

The Pennsylvania State University

The Graduate School

The Mary Jean and Frank P. Smeal College of Business

**THE IMPACT OF MANDATED OPTION  
EXPENSING ON EXECUTIVE COMPENSATION  
AND CORPORATE INVESTMENT**

A Dissertation in

Business Administration

by

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Submitted in Partial Fulfillment  
of the Requirements  
for the Degree of

Doctor of Philosophy

August 2017

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## Abstract

I provide evidence that the accounting costs of executive compensation – items that affect reported earnings but not cash flows – significantly impact the structure of executive compensation contracts and ensuing corporate policies. Following the introduction of mandated option expensing, firms reduce both the quantity and the vesting periods of executive stock option grants. Substitution into restricted stock or other forms of compensation is not sufficient to fully offset the decline in options. Consequently, CEOs receive a lower proportion of incentive-based compensation and shorter pay durations. These changes in compensation are persistent and more pronounced for firms with greater *ex-ante* reliance on option compensation. Moreover, these changes in compensation, which reduced incentives to maximize long-term shareholder value, induce managers to act more conservatively; firms of affected CEOs reduce investment and adopt more conservative financing policy.

# Contents

List of Tables	v
Acknowledgements	vi
<b>1 Introduction</b>	<b>1</b>
<b>2 Related Literature</b>	<b>6</b>
<b>3 Background on FAS 123R</b>	<b>9</b>
<b>4 Hypotheses</b>	<b>10</b>
4.1 FAS 123R and Changes in Compensation Incentives . . . . .	10
4.2 FAS 123R and Changes in Investment and Financing Policy . . . . .	12
<b>5 Sample and Empirical Approach</b>	<b>14</b>
5.1 Difference-in-Differences Design . . . . .	14
5.2 Dependent Variables . . . . .	15
5.3 Measure of Exposure to FAS 123R . . . . .	16
5.4 Controls . . . . .	17
5.5 Summary Statistics . . . . .	17
<b>6 Empirical Results</b>	<b>18</b>
6.1 FAS 123R and Changes in Compensation Incentives . . . . .	18
6.2 FAS 123R and Changes in Investment and Financing Policy . . . . .	22
<b>7 Robustness Tests</b>	<b>25</b>
7.1 Placebo Tests . . . . .	25
7.2 Matched Sample Tests . . . . .	26
7.3 Job Security . . . . .	27
7.4 Other Robustness Tests . . . . .	28
<b>8 Changes in Innovative Output</b>	<b>29</b>
<b>9 Conclusion</b>	<b>31</b>
<b>A Appendix: Variable Definitions</b>	<b>51</b>
<b>B Appendix: Journal Entries Under FAS 123R</b>	<b>55</b>
<b>C Appendix: Additional Insight Into Changes in Compensation</b>	<b>59</b>
References	65

## List of Tables

1	Summary Statistics . . . . .	33
2	Changes in Executive Compensation in Response to FAS 123R . . . . .	34
3	Changes in Equity Compensation in response to FAS 123R . . . . .	35
4	Changes in Vesting Periods in response to FAS 123R . . . . .	36
5	Changes in the Duration of Compensation in Response to FAS 123R . . . . .	37
6	Changes in Compensation Under Consistent Valuation Model . . . . .	38
7	Changes in Discretionary Option Valuation . . . . .	39
8	Changes in Investment in Response to FAS 123R . . . . .	40
9	Balance Sheet Changes in Response to FAS 123R . . . . .	41
10	Placebo Tests - Changes in Executive Compensation . . . . .	42
11	Placebo Tests - Changes in Corporate Outcomes . . . . .	43
12	Matched Sample Tests - Covariate Balance . . . . .	44
13	Matched Sample Tests - Changes in the Structure of Compensation . . . . .	45
14	Matched Sample Tests - Changes in Corporate Outcomes . . . . .	46
15	Winsorized Sample . . . . .	47
16	Survivorship Bias . . . . .	48
17	Changes Under Alternative Exposure Measure . . . . .	49
18	Changes in Innovation in response to FAS 123R . . . . .	50
C1	Changes in Total Compensation in response to FAS 123R . . . . .	62
C2	Changes in Non-Equity Compensation in Response to FAS 123R . . . . .	63
C3	Long-Term Changes in Executive Compensation . . . . .	64

## Acknowledgements

I am extremely indebted to my dissertation co-chairs, Laura Field and Matthew Gustafson, for their constant mentorship and encouragement throughout my time at Penn State. I was extremely fortunate to have two advisors who always made themselves available when I needed guidance and who always pushed me to think more deeply about my research.

