 0.28 percentage points.

Column (3) adds an interaction term between *BEAT* and *NEWLYVESTING*. This interaction term is significantly negative. Thus, the negative association between *NEWLYVESTING* and announcement returns documented in column (2) is driven by earnings announcements that exceed the forecast, as these announcements are particularly suggestive of earnings inflation. Increasing the *NEWLYVESTING* tercile rank by one lowers the market response to beating a forecast by 1.22 percentage points, versus the average response of 2.46%.²⁴ In sum, we find that, although managers with more vesting equity are more likely to beat earnings forecasts, doing so does not lead to a more positive market response on average. These findings suggest that, at least to some extent, the stock market recognizes managers' incentives to inflate earnings when a significant amount of their equity vests.

5. Conclusion

This paper studies the link between equity vesting and real investment decisions. We construct a new empirical measure of a CEO's myopic incentives that corresponds closely to theories of managerial myopia: the stock price sensitivity of equity vesting over the next year. This measure is driven by equity grants made several years prior and thus unlikely to be correlated with current investment opportunities. We show that newly-vesting equity is significantly negatively related to various measures of investment, and also to an industry-adjusted real earnings management measure. It is positively related to the likelihood that a firm

²⁴ Note that the coefficient on *NEWLYVESTING* is now positive. It implies that increasing the *NEWLYVESTING* tercile by one mitigates the negative reaction to missing an earnings forecast by 0.5 percentage points compared to the baseline of -3.6%. One potential interpretation is that the market infers that the manager has not inflated earnings, despite his myopic incentives, mitigating the negative response to missing the forecast.

marginally beats the analysts' earnings forecast, and the likelihood of the manager cutting R&D to meet earnings targets. Interestingly, the market responds less positively to beating earnings forecasts when a significant amount of the CEO's equity vests. These results suggest that investors rationally discount good earnings news when they expect earnings to be inflated, as in Stein (1989). More generally, our paper contributes to the broader literature on executive compensation by suggesting that CEO contracts can have real effects.

While we have shown that investment is negatively related to newly-vesting equity, the reduction in investment need not be inefficient. For example, if managers tend to overinvest due to empire-building, a fall in investment would bring it closer to the optimal level. Even if the reduction in investment induced by the CEO's contract is inefficient, this does not mean that his contract is inefficient overall. Boards of directors may recognize that short-vesting equity leads to underinvestment, but trade this off against the costs of longer-term contracts. Such contracts may expose the manager to risks outside his control, and cause him to demand a risk premium. Moreover, even if long-vesting equity encourages investment today, it may deter investment in future years. Brisley (2006) shows that long-vesting options may become deep in the money before the manager can exercise them, and the resulting large equity position may make the manager more risk-averse and lead him to reduce investment.

More broadly, our measure of myopic incentives, the sensitivity of stock and options vesting over the upcoming year, is relatively easy to construct, and potentially usable in wider contexts than investment decisions. In future research, it would be interesting to study whether it is linked to other examples of myopic behavior.

Appendix A: A simple model of myopia

This section presents a simple myopia model showing that the manager's incentives to engage in myopia are positively related to $\alpha_t \omega_t P_t$, the dollar value of his newly-vesting equity, and clarifies how this measure compares to other measures of CEO incentives such as unvested equity or duration. Assume that the manager's wealth is given by equation (1) in the main paper and that he can cut investment in year t by m_t . Doing so increases the short-term stock price P_t by a factor m_t , and reduces future stock prices P_{t+s} by a factor $1/2 g_s m_t^2$ (where P_{t+s} is the "baseline" stock price in year $t+s$ in the absence of myopia). The parameter $g_s \geq 0$ allows for flexibility in both the magnitude and timing of the long-run value erosion. For example, cutting investment in a long-term project may not reduce stock prices until far into the future, and so we will have $g_s = 0$ for low s .²⁵ Cutting investment also costs the manager $1/2 c m_t^2$. This term captures any personal cost to the manager of engaging in myopia not captured in the reduction in his long-term equity holdings. For example, it takes effort to change investment plans (particularly to get changes through board scrutiny). In addition, reducing the firm's long-run value may lower his reputation and increase the risk of being fired.

The manager chooses myopia m_t to maximize:

$$S_t + \alpha_t [\omega_t P_t (1 + m_t) + \sum_{s=1}^T \omega_{t+s} E(P_{t+s}) (1 - \frac{1}{2} g_s m_t^2)] - \frac{1}{2} c m_t^2, \quad (\text{A1})$$

which yields the solution

$$m = \frac{\alpha_t \omega_t P_t}{c + \alpha_t \sum_{s=1}^T \omega_{t+s} E(P_{t+s}) g_s}. \quad (\text{A2})$$

The numerator in equation (A2), $\alpha_t \omega_t P_t$, corresponds to our *NEWLYVESTING* measure. The equation therefore suggests a positive link between myopia and *NEWLYVESTING* ($\alpha_t \omega_t P_t$). In other words, CEOs with larger *NEWLYVESTING* should be more likely to reduce investment, which is what we test empirically. The model shows that myopia m also depends on two other factors (the two terms in the denominator), which are generally more difficult to measure than $\alpha_t \omega_t P_t$. The first factor is the non-pecuniary cost of engaging in myopia, c . The second factor is the future value erosion of the CEO's unvested equity holdings, $\alpha_t \sum_{s=1}^T \omega_{t+s} E(P_{t+s}) g_s$. Importantly, the size of the erosion depends on the time and magnitude at which myopia reduces the stock price. For example, if $g_1 = g_2 = 0$, equity vesting in years $t+1$ and $t+2$ will be unaffected. It is very difficult to measure g_s empirically.

The above framework allows us to compare *NEWLYVESTING* to other measures of CEO incentives such as unvested equity and duration. Starting with the former, the manager's

²⁵ In general, we will have $g_{s+1} \geq g_s$: if the myopic action lowers the price in year t , it will also lower the price in year $t+1$; however, this assumption is not necessary for the analysis.

unvested equity holdings (*UNVESTEDADJ*) correspond to $\alpha_t(1-\omega_t)P_t$. This is an imperfect proxy for the $\alpha_t \sum_{s=1}^T \omega_{t+s} E(P_{t+s}) g_s$ term in the denominator. This proxy is imperfect because future-vesting equity can either exacerbate or mitigate myopia. The effect depends on how a myopic action in year t is expected to affect the price in year $t+s$. One scenario is that the price boost induced by myopia in year t persists until $t+s$, so that an equity grant vesting in $t+s$ encourages myopia. (Our simple model can be easily extended to accommodate a persistent effect; note that the positive link between myopia and *NEWLYVESTING* ($\alpha_t \omega_t P_t$) would continue to hold.) Alternatively, by year $t+s$, the price could revert back to the level expected in the absence of myopia ($g_s = 0$), in which case equity vesting in $t+s$ would have no effect, or decline even further ($g_s < 0$), in which case equity vesting in $t+s$ would discourage myopic behavior in year t . Thus, to provide a clear measure of myopic incentives, future equity grants would have to be weighted by the g_s parameters, which are difficult to estimate. In a similar vein, Laux (2012) argues that future-vesting equity could increase rather than mitigate myopia: if unvested holdings are forfeited upon dismissal, then such holdings may cause the manager to act myopically to avoid being fired. Nevertheless, to assess whether *NEWLYVESTING* induces myopia even when taking unvested equity into account, we use *UNVESTEDADJ* as a standard control in all specifications where *NEWLYVESTING* is the independent variable of interest. In other specifications, we use *RATIO* or *RATIOALL* as the independent variable of interest, which includes *UNVESTEDADJ* in the denominator.

The ambiguity of the effects of future-vesting equity on myopia is also relevant for the duration measure. Duration averages the vesting horizons across all equity tranches held by the CEO, including those vesting in the future (i.e., it corresponds to $\frac{\alpha_t P_t \sum_{s=1}^T s \omega_{t+s-1}}{\alpha_t P_{t+S}}$ or $\sum_{s=1}^T s \omega_{t+s-1}$).

Another possible advantage of *NEWLYVESTING* is that it considers the magnitude of the dollar gain from increasing P_t . For example, duration (and our ratio measures) treat a CEO with only one share of stock vesting in year $t=1$ (roughly) the same as a CEO with a million shares, all vesting in $t=1$. To the extent that the magnitude of dollar incentives matters for investment decisions (see equation (A2)), this provides another reason for why *NEWLYVESTING* may be a clearer determinant of investment than either ratios or duration.

Appendix B: Definition of variables

This appendix describes the calculation of variables used in the core analysis. Underlined variables refer to variable names within Compustat.

Variable	Definition
CEO incentives from equity vesting	
$NEWLYVESTING_{t+1}$	The dollar change in the value of newly-vesting equity in year $t+1$ for a 100% change in the stock price, calculated as $NEWLYVESTINGSTOCK$ (the number of newly-vesting shares in year $t+1$ \times stock price at the end of year t) plus $NEWLYVESTINGOPTION$ (aggregated delta of newly-vesting options in year $t+1$ \times stock price at the end of year t). The delta of an option is calculated using the Black-Scholes formula. The inputs (i.e., dividend yield, risk-free interest rate, and volatility) to the Black-Scholes formula are those associated with a firm's newly-awarded options in year t from Equilar, and if unavailable, replaced with those associated with a firm's newly-awarded options in year $t+1$ from Equilar, followed by year t 's inputs from ExecuComp (or year $t+1$'s if year t 's are missing), and by year t 's inputs from Compustat (or year $t+1$'s if year t 's are missing), in that order;
$UNVESTED_t$	The dollar change in the value of unvested equity in year t for a 100% change in the stock price, calculated as $UNVESTEDSTOCK$ (the total number of unvested share including unvested LTIP shares \times stock price, both at the end of year t) plus $UNVESTEDOPTION$ (aggregated delta of unvested options \times stock price, both at the end of year t). Delta is calculated similarly as above;
$UNVESTEDADJ_t$	The sum of $\max(UNVESTEDSTOCK_t - NEWLYVESTINGSTOCK_{t+1}, 0)$ and $\max(UNVESTEDOPTION_t - NEWLYVESTINGOPTION_{t+1}, 0)$;
$VESTED_t$	The dollar change in the value of already-vested equity in year t for a 100% change in the stock price, calculated as $VESTEDSTOCK$ (the number of already-vested shares \times stock price, both at the end of year t) plus $VESTEDOPTION$ (aggregated delta of already-vested options \times stock price, both at the end of year t). Delta is calculated similarly as above;
$RATIO_t$	The ratio of $NEWLYVESTING_{t+1}$ to the sum of $NEWLYVESTING_{t+1}$ and $UNVESTEDADJ_t$;
$RATIOALL_t$	The ratio of $NEWLYVESTING_{t+1}$ to the sum of $NEWLYVESTING_{t+1}$, $UNVESTEDADJ_t$, and $VESTED_t$;
$NEWLYVESTINGIN_{t+1}$ ($UNVESTEDIN_t$, $UNVESTEDADJIN_t$, $VESTEDIN_t$)	Similar to $NEWLYVESTING_{t+1}$, except that options' deltas are replaced with their intrinsic values, i.e., delta is set to 1 for all in-the-money options and is set to zero for all out-of-the-money options (calculations are analogous for all measures with a postfix of IN);
$DURATION_t$	One duration measure constructed by Gopalan et al. (2014), defined as the weighted average of the vesting periods of a CEO's total equity holdings, with each equity grant's weight being the ratio of its delta to the aggregate delta;
Stock sold	
$STOCKSOLD_{t+1}$	The number of shares sold in year $t+1$ \times stock price at the end of year t ;
Change in investment	
ARD_{t+1}	Change in R&D expenditures (\underline{XRD}) from year t to $t+1$, scaled by total assets (\underline{AT}) at the end of year t . Missing R&D expenditures are set to zero;
$ARDAD_{t+1}$	Change in the sum of R&D expenditures (\underline{XRD}) and advertising expenses (\underline{XAD}) from year t to $t+1$, scaled by total assets at the end of year t . Missing R&D

expenditures and advertising expenses are set to zero;

$\Delta CAPEX_{t+1}$	Change in capital expenditures (<u>CAPEX</u>) from year t to $t+1$, scaled by total assets at the end of year t . Missing capital expenditures are set to zero;
$\Delta RDADCAPEX_{t+1}$	Change in the sum of R&D expenditures (<u>XRD</u>), advertising expenses (<u>XAD</u>), and capital expenditures (<u>CAPEX</u>) from year t to $t+1$, scaled by total assets at the end of year t . Missing R&D expenditures, advertising expenses, and capital expenditures are set to zero;
$\Delta CAPEXALL_{t+1}$	Change in annual increase in gross fixed assets (<u>PPEGT</u>) from year t to $t+1$ (i.e., $(PPEGT_{t+1} - PPEGT_t) - (PPEGT_t - PPEGT_{t-1})$), scaled by total assets at the end of year t . Missing <u>PPEGT</u> are replaced with net fixed assets (<u>PPENT</u>) if available;
$\Delta RDADCAPEXALL_{t+1}$	Change in the sum of R&D expenditures (<u>XRD</u>), advertising expenses (<u>XAD</u>), and annual increase in gross fixed assets (<u>PPEGT</u>) from year t to $t+1$, scaled by total assets at the end of year t . Missing R&D expenditures and advertising expenses are set to zero and missing <u>PPEGT</u> replaced with <u>PPENT</u> if available;
$ABDISEXP_{t+1}$	Abnormal discretionary expenses measure based on Roychowdhury (2006). To compute the measure, we estimate normal discretionary expenses, $NDISEXP_{i,t+1}$ for each firm-year as the fitted values from a cross-sectional regression of :

$$\frac{DISEXP_{i,t+1}}{ASSET_{i,t}} = \beta_0 + \beta_1 \frac{1}{ASSET_{i,t}} + \beta_2 \frac{SALE_{i,t}}{ASSET_{i,t}} + \varepsilon_{i,t+1}$$

The regression is estimated separately within each industry-year using all Compustat firms (excluding financial and utilities firms). Industries are classified based on 2-digit SIC codes. $DISEXP$ are the sum of R&D expenditures (XRD), advertising expenses (XAD), and selling, general and administrative expenses (XSGA), with missing values set to zero. $SALE$ and $ASSET$ are the sales revenue and total assets. Abnormal discretionary expenses are then calculated as:

$$ABDISEXP_{i,t+1} = (DISEXP_{i,t+1} / ASSET_{i,t}) - NDISEXP_{i,t+1};$$

Control variables

Q_{t+1}	Tobin's Q at the end of year $t+1$, calculated as [market value of equity (<u>PRCC_F</u> × <u>CSHPRI</u>) plus liquidating value of preferred stock (<u>PSTKL</u>) plus book value of debt (<u>DLTT</u> + <u>DLC</u>) minus balance sheet deferred taxes and investment tax credit (<u>TXDITC</u>)] divided by total assets (<u>AT</u>) at the end of year t .
Q_t	Tobin's Q at the end of year t ;
MV_t	Natural logarithm of market value of equity at the end of year t (<u>PRCC_F</u> × <u>CSHPRI</u>);
$MOMENTUM_t$	A firm's compounded market-adjusted monthly stock returns over the twelve months in year t , with market-adjusted monthly stock return calculated as the firm's monthly raw stock return minus the corresponding monthly return on the CRSP value-weighted index;
AGE_t	Natural logarithm of one plus a firm's age, approximated by the number of years listed on Compustat, as the end of year t ;
$CASH_t$	Cash and short-term investments (<u>CHE</u>) at the end of year t divided by total assets at the end of year t ;
$BOOKLEV_t$	Book value of debt (<u>DLTT</u> + <u>DLC</u>) at the end of year t divided by total assets at the end of year t ;
$RETEARN_t$	Balance sheet retained earnings (<u>RE</u>) at the end of year t divided by total assets at the end of year t ;
ROA_t	Return-on-assets ratio, calculated as net income (<u>NI</u>) during year t divided by the average total assets of year t ;

<i>SALARY_t</i>	CEO's salary in year <i>t</i> ;
<i>BONUS_t</i>	CEO's cash bonus in year <i>t</i> ;
<i>Additional variables used in the earnings forecast analysis</i>	
<i>BEAT_{t+1}</i>	A dummy variable that equals one if the reported EPS is more than or equal to mean analyst consensus forecast in a given quarter and zero otherwise;
<i>BEATBELOW_{t+1}</i>	A dummy variable that equals one if the reported EPS falls between mean analyst consensus forecast and that plus one cent in a given quarter;
<i>BEATABOVE_{t+1}</i>	A dummy variable that equals one if the reported EPS exceeds mean analyst consensus forecast plus one cent in a given quarter;
<i>INSTIPCT_t</i>	The total percentage of shares owned by institutional investors at the end of the 4 th quarter of year <i>t</i> ;
<i>ALY_N_{t+1}</i>	Natural logarithm of one plus the number of analysts;
<i>HORIZON_{t+1}</i>	Natural logarithm of one plus the mean average forecasting horizon, with forecasting horizon being the number of days between an analyst forecast date and earnings announcement date;
<i>ALY_DISP_{t+1}</i>	Analyst forecast dispersion, calculated as the standard deviation of analyst forecasts scaled by the absolute value of the mean analyst consensus forecast;
<i>POSUE_{t+1}</i>	A dummy variable that equals one if the reported EPS in a given quarter exceeds that of the same quarter last fiscal year and zero otherwise;
<i>Additional variables used in the logit regressions of R&D cuts</i>	
<i>CUTANDBEAT_t</i>	A dummy variable that equals one for fiscal quarters in which a firm (1) meets or beats the analysts' consensus earnings forecast, and (2) the firm would have missed the forecast if its R&D expense remained at the same level as in the same quarter of the prior fiscal year. To construct the dummy, we first compute a hypothetical EPS (HEPS) for each quarter defined as: $HEPS_t = EPS_t + (R\&D_t(1-\tau) - R\&D_{t-4}(1-\tau))/Shares\ Outstanding_t$ Subscripts <i>t</i> and <i>t-4</i> denote quarters, and τ is the firm's after-interest marginal tax rate in the fiscal year of quarter <i>t</i> from Blouin, Core, and Guay (2010). A firm-quarter is classified as <i>CUTANDBEAT</i> if $HEPS_t < Forecast_t$ and $EPS_t \geq Forecast_t$;
<i>R&D_{t-4}</i>	R&D expense (<i>XRDQ</i>) in quarter <i>t-4</i> divided by assets at the end of quarter <i>t-4</i> ;
<i>Additional variables used in the earnings announcement analysis</i>	
<i>CAR_{t+1}</i>	Cumulative market adjusted return from day -1 to +1 around the quarterly earnings announcement in year <i>t+1</i> . Market adjusted daily returns are computed by subtracting from the stock's raw return the return on the CRSP value-weighted NYSE/AMEX/NASDAQ index;
<i>DIF_{t+1}</i>	Difference between the reported EPS and the mean analyst consensus forecast;
<i>LEVERAGE_t</i>	Sum of long-term and short-term debt divided by the sum of the short-term and long term debt, and the book value of equity;
<i>PASTRET(1Y)</i>	Cumulative monthly industry adjusted return over the twelve month prior to the earnings announcement in percent;
<i>PASTRET(1M)</i>	Monthly industry adjusted return for the month prior to the earnings announcement in percent;
<i>Q4</i>	A dummy variable to indicate the 4 th quarter of a fiscal year;
<i>ANNRET(LAG1-4)</i>	Cumulative market adjusted returns from day -1 to +1 around the quarterly earnings announcements in the quarters -1 to -4 relative to the current quarter. The computation is the same as for the current quarter.

Appendix C: A numerical example

This appendix illustrates the calculation steps to derive equity incentives for one CEO in our sample, along with the company's disclosure tables retrieved from Equilar for the two fiscal years on which the calculations are based. As an example, we use James McCann, CEO of 1-800 Flowers.com, Inc. and calculate the stock price sensitivity of his newly-vesting equity for the fiscal year ended on June 30th, 2009 (*NEWLYVESTING*), that of his unvested equity for the fiscal year ended on June 30th, 2008 (*UNVESTED*), and that of his already-vested equity for the fiscal year ended on June 30th, 2008 (*VESTED*).

First, we obtain option data from Equilar for James McCann:

B.1 Outstanding options as reported in Equilar				
	Equity Type	Number of Securities	Exercise Price	Expiration Date
<i>As of June 30th, 2009</i>				
(1)	Unexercisable Options	10,000	\$ 8.45	12/2/14
(2)	Unexercisable Options	20,000	\$ 6.52	10/13/15
(3)	Unexercisable Options	224,109	\$ 3.11	5/5/16
(4)	Exercisable Options	39,810	\$ 12.44	12/17/09
(5)	Exercisable Options	82,730	\$ 11.58	8/2/11
(6)	Exercisable Options	200,000	\$ 12.87	1/11/12
(7)	Exercisable Options	200,000	\$ 6.42	9/23/12
(8)	Exercisable Options	170,148	\$ 6.70	3/24/13
(9)	Exercisable Options	29,852	\$ 6.70	3/24/13
(10)	Exercisable Options	40,000	\$ 8.45	12/2/14
(11)	Exercisable Options	30,000	\$ 6.52	10/13/15
<i>As of June 30th, 2008</i>				
(12)	Unexercisable Options	20,000	\$ 8.45	12/2/14
(13)	Unexercisable Options	30,000	\$ 6.52	10/13/15
(14)	Exercisable Options	39,810	\$ 12.44	12/17/09
(15)	Exercisable Options	82,730	\$ 11.58	8/2/11
(16)	Exercisable Options	200,000	\$ 12.87	1/11/12
(17)	Exercisable Options	200,000	\$ 6.42	9/23/12
(18)	Exercisable Options	170,148	\$ 6.70	3/24/13
(19)	Exercisable Options	29,852	\$ 6.70	3/24/13
(20)	Exercisable Options	30,000	\$ 8.45	12/2/14
(21)	Exercisable Options	20,000	\$ 6.52	10/13/15

B.2 Newly granted options as reported in Equilar					
	Equity Type	Grant Date	Number of Securities	Exercise Price	Expiration Date
(22)	Newly Granted Options	5/5/09	224,109	\$ 3.11	5/5/16

To calculate the number of newly-vesting options for fiscal year 2009 and unvested/already-vested options at the end of fiscal year 2008, we match and group the outstanding options by exercise price (*EXERPRC*) and expiration date (*EXPDATE*). We then infer the number of newly-vesting options from the following relationship:

$$NEWLYVESTINGOPTIONNUM (EXERPRC_p, EXPDATE_d)_{t+1} = UNVESTEDOPTIONNUM (EXERPRC_p, EXPDATE_d)_t + NEWOPTIONNUM (EXERPRC_p, EXPDATE_d)_{t+1} - UNVESTEDOPTIONNUM (EXERPRC_p, EXPDATE_d)_{t+1}$$

After identifying the number of newly-vesting, unvested, and already-vested securities, we then input into the Black-Scholes formula the risk-free rate, volatility, and dividend yield from Equilar and calculate each option's delta, grant-by-grant. The risk-free rate is not available for fiscal year 2008, so we replace it with the risk-free rate of 0.027 from fiscal year 2009. Similarly, we replace the missing volatility and dividend yield for fiscal year 2008 with the volatility of 0.7237 and the dividend yield of 0 from fiscal year 2009.

B.3 Calculated number and delta of newly-vesting, unvested, and already-vested options							
Calculated number of options	Equity Type	Number of Securities	Exercise Price	Expiration Date	Term as of 6/30/08	Z	Delta
<i>As of June 30th, 2009</i>							
(12) - (1)	Newly-vesting Options	10,000	\$ 8.45	12/2/14	6.4275	0.865	8,064
(13) - (2)	Newly-vesting Options	10,000	\$ 6.52	10/13/15	7.2904	1.072	8,582
(22) - (3)	Newly-vesting Options	0	\$ 3.11	5/5/16			
							ΣDelta=16,646
<i>As of June 30th, 2008</i>							
(12)	Unvested Options	20,000	\$ 8.45	12/2/14	6.4275	0.865	16,128
(13)	Unvested Options	30,000	\$ 6.52	10/13/15	7.2904	1.072	25,746
							ΣDelta=41,874
(14)	Already-vested Options	39,810	\$ 12.44	12/17/09	1.4659	-0.266	15,724
(15)	Already-vested Options	82,730	\$ 11.58	8/2/11	3.0904	0.242	49,266
(16)	Already-vested Options	200,000	\$ 12.87	1/11/12	3.5344	0.243	119,174
(17)	Already-vested Options	200,000	\$ 6.42	9/23/12	4.2356	0.825	159,041
(18)+(19)	Already-vested Options	200,000	\$ 6.70	3/24/13	4.7342	0.844	160,152
(20)	Already-vested Options	30,000	\$ 8.45	12/2/14	6.4275	0.865	24,192
(21)	Already-vested Options	20,000	\$ 6.52	10/13/15	7.2904	1.072	17,164
							ΣDelta=544,714

To calculate the price-sensitivity measures of options, we multiply the deltas calculated above by the closing stock price of \$6.45 at the end of fiscal year 2008. James McCann's *NEWLYVESTINGOPTION* during fiscal year 2009 is therefore calculated as $16,646 \times 6.45 = 107,366.7$, and his *UNVESTEDOPTION* and *VESTEDOPTION* at the end of fiscal year 2008 as $41,874 \times 6.45 = 270,087.3$ and $544,714 \times 6.45 = 3,513,405.3$, respectively.

Second, we obtain share data from Equilar for James McCann:

B.4 Shares held as reported in Equilar						
Shares Acquired on Vesting of Stock for the year ended on June 30th 2009 (a)	Total Unvested Shares for the year ended on June 30th 2008 (b)	Total Unvested IP Shares for the year ended on June 30th 2008 (c)	Unvested Shares for the year ended on June 30th 2008 = (b) + (c)	Shares Held for the year ended on June 30th 2008 (d)	Options Exercisable Within 60 Days of Proxy Date for the year ended on June 30th 2008 (e)	Already-vested Shares for the year ended on June 30th 2008 = (d) – (e)
67,434	33,000	277,677	310,677	36,775,359	792,540	35,982,819

To calculate the price-sensitivity measures of shares, we multiply the number of shares above by the closing stock price of \$6.45 at the fiscal year end of 2008. James McCann's *NEWLYVESTINGSTOCK* during fiscal year 2009 is therefore calculated as $67,434 \times 6.45 = 434,949.3$, and his *UNVESTEDSTOCK* and *VESTEDSTOCK* at the end of fiscal year 2008 as $310,677 \times 6.45 = 2,003,866.65$ and $35,982,819 \times 6.45 = 232,089,182.55$, respectively.

Finally, we sum the sensitivity measures of options and shares to construct the variables used in the main specification, *NEWLYVESTING*, *UNVESTEDADJ*, *VESTED*, *RATIO*, and *RATIOALL*.

B.5 Variables used in the main specification				
<i>NEWLYVESTING</i>	<i>UNVESTEDADJ</i>	<i>VESTED</i>	<i>RATIO</i>	<i>RATIOALL</i>
542,316	1,731,637.95	235,602,587	0.238	0.002

Table 1: Sample selection and summary statistics**Panel A: Sample selection**

Firm-CEO-years in Equilar for which we can calculate the price sensitivity of newly-vesting equity in year $t+1$, and that of unvested and already-vested equity in year t for the sample period of fiscal year 2007 to 2010	9,385
(-) Observations missing COMPUSTAT data to calculate investment measures and control variables, and observations missing CRSP monthly returns to calculate momentum	(320)
(-) Observations associated with financial firms (SICs between 6000 and 6999)	(2,010)
(-) Observations associated with utility firms (SICs between 4900 and 4949)	(325)
Number of Firm-CEO-years in the final sample	6,730
Number of unique firms in the final sample	2,047

Table 1 (Cont'd)

Panel B: Summary statistics

Variable	N	Mean	SD	5%	25%	Median	75%	95%
<i>CEO incentives from equity vesting</i>								
<i>NEWLYVESTINGSTOCK_{t+1}</i>	6,730	1,007,672	2,203,651	0	0	127,564	926,250	5,142,500
<i>NEWLYVESTINGOPTION_{t+1}</i>	6,730	2,539,718	5,062,821	0	173	660,451	2,496,377	11,700,000
<i>NEWLYVESTING_{t+1}</i>	6,730	3,626,232	6,372,761	0	310,737	1,257,137	3,917,051	15,900,000
<i>UNVESTEDSTOCK_t</i>	6,730	3,746,586	7,785,361	0	0	792,389	3,645,577	17,700,000
<i>UNVESTEDOPTION_t</i>	6,730	5,339,176	10,300,000	0	0	1,370,083	5,440,901	24,500,000
<i>UNVESTED_t</i>	6,730	9,337,752	15,700,000	0	841,833	3,341,484	10,400,000	39,500,000
<i>UNVESTEDADJ_t</i>	6,730	5,656,486	10,200,000	0	346,113	1,835,151	6,132,905	25,000,000
<i>VESTEDSTOCK_t</i>	6,730	55,900,000	191,000,000	72,775	1,629,998	6,123,997	22,800,000	244,000,000
<i>VESTEDOPTION_t</i>	6,730	12,600,000	25,900,000	0	288,680	2,828,472	11,900,000	60,400,000
<i>VESTED_t</i>	6,730	70,400,000	205,000,000	415,985	4,156,739	13,300,000	43,500,000	298,000,000
<i>RATIO_t</i>	6,167	0.431	0.246	0.060	0.273	0.392	0.536	1.000
<i>RATIOALL_t</i>	6,710	0.116	0.116	0.000	0.024	0.090	0.167	0.336
<i>Stock sold</i>								
<i>STOCKSOLD_{t+1}</i>	6,730	4,098,075	11,200,000	0	0	288,069	2,659,125	19,800,000

Table 1(Cont'd)**Panel B (Cont'd)**

Variable	N	Mean	SD	5%	25%	Median	75%	95%
<i>Change in investment</i>								
ΔRD_{t+1}	6,730	0.003	0.029	-0.017	0.000	0.000	0.002	0.037
$\Delta RDAD_{t+1}$	6,730	0.004	0.032	-0.023	0.000	0.000	0.004	0.044
$\Delta CAPEX_{t+1}$	6,730	0.002	0.043	-0.056	-0.009	0.000	0.010	0.061
$\Delta RDADCAPEX_{t+1}$	6,730	0.006	0.065	-0.080	-0.013	0.002	0.019	0.105
$\Delta CAPEXALL_{t+1}$	6,730	0.006	0.106	-0.123	-0.023	0.000	0.024	0.153
$\Delta RDADCAPEXALL_{t+1}$	6,730	0.010	0.123	-0.146	-0.027	0.002	0.034	0.188
<i>Control variables used in the main specification</i>								
Q_{t+1}	6,730	1.848	1.720	0.470	0.835	1.287	2.141	5.358
Q_t	6,730	2.017	2.024	0.470	0.868	1.372	2.333	5.868
MV_t	6,730	6.896	1.599	4.510	5.779	6.712	7.901	9.897
$MOMENTUM_t$	6,730	0.098	0.540	-0.552	-0.220	0.000	0.275	1.072
AGE_t	6,730	2.841	0.731	1.609	2.398	2.773	3.401	4.060
$CASH_t$	6,730	0.204	0.219	0.006	0.040	0.120	0.295	0.688
$BOOKLEV_t$	6,730	0.215	0.218	0.000	0.013	0.173	0.330	0.645
$RETEARN_t$	6,730	-0.191	1.362	-2.403	-0.144	0.163	0.389	0.724
ROA_t	6,730	0.005	0.179	-0.374	-0.012	0.046	0.090	0.190
$SALARY_t$	6,730	670,194	336,489	265,000	429,577	600,000	860,833	1,300,000
$BONUS_t$	6,730	167,704	483,780	0	0	0	58,000	979,620

This panel reports the summary statistics of the main variables used in our multivariate analysis. All variables are winsorized at 1% and 99% level. Variable definitions are listed in Appendix B.

Table 2: The relationship between the change in investment and equity incentives, including newly-vesting equity, adjusted unvested equity, and already-vested equity separately

Panel A: Baseline specifications

Dependent Variables	(1)	(2)	(3)	(4)	(5)	(6)
	ΔRD_{t+1}	$\Delta RDAD_{t+1}$	$\Delta CAPEX_{t+1}$	$\Delta RDAD$ - $CAPEX_{t+1}$	$\Delta CAPEX$ - ALL_{t+1}	$\Delta RDAD$ - $CAPEXALL_{t+1}$
<i>NEWLYVESTING</i> _{t+1}	-0.309** (0.148)	-0.391** (0.165)	-0.205 (0.183)	-0.707** (0.285)	-1.395*** (0.513)	-2.154*** (0.616)
<i>UNVESTEDADJ</i> _t	-0.034 (0.055)	-0.053 (0.068)	0.000 (0.123)	-0.093 (0.168)	0.514 (0.447)	0.478 (0.496)
<i>VESTED</i> _t	-0.004 (0.005)	-0.002 (0.006)	0.039** (0.017)	0.035* (0.018)	0.020 (0.037)	0.016 (0.042)
<i>Q</i> _{t+1}	0.004*** (0.001)	0.004*** (0.001)	0.006*** (0.001)	0.011*** (0.002)	0.021*** (0.003)	0.026*** (0.004)
<i>Q</i> _t	0.003*** (0.001)	0.004*** (0.001)	0.000 (0.001)	0.005*** (0.002)	-0.007*** (0.002)	-0.002 (0.003)
<i>MV</i> _t	-0.005* (0.003)	-0.005* (0.003)	0.004 (0.003)	-0.003 (0.005)	-0.005 (0.008)	-0.014 (0.010)
<i>MOMENTUM</i> _t	0.004*** (0.001)	0.004*** (0.002)	0.010*** (0.002)	0.016*** (0.003)	0.020*** (0.005)	0.027*** (0.006)
<i>AGE</i> _t	-0.017* (0.010)	-0.017 (0.010)	-0.008 (0.012)	-0.030 (0.019)	0.011 (0.036)	-0.004 (0.041)
<i>CASH</i> _t	0.024** (0.010)	0.027** (0.011)	0.089*** (0.014)	0.123*** (0.022)	0.274*** (0.033)	0.315*** (0.041)
<i>BOOKLEV</i> _t	-0.004 (0.010)	-0.006 (0.011)	-0.045*** (0.014)	-0.060*** (0.021)	-0.123*** (0.043)	-0.137*** (0.049)
<i>RETEARN</i> _t	0.008** (0.004)	0.008** (0.004)	-0.000 (0.002)	0.009* (0.006)	-0.007 (0.007)	0.007 (0.009)
<i>ROA</i> _t	0.027** (0.013)	0.036** (0.014)	0.010 (0.011)	0.051** (0.022)	0.007 (0.027)	0.059* (0.035)
<i>SALARY</i> _t	0.007 (0.052)	-0.014 (0.069)	-0.084 (0.119)	-0.134 (0.150)	0.011 (0.250)	-0.049 (0.280)
<i>BONUS</i> _t	-0.001 (0.007)	-0.000 (0.008)	0.001 (0.020)	0.005 (0.023)	0.034 (0.052)	0.047 (0.057)
Intercept	0.073** (0.030)	0.071** (0.032)	-0.017 (0.036)	0.078 (0.055)	-0.038 (0.109)	0.051 (0.126)
Observations	6,730	6,730	6,730	6,730	6,730	6,730
Adjusted R ²	0.403	0.425	0.320	0.406	0.233	0.273

This panel reports the ordinary least squares (“OLS”) regression results on the relationship between the CEO’s vesting equity and investment. Variable definitions are listed in Appendix B. *NEWLYVESTING*, *UNVESTEDADJ*, and *VESTED* are in billions, and *SALARY* and *BONUS* are in ten millions. Standard errors are in parentheses, adjusted for heteroskedasticity, and clustered by firm. Year and firm fixed effects are included in all columns. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 2 (Cont'd)

Panel B: Changes-in-changes specifications

Dependent Variables	(1)	(2)	(3)	(4)	(5)	(6)
	ΔRD_{t+1}	$\Delta RDAD_{t+1}$	$\Delta CAPEX_{t+1}$	$\Delta RDAD$ - $CAPEX_{t+1}$	$\Delta CAPEX$ - ALL_{t+1}	$\Delta RDAD$ - $CAPEXALL_{t+1}$
$\Delta NEWLYVESTING_{t+1}$	-0.339** (0.141)	-0.378*** (0.142)	-0.159 (0.192)	-0.632** (0.262)	-1.488*** (0.536)	-2.091*** (0.609)
$\Delta UNVESTEDADJ_t$	-0.054 (0.049)	-0.099* (0.056)	-0.185 (0.113)	-0.305** (0.145)	-0.601* (0.361)	-0.744* (0.394)
$\Delta VESTED_t$	-0.006 (0.006)	-0.002 (0.006)	0.039** (0.016)	0.034* (0.020)	0.052 (0.043)	0.047 (0.046)
ΔQ_{t+1}	0.000 (0.001)	0.000 (0.001)	0.003*** (0.001)	0.005*** (0.002)	0.013*** (0.003)	0.014*** (0.003)
ΔQ_t	0.001 (0.001)	0.001 (0.001)	0.001 (0.001)	0.002 (0.002)	0.001 (0.002)	0.002 (0.002)
ΔMV_t	0.005* (0.003)	0.006** (0.003)	0.015*** (0.003)	0.022*** (0.005)	0.001 (0.008)	0.009 (0.009)
$\Delta MOMENTUM_t$	0.000 (0.001)	-0.000 (0.001)	-0.001 (0.002)	-0.000 (0.003)	0.014*** (0.005)	0.015*** (0.005)
$\Delta CASH_t$	0.003 (0.009)	0.003 (0.010)	0.038*** (0.011)	0.040** (0.018)	0.156*** (0.028)	0.172*** (0.034)
$\Delta BOOKLEV_t$	-0.005 (0.011)	-0.003 (0.012)	-0.046*** (0.013)	-0.063*** (0.022)	-0.128*** (0.033)	-0.122*** (0.040)
$\Delta RETEARN_t$	0.005 (0.004)	0.007 (0.005)	-0.003 (0.004)	0.004 (0.007)	-0.002 (0.008)	0.013 (0.013)
ΔROA_t	0.011 (0.008)	0.015* (0.009)	0.000 (0.010)	0.020 (0.015)	-0.011 (0.022)	0.022 (0.025)
$\Delta SALARY_t$	-0.041 (0.104)	0.016 (0.136)	-0.030 (0.216)	-0.041 (0.281)	-0.416 (0.469)	-0.398 (0.545)
$\Delta BONUS_t$	-0.011 (0.007)	-0.003 (0.009)	0.014 (0.028)	0.013 (0.033)	0.133** (0.061)	0.142** (0.065)
Intercept	0.006*** (0.001)	0.006*** (0.001)	0.011*** (0.002)	0.019*** (0.003)	0.011** (0.005)	0.016*** (0.006)
Observations	4,378	4,378	4,378	4,378	4,378	4,378
Adjusted R ²	0.493	0.513	0.397	0.468	0.326	0.368

This panel reports the OLS regression results on the relationship between the CEO's vesting equity and investment. Variable definitions are listed in Appendix B. *NEWLYVESTING*, *UNVESTEDADJ*, and *VESTED* are in billions, and *SALARY* and *BONUS* are in ten millions. The prefix Δ denotes the change from year $t-1$ to t for variables with subscript t and from year t to $t+1$ for variables with subscript $t+1$. Standard errors are in parentheses, adjusted for heteroskedasticity, and clustered by firm. Year and firm fixed effects are included in all columns. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 2 (Cont'd)

Panel C: Baseline specification with option delta replaced with its intrinsic value

Dependent Variables	(1)	(2)	(3)	(4)	(5)	(6)
	ΔRD_{t+1}	$\Delta RDAD_{t+1}$	$\Delta CAPEX_{t+1}$	$\Delta RDAD$ - $CAPEX_{t+1}$	$\Delta CAPEX$ - ALL_{t+1}	$\Delta RDAD$ - $CAPEXALL_{t+1}$
<i>NEWLYVESTINGIN</i> _{t+1}	-0.292** (0.114)	-0.392*** (0.126)	-0.147 (0.127)	-0.650*** (0.201)	-1.248*** (0.376)	-1.961*** (0.446)
<i>UNVESTEDADJIN</i> _t	-0.004 (0.052)	0.000 (0.064)	-0.015 (0.089)	-0.038 (0.133)	0.495 (0.341)	0.543 (0.385)
<i>VESTEDIN</i> _t	-0.006 (0.005)	-0.002 (0.006)	0.046*** (0.016)	0.043** (0.018)	0.010 (0.036)	0.004 (0.040)
<i>Q</i> _{t+1}	0.004*** (0.001)	0.004*** (0.001)	0.005*** (0.001)	0.011*** (0.002)	0.021*** (0.003)	0.026*** (0.003)
<i>Q</i> _t	0.003*** (0.001)	0.004*** (0.001)	0.000 (0.001)	0.005*** (0.001)	-0.007*** (0.002)	-0.002 (0.003)
<i>MV</i> _t	-0.005** (0.002)	-0.005** (0.002)	0.004 (0.002)	-0.003 (0.004)	-0.005 (0.007)	-0.015* (0.008)
<i>MOMENTUM</i> _t	0.004*** (0.001)	0.004*** (0.001)	0.010*** (0.002)	0.016*** (0.002)	0.020*** (0.004)	0.027*** (0.005)
<i>AGE</i> _t	-0.017** (0.008)	-0.017* (0.009)	-0.009 (0.010)	-0.030** (0.015)	0.010 (0.030)	-0.004 (0.034)
<i>CASH</i> _t	0.024*** (0.009)	0.027*** (0.009)	0.089*** (0.011)	0.123*** (0.018)	0.274*** (0.027)	0.315*** (0.035)
<i>BOOKLEV</i> _t	-0.004 (0.009)	-0.006 (0.009)	-0.045*** (0.011)	-0.060*** (0.017)	-0.124*** (0.036)	-0.138*** (0.041)
<i>RETEARN</i> _t	0.008*** (0.003)	0.008** (0.003)	-0.000 (0.002)	0.009** (0.005)	-0.007 (0.006)	0.006 (0.008)
<i>ROA</i> _t	0.027** (0.011)	0.036*** (0.011)	0.010 (0.009)	0.051*** (0.018)	0.008 (0.022)	0.060** (0.029)
<i>SALARY</i> _t	0.004 (0.043)	-0.019 (0.058)	-0.089 (0.099)	-0.145 (0.125)	0.006 (0.207)	-0.062 (0.233)
<i>BONUS</i> _t	-0.002 (0.006)	-0.000 (0.006)	0.002 (0.017)	0.005 (0.019)	0.036 (0.043)	0.048 (0.047)
Intercept	0.074*** (0.025)	0.071*** (0.026)	-0.013 (0.030)	0.083* (0.046)	-0.037 (0.091)	0.054 (0.104)
Observations	6,730	6,730	6,730	6,730	6,730	6,730
Adjusted R ²	0.403	0.425	0.320	0.406	0.233	0.273

This panel reports the OLS regression results on the relationship between the CEO's vesting equity and investment, replacing the option delta with its intrinsic value. Variable definitions are listed in Appendix B. *NEWLYVESTINGIN*, *UNVESTEDADJIN*, and *VESTEDIN* are in billions, and *SALARY* and *BONUS* are in ten millions. Standard errors are in parentheses, adjusted for heteroskedasticity, and clustered by firm. Year and firm fixed effects are included in all columns. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 2 (Cont'd)

Panel D: Baseline specification controlling for duration

Dependent Variables	(1)	(2)	(3)	(4)	(5)	(6)
	ΔRD_{t+1}	$\Delta RDAD_{t+1}$	$\Delta CAPEX_{t+1}$	$\Delta RDAD$ - $CAPEX_{t+1}$	$\Delta CAPEX$ - ALL_{t+1}	$\Delta RDAD$ - $CAPEXALL_{t+1}$
<i>NEWLYVESTING</i> _{t+1}	-0.130 ** (0.056)	-0.269 *** (0.095)	-0.292 * (0.170)	-0.624 *** (0.215)	-1.693 *** (0.530)	-2.210 *** (0.594)
<i>DURATION</i> _t	-0.001 (0.001)	-0.002 (0.001)	-0.001 (0.002)	-0.004 (0.002)	-0.003 (0.005)	-0.006 (0.005)
<i>UNVESTEDADJ</i> _t	0.074 (0.046)	0.055 (0.066)	-0.063 (0.118)	0.015 (0.160)	0.383 (0.487)	0.479 (0.532)
<i>VESTED</i> _t	-0.001 (0.003)	-0.004 (0.004)	0.045** (0.023)	0.046* (0.026)	0.023 (0.026)	0.021 (0.029)
<i>Q</i> _{t+1}	0.001 (0.001)	0.001 (0.001)	0.006*** (0.002)	0.008*** (0.003)	0.027*** (0.005)	0.030*** (0.006)
<i>Q</i> _t	0.000 (0.001)	0.003** (0.001)	0.001 (0.001)	0.003 (0.002)	-0.011*** (0.004)	-0.009* (0.005)
<i>MV</i> _t	-0.004** (0.002)	-0.003* (0.002)	0.005* (0.003)	0.001 (0.004)	0.001 (0.010)	-0.004 (0.011)
<i>MOMENTUM</i> _t	0.001 (0.001)	0.001 (0.001)	0.009*** (0.002)	0.010*** (0.002)	0.015** (0.007)	0.016** (0.007)
<i>AGE</i> _t	-0.002 (0.005)	0.005 (0.007)	-0.023 (0.019)	-0.021 (0.022)	0.055 (0.049)	0.061 (0.053)
<i>CASH</i> _t	0.023*** (0.007)	0.030*** (0.008)	0.069*** (0.015)	0.105*** (0.019)	0.297*** (0.047)	0.349*** (0.052)
<i>BOOKLEV</i> _t	-0.003 (0.008)	-0.007 (0.010)	-0.059*** (0.015)	-0.064*** (0.019)	-0.129*** (0.048)	-0.137*** (0.053)
<i>RETEARN</i> _t	0.003 (0.005)	0.003 (0.006)	-0.003 (0.005)	-0.000 (0.008)	-0.025 (0.023)	-0.022 (0.025)
<i>ROA</i> _t	0.035*** (0.012)	0.046*** (0.013)	0.008 (0.014)	0.066*** (0.024)	0.036 (0.049)	0.127** (0.058)
<i>SALARY</i> _t	-0.005 (0.047)	-0.027 (0.088)	0.001 (0.155)	-0.101 (0.199)	-0.250 (0.281)	-0.354 (0.324)
<i>BONUS</i> _t	-0.001 (0.005)	-0.001 (0.006)	0.012 (0.018)	0.013 (0.022)	0.013 (0.054)	0.022 (0.057)
Intercept	0.031 (0.019)	0.003 (0.027)	0.024 (0.060)	0.041 (0.069)	-0.189 (0.169)	-0.176 (0.185)
Observations	3,433	3,433	3,433	3,433	3,433	3,433
Adjusted R ²	0.423	0.449	0.355	0.409	0.263	0.282

This panel reports the OLS regression results on the relationship between the CEO's vesting equity and investment, controlling for a duration measure introduced by Gopalan et al. (2014). This measure is the weighted average of the vesting periods of a CEO's total equity holdings, with each equity grant's weight being the ratio of its delta to the aggregate delta. Variable definitions are listed in Appendix B. *NEWLYVESTING*, *UNVESTEDADJ*, and *VESTED* are in billions, and *SALARY* and *BONUS* are in ten millions. Standard errors are in parentheses, adjusted for heteroskedasticity, and clustered by firm. Year and firm fixed effects are included in all columns. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 3: The relationship between change in investment and equity incentive ratios**Panel A: Measuring CEO incentives as the ratio of newly-vesting equity to the sum of newly-vesting equity and adjusted unvested equity**

Dependent Variables	(1)	(2)	(3)	(4)	(5)	(6)
	ΔRD_{t+1}	$\Delta RDAD_{t+1}$	$\Delta CAPEX_{t+1}$	$\Delta RDAD$ - $CAPEX_{t+1}$	$\Delta CAPEX$ - ALL_{t+1}	$\Delta RDAD$ - $CAPEXALL_{t+1}$
$RATIO_t$	-0.006** (0.003)	-0.007*** (0.003)	0.002 (0.004)	-0.007 (0.006)	-0.004 (0.012)	-0.017 (0.013)
Q_{t+1}	0.003*** (0.001)	0.004*** (0.001)	0.006*** (0.001)	0.011*** (0.002)	0.021*** (0.003)	0.026*** (0.004)
Q_t	0.003*** (0.001)	0.003*** (0.001)	0.000 (0.001)	0.004** (0.002)	-0.008*** (0.002)	-0.003 (0.003)
MV_t	-0.007** (0.003)	-0.007** (0.003)	0.005* (0.003)	-0.004 (0.005)	-0.005 (0.009)	-0.018 (0.011)
$MOMENTUM_t$	0.004** (0.002)	0.004*** (0.002)	0.010*** (0.002)	0.017*** (0.003)	0.019*** (0.005)	0.027*** (0.006)
AGE_t	-0.020* (0.011)	-0.019 (0.012)	-0.010 (0.012)	-0.034* (0.020)	0.013 (0.039)	-0.003 (0.045)
$CASH_t$	0.019* (0.011)	0.023* (0.012)	0.089*** (0.015)	0.119*** (0.023)	0.268*** (0.035)	0.304*** (0.043)
$BOOKLEV_t$	-0.011 (0.010)	-0.013 (0.011)	-0.037*** (0.014)	-0.058*** (0.021)	-0.100** (0.045)	-0.120** (0.050)
$RETEARN_t$	0.009** (0.004)	0.009** (0.004)	0.000 (0.002)	0.011* (0.006)	-0.001 (0.007)	0.017* (0.009)
ROA_t	0.033** (0.013)	0.041*** (0.014)	0.009 (0.011)	0.057*** (0.021)	0.012 (0.028)	0.077** (0.035)
$SALARY_t$	0.011 (0.051)	0.018 (0.062)	-0.065 (0.128)	-0.077 (0.150)	-0.150 (0.263)	-0.184 (0.285)
$BONUS_t$	-0.006 (0.007)	-0.004 (0.008)	0.003 (0.021)	0.002 (0.024)	0.051 (0.055)	0.060 (0.060)
Intercept	0.097*** (0.033)	0.094*** (0.035)	-0.022 (0.037)	0.101* (0.059)	-0.037 (0.118)	0.088 (0.135)
Observations	6,167	6,167	6,167	6,167	6,167	6,167
Adjusted R ²	0.411	0.437	0.332	0.419	0.245	0.289

This panel reports the OLS regression results on the relationship between the CEO's equity incentives (measured using *RATIO*) and investment. Variable definitions are listed in Appendix B. *SALARY* and *BONUS* are in ten millions. Standard errors are in parentheses, adjusted for heteroskedasticity, and clustered by firm. Year and firm fixed effects are included in all columns. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 3 (Cont'd)

Panel B: Measuring CEO incentives as the ratio of newly-vesting equity to the sum of newly-vesting equity, adjusted unvested equity, and already-vested equity

Dependent Variables	(1)	(2)	(3)	(4)	(5)	(6)
	ΔRD_{t+1}	$\Delta RDAD_{t+1}$	$\Delta CAPEX_{t+1}$	$\Delta RDAD$ - $CAPEX_{t+1}$	$\Delta CAPEX$ - ALL_{t+1}	$\Delta RDAD$ - $CAPEXALL_{t+1}$
<i>RATIOALL_t</i>	-0.019** (0.008)	-0.021** (0.008)	-0.003 (0.009)	-0.029** (0.015)	-0.014 (0.030)	-0.054 (0.035)
<i>Q_{t+1}</i>	0.003*** (0.001)	0.004** (0.001)	0.006** (0.001)	0.011** (0.002)	0.021** (0.003)	0.026** (0.004)
<i>Q_t</i>	0.003*** (0.001)	0.003*** (0.001)	0.000 (0.001)	0.005** (0.002)	-0.008** (0.002)	-0.002 (0.003)
<i>MV_t</i>	-0.006** (0.003)	-0.006** (0.003)	0.005* (0.003)	-0.003 (0.005)	-0.005 (0.008)	-0.015 (0.010)
<i>MOMENTUM_t</i>	0.004*** (0.001)	0.004*** (0.002)	0.010*** (0.002)	0.016*** (0.003)	0.019*** (0.005)	0.027*** (0.006)
<i>AGE_t</i>	-0.017* (0.010)	-0.017* (0.010)	-0.011 (0.012)	-0.033* (0.019)	0.006 (0.036)	-0.010 (0.042)
<i>CASH_t</i>	0.024** (0.010)	0.027** (0.011)	0.088*** (0.014)	0.122*** (0.022)	0.272*** (0.033)	0.313*** (0.042)
<i>BOOKLEV_t</i>	-0.004 (0.010)	-0.007 (0.011)	-0.045*** (0.014)	-0.061*** (0.021)	-0.121*** (0.043)	-0.134*** (0.049)
<i>RETEARN_t</i>	0.008** (0.004)	0.008** (0.004)	-0.000 (0.002)	0.009 (0.006)	-0.007 (0.007)	0.007 (0.009)
<i>ROA_t</i>	0.027** (0.013)	0.036*** (0.014)	0.010 (0.011)	0.051** (0.022)	0.008 (0.027)	0.060* (0.035)
<i>SALARY_t</i>	-0.018 (0.051)	-0.045 (0.070)	-0.073 (0.118)	-0.163 (0.150)	-0.033 (0.250)	-0.152 (0.281)
<i>BONUS_t</i>	-0.001 (0.007)	0.001 (0.008)	0.001 (0.020)	0.006 (0.023)	0.037 (0.052)	0.052 (0.057)
Intercept	0.081*** (0.030)	0.081** (0.032)	-0.015 (0.036)	0.093* (0.055)	-0.025 (0.109)	0.083 (0.125)
Observations	6,710	6,710	6,710	6,710	6,710	6,710
Adjusted R ²	0.404	0.426	0.317	0.405	0.232	0.272

This panel reports the OLS regression results on the relationship between the CEO's equity incentives (measured using *RATIOALL*) and investment. Variable definitions are listed in Appendix B. *SALARY* and *BONUS* are in ten millions. Standard errors are in parentheses, adjusted for heteroskedasticity, and clustered by firm. Year and firm fixed effects are included in all columns. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 4: The relationship between abnormal discretionary expenses and equity incentives

Dependent Variables	(1)	(2)	(3)
		<i>ABDISEXP_{t+1}</i>	
<i>NEWLYVESTING_{t+1}</i>	-0.769* (0.404)		
<i>UNVESTEDADJ_t</i>	-0.001 (0.021)		
<i>VESTED_t</i>	0.116 (0.266)		
<i>RATIO_t</i>		-0.026*** (0.008)	
<i>RATIOALL_t</i>			-0.032 (0.023)
<i>Q_{t+1}</i>	0.018*** (0.003)	0.018*** (0.004)	0.018*** (0.003)
<i>Q_t</i>	0.005* (0.003)	0.004 (0.003)	0.005* (0.003)
<i>MV_t</i>	0.008 (0.008)	0.005 (0.008)	0.005 (0.008)
<i>MOMENTUM_t</i>	-0.001 (0.004)	-0.001 (0.004)	0.000 (0.004)
<i>AGE_t</i>	0.032 (0.025)	0.024 (0.027)	0.035 (0.025)
<i>CASH_t</i>	-0.038 (0.036)	-0.047 (0.037)	-0.038 (0.036)
<i>BOOKLEV_t</i>	-0.131** (0.042)	-0.151*** (0.040)	-0.137*** (0.042)
<i>RETEARN_t</i>	-0.073** (0.013)	-0.074*** (0.014)	-0.074** (0.013)
<i>ROA_t</i>	-0.126*** (0.038)	-0.111*** (0.034)	-0.126*** (0.039)
<i>SALARY_t</i>	0.041 (0.036)	0.047 (0.037)	0.043 (0.037)
<i>BONUS_t</i>	-0.227 (0.206)	-0.146 (0.214)	-0.255 (0.209)
Intercept	-0.065 (0.069)	-0.020 (0.070)	-0.049 (0.069)
Observations	6,005	5,525	5,990
Adjusted R ²	0.91	0.91	0.91

This table reports the OLS regression results on the relationship between the CEO's vesting equity and abnormal discretionary expenses, *ABDISEXP_{t+1}*. Variable definitions are listed in Appendix B. *NEWLYVESTING*, *UNVESTEDADJ*, and *VESTED* are in billions, and *SALARY* and *BONUS* are in ten millions. Standard errors are in parentheses, adjusted for heteroskedasticity, and clustered by firm. Firm fixed effects are included in all columns. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 5: The relationship between change in investment and equity sales**Panel A: Correlations between equity sales and newly-vesting equity**

	Pearson				
Spearman		(i)	(ii)	(iii)	(iv)
(i) $STOCKSOLD_{t+1}$			0.258***	0.330***	0.377***
(ii) $NEWLYVESTINGSTOCK_{t+1}$		0.363***		0.179***	0.600***
(iii) $NEWLYVESTINGOPTION_{t+1}$		0.240***	0.279***		0.923***
(iv) $NEWLYVESTING_{t+1}$		0.393***	0.559***	0.822***	

This panel reports Pearson and Spearman correlations between equity sales ($STOCKSOLD_{t+1}$) and equity vesting ($NEWLYVESTINGSTOCK_{t+1}$, $NEWLYVESTINGOPTION_{t+1}$, and $NEWLYVESTING_{t+1}$). Variable definitions are listed in Appendix B. Pearson (Spearman) correlations are reported above (below) the main diagonal. *** (**) (*) indicates significance at the 1% (5%) (10%) level.

Table 5 (Cont'd)

Panel B: Using newly-vesting equity as an IV for equity sales

Dependent Variables	(1) <i>STOCK-</i> <i>SOLD</i> _{<i>t+1</i>}	(2.1) <i>ARD</i> _{<i>t+1</i>}	(2.2) <i>ARDAD</i> _{<i>t+1</i>}	(2.3) <i>ΔCAPEX</i> _{<i>t+1</i>}	(2.4) <i>ARDAD-</i> <i>CAPEX</i> _{<i>t+1</i>}	(2.5) <i>ΔCAPEX-</i> <i>ALL</i> _{<i>t+1</i>}	(2.6) <i>ARDADCAP-</i> <i>EXALL</i> _{<i>t+1</i>}
<i>NEWLYVESTING</i> _{<i>t+1</i>}	0.328 ^{***} (0.034)						
<i>FIT_STOCKSOLD</i> _{<i>t+1</i>}		-0.942 [*] (0.553)	-1.192 [*] (0.635)	-0.625 (0.585)	-2.154 ^{**} (1.083)	-4.252 ^{**} (1.918)	-6.564 ^{**} (2.631)
<i>UNVESTEDADJ</i> _{<i>t</i>}	-0.022 (0.025)	-0.054 (0.073)	-0.078 (0.089)	-0.013 (0.123)	-0.139 (0.193)	0.422 (0.492)	0.337 (0.593)
<i>VESTED</i> _{<i>t</i>}	0.018 ^{**} (0.002)	0.013 (0.014)	0.020 (0.016)	0.050 ^{**} (0.023)	0.074 ^{**} (0.033)	0.098 [*] (0.059)	0.136 [*] (0.078)
<i>Q</i> _{<i>t+1</i>}	0.001 ^{***} (0.000)	0.004 ^{**} (0.001)	0.005 ^{**} (0.001)	0.006 ^{**} (0.001)	0.012 ^{**} (0.002)	0.024 ^{**} (0.004)	0.031 ^{**} (0.005)
<i>Q</i> _{<i>t</i>}	0.000 [*] (0.000)	0.003 ^{**} (0.001)	0.004 ^{**} (0.001)	0.000 (0.001)	0.005 ^{**} (0.002)	-0.007 ^{**} (0.002)	-0.001 (0.003)
<i>MV</i> _{<i>t</i>}	0.000 (0.000)	-0.006 ^{**} (0.003)	-0.005 [*] (0.003)	0.004 (0.003)	-0.004 (0.005)	-0.007 (0.008)	-0.017 [*] (0.010)
<i>MOMENTUM</i> _{<i>t</i>}	0.001 ^{**} (0.000)	0.005 ^{**} (0.002)	0.005 ^{**} (0.002)	0.010 ^{**} (0.002)	0.018 ^{**} (0.003)	0.022 ^{**} (0.005)	0.031 ^{**} (0.006)
<i>AGE</i> _{<i>t</i>}	-0.002 (0.002)	-0.019 [*] (0.010)	-0.019 [*] (0.011)	-0.010 (0.012)	-0.034 [*] (0.019)	0.002 (0.037)	-0.017 (0.044)
<i>CASH</i> _{<i>t</i>}	0.000 (0.002)	0.024 ^{**} (0.011)	0.027 ^{**} (0.011)	0.089 ^{**} (0.014)	0.123 ^{**} (0.022)	0.274 ^{**} (0.034)	0.315 ^{**} (0.043)
<i>BOOKLEV</i> _{<i>t</i>}	0.001 (0.002)	-0.003 (0.010)	-0.005 (0.011)	-0.044 ^{**} (0.014)	-0.058 ^{**} (0.022)	-0.118 ^{**} (0.044)	-0.129 ^{**} (0.050)
<i>RETEARN</i> _{<i>t</i>}	0.001 ^{**} (0.000)	0.009 ^{**} (0.004)	0.009 ^{**} (0.004)	0.000 (0.002)	0.011 ^{**} (0.006)	-0.004 (0.007)	0.012 (0.010)
<i>ROA</i> _{<i>t</i>}	-0.001 (0.001)	0.026 ^{**} (0.013)	0.034 ^{**} (0.014)	0.009 (0.011)	0.048 ^{**} (0.022)	0.002 (0.027)	0.052 (0.036)
<i>SALARY</i> _{<i>t</i>}	0.073 ^{***} (0.016)	0.076 (0.078)	0.073 (0.097)	-0.038 (0.133)	0.024 (0.199)	0.321 (0.326)	0.430 (0.417)
<i>BONUS</i> _{<i>t</i>}	0.002 (0.004)	0.000 (0.009)	0.002 (0.010)	0.002 (0.020)	0.009 (0.026)	0.041 (0.058)	0.058 (0.068)
Intercept	0.003 (0.009)	0.037 ^{**} (0.014)	0.035 ^{**} (0.015)	-0.020 (0.016)	0.027 (0.026)	-0.009 (0.049)	0.044 (0.058)
Observations	6,730	6,730	6,730	6,730	6,730	6,730	6,730
Adjusted R ² (R ²)	0.421	0.354	0.359	0.304	0.343	0.159	0.138

This panel reports the 2SLS regression results on the relationship between the CEO's equity sales and investment, using *NEWLYVESTING* as an instrumental variable for *STOCKSOLD*. Column (1) presents the first-stage regression results, and columns (2.1)-(2.6) present the second-stage regression results for the six different investment measures. Variable definitions are listed in Appendix B. *FIT_STOCKSOLD* is the fitted value of *STOCKSOLD* from the first-stage regressions. *STOCKSOLD*, *NEWLYVESTING*, *UNVESTEDADJ*, and *VESTED* are in billions, and *SALARY* and *BONUS* are in ten millions. Standard errors are in parentheses, adjusted for heteroskedasticity, and clustered by firm. Year and firm fixed effects are included in all columns. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 6: The relationship between the likelihood of meeting/beating analyst consensus forecast and equity incentives

Dependent Variables	(1)	(2)	(3)	(4)	(5)
	<i>BEAT</i> _{<i>t+1</i>}	<i>BEAT- BELOW</i> _{<i>t+1</i>}	<i>BEAT- ABOVE</i> _{<i>t+1</i>}	<i>BEAT- BELOW</i> _{<i>t+1</i>}	<i>BEAT- ABOVE</i> _{<i>t+1</i>}
<i>NEWLYVESTING</i> _{<i>t+1</i>}	5.566* (3.021) [1.878*]	6.705** (3.262) [1.263**]	-0.173 (2.953) [-0.068]		
<i>NEWLYVESTINGSTOCK</i> _{<i>t+1</i>}				8.834 (9.455) [1.664]	3.194 (7.247) [1.246]
<i>NEWLYVESTINGOPTION</i> _{<i>t+1</i>}				6.936* (3.743) [1.307*]	-1.093 (3.456) [-0.426]
<i>UNVESTEDADJ</i> _{<i>t</i>}	2.596 (2.002)	3.228 (2.093)	0.045*** (0.016)	3.220 (2.091)	-0.450 (1.955)
<i>VESTED</i> _{<i>t</i>}	-0.107 (0.075)	-0.174 (0.107)	-0.052*** (0.008)	-0.167 (0.106)	0.005 (0.085)
<i>MV</i> _{<i>t</i>}	0.018 (0.017)	-0.049** (0.020)	0.248*** (0.090)	-0.050** (0.021)	0.045*** (0.016)
<i>Q</i> _{<i>t</i>}	-0.035*** (0.008)	0.031*** (0.009)	-0.022 (0.023)	0.032*** (0.009)	-0.052*** (0.008)
<i>ROA</i> _{<i>t</i>}	0.480*** (0.088)	0.384*** (0.117)	0.234*** (0.062)	0.384*** (0.117)	0.249*** (0.090)
<i>AGE</i> _{<i>t</i>}	-0.027 (0.024)	-0.001 (0.028)	0.106*** (0.036)	-0.001 (0.028)	-0.022 (0.023)
<i>INSTIPCT</i> _{<i>t</i>}	0.176*** (0.063)	-0.147** (0.072)	0.090*** (0.035)	-0.147** (0.072)	0.234*** (0.062)
<i>ALY_N</i> _{<i>t+1</i>}	0.152*** (0.036)	0.049 (0.044)	-0.042*** (0.015)	0.049 (0.044)	0.106*** (0.036)
<i>HORIZON</i> _{<i>t+1</i>}	0.018 (0.033)	-0.123*** (0.047)	0.806*** (0.024)	-0.122*** (0.047)	0.091*** (0.035)
<i>ALY_DISP</i> _{<i>t+1</i>}	-0.092*** (0.015)	-0.121*** (0.029)	-1.242*** (0.195)	-0.121*** (0.029)	-0.042*** (0.015)
<i>POSUE</i> _{<i>t+1</i>}	0.924*** (0.025)	0.040 (0.029)	-0.457 (1.948)	0.039 (0.029)	0.805*** (0.024)
Intercept	-0.461** (0.190)	-0.277 (0.257)	0.002 (0.086)	-0.272 (0.258)	-1.243*** (0.196)
Observations	17,173	17,173	17,173	17,173	17,173
Pseudo R ²	0.126	0.027	0.091	0.027	0.091

This table reports the probit regression results on the relationship between the CEO's vesting equity and the likelihood of beating the quarterly analyst consensus forecast. Variable definitions are listed in Appendix B. *NEWLYVESTING*, *NEWLYVESTINGSTOCK*, *NEWLYVESTINGOPTION*, *UNVESTEDADJ*, and *VESTED* are in billions. Standard errors are in parentheses, adjusted for heteroskedasticity, and clustered by firm. For *NEWLYVESTING*, *NEWLYVESTINGSTOCK*, and *NEWLYVESTINGOPTION*, the marginal effects (dF/dx) are displayed below the standard errors. Year and industry fixed effects are included in all columns. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Table 7: Linking R&D cuts to meeting or beating analyst forecasts

Dependent Variables	(1)	(2)	(3)
	All firms	Firms with R&D _{t-4} > 0	Firms with R&D cuts
	<i>CUTANDBEAT_t</i> Indicator		
<i>NEWLYVESTING_y</i>	35.469^{***}	31.095^{***}	37.567^{***}
	(11.182)	(10.916)	(13.609)
<i>UNVESTEDADJ_{y-1}</i>	-8.224	-11.245	-0.736
	(8.503)	(8.390)	(8.797)
<i>VESTED_{y-1}</i>	-1.798 ^{**}	-0.987 ^{**}	-0.847 [*]
	(0.549)	(0.439)	(0.469)
<i>Q_{y-1}</i>	-0.290 ^{***}	-0.273 ^{***}	-0.086 [*]
	(0.057)	(0.054)	(0.048)
<i>Q_t</i>	-0.087	-0.067	-0.078
	(0.055)	(0.051)	(0.056)
<i>MV_{t-1}</i>	0.145 ^{**}	0.017	0.057
	(0.068)	(0.070)	(0.069)
<i>MOMENTUM_{t-1}</i>	-0.173	-0.118	-0.039
	(0.114)	(0.111)	(0.116)
<i>AGE_{y-1}</i>	0.181 [*]	0.100	-0.024
	(0.103)	(0.102)	(0.109)
<i>CASH_{t-1}</i>	0.297	-0.495	-0.358
	(0.380)	(0.312)	(0.331)
<i>BOOKLEV_{t-1}</i>	-0.614 [*]	0.024	-0.217
	(0.332)	(0.285)	(0.269)
<i>RETEARN_{t-1}</i>	0.027	0.016	0.032
	(0.077)	(0.056)	(0.054)
<i>ROA_{t-1}</i>	1.987	0.444	0.895
	(1.428)	(1.181)	(1.079)
<i>R&D_{t-4}</i>	31.006 ^{***}	20.528 ^{***}	15.983 ^{***}
	(2.584)	(2.090)	(2.085)
<i>SALARY_{y-1}</i>	-1.907	3.956	0.157
	(2.758)	(2.925)	(3.092)
<i>BONUS_{y-1}</i>	-0.978	0.321	0.663
	(1.777)	(1.542)	(1.385)
Intercept	-4.651	-2.892	-1.726
	(0.483)	(0.455)	(0.461)
<i>Observations(CUTANDBEAT=0)</i>	15,083	6,113	1,853
<i>Observations(CUTANDBEAT=1)</i>	582	582	582
<i>PROB (NEWLYVESTING at Mean-Std/2)</i>	0.020	0.062	0.208
<i>PROB (NEWLYVESTING at Mean+Std/2)</i>	0.027	0.078	0.251
<i>Odds</i>	0.309	0.250	0.207

This table reports the logistic regressions results estimated on the relationship between the CEO's vesting equity and the likelihood of *CUTANDBEAT*, cutting R&D to beat the earnings forecast. Subscript *t* denotes the quarter of the analyst forecast. Subscript *y* denotes the fiscal year to which quarter *t* belongs. Variable definitions are listed in Appendix B. *NEWLYVESTING*, *UNVESTEDADJ*, and *VESTED* are in billions, and *SALARY* and *BONUS* are in ten millions. Standard errors are in parentheses, clustered by firm. *** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively. *PROB* is the implied probability of *CUTANDBEAT*=1, evaluated at the mean of all control variables, and with *NEWLYVESTING* at the mean plus or minus half of its standard deviation.

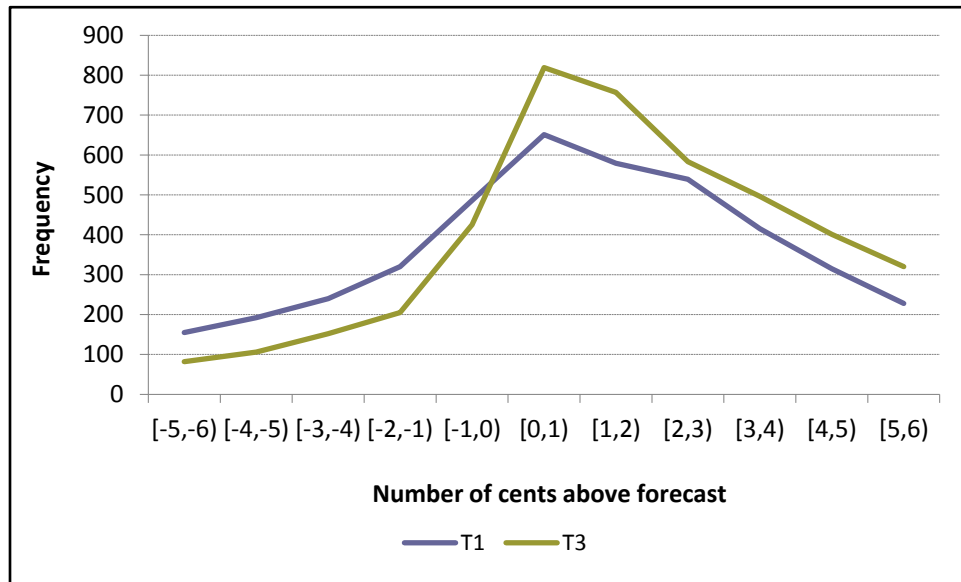
Table 8: The relationship between earnings announcement returns and equity incentives

Dependent Variables	(1)	(2)	(3)
		<i>CAR (-1, +1)</i>	
<i>TERC. NEWLYVESTING</i> _{<i>t+1</i>}	-0.167 (0.139)	-0.278** (0.137)	0.545** (0.212)
<i>TERC. NEWLYVESTING</i> _{<i>t+1</i>} × <i>BEAT</i> _{<i>t+1</i>}			-1.215*** (0.230)
<i>TERC. UNVESTEDADJ</i> _{<i>t</i>}	0.198 (0.140)	0.080 (0.134)	0.093 (0.133)
<i>TERC. VESTED</i> _{<i>t</i>}	0.170 (0.113)	0.102 (0.106)	0.106 (0.106)
<i>DIF</i> _{<i>t+1</i>}		0.332 (0.292)	0.314 (0.284)
<i>BEAT</i> _{<i>t+1</i>}		6.358** (0.203)	7.603*** (0.351)
<i>MV</i> _{<i>t</i>}	-0.193** (0.081)	-0.386*** (0.081)	-0.377*** (0.081)
<i>Q</i> _{<i>t</i>}	-0.049 (0.057)	0.012 (0.054)	0.010 (0.054)
<i>LEVERAGE</i> _{<i>t</i>}	1.549** (0.440)	1.964*** (0.421)	1.937*** (0.420)
<i>PASTRET(1Y)</i>	-0.004 (0.003)	-0.009*** (0.003)	-0.009*** (0.003)
<i>PASTRET(1M)</i>	0.017 (0.011)	0.002 (0.010)	0.001 (0.010)
<i>Q4</i>	0.148 (0.208)	0.375* (0.205)	0.383* (0.205)
<i>ANNRET(LAG1)</i>	-0.016 (0.010)	-0.030*** (0.010)	-0.031*** (0.010)
<i>ANNRET(LAG2)</i>	-0.017* (0.010)	-0.024*** (0.009)	-0.025*** (0.009)
<i>ANNRET(LAG3)</i>	-0.007 (0.009)	-0.008 (0.009)	-0.009 (0.009)
<i>ANNRET(LAG4)</i>	0.010 (0.009)	0.009 (0.008)	0.009 (0.008)
Intercept	-0.352 (1.610)	-2.651* (1.568)	-3.436** (1.559)
Observations	18,686	18,686	18,686
Adjusted R ²	0.007	0.087	0.089

This table reports the OLS regression results on the relationship between the CEO's vesting equity and the cumulative market adjusted returns over days -1 to +1 around the percentage quarterly earnings announcements in year *t+1* (*CAR*_{*t+1*}). Variable definitions are listed in Appendix B. *TERC. NEWLYVESTING*, *UNVESTEDADJ*, and *VESTED* are tercile ranks 0-2 for the vesting variables. Standard errors are in parentheses, clustered by announcement day. Industry fixed effects are included in all columns.

*** (**) (*) indicates significance at the 1% (5%) (10%) two-tailed level, respectively.

Fig. 1: The frequency of earnings surprises around the analyst forecast for high and low *NEWLYVESTING* firms



This figure illustrates the frequency of earnings surprises of different magnitudes separately for firms with *NEWLYVESTING* in the top tercile of the sample (T3) and firms with *NEWLYVESTING* in the bottom tercile of the sample (T1). The y-axis reports the number of firm-quarters (within T1 and T3) in which the reported EPS exceeds (or falls below) the analyst mean consensus forecast as indicated by the x-axis.

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