The Impact of CEO Pay Duration on Corporate Investment: Evidence from FAS 123R

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Abstract

I investigate the relationship between CEO pay duration and corporate investment. Exploiting an exogenous change in compensation incentives under the adoption of FAS 123R, which mandates the expensing of option compensation, I show that firms decrease both the vesting periods and overall proportion of CEO option compensation, resulting in shorter pay durations. Controlling for contemporaneous changes in the delta and vega of CEO compensation, I provide evidence that the decline in duration is primarily responsible for decreased investment in R&D post-FAS 123R. The analysis provides empirical support for theory on the importance of pay duration in influencing firm investment behavior.

Keywords: Executive Compensation, Incentives, Investment, Corporate Governance, FAS 123R

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1 Introduction

Executive compensation is an important means of aligning manager behavior with shareholder interests (Holmstrom, 1979; Jensen, 1986). Recent theoretical literature argues that the duration of executive compensation is particularly important in mitigating managerial short-termism and motivating managers to maximize long-term shareholder value (Gopalan, Milbourn, Song, and Thakor, 2014; Manso, 2011). The theory argues, intuitively, that a manager will be more motivated to maximize the long-term performance of the firm when the value of his own compensation is correspondingly tied to long-term performance. While the theory is straightforward, establishing an empirical relationship between duration and real activity poses two challenges: accurate measurement of CEO pay duration and establishment of causality. In this paper, I address both of these obstacles by exploiting a change in the accounting treatment of option compensation under accounting regulation FAS 123R to provide empirical evidence in support of a causal relationship between CEO pay duration and real investment decisions.

Effective beginning in 2005, accounting regulation FAS 123R requires firms to expense options awarded to employees, introducing an accounting cost associated with option compensation.[1] Importantly, the rule change has no bearing on either a firm's investment opportunities or the economic motivations for awarding options as a means of providing managerial incentives. For these reasons, the adoption of FAS 123R provides an ideal setting in which to investigate the impact of a change in compensation incentives on firm outcomes since it imposes an exogenous shock to option compensation and the managerial incentives embedded therein. Indeed, several studies have used this setting to examine the impact of changes

[1]Specifically, FAS 123R requires firms to expense the fair value of options awarded as compensation, which is virtually always positive, whereas firms were previously allowed to expense only the intrinsic value, which is usually zero. The intrinsic value of an option, which is equal to the current stock price minus the strike price, usually has a zero value at the grant date since firms almost always issue employee stock options at the money. The market value of an option granted at the money, however, is almost always positive as there is virtually always a non-zero probability that the option will be in the money at some point prior to expiration. Accordingly, FAS 123R introduced an accounting cost related to the awarding of employee stock options.

in compensation on firm outcomes. For example, Hayes, Lemmon, and Qiu (2012) show that option compensation and CEO risk-taking incentives (as captured by the vega of compensation) declined following the adoption of FAS 123R, and Mao and Zhang (2018) show that this decline in vega is associated with a decline in innovative output. While these studies highlight important changes in compensation and firm outcomes following the introduction of FAS 123R, they have omitted any discussion or analysis of a potential coinciding change in CEO pay duration. In this paper, I address this gap.

Duration, defined by Gopalan et al. (2014) as the weighted average of the vesting periods of each component of CEO pay, reflects the extent to which compensation is based on long-term performance. Duration is a function of both (i) the proportion of equity compensation relative to total compensation, and (ii) the vesting periods of equity compensation, and hence a decline in either component could contribute to a decline in pay duration. I show that following the introduction of mandated option expensing under FAS 123R, firms decrease both the proportion and vesting periods of equity compensation significantly.[2] These declines result in signficantly diminished CEO pay durations and firms with greater *ex-ante* exposure to the rule change see significantly more reduced durations.

To identify firms with high *ex-ante* exposure to the rule, I follow prior literature (Hayes et al., 2012; Mao and Zhang, 2018), and split the sample based on the perceived accounting costs of option expensing as measured by the average fair value of the pro forma option expense (deflated by fully diluted shares used to calculate earnings per share) the company reported in the pre-FAS 123R period. This captures the amount by which earnings per share would be reduced if a firm were required to expense the fair value of its options. Following the literature, I define firms as having a high accounting impact, or high *ex-ante* exposure to the rule, as firms with a pro forma option expense that is above the sample median in the pre-

[2]Under both Black-Scholes and binomial option pricing models, reducing the expiration of an option decreases its value, ceteris paribus. Therefore, a firm interested in mitigating the accounting impact the CEO's compensation could reduce the expiration (and possibly the vesting period) of a CEO's option compensation while awarding the same amount of underlying shares. Section 3 develops the hypotheses involving the impact of FAS 123R on vesting periods and pay duration in more detail.

FAS 123R period. In difference-in-differences estimates, I find that CEO pay duration among treated firms (i.e. firms with high *ex-ante* exposure) drops by 0.19 relative to control firms (i.e. firms with low *ex-ante* exposure). With a sample average duration of 1.21 years, this represents an average decline of 15.7%. Equity incentive compensation also decreases overall, declining among treated firms by roughly 19% as a proportion of total compensation relative to control firms. Overall, firms with high exposure to the rule experience significant declines in the extent to which their CEO's compensation is tied to long-term firm performance. In contrast, while delta and vega decline for all firms on average (consistent with Hayes et al., 2012 and Mao and Zhang, 2018), I do not find that firms more impacted by the rule experience greater declines in delta and vega, suggesting that decreases in these incentives over the sample period is due to something other than a change in accounting costs.

I next investigate whether a decline in CEO pay duration impacts corporate investment. To do so, I perform cross-sectional tests of the impact of average changes in duration, delta, and vega from the pre- to post-FAS 123R periods on corporate investment. I find evidence that R&D declines post-FAS 123R, consistent with Mao and Zhang (2018), but the evidence in this paper suggests that it is changes in duration, not changes in vega or delta, which are primarily responsible for the observed changes in R&D expenditures. I also test whether duration impacts capital expenditures and shareholder payout but do not find any significant relationship. These findings overall are consistent with the notion that duration plays an important role in motivating managers to invest in projects with long-term payoffs, even when controlling for other key incentives.

Overall, the findings of this paper produce two important conclusions. First, any shock to executive compensation can affect incentives across multiple dimensions. In the case of FAS 123R, specifically, firms most exposed to the rule change see significantly greater declines in CEO pay duration in addition to any changes in delta and vega. Any future research examining shocks to compensation should account for the various dimensions along which compensation may be affected. Second, changes in duration appear to have in an impact on

the horizon of corporate investment; firms with greater decreases in duration are more likely to reduce investment in long-term projects, especially as represented by investment in R&D.

This paper's contribution to the literature are threefold: First, I provide empirical evidence for recent theoretical work linking the duration of CEO pay with investment decisions. Gopalan et al. (2014) quantify the duration of executive compensation, propose it as a measure that captures the extent to which an executive's compensation is tied to long-term performance, and show broad variations in duration across industries. Manso (2011) argues that long vesting periods are a necessary condition to induce investment in long-term projects with uncertain payoffs, such as investment in innovation. This paper provides empirical evidence in support of these theoretical findings by emprically linking changes in the duration of executive compensation with changes in corporate investment strategy and innovative output.

Second, this paper complements recent studies that have examined the specific impact of FAS 123R on executive compensation and managerial incentives. Hayes et al. (2012) and Skantz (2012) show that firms substituted restricted stock for options following FAS 123R, which decreased the delta and the convexity (vega) of CEO pay. Mao and Zhang (2018) link this decrease in vega to a decrease in firm innovative output. While these studies focus on delta and vega, I show that they omit an important variable: duration. While it is not possible to perfectly disentangle the effects of all three aspects of compensation, I provide evidence that changes in investment and innovative activity post-FAS 123R are most likely due to changes in duration rather than changes in delta or vega. Consistent with Hayes et al. (2012) and Mao and Zhang (2018), I confirm declines in vega and delta on average in the post-FAS 123R period. However, I find that delta and vega did not change significantly among firms most exposed to the rule change. This finding, which was not investigated in either previous study, suggests that changes in delta and vega occurred for reasons independent from FAS 123R and that any change imposed by FAS 123R should not be attributed to changes in either delta of vega. Furthermore, in cross-sectional tests

comparing changes in duration, delta, and vega from pre- to post-FAS 123R periods on investment decisions, I find that a change in duration is positively related to R&D spending where delta and vega have no significant relationship.

Additionally, this paper is closely related to contemporaneous work by Ladika and Sautner (2020) who examine the impact of accelerated option vesting on corporate investment. Their analysis centers on a subsample of firms who accelerated the vesting schedule of unvested options to avoid incurring charges under FAS 123R, which required that even unvested options awarded in prior years be expensed retroactively. Our papers, while complementary, differ in two ways. First, their identification strategy depends on the endogenous firm decision of whether to accelerate unvested options, while my approach of measuring firms *ex-ante* exposure to the new rule represents an intention-to-treat (ITT) analysis. Some benefits of an ITT analysis in this context include: it preserves sample size; it gives an unbiased estimate of the impact of FAS 123R on the outcome variables since inferences are not based on (potentially endogenous) subsamples; and it minimizes endogeneity concerns by identifying based off of *ex-ante* exposure to the rule rather than measuring the effect of an endogenous corporate decision which could be correlated with future investment. Second, data on the vesting schedules of executive compensation enables me to explicitly measure the duration of CEO compensation and reveal a more detailed story regarding how firms adjusted compensation contracts to counteract the impact of FAS 123R.

Finally, this paper adds to a broad literature on the determinants of the structure of executive compensation. For example, past literature has shown that firms design contracts according to their needs to address agency-related issues, including tying manager pay to performance (Jensen and Murphy, 1990), controlling risk-taking incentives (Guay, 1999), or inducing managers to focus on long-term performance (Gopalan et al., 2014). These studies highlight the *benefits* of executive compensation contracts in terms of the incentives they provide managers. In contrast, the *costs* of executive compensation have recieved less attention in the literature notwithstanding that contracts reflect both the benefits and costs

of motivating desired behavior from agents (Prendergast, 2000). This paper highlights that accounting costs also ultimately impact the design of CEO pay. Specifically, I show that accounting costs contribute to the tradeoff firms face between providing incentives for long-term performance and meeting near-term accounting goals. Holding the true economic cost of executive compensation constant, a change in the accounting costs of option compensation leads firms to alter the structure of compensation which ultimately has economic consequences.

The remainder of the paper proceeds as follows. Section 2 discusses the events surrounding the adoption of option expensing under FAS 123R, explains in more detail the impact of option expensing, and develops testable hypotheses. Section 3 describes the sample and empirical methodology. Section 4 analyzes the impact of option expensing on the structure of executive compensation and subsequent changes in corporate investment. Section 5 concludes.

2 Hypothesis Development

In this section I discuss the background of FAS 123R and develop hypotheses for how the adoption of mandated option expensing under the new rule may impact executive compensation and subsequent investment decisions.

2.1 Background on FAS 123R

In 2003, the Financial Accounting Standards Board (FASB), the organization responsible for setting financial accounting standards in the United States, announced that they would reconsider the accounting standards for equity-based compensation. Up to this point, firms had great flexibility in choosing how to measure and report expenses tied to employee option compensation. Notwithstanding this flexibility, the vast majority of firms chose to expense the intrinsic value of awarded options, which is equal to the stock price minus the exercise

price, or the value of the options if exercised immediately. Since most option grants are awarded at-the-money (i.e. with an exercise price set to the current stock price), the intrinsic value at the time options are awarded is virtually always zero. In 2004, FASB released a draft proposing that firms be required to recognize and expense the fair value of employee stock options under a revised standard, FAS 123R. In contrast to the intrinsic value, the fair value is the market value of an option estimated under a Black-Scholes or binomial model and is virtually always positive, reflecting the non-zero probability that the option will be in the money at some point prior to expiration.

The rule change, which became effective for large public firms beginning on June 15, 2005, introduced an accounting cost to option compensation. For firms who relied on option compensation prior to FAS 123R, continued option usage would negatively impact net income. This decrease in net income represents a change in accounting earnings only, and does not impose any marginal decrease in economic earnings or cash flows. However, such a change may not be irrelevant if a decrease in reported earnings translates into real or percieved costs indirectly. Survey evidence suggests this is the case. For example, managers believe that meeting or beating earnings targets builds credibility with the market and helps bolster stock prices, while missing earnings targets can cause severe backlash in both equity and debt markets (Graham, Harvey, and Rajgopal, 2005). Furthermore, managers appear to strive to maintain a smooth stream of earnings; Graham et al. (2005) report that 78% of surveyed managers are willing to sacrifice economic value in exchange for smooth earnings. In addition to stock price motivations, bond covenants and employee bonuses are often based on accounting benchmarks and so maintaining earnings can be important to maximizing bonuses or preventing debt covenant violations.[3]

Given these motivations for firms to manage accounting earnings, I expect firms to adjust compensation post-FAS 123R. I group my hypotheses into two sets. First, I expect that

[3]For a more thorough review of why managers might be motivated to manage earnings see Stein (1988), Burgstahler and Dichev (1997), Healy and Wahlen (1999), Dechow and Skinner (2000), Fields, Lys, and Vincent (2001), and Leuz, Nanda, and Wysocki (2003).

mandated option expensing leads to decreased CEO pay duration via reductions in both the level and vesting periods of option compensation. Second, I expect that diminished pay duration induced by mandated option expensing subsequently leads to changes in real investment decisions consistent with theoretical predictions.

2.2 The Impact of FAS 123R on CEO Pay Duration

Equity compensation (option grants and restricted stock grants) make up a substantial portion of the majority of CEO pay packages. Equity awards can be time-contingent, performance-contingent, or both time- and performance-contingent. To best align manager and shareholder interests, firms presumably select the optimal mix of cash and equity compensation as well as the optimal time horizon over which the compensation vests. When firms employ any time-contingent awards, they introduce duration to the manager's compensation by weighting his pay more on long-term performance. Even if vesting is not conditional on performance, as is the case with simple time-contingent awards, the value of the awards are a function of the underlying stock price at the time the award vests. Following Gopalan et al. (2014), I define and measure the duration of CEO compensation as the weighted average of the vesting horizon of all components of compensation. I expect CEO pay duration to decrease following the adoption of FAS 123R and explain why below.

As shown by Hayes et al. (2012) and Mao and Zhang (2018), firms decreased option compensation following the adoption of FAS 123R. In section 4, I confirm this finding for my sample of firms, and also show that although firms substitute option compensation with restricted stock, this substitution does not fully offset the decline in options and consequently equity incentive compensation declines overall. Therefore, the proportion (i.e. weighting) of long-term incentive-based equity compensation declines. While this fact alone may lead to a decrease in duration, since duration is dependent on both the weighting and vesting periods of option grants, a decline in duration is not obvious since firms may increase vesting periods to offset a declining level of equity compensation. Therefore, I also examine changes in the

vesting periods of equity grants changed post-FAS 123R.

Option grants are typically structured to vest after a certain amount of time from the award date, followed by a window of time within which a manager can exercise the options before they expire. All else equal, increasing (decreasing) the expiration of an option grant will increase (decrease) the fair value of the option. The intuition behind this idea is that longer expirations provide more time, and thus a greater probability, that the value of the underlying asset will drift higher. Conversely, extending the expiration also provides more time for the value to drift lower. However, since options limit losses but not gains, extending the expiration only increases the probabily of upside gains and not downside losses. Thus, firms interested in mitigating the accounting impact of option expensing could decrease the expiration (and perhaps also the associated vesting period) while leaving the amount of underlying securities unchanged. Therefore, I expect FAS 123R to put downward pressure on option vesting periods.

Because duration can change via either (i) a change in the weighting of equity relative to total compensation or (ii) a change in the vesting period(s) of equity compensation, and because I expect FAS 123R to put downward pressure on both, I expect CEO pay duration to decrease post-FAS 123R. Formally, I test the following hypothesis:

> **H1:** *The duration of CEO compensation decreases following mandated option expensing and the magnitude of the decline is increasing in a firm's* ex-ante *option exposure.*

2.3 The Impact of FAS 123R on Corporate Investment

Theory has long argued the importance of executive compensation as a means of aligning executive incentives with shareholder interests. To that end, a substantial portion of CEO pay should be tied to performance (Jensen and Murphy, 1990). Recent theory has emphasized the importance of pay duration in mitigating managerial short-termism and motivating value-creation over the long run (Gopalan et al., 2014; Manso, 2011; Bebchuk

and Fried, 2010). Given the predicted changes in CEO pay duration (H1), a natural next question is whether changes in compensation incentives ultimately affect real investment decisions. I expect managers to divert expenditures from projects with long-term horizons (e.g. R&D spending and capex) into expenditures with short-term payoffs (e.g. shareholder distributions). Specifically, I test the following hypothesis:

> **H2:** *Expenditures shift from long-term investment to increased shareholder payouts following mandated option expensing and the magnitude of the shift is increasing in a firm's* ex-ante *option exposure.*

The empirical framework used to test these hypotheses is described in the next section.

3 Sample and Empirical Approach

I combine detailed data on executive compensation contracts from Incentive Lab with data on annual firm investment and firm fundamentals from Compustat and the Center for Research in Security Prices (CRSP) to examine how the design of executive compensation contracts and subsequent investment decisions change in response to mandated option expensing.[4] I exclude all financials and utilities. The variables of interest and empirical design are described below.

3.1 Executive Compensation Variables

I collect detailed data on CEO compensation contracts from Incentive Lab, including total compensation, salary, bonus, option awards, restricted stock awards, and other compensation.[5] I follow Mao and Zhang (2018) and limit my sample to the years 2002-2008, excluding 2005 to avoid noise in the year of transition to the new rule. Hence the analysis includes

[4]Incentive Lab is a product of Institutional Shareholder Services.

[5]I classify any compensation that does not fall under salary, bonus, options, or restricted stock as other compensation. For the average (median) firm in my sample, this represents 4.9% (1.7%) of total compensation.

three years each in the pre-FAS 123R and post-FAS 123R periods. A key advantage of this dataset is that it provides detailed data on the vesting schedules of restricted stock and option grants making it possible to observe the CEO's pay duration, or the extent to which a CEO's pay is based on long-term performance, for each year of my sample. I calculate the duration of compensation following Gopalan et al. (2014) as a weighted average of the vesting period of each component of compensation where the weight used is the percent of total that the component makes up. Specifically:

$$Duration = \frac{(Salary{+}Bonus) \times 0 + \sum_{i=1}^{n_{rs}} Restricted\ Stock\ Value_i \times t_i + \sum_{j=1}^{n_o} Option\ Value_j \times t_j}{Salary{+}Bonus + \sum_{i=1}^{n} Restricted\ Stock\ Value_i + \sum_{j=1}^{m} Option\ Value_j} \quad (1)$$

where i denotes an individual restricted stock grant, j denotes an individual option grant, and t is the time until grant i or j vests. Some grants have a graded vesting clause, meaning the grant is vested in installments (e.g. one third of the grant vests in 3 years, another third in 4 years, and the last third in 5 years). With these grants, I treat each installment as a separate grant with its own duration. Since salary and bonus vest immediately, they have a duration of zero.

Data on CEO compensation delta (the sensitivity of compensation to the stock price) and vega (the sensitivity of compensation to the volatility of the stock price) are included following Coles, Daniel, and Naveen (2006).[6]

3.2 Difference-in-Differences Design

I employ a difference-in-differences specification to examine the impact of mandated option expensing on executive compensation and corporate investment, exploiting heterogeneity in exposure to the accounting impact of FAS 123R to test whether firms with higher exposure (treated firms) are more impacted by FAS 123R. To distinguish between treated and control

[6]At the time of this draft, these data are generously provided by Lalitha Naveen on her website: http://sites.temple.edu/lnaveen/data/. See also Core and Guay (2002).

firms, I follow Mao and Zhang (2018) and Hayes et al. (2012) and split my sample based on the perceived accounting costs of option expensing as measured by the average fair value of the pro forma option expense (deflated by fully diluted shares used to calculate earnings per share) the company reported in the pre-FAS 123R period. This captures the amount by which earnings per share would be reduced if a firm were required to expense the fair value of its options. An indicator variable, *HighExposure*, is set equal to one for firms with a pro forma option expense that is above the sample median in the pre-FAS 123R period, and is set to zero otherwise.

$$\begin{aligned} Compensation &= \alpha + \beta_1 HighExposure{*}Post + \beta_2 HighExposure + \beta_3 Post \\ &\quad + \beta_4 Controls + \beta_5 IndustryFE + \epsilon \end{aligned} \tag{2}$$

where the *Compensation* variable of central interest is the duration of CEO compensation, but in tests of overall changes in compensation will take the place of option compensation (as a percentage of total compensation) or other compensation variables of interest. *Post* is an indicator equal to one for fiscal years after 2005, and zero otherwise. I use 2005 as the delineation between pre and post periods since FAS 123R became effective for large, publicly traded firms on June 15, 2005. *Controls* includes those described in section 3.3 and *IndustryFE* includes industry fixed effects at the 2-digit SIC code level. In the second half of the analysis, I run a modified version of this test where the dependent variable is one reflecting firm investment decisions, such as R&D expenditure, capex, and shareholder distributions. The control variables vary in this version to be consistent with prior literature, and these tests are described in more detail in section 4.

The interpretation of the above regression is as follows. If mandated option expensing insignificantly impacts compensation structure and ensuing investment decisions, then β_1, the coefficient of interest, will not be significantly different from zero. On the other hand, to the extent that the impact of mandated option expensing is significant and is significantly

greater for firms with higher *ex-ante* exposure, then I expect β_1 to be significantly different from zero.

3.3 Controls

I follow Mao and Zhang (2018) and use firm financial data from Compustat and CRSP to develop a set of controls likely to explain changes in compensation and investment decisions. Controls include firm size (the natural logarithm of total assets, or *Ln(Assets)*); CEO Tenure (the natural log of one plus tenure, or *Ln(1+Tenure)*); and the level of CEO cash compensation ('emphCash Compensation). Following the literature, tests on firm investment also include the following controls (and omit cash compensation): the natural logarithm of property, plant and equipment divided by the number of employees, or *Ln(PPE/EMP)*; the book value of assets minus the book value of equity plus the market value of equity, all over total assets, or *Tobin's Q*; the percentage of the stock held by institutions, or *Inst. Ownership*[7]; and the Herfindahl Index (*HHI*) and the squared Herfindahl Index (HHI^2). All tests include industry fixed-effects following prior literature. All controls are lagged (i.e. measured at the beginning of the fiscal year) and all variables are defined in the appendix.

3.4 Summary Statistics

The final sample includes 2,547 firm-year observations. Table 1 provides descriptive statistics for sample firms over the sample period. Following Mao and Zhang (2018), my sample period runs from 2002-2008, excluding 2005. This sample period captures activity in equal three-year periods directly before and after the adoption of FAS 123R while omitting fiscal years impacted directly by the dot-com bubble of the early 2000s or in the direct wake of the global financial crisis after 2008. For the average (median) firm-year in the sample period, the CEO's total compensation amounts to \$5.7 million (\$3.6 million) and is comprised of 27.3% (21.9%) salary, 17.8% (14.1%) bonus, 27.6 % (23.7%) option compensation, 22.4%

[7]This variable is drawn from the Thomson Reuters Institutional Holdings (form 13F) database.

(11.6%) restricted stock compensation, and 4.9% (1.7%) other compensation. The average (median) duration is 1.21 (1.18) years. This closely matches the average duration of 1.22 reported by Gopalan et al. (2014) for their sample years of 2006-2009.

The average (median) firm in my sample has sales of $9.6 billion ($2.8 billion). Comparatively, the average (median) firm in Mao and Zhang (2018) has sales of $4.8 billion ($1.2 billion). This difference likely reflects Incentive Lab's limited coverage and focus on S&P 500 companies. Therefore, my analysis focuses on a smaller sample of large, mature companies.

4 Empirical Results

This section presents the empirical results from difference-in-differences estimates of the impact of mandated option expensing under FAS 123R on executive compensation and ensuing investment decisions. Results are divided into two main sections. Section 4.1 documents the impact of mandated option compensation on the design of CEO compensation contracts and shows that equity compensation, equity grant vesting periods, and the duration of the CEO's compensation all decline following the introduction of mandated option expensing under FAS 123R. These declines are more pronounced for firms that were more exposed to the rule. Section 4.2 presents evidence that the decline in duration induced by FAS 123R is associated with subsequent changes in corporate investment, especially R%D expenditures. Firms with greater *ex-ante* exposure are more likely to reduce investment.

4.1 FAS 123R and Changes in Compensation Incentives

In this section I test whether exposure to accounting costs imposed by FAS 123R leads firms to change key aspects of CEO compensation contracts. To do this, I employ the difference-in-differences framework described in the previous section and estimate equation (2) with respect to various characteristics of the CEO's annual compensation contract. I begin by looking broadly at how different components of compensation changed following

the introduction of FAS 123R. Table 2 gives regression estimates of how CEO compensation changed in firms with high exposure to option expensing relative to firms with low exposure. As described in section 3, *HighExposure* is equal to one for firms with an above-median pro forma option expense (scaled by fully diluted shares oustanding) and equal to zero otherwise. Columns 1 through 6 report changes in the proportion of the components of total compensation, while column 7 reports the change in the level of equity compensation.

In column 1, the coefficient for *HighExposure*Post* is negative and significant, indicating that firms with high exposure to the new rule signficant decrease CEO option compensation (as a proportion of total compensation) following the adoption of the rule relative to firms with low exposure. Specifically, CEOs of highly exposed firms see their proportion of option compensation decline by 30.2% relative to CEOs of low-exposure firms. Column 2 shows that high-exposure firms increase their use of restricted stock to partially offset a decline in options, but column 3 shows that equity compensation overall (*AllEquity* includes option plus stock compensation) declines by 19.4% as a proportion of total compensation for high-exposure firms relative to low-exposure firms.

Columns 4 and 5 of Table 2 show that high-exposure firms also increased cash compensation (both salary and bonus, shown in columns 4 and 5 respectively) relative to low-exposure firms, consistent with firms increasing other forms of compensation to compensate for a reduction in options. In column 6, the coefficient on *HighExposure*Post* is insignificant which can be interepreted as any compensation not captured by options, restricted stock, salary, or bonus did not materially change in the wake of FAS 123R. The coefficient in column 7 indicates that the level equity compensation declines significantly for high-exposure firms relative to other firms. In other words, both the proportion and level of equity compensation fall for highly exposed firms relative to other firms.

The results in Table 2 support the notion that firms are willing to change the structure of executive compensation to mitigate the accounting impact of FAS 123R. Specifically, the results indicate that firms exposed to FAS 123R significantly reduce the amount of

option compensation awarded to their CEOs following the enactment of mandated option expensing. This finding is consistent with Hayes et al. (2012) and Mao and Zhang (2018), but additionally shows that the substitution to restricted stock following the introduction of FAS 123R was insufficient to fully offset the reduction in options, and so exposed firms see equity incentive compensation decline overall. Because compensation duration depends in part on the weight (or proportion) the components of compensation, such a decline in the proportion of equity incentive compensation could alone translate to a decline in duration. However, whether duration in fact decreases will also depend on potential changes in vesting periods. An increase in vesting periods could offset a decline in the proportion of equity compensation, but if vesting periods decrease or remain unchanged, a decrease in duration will likely follow. Therefore, I run tests to examine whether option expensing induces firms to decrease the vesting periods of equity grants.

All else equal, options with longer times to expiration have greater value because the probability of being further in the money is greater over a longer time horizon. Executive option grants are typically structured to vest after a specific time frame (typically 3 to 5 years) followed by a window in which the CEO can exercise the options before they expire. Longer vesting periods are associated with longer times to expiration since expiration must occur after the vesting period. Thus, options with longer vesting periods (and therefore longer expirations) have the greatest accounting impact, all else equal. In Tables 3 and 4, I examine the impact of FAS 123R on option vesting periods and CEO pay duration. In columns 1 through 3 of Table 3, I show how average vesting periods changed for equity grants overall (column 1), stock grants only (columns 2) and option grants only (column 3) on an equal-weighted basis. Columns 4 through 6 show results for value-weighted average vesting periods (weighted by the grant date fair value). In columns 3 and 6, the coefficient for *HighExposure*Post* is negative and significant, showing that average vesting periods of option grants decline be 1-2 years for firms with high exposure to the new rule. Coefficients in columns 2 and 5 suggest that the reduction of option grants with long vesting periods was

at least partially offset by increases of the same with respect to stock grants. However, as the coefficient in column 4 shows, vesting periods for equity grants decline overall by 0.241 years on a value-weighted basis.

Given this decrease in vesting periods in conjunction with the decrease in the level of equity compensation documented in Table 2, a diminishing of duration should directly follow.[8] Table 4 quantifies this change in duration alongside changes in other incentives tested in prior literature. Post-FAS 123R, highly-exposed firms decrease their CEO pay duration by 0.19 relative to other firms. With a sample average duration of 1.21, this represents a decrease of about 15.7%, a significant decline statistically speaking. Whether the decline is economically significant will depend on the power of duration as a managerial incentive and whether this decline in fact spurs any change in economic decisions, such as how the firm invests its capital.

An important takeaway from Table 4 is that while CEO compensation delta and vega do decline post-FAS 123R, as indicated by negative and significant coefficients on *Post*, they do not decline for firms most impacted by the rule change; in columns 2 and 3, the coefficients on *HighExposure*Post* are insignfiicantly different from zero. This throws into question findings from prior literature attributing changes in investment and innovative output to changes in vega and delta post-FAS123R. If firms most impacted by the rule were more likely to decrease CEO pay duration, but not necessarily vega or delta, then any change in vega and delta during the same time period is spurious. Therefore, any subsequent changes in investment or innovation cannot be attributed to changes in delta and vega since duration is the only incentive among the three that significantly changes for firms highly-exposed to the new rule.

Overall, the results in this section provide evidence that accounting costs can play a significant role in the design of executive compensation contracts. After the introduction of

[8]Duration is a function of (i) the proportion of equity-to-total compensation, and (ii) the vesting periods of the equity components of compensation. See equation (1). Therefore, a decrease in each component will jointly contribute to a decrease in duration.

mandated option expensing, firms more exposed to the rule are more likely to decrease the level and vesting periods of CEO option grants which leads to a significant decline in the duration of CEO pay. These changes represent an important shift in CEO incentives with a diminished emphasis on long-term performance. In the next section, I explore whether this shift ultimately led to changes in investment decisions.

4.2 FAS 123R and Changes in Investment and Financing Policy

In this section I test whether the diminishing of CEO pay duration documented in the previous section is associated with subsequent changes in investment decisions. A decrease in duration represents a decrease in weighting of the CEO's pay based on long-term performance which could inuitively result in decreased investment in long-term projects. Guay, Kothari, and Sloan (2003) warn that mandated option expensing could stifle corporate investment and innovation. In this vein, Manso (2011) argues that pay based on long-term firm performance is a key component of motivating investment in innovation or any long-term project.

Several studies have examined such outcomes around the adoption of FAS 123R. Mao and Zhang (2018) show that innovative activity, captured by patenting activity and research and development expenditures, decrease post-FAS 123R. Ferri and Li (2020) examine whether firms shifted from repurchases to dividends as option-based compensation decreased following FAS 123R but do not find any significant change in either category. These and other papers document important changes (or lack of changes) in firm behavior following the rule change, but often mischaracterize FAS 123R as representing a one-dimensional change in compensation characteristics. As documented in section 4.1 of this paper, compensation changed along multiple dimensions, especially in terms of duration for those firms most impacted by the accounting rule change. Therefore, it would be misguided to attribute changes in firm outcomes after FAS 123R solely to changes in vega, delta, or any other incentive without controlling for changes in duration. In this section, I provide preliminary evidence of the marginal impact of each individual incentive on firm decisions regarding investment and

shareholder distributions.

Table 5 reports difference-in-differences regressions for the overall impact of FAS 123R on investment and shareholder distributions. I use research and development expenditure (scaled by total assets) and capital expenditures (scaled by total assets) as measures of investment in long-term projects, and repurchases (scaled by total assets) and dividends per share capture shareholder distributions.[9] The coefficients on *HighExposure*Post* in columns 1 and 2, while not statistically significant, indicate a decrease in R&D expenditures and increases in capex and repurchases. While the results in this table are useful to see the overall impact of mandated option expensing on capital allocation, the insights from these results are limited since statistical significance is minimal and because the changes cannot be attributed to any one incentive but show the overall impact of FAS 123R.

In Table 6, I estimate cross sectional regressions of the impact of changes in CEO compensation incentives on investment to explore the differential impact of changes in individual incentives. The explanatory variables of interest are measured as changes in average duration, delta, and vega from the post-FAS 123R period (2002-2004) to the post-FAS 123 period (2005-2008). Specifically, $\Delta Duration$ is calculated as the percentage change in average duration in the post-period years (2006-2008) relative to the average duration in the pre-period years (2002-2004). $\Delta Ln(1+Delta)$, $\Delta Ln(Vega)$, and all control variables are likewise calculated.[10] Collapsing the sample to cross-sectional observations limits the power of the tests as observations are reduced to 419, thus the results are interpreted with caution. However, the analysis can still provide valuable preliminary insight into the impacts of changes in various incentives when conditioned on each other.

Columns 1 through 4 of Table 6 show the impact of incentives on R&D expenditure. Columns 1 through 3 control for one incentive at a time while column 4 combines all three

[9]Controls used in this regression include firm size *Ln(Sales)*; the log of net property, plant, and equipment divided by the number of employees, *Ln(PPE/EMP)*; *Tobin's Q*; *Ln(1+Tenure)*; Institutional ownership, or *Inst. Ownership*, which is the percentage of stock held by institutions; the Herfindahl Index, *HHI*; and the squared Herfindahl Index, HHI^2; these controls are drawn from prior literature, e.g. Mao and Zhang (2018).

[10]I use the natural log of Delta and Vega to be consistent with prior literature; these variables are highly skewed as shown in Table 1.

incentives. Columns 5 through 8 repeat the analysis but for Capex. The results in column 4 indicate that duration has a positive and signfiicant impact on R&D spending while delta and vega do not have a statistically significant relationship with R&D spending. This suggests that the decline in duration resulted in a decline in R&D spending. Duration does not have a statistically significant relationsihp with capex, but delta is positively related to capex while vega exhibits an inverse relationship.

In Table 7, I repeat the cross-sectional analysis with shareholder distributions, both repurchases (scaled by total assets) and dividends per share. The tests do not yield any statistically significant relationship between duration and either repurchases or dividends. Again, this could be due to the limited power of the tests.

Taken together, the results from tables 5 through 7, indicate that firms reduced R&D expenditures after FAS 123R, and that this reduction was more likely due to a decline in duration than due to changes in other dimensions of CEO pay. In other words, duration is likely the key factor responsible for a decrease in R&D spending among firms most affected by the rule change, although these results should be interpreted with caution due to a limited sample. While further research may be required to more cleanly disentangle the relationship between each incentive and capital allocation decisions, the results of this paper indicate that any shock to compensation impacts incentives along various dimensions. Thus, in the wake of any shock to compensation, care should be taken before ascribing changes in outcomes to any single incentive.

5 Conclusion

This paper shows that in managing the impact of mandatory option compensation under FAS 123R, firms significantly redesign the CEO's compensation package affecting incentives along several dimensions. Specifically, firms decrease option compensation significantly but substitution into restricted stock is not sufficient to fully offset the decline in options. As

a result, CEOs receive a lower proportion of equity compensation. Firms also decrease the vesting periods of option compensation. Together, these changes contribute to a significant decline in the duration of the CEO pay. These changes are most pronounced for firms with greater *ex-ante* reliance on option compensation and therefore greater exposer to the accounting impact of option expensing. While delta and vega also decline post-FAS 123R, they were not more likely to decline for firms most affected by the rule, suggesting that declines in these incentives were due to some other factor unrelated to mandated option expensing.

Changes in the level and duration of equity compensation have important implications for manager incentives to maximize the long-term interests of shareholders. Theory has long argued that equity compensation is an important tool to induce managers to act in the best interest of shareholders (Jensen and Murphy, 1990) and pay duration has been argued to be essential in mitigating managerial myopia (Manso, 2011; Gopalan et al., 2014). Consistent with theoretical predictions, I show that firms which decreased the duration of CEO pay reduce investment, particularly research and development expenditure. The findings of this paper suggest that changes in duration, not changes in vega or delta, are primarily responsible for observed changes in investment and innovation around FAS 123R. However, it remains a challenge to disentangle the relative importance of dimensions of CEO incentives, such as duration, delta, and vega. Future work may better disentangle the individual and dynamic effects of these dimensions of CEO pay.

The evidence in this paper supports the idea that changes in the accounting treatment of compensation are not merely cosmetic. These accounting costs affect the design of executive pay which in turn influences real activity. As accounting standards for employee compensation continue to evolve and compensation structures become more complex (Bettis, Bizjak, Coles, and Kalpaty, 2018), it's important to consider the impact of accounting standards not just on financial reporting but also on managerial incentives and subsequent corporate investment.

Appendix: Variable Definitions

Panel A: Compensation Variables

Variable	Definition and Sources
Total Compensation	The sum of the value of salary, bonus, options, restricted stock, and other compensation awarded to the CEO during the fiscal year (in $000s). Source: Incentive Lab.
Salary	The amount of salary compensation (in $000s) awarded to the CEO during the fiscal year. Source: Incentive Lab
Bonus	The amount of bonus compensation (in $000s) awarded to the CEO during the fiscal year. Source: Incentive Lab
Option	The amount of option compensation (in $000s) awarded to the CEO during the fiscal year. Source: Incentive Lab
Stock	The amount of restricted stock compensation (in $000s) awarded to the CEO during the fiscal year. Source: Incentive Lab
AllEquity	The sum of the value of option and restricted stock compensation (in $000s) awarded to the CEO during the fiscal year. Source: Incentive Lab
Other	The value of all compensation awarded to the CEO during the fiscal year (in $000s) in excess of salary, bonus, options, and restricted stock. Source: Incentive Lab
Salary%	The value of salary compensation divided by total compensation awarded to the CEO during the fiscal year. Source: Incentive Lab
Bonus%	The value of bonus compensation divided by total compensation awarded to the CEO during the fiscal year. Source: Incentive Lab
Option%	The value of option compensation divided by total compensation awarded to the CEO during the fiscal year. Source: Incentive Lab. Source: Incentive Lab
Stock%	The value of restricted stock compensation divided by total compensation awarded to the CEO during the fiscal year. Source: Incentive Lab.
Other%	The value of other compensation (compensation exluding salary, bonus, options, and restricted stock) divided by total compensation awarded to the CEO during the fiscal year. Source: Incentive Lab
AllEquity%	The sum of the value of option compensation and restricted stock compensation divided by total compensation awarded to the CEO during the fiscal year. Source: Incentive Lab

Ln(AllEquity)	The natural log of the sum option and stock compensation awarded to the CEO during the fiscal year. Source: Incentive Lab
Duration	The value of each equity grant (option or restricted stock) awarded to the CEO in year t multiplied by the number of years until the grant vests, summed over all grants and all divided by the value of total compensation awarded to the CEO during the fiscal year (following Gopalan et al. 2014); this is equivalent to the weighted average vesting period where salary and bonus compensation receive a weighting of zero. See equation (1). Source: Incentive Lab
Ln(1+Delta)	The natural log of one plus Delta, where Delta is equal to the dollar change in the CEO's compensation per each 1% change in the underlying firm's stock price. Source: Coles, Daniel, and Naveen (2006)[11]
Ln(1+Vega)	The natural log of one plus Vega, where Vega is equal to the dollar change in the CEO's compensation per each 1% change in the standard deviation of the underlying firm's stock price returns. Source: Coles, Daniel, and Naveen (2006)[11]
Equal-Weighted Average Vesting Period	The average vesting period of all equity grants (including both options and restricted stock) awarded to the CEO during the fiscal year. Source: Incentive Lab
Value-Weighted Average Vesing Period	The weighted-average vesting period of all equity grants (including both options and restricted stock) awarded to the CEO during the fiscal year. Vesting periods for each grant are weighted by their grant date fair value. Source: Incentive Lab

Panel B: Investment and Shareholder Distribution Variables

Variable	Definition and Sources (Compustat variable designations in parentheses where applicable).
R&D/Assets	Research and development expense divided by total assets all multiplied by 100. Variable is set to zero if missing. Source: Compustat. (100*XRD/AT)
Capex/Assets	Capital expenditures divided by total assets all multiplied by 100. Source: Compustat. (100*$CAPX/AT$)
Repo/Assets	Common equity repurchases divided by lagged total assets all multiplied by 100. Source: Compustat. (100*$PRSTK$ - $PSTKRV$ all over lagged AT)
DPS	Dividends per share. Source: Compustat (DVPSX_F)

[11] At the time of this draft, these data are generously provided by Lalitha Naveen on her website: http://sites.temple.edu/lnaveen/data/. See also Core and Guay (2002).

Panel C: Controls[12]

Variable	Definition and Sources (Compustat variable designations in parentheses where applicable)
HighExposure	An indicator equal to 1 for firms with above-median perceived accounting costs, calculated as the average fair value of the pro forma option expense (deflated by fully diluted shares used to calculate earnings per share; *CSHFD* in Compustat) the company reported in the pre-FAS 123R period (2002-2004), and is set to zero otherwise. Source: Incentive Lab, Compustat.
Post	Indicator variable equal to one for fiscal years after 2005 (i.e. for years 2006-2008) and equal to zero otherwise.
Ln(Assets)	The natural log of total assets (in $ millions). Source: Compustat (Ln(AT))
Ln(Sales)	The natural log of sales (in $ millions). Source: Compustat (Ln($SALE$))
Ln(Tenure)	The natural log of one plus the number of days since the CEO was appointed to his position as of the beginning of the fiscal year. Source: ExecuComp
Cash Compensation	The sum of all cash compensation (salary plus bonus) awarded to the CEO during the fiscal year. Source: Incentive Lab
Ln(PPE/EMP)	The natural log of net property, plant and equipment divided by the number of employees. Source: Compustat (Ln($PPENT/EMP$))
Tobin's Q	Total assets plus the market value of equity minus the book value of equity all divided by total assets. Source: Compustat ($(AT+PRCC\_FCSHO-CEQ)/AT$)
Inst. Ownership	The percentage of stock held by institutions. Source: Thomson Reuters Institutional Holdings (form 13F) database.
HHI	The Herfindahl Index, based on annual sales by 2-digit SIC industries. Source: Compustat
HHI^2	The square of the Herfindahl Index. Source: Compustat

[12]Note that controls in all regressions are lagged.

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Table 1: Summary Statistics

This table reports descriptive statistics for the sample of firms covered in the Incentive Lab database for fiscal years 2002-2008, excluding 2005, the year FAS 123R was implemented. Reported are number of observations along with the mean, median, and 25^{th} and 75^{th} percentile values. *Total Compensation* is the sum of *Salary*, *Bonus*, *Option*, *Stock*, and *Other* compensation. *Salary%*, *Bonus%*, *Option%*, *Stock%*, and *Othe%r* represent each component's proportion to *Total Compensation*. All other variables are defined in the appendix.

Sample Period: 2002-2008, excluding 2005

	N	Mean	25th Pctl	Median	75th Pctl
Levels of CEO Compensation (in $000s)					
Total Compensation	2,547	5,706.2	1,958.3	3,621.2	6,581.5
Salary	2,547	842.6	568.8	807.5	1,004.8
Bonus	2,547	1,028.6	0.0	462.0	1,200.0
Option	2,547	1,882.9	0.0	623.0	2,438.5
Stock	2,547	1,711.4	0.0	248.4	1,746.0
Other	2,547	240.8	14.1	59.2	204.6
Percentage of CEO Compensation					
Salary%	2,547	27.3	13.1	21.9	34.4
Bonus%	2,547	17.8	0.0	14.1	29.2
Option%	2,547	27.6	0.0	23.7	49.6
Stock%	2,547	22.4	0.0	11.6	41.5
Other%	2,547	4.9	0.5	1.7	5.0
Compensation Incentives					
Duration (in years)	2,547	1.21	0.68	1.18	1.64
Delta (in $000s)	1,961	1,234.8	175.1	374.8	885.4
Vega (in $000s)	2,003	280.0	58.1	145.0	321.2
Other Variables					
Sales (in $mm)	2,547	9,632.4	1,148.9	2,783.3	7,953.9
PPE per Employee (in $000s)	2,547	400.7	26.2	53.5	143.3
R&D/Assets	2,547	3.52	0.00	0.15	3.55
Tobin's Q	2,547	1.98	1.27	1.62	2.21
CEO Tenure (in days)	2,547	2,871	1,031	1,978	3,651
Inst. Ownership (%)	2,547	71.1	62.1	76.7	87.2

Table 2: Changes in Composition of CEO Pay in Response to FAS 123R

This table presents difference-in-differences estimates of the effect of mandated option expensing on various components of CEO compensation. The sample includes firm-year compensation data for 2002-2008, excluding 2005. The dependent variables in columns (1)-(6) are expressed as percentages of total compensation, while the dependent variables in column (7) is the log of the nominal level of equity compensation (option plus stock compensation). The explanatory variable of interest is the interaction *HighExposure*Post*, where *HighExposure* captures firms' *ex-ante* reliance on option compensation and is an indicator equal to one for firms with a pro forma option expense that is above the sample median in the pre-FAS 123R period (2002-2004), and zero otherwise; *Post* is an indicator equal to one for fiscal years 2006-2008, and zero otherwise. All controls are lagged one year and are defined in the appendix. T-Statistics based on robust standard errors are reported in parentheses. Statistical significance is denoted at the 1% (***), 5% (**), and 10% (*) levels.

	(1) Option%	(2) Stock%	(3) AllEquity%	(4) Salary%	(5) Bonus%	(6) Other%	(7) Ln(AllEquity)
HighExposure*Post	-0.302***	0.109***	-0.194***	0.065***	0.136***	-0.007	-2.366***
	(-10.21)	(3.88)	(-6.36)	(3.14)	(6.75)	(-0.57)	(-4.34)
Post	0.155***	-0.016	0.139***	0.009	-0.182***	0.034***	1.032***
	(10.47)	(-1.01)	(8.14)	(0.75)	(-16.35)	(5.11)	(3.15)
HighExposure	0.098	0.146	0.244**	0.011	-0.146**	-0.108***	1.734
	(1.17)	(1.22)	(1.98)	(0.12)	(-2.25)	(-3.37)	(1.44)
Ln(Assets)	-0.003	-0.009	-0.012**	0.014***	-0.005	0.003	-0.168
	(-0.66)	(-1.56)	(-2.05)	(2.72)	(-1.36)	(0.99)	(-1.64)
Ln(Tenure)	0.002	0.000	0.002	-0.003	-0.001	0.002*	0.059
	(0.66)	(0.15)	(0.67)	(-1.31)	(-0.53)	(1.72)	(1.03)
Cash Compensation	-0.000	0.000	-0.000	-0.000	0.000***	-0.000**	0.000
	(-1.42)	(0.45)	(-1.14)	(-1.47)	(2.69)	(-2.01)	(0.54)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	2,547	2,547	2,547	2,547	2,547	2,547	2,547
adj. R^2	0.509	0.400	0.374	0.427	0.403	0.343	0.343

Table 3: Changes in Equity Grant Vesting Periods

This table presents difference-in-differences estimates of the effect of mandated option expensing on the vesting periods of stock and option grants. The sample includes firm-year compensation data for 2002-2008, excluding 2005. The dependent variables in columns (1)-(3) are calculated as the simple average of the grant vesting periods for the firm-year, while the dependent variables in columns (4)-(6) is the weighted average of the grant vesting periods for the firm year, where the vesting periods are weighted by the value of the grant relative to the sum of the value of all grants for the firm-year. The explanatory variable of interest is the interaction *HighExposure*Post*, where *HighExposure* captures firms' *ex-ante* reliance on option compensation and is an indicator equal to one for firms with a pro forma option expense that is above the sample median in the pre-FAS 123R period (2002-2004), and zero otherwise; *Post* is an indicator equal to one for fiscal years 2006-2008, and zero otherwise. All controls are lagged one year and are defined in the appendix. T-Statistics based on robust standard errors are reported in parentheses. Statistical significance is denoted at the 1% (***), 5% (**), and 10% (*) levels.

	Equal-Weighted Average Vesting Period			Value-Weighted Average Vesting Period		
	(1) All Grants	(2) Stock Grants	(3) Option Grants	(4) All Grants	(5) Stock Grants	(6) Option Grants
HighExposure*Post	0.089	0.522***	-0.501***	-0.241	1.088***	-1.607***
	(0.55)	(3.36)	(-2.72)	(-1.37)	(4.33)	(-7.91)
Post	-0.109	0.063	-0.332***	0.285***	-0.129	1.019***
	(-1.21)	(0.69)	(-3.50)	(2.68)	(-1.00)	(8.67)
HighExposure	1.312***	0.311	0.711	2.021***	-1.092	2.484***
	(2.95)	(0.27)	(0.72)	(4.15)	(-0.62)	(6.47)
Ln(Assets)	-0.005	-0.015	0.025	-0.046	-0.039	0.001
	(-0.14)	(-0.61)	(0.68)	(-1.28)	(-1.09)	(0.02)
Ln(Tenure)	0.001	0.001	0.003	0.003	-0.003	0.008
	(0.09)	(0.05)	(0.17)	(0.16)	(-0.14)	(0.39)
Cash Compensation	0.000	0.000	0.000	0.000	-0.000	-0.000
	(0.73)	(0.02)	(0.27)	(0.25)	(-0.24)	(-1.36)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2,547	2,547	2,547	2,547	2,547	2,547
adj. R^2	0.438	0.424	0.476	0.431	0.407	0.502

Table 4: Changes in CEO Compensation Incentives

This table presents difference-in-differences estimates of the effect of mandated option expensing on the duration, delta, and vega of CEO compensation. The sample includes firm-year compensation data for 2002-2008, excluding 2005. The explanatory variable of interest in columns (1)-(3) is the interaction *HighExposure*Post*, where *HighExposure* captures firms' *ex-ante* reliance on option compensation and is an indicator equal to one for firms with a pro forma option expense that is above the sample median in the pre-FAS 123R period (2002-2004), and zero otherwise; *Post* is an indicator equal to one for fiscal years 2006-2008, and zero otherwise. Regressions in columns (4)-(6) are not difference-in-differences regressions but rather estimate the difference between pre- and post-FAS periods only (i.e. the overall difference independent of the effect of mandated option expensing). All controls are lagged one year and are defined in the appendix. T-Statistics based on robust standard errors are reported in parentheses. Statistical significance is denoted at the 1% (***), 5% (**), and 10% (*) levels.

	(1) Duration	(2) Ln(1+Delta)	(3) Ln(1+Vega)	(4) Duration	(5) Ln(1+Delta)	(6) Ln(1+Vega)
HighExposure*Post	-0.190**	-0.025	0.228			
	(-2.11)	(-0.18)	(1.59)			
Post	0.064	-0.377***	-0.533***	0.015	-0.418***	-0.503***
	(1.24)	(-5.31)	(-6.82)	(0.36)	(-6.09)	(-7.21)
HighExposure	0.775***	4.564***	3.488***			
	(2.62)	(6.12)	(3.88)			
Ln(Assets)	-0.025	-0.011	0.055	-0.022	0.051	0.103
	(-1.59)	(-0.17)	(0.62)	(-1.42)	(0.64)	(1.11)
Ln(Tenure)	0.007	0.081***	0.037***	0.006	0.079***	0.037***
	(0.72)	(5.43)	(2.66)	(0.56)	(5.24)	(2.64)
Cash Compensation	0.000	0.000***	0.000**	0.000	0.000***	0.000**
	(0.39)	(4.44)	(2.30)	(0.17)	(4.38)	(2.45)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
N	2,547	1,961	2,003	2,547	1,961	2,003
adj. R^2	0.346	0.675	0.716	0.345	0.670	0.713

Table 5: Changes in Investment and Distributions

This table presents difference-in-differences estimates of the effect of mandated option expensing on corporate investment and shareholder distributions. The sample includes firm-year observations for 2002-2008, excluding 2005. The explanatory variable of interest is the interaction *HighExposure*Post*, where *HighExposure* captures firms' *ex-ante* reliance on option compensation and is an indicator equal to one for firms with a pro forma option expense that is above the sample median in the pre-FAS 123R period (2002-2004), and zero otherwise; *Post* is an indicator equal to one for fiscal years 2006-2008, and zero otherwise. All controls are lagged one year and are defined in the appendix. T-Statistics based on robust standard errors are reported in parentheses. Statistical significance is denoted at the 1% (***), 5% (**), and 10% (*) levels.

	Investment		Shareholder Payout	
	(1) R&D/Assets	(2) Capex/Assets	(3) Repo/Assets	(4) DPS
HighExposure*Post	-0.531	0.423	1.227	-0.113*
	(-1.05)	(0.63)	(1.40)	(-1.86)
Post	0.517*	1.028***	2.124***	0.210***
	(1.91)	(3.91)	(5.53)	(4.11)
HighExposure	-0.796**	0.747**	-1.040**	-0.084**
	(-2.40)	(2.20)	(-2.10)	(-2.38)
Ln(Sales)	-0.936***	-0.214***	0.339***	0.077***
	(-6.37)	(-2.64)	(3.02)	(8.62)
Ln(PPE/EMP)	0.142	1.946***	-0.377***	-0.028*
	(1.34)	(12.10)	(-2.44)	(-1.72)
Tobin's Q	1.516***	1.012***	2.101***	-0.017*
	(5.89)	(8.40)	(6.16)	(-1.70)
Ln(1+Tenure)	-0.080**	-0.036	0.225***	0.015***
	(-2.16)	(-1.00)	(4.90)	(2.63)
Inst. Ownership	2.101***	-0.557	1.291	-0.452***
	(2.91)	(-0.88)	(1.35)	(-6.22)
HHI	25.063***	-8.480	-9.391	0.978
	(3.94)	(-1.09)	(-0.96)	(0.45)
HHI^2	-34.984***	5.951	0.942	-2.703
	(-4.30)	(0.60)	(0.05)	(-1.02)
Industry Fixed Effects	Yes	Yes	Yes	Yes
N	2,547	2,547	2,547	2,547
adj. R^2	0.330	0.523	0.133	0.117

Table 6: Cross Sectional Changes in Investment

This table presents cross-sectional estimates of the effect of mandated option expensing on corporate investment. The sample includes firm-level observations for firms in the baseline sample. For each observation, all variables represent changes in the average value from pre- (2002-2004) to post-FAS 123R (2006-2008) periods for each firm. All variables are defined in the appendix. T-Statistics based on robust standard errors are reported in parentheses. Statistical significance is denoted at the 1% (***), 5% (**), and 10% (*) levels.

	ΔR&D/Assets				ΔCapex/Assets			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔDuration	0.504**			0.351*	0.118			0.102
	(2.17)			(1.66)	(0.69)			(0.67)
ΔLn(1+Delta)		-0.075		-0.048		0.303*		0.561**
		(-0.41)		(-0.24)		(1.72)		(2.53)
ΔLn(1+Vega)			-0.013	-0.018			-0.216	-0.431**
			(-0.10)	(-0.13)			(-1.49)	(-2.30)
ΔLn(Sales)	-0.056	-0.696	-0.745	-0.664	0.465	-0.048	0.279	-0.019
	(-0.08)	(-0.78)	(-0.82)	(-0.76)	(1.19)	(-0.09)	(0.58)	(-0.04)
ΔLn(PPE/EMP)	-0.824	-1.007	-1.017	-1.081	2.598***	2.352***	2.343***	2.231***
	(-0.84)	(-1.53)	(-1.54)	(-1.63)	(6.16)	(4.60)	(4.62)	(4.26)
ΔTobin's Q	0.498	0.146	0.115	0.126	0.512**	0.681***	0.800***	0.568**
	(1.26)	(0.38)	(0.31)	(0.32)	(2.02)	(2.86)	(3.52)	(2.33)
ΔLn(1+Tenure)	-0.006	-0.054	-0.060	-0.058	0.078	0.070	0.105	0.072
	(-0.08)	(-0.94)	(-1.01)	(-1.02)	(1.02)	(0.92)	(1.41)	(0.96)
ΔInst. Ownership	0.370	-0.548	-0.513	-0.682	2.952**	1.828	1.731	1.973
	(0.14)	(-0.19)	(-0.18)	(-0.23)	(2.40)	(1.07)	(1.02)	(1.14)
ΔHHI	2.378	2.467	2.538	3.923	19.289**	18.661**	16.345*	16.419*
	(0.62)	(0.53)	(0.57)	(0.86)	(2.39)	(2.09)	(1.82)	(1.94)
ΔHHI^2	-0.804	0.426	0.279	-1.889	-28.334*	-28.107*	-23.560	-23.615
	(-0.12)	(0.08)	(0.05)	(-0.33)	(-1.80)	(-1.71)	(-1.38)	(-1.53)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	531	419	419	419	531	419	419	419
adj. R^2	-0.064	-0.105	-0.106	-0.103	0.351	0.361	0.360	0.370

Table 7: Cross Sectional Changes in Shareholder Distributions

This table presents cross-sectional estimates of the effect of mandated option expensing on shareholder distributions. The sample includes firm-level observations for firms in the baseline sample. For each observation, all variables represent changes in the average value from pre- (2002-2004) to post-FAS 123R (2006-2008) periods for each firm. All variables are defined in the appendix. T-Statistics based on robust standard errors are reported in parentheses. Statistical significance is denoted at the 1% (***), 5% (**), and 10% (*) levels.

	ΔRepo/Assets				ΔDPS			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔDuration	0.515			0.415	-0.001			-0.002
	(1.29)			(0.89)	(-0.05)			(-0.06)
ΔLn(1+Delta)		0.057		-0.072		-0.060*		-0.046
		(0.13)		(-0.15)		(-1.78)		(-1.19)
ΔLn(1+Vega)			0.254	0.253			-0.042	-0.025
			(0.93)	(0.89)			(-1.46)	(-0.75)
ΔLn(Sales)	0.545	0.869	0.789	0.894	-0.106	-0.083	-0.107	-0.082
	(0.76)	(0.83)	(0.78)	(0.86)	(-1.45)	(-0.66)	(-0.82)	(-0.65)
ΔLn(PPE/EMP)	0.144	0.557	0.608	0.535	0.192	0.286	0.272	0.280
	(0.15)	(0.51)	(0.55)	(0.48)	(1.29)	(1.35)	(1.27)	(1.28)
ΔTobin's Q	0.325	0.421	0.447	0.466	0.058**	0.091***	0.066**	0.085**
	(0.72)	(0.61)	(0.70)	(0.68)	(2.49)	(2.72)	(2.32)	(2.32)
ΔLn(1+Tenure)	0.076	0.184	0.176	0.178	-0.010	-0.003	-0.005	-0.002
	(0.61)	(1.30)	(1.26)	(1.24)	(-1.17)	(-0.22)	(-0.42)	(-0.21)
ΔInst. Ownership	-2.354	-7.222**	-7.291**	-7.498**	-0.140	-0.246	-0.212	-0.235
	(-0.94)	(-2.41)	(-2.47)	(-2.49)	(-0.80)	(-0.68)	(-0.59)	(-0.65)
ΔHHI	-4.494	-5.057	-3.264	-1.619	-4.618	-5.281	-5.463	-5.443
	(-0.48)	(-0.58)	(-0.37)	(-0.18)	(-1.26)	(-1.34)	(-1.39)	(-1.39)
ΔHHI^2	-2.642	-2.254	-5.740	-8.319	6.862	8.043	8.390	8.354
	(-0.17)	(-0.16)	(-0.41)	(-0.59)	(1.05)	(1.14)	(1.19)	(1.19)
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	531	419	419	419	531	419	419	419
adj. R^2	0.026	0.050	0.052	0.050	0.025	0.039	0.038	0.036