Laura has a unique talent for quickly distilling a research question and understanding how a paper's contribution fits within the existing literature. Our discussions have helped me to see the broader picture and to view my research from new and creative angles. Laura is also unusually committed to her students and I am extremely grateful for her willingness to review my drafts meticulously and provide detailed feedback.

I am grateful to Matt for being willing to serve as an advisor to me while balancing the many demands that being an assistant professor brings. He was instrumental in helping me get involved in meaningful research projects at an early stage of the doctoral program and has since proved to be an ideal advisor and coauthor. Matt's productivity and work ethic are second to none and I surely exploited these qualities, knowing that I could go to Matt with any question, regardless of the subject matter, and receive a thoughtful and thorough response. His direction has been invaluable.

I am also indebted to my committee members, David Haushalter and Karl Muller for their thoughtful feedback and advice throughout the years.

I am extremely grateful to many other current and former faculty members in the Department of Finance. Specifically, my work, and my development as a researcher, has been greatly influenced by discussions with Peter Iliev, Jason Kotter, Michelle Lowry, and Fenghua Song.

Above all, I am grateful to my family. The completion of this dissertation would not have been possible without the constant support and encouragement of my wife, Liz, my son, Redder and my daughter, Willa.

# 1 Introduction

Academics and practitioners alike have expressed concern that managers are too preoccupied with accounting earnings.<sup>1</sup> An extensive literature in accounting documents the widespread practice of earnings management, and the majority of executives surveyed admit that they would use accounting discretion or take real economic actions such as cutting discretionary spending on R&D, advertising, and maintenance, or delaying a new project in order to meet accounting expectations (Healy and Wahlen, 1999; Graham, Harvey, and Rajgopal, 2005). Thus, managers place high importance on accounting earnings and in some circumstances managing accounting costs takes precedence over economic considerations. In this paper, I investigate how firms manage this tradeoff between accounting costs and economic considerations in the context of executive compensation contracts.

Executive compensation is an important means of aligning manager behavior with shareholder interests (Holmstrom, 1979; Jensen, 1986). However, although executive compensation directly impacts reported earnings, little is known about how the accounting costs of compensation affect firm decisions regarding the design of executive pay. To investigate this issue, I examine how the structure of executive compensation changes following the introduction of mandated option expensing under FAS 123R. FAS 123R, which was implemented in 2006, changed the accounting treatment of employee stock options. Prior to the implementation of FAS 123R, firms were not required to expense the market value of option compensation but rather were permitted to expense the intrinsic value of the options.<sup>2</sup> FAS 123R eliminated the choice to expense options at their intrinsic value and requires firms to expense any options granted to employees at their estimated market value. Thus, FAS 123R increases the accounting expenses associated with option compensation, but does not affect the economic motivations for awarding options as a means of providing managerial incentives and does not directly affect cash flows.

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<sup>1</sup>See, for instance, “The Numbers Game,” by Arthur Levitt, speech delivered at the NYU Center for Law and Business, New York, NY, September 28, 1998; Fuller and Jensen (2002); “Beyond Quarterly Earnings,” by Alfred Rappaport, *Wall Street Journal*, March 8, 2004; “Some Heresy on Wall Street: Look Past the Quarter,” by Andrew Ross Sorkin, *The New York Times*, February 1, 2016; and “Buffet Says Earnings Guidance Can Lead to Corporate Malpractice,” *Bloomberg*, July 21, 2016.

<sup>2</sup>The intrinsic value of an option 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.



The extent to which this change in the accounting costs of compensation will affect the structure of executive compensation is unclear. If the board considers managing accounting costs to be important relative to the economic incentives embedded in executive contracts, then compensation contracts may change in response to changes in accounting standards. Alternatively, if the board believes investors fully understand how executive compensation is expensed, or if the board believes executive performance is highly sensitive to specific contractual features, then changes in accounting standards may have little or no effect on compensation contracts. However, understanding the empirical relation between accounting costs and executive compensation is important since compensation is thought to be a primary means of aligning manager behavior with the long-term interests of shareholders (Jensen and Murphy, 1990; Manso, 2011).

I provide evidence that firms significantly adjust executive compensation contracts following the introduction of mandated option expensing in two important ways. First, firms significantly scale back their use of option compensation, and while firms do substitute toward alternative forms of compensation, especially restricted stock, the increase in restricted stock is not sufficient to fully offset the decline in options. As a result, CEOs are paid less equity compensation overall both in nominal terms and as a percentage of total compensation. Importantly, difference-in-difference specifications indicate that these changes are more pronounced for firms with greater *ex-ante* exposure to the accounting impact of option expensing. A one-unit increase in *ex-ante* exposure<sup>3</sup> to option expensing is associated with a decrease in the proportion of equity-to-total compensation of 7.1-18.8 percentage points. This represents a substantial decrease since a firm's average proportion of equity-to-total compensation is about 46%. This result is consistent with accounting costs driving decisions about the design of executive pay and suggest that in managing the accounting cost of options introduced by FAS 123R, firms are willing to reduce the CEO's incentive-based compensation.

Second, I find that firms reduce the vesting periods of executive equity grants. Equity grants are often set to vest after a number of years in order to tie an executive's compensation to long-term performance. All else equal, options with longer vesting periods (which have longer

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<sup>3</sup>Under my definition of *ex-ante* exposure, a one-unit increase in exposure represents the difference between not having any reliance on options as a form of executive compensation *ex-ante* and being solely reliant on options as a means of providing equity incentives to the CEO.

corresponding times to expiration) will have greater estimated market values and thus would have a greater accounting impact under FAS 123R. Consistent with firms adjusting compensation contracts to mitigate the accounting impact of option expensing, I find that firms with high *ex-ante* exposure to the new rule are more likely to reduce the vesting periods of executive option grants. This serves as additional evidence that firms are willing to adjust manager pay packages in order to manage the accounting costs of compensation and suggests that firms reduced the extent to which a manager's pay is based on long-term performance in order to reduce the accounting impact of option expensing.

One important implication of the findings so far is that given reductions in the level and vesting periods of equity compensation, the duration of executive compensation should also decrease. Duration quantifies the extent to which compensation is based on long-term performance and reflects the weighted average of the vesting periods of each component of the executive's compensation. Understanding the extent to which duration changed after FAS 123R is crucial given that recent theory emphasizes the importance of duration in mitigating managerial short-termism (Bebchuk and Fried, 2010; Manso, 2011). Since duration is a function of (i) the proportion of equity-to-total compensation, and (ii) the vesting periods of the equity components of compensation, a decline in duration should occur mechanically given reductions in both, but I formally test for a decline in duration and find that after FAS 123R, pay duration falls by 0.086 years, and this decrease is more pronounced for firms with greater *ex-ante* exposure to option expensing. Specifically, a one unit increase in ex-ante exposure is associated with an additional decrease in duration of 0.25-0.45 years. This represents a substantial decrease since average pay duration is between 1-1.5 years.<sup>4</sup>

The declines in equity compensation and the duration of compensation following the implementation of FAS 123R appear to be permanent rather than transitory. To show this, I estimate an augmented difference-in-differences model where I compare compensation in the intermediate period between the announcement and implementation of the revised standard, and in each individual year following the implementation of mandated option expensing. I find that both equity compensation and pay duration decline beginning after the initial announcement of the

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<sup>4</sup>Gopalan, Milbourn, Song, and Thakor (2014) find average CEO pay duration to be between 1.37-1.4 while I find an average of about one year for the same period.

proposed revision in 2003, and this decrease becomes more severe after implementation in 2006 and persists through 2010, the end of my sample period.

Overall, these findings indicate that in managing accounting costs, firms adjust the design of executive compensation contracts in important ways. In order to mitigate the impact of mandated option expensing on accounting earnings, firms change the composition of executive compensation by lessening the overall extent to which a manager's pay is tied to performance and decreasing the extent to which manager pay is based on long-term performance. Because these features of executive compensation are so widely argued to be essential to aligning manager behavior with the long-term interests of shareholders, I next investigate the effect of these changes in manager pay on corporate investment and financing policy. From a theoretical perspective, it is unclear how a reduction in equity incentives and duration will affect investment decisions and financing policy. Now that the manager's pay is less tied to firm performance, and particularly less tied to long-term performance, the manager may invest more and adopt a more risky financing policy since he is not as exposed to the firm's downside risk. Alternatively, the manager may invest less and adopt a less risky financing policy since he is not rewarded as much for upside gains. Alternatively, there may be no change in manager behavior if the changes in incentives are small relative to the manager's broad and complex set of incentives. I find that firms most impacted by option expensing subsequently reduce investment and adopt a more conservative balance sheet. Together, the results are that the changes in compensation caused by option expensing led managers to be more conservative and enjoy the "quiet life," consistent with manager preferences described by Bertrand and Mullainathan (2003).

To minimize the possibility that the results are not spurious, I run a number of robustness tests. The risk is that firms identified as being highly reliant on options prior to the implementation of mandated option expensing are different from firms that are not reliant on options in unobservable ways that drive subsequent changes in compensation and investment and financing policy for reasons unrelated to option expensing. For example, one alternative explanation is that firms may experience a lifecycle effect whereby when growth opportunities are high, cash is used for investment and equity compensation is preferred over cash compensation, and as growth opportunities diminish, investment subsides and cash compensation replaces equity

compensation. To mitigate the possibility that such explanations drive the reported changes in compensation and investment, I first run placebo tests over the period 1992-2002. Defining exposure to option expensing in the same way and running tests over the placebo period, I find no evidence of a relationship between high options usage and subsequent changes in compensation and investment in the absence of changes of the accounting treatment of options.

Second, matching on observable firm characteristics such as age, size, and industry, results are quantitatively and qualitatively similar; for firms that are similar along observable dimensions but which differ only in their use of options vs. restricted stock prior to the implementation of the revised standard, firms with greater exposure to the accounting impact of option expensing saw significantly greater declines in equity compensation, vesting periods, and the duration of the CEO's compensation as well as greater subsequent declines in investment and more conservative balance sheets. Additionally, the findings in this paper are robust to various definitions of a firm's *ex-ante* exposure to mandated option expensing, winsorizing outlying observations, and controlling for survivorship bias.

This paper proceeds as follows. Section 2 reviews related literature and distinguishes this paper's contribution from extant work. Section 3 discusses the events surrounding the adoption of option expensing under FAS 123R and explains in more detail the impact of option expensing. Section 4 develops testable hypotheses. Section 5 describes the sample and empirical methodology. Section 6 analyzes the impact of option expensing on the structure of executive compensation and subsequent changes in investment and financing policy. Section 7 addresses alternative explanations and outlines several robustness tests. Section 8 concludes.

## 2 Related Literature

The key findings of this paper are twofold: (i) that changes in the accounting impact of employee compensation lead firms to change the structure of executive compensation contracts, and (ii) that changes in the structure of executive compensation contracts and the incentives embedded therein subsequently affect firm investment decisions and financing policy. Thus, the paper contributes both the earnings management and executive compensation literatures, and makes an important connection between these two prominent literatures by showing how the accounting impact of equity compensation affects how compensation packages are designed, which subsequently alters managerial incentives pertaining to investment and financing policy.

A substantial body of evidence supports the notion that executives engage in earnings management (Healy, 1985; Healy and Wahlen, 1999; Burgstahler and Dichev, 1997; Teoh, Welch and Wong, 1998a and 1998b). That is, managers use discretion in the choice of reporting methods, estimates, and disclosures in order to inflate or otherwise manipulate reported firm performance. In addition to using accounting discretion to manipulate earnings (i.e. engaging in accrual-based earnings management), evidence suggests firms also manipulate earnings through real activity, such as implementing price discounts to temporarily boost sales, overproducing to achieve a lower cost of goods sold, repurchasing stock to boost earnings per share, and reducing discretionary expenses such as R&D expenditures (Bens, Nagar, Franco Wong, 2002; Roychowdhury, 2006). Consistent with these findings, in survey evidence from Graham, Harvey, and Rajgopal (2005), the majority of executives surveyed say they would decrease discretionary spending (e.g. R&D and advertising expenses) and/or delay a project, even if this means sacrificing value, in order to meet an earnings target. An surprising 78% of executives admit to being willing to sacrifice long-term value in order to smooth earnings. Thus managers place high importance on accounting earnings to the extent that in some cases they are willing to forego economic value to manage accounting costs. This paper provides evidence of a specific channel, the design of executive compensation contracts, through which firms manage accounting costs and affect economic consequences. This finding is important given the importance of executive compensation for providing managerial incentives.

On one hand, executive compensation is an important tool for motivating managers to act in the best interest of shareholders (Jensen, 1986; Jensen and Murphy, 1990). On the other, executive compensation is an expense that directly impacts accounting earnings. For example, in 2010, the mean (median) value of the chief executive officer's total compensation represented 3.8% (1.2%) of net income or \$0.035 (\$0.023) on a per-share basis. This represents a nontrivial accounting impact, especially considering these figures only reflect the compensation of one employee (albeit the most highly paid employee in most cases). This paper shows that holding the true cost of compensation constant, firms redesign significant aspects of compensation in response to changes in the accounting cost of compensation. Specifically, when the accounting impact of option compensation increased under FAS 123R, firms decreased equity compensation as well as the vesting periods of equity compensation, resulting in lower durations of compensation. In managing the accounting costs of compensation, firms alter manager pay and the incentives embedded therein.

This finding adds to a broad literature explaining 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, Milbourn, Song, and Thakor, 2014). These studies highlight the benefits of executive compensation contracts in terms of the incentives they provide managers. However, contracts reflect the benefits and costs of motivating desired behavior from agents (Prendergast, 2000). The costs of executive compensation have received much less attention. Besides the obvious cost of the true monetary cost to pay executives, I show that holding the true cost constant, accounting costs contribute to the tradeoff firms face between providing incentives for long-term performance and meeting near-term accounting goals.

Given a change in the structure of compensation, a natural next question then is whether manager behavior subsequently changed. Theoretical predictions of how managers will respond to decreased equity incentives and lower durations are ambiguous. While the primary functions of the executive pay package are to mitigate managerial myopia (Stein, 1988; Bolton, Scheinkman, and Xiong, 2006) and motivate managers to take an appropriate amount of risk

(cites), weakened incentives could lead managers to either overinvest and take excessive risks, or to underinvest and take less risks. Most empirical studies show associations between incentives and investment behavior, while I exploit a setting which caused a shock to equity compensation and the duration of compensation which then allows me to observe how behavior changes in response to changed incentives.

Additionally, this paper complements several recent studies that have examined the specific impact of mandated option expensing under FAS 123R on executive compensation and managerial incentives. Hayes, Lemmon, and Qiu (2012) show that firms substituted stock for options, which decreased the convexity (vega) of CEO pay. I show that while firms did increase their use of restricted stock, the substitution was insufficient to fully offset the decline in options and several important characteristics of CEO declined as a result, including the level of total pay, the proportion of equity compensation, and the duration of compensation. Ladika and Sautner (2016) show that firms accelerated the vesting of executive stock options to avoid having to expense them under FAS 123R. My study clarifies that the acceleration of option vesting was not merely a transitory decrease in equity compensation, and that even though firms increased restricted stock compensation, equity compensation remained lower than pre-FAS 123R levels over the long run. Skantz (2012) also documents the trade-off between options and restricted stock around FAS 123R, finds that total compensation did not decline, although the sample period only runs through 2007. Using a longer sample period, I show that equity incentives did decline for firms with relatively greater exposure to the rule.

### 3 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. Firms have always been required to expense the value of the compensation they award employees in the form of stock options, but prior to this announcement, firms had great flexibility in choosing how to measure that value. Most firms chose to expense the intrinsic value (the immediate-exercise value, or the stock price minus the exercise price). Since most option grants are awarded at-the-money, the component of compensation made up of options most had no impact on a firm's net income. In 2004, FASB released a draft proposing that firms be required to recognize as an expense the fair value of employee stock options under a revised standard, FAS 123R. In contrast to the intrinsic value, the fair value is an estimated market value from a Black-Scholes or similar model and is almost always greater than zero.

This requirement, which became effective for fiscal years beginning after June 15, 2005, introduced an accounting cost to awarding option compensation. For firms who relied on option compensation prior to FAS 123R, continued option issuance would result in a decrease in net income. Although this the decrease in net income does not represent a fundamental economic deterioration in the firm, a decrease in reported earnings can translate into real costs. First, managers believe that meeting or beating earning targets builds credibility with the market and helps bolster stock prices, while missing earnings estimates can cause severe backlash in equity and debt markets (Graham, Harvey, and Rajgopal, 2005). Second, even if analysts and investors correctly incorporated the effects of FAS 123R into earnings expectations, managers strive to maintain a steady stream of earnings. Graham et al. (2005) report that 78% of surveyed managers sacrifice economic value in exchange for smooth earnings. In addition to stock price motivations, bond covenants and employee bonuses are often based on accounting numbers and so maintaining earnings can be important to maximizing bonuses or reducing the probability of debt covenant violation.<sup>5</sup>

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<sup>5</sup>For a more complete review of the motivations for why managers might use discretion to smooth earnings or meet earnings targets see Healy and Wahlen (1999), Dechow and Skinner (2000), and Fields, Lys, and Vincent (2001).



## 4 Hypotheses

Firms typically award their CEOs a compensation package comprised of a cash component (base salary and bonus) and an equity component (option grants and restricted stock grants).<sup>6</sup> Firms can choose how much or how little of each component to award and construct a set of incentives to induce the desired behavior from the CEO. Prior to the announcement of the revised accounting standard for employee stock options, firms differ in their degree of reliance on option compensation relative to other forms of compensation as a means of providing managerial incentives. Thus the newly imposed accounting impact of option expensing varied among firms depending on the extent to which firms relied on options relative to other forms of compensation. I exploit the heterogeneity in firms' exposure to the mandate to test several hypotheses. Importantly, mandated option expensing represents an exogenous increase in the accounting cost of option compensation while having no bearing on economic the motivation for awarding option compensation as a means of incentivizing managers.

I group my hypotheses into two sets. First, I test how mandated option expensing influenced the structure of executive compensation. Second, I test whether mandated option expensing and the changes in compensation it affected led to changes in behavior in terms of investment and financing policy.

### 4.1 FAS 123R and Changes in Compensation Incentives

Under FAS 123R, the cost of awarding option compensation increased. According to basic microeconomic theory, when a good increases in price, the consumer will demand less of that good and will substitute other, now relatively cheaper, goods for the good whose price increased due to a *substitution effect*. However, the consumer will demand less of both goods overall due to the *income effect*. The substitution from options to restricted stock has been documented by Hayes et al. (2012). However, if firms increased restricted stock compensation to fully offset the decrease in option compensation then earnings would be equally impacted. If firms place sufficient importance on managing the accounting costs of option expensing, then substitution

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<sup>6</sup>Other forms of compensation may make up a small part of the CEOs total compensation package. I examine changes in other forms of compensation in section 7.3 and find no evidence that the use of these other forms of compensation was affected by mandated option expensing.

into restricted stock or other forms of compensation will be limited and insufficient to fully offset declines in option compensation. Therefore, I hypothesize that FAS 123R led to overall decreases in equity-based compensation. Specifically, I test the following hypothesis:

**H1a:** *The proportion of equity-based compensation as a percentage of the CEO's total compensation decreases following mandated option expensing and the magnitude of the decline is increasing in a firm's ex-ante option exposure.*

After testing whether equity compensation declined overall, next I test whether certain types of option grants were more likely to be avoided after FAS 123R. Option grants typically vest over a certain period of time followed by a window between the vesting date and the expiration date, providing the manager with a window of time in which he is free to exercise the option. All else equal, an option grants with longer vesting periods (and thus longer corresponding times to expiration) will have a greater estimated market value.<sup>7</sup> Thus if firms restructure compensation contracts as a means of mitigating the impact of option expensing, I expect firms to decrease the vesting periods of executive option grants. Specifically, I test the following hypothesis:

**H1b:** *The vesting periods of CEO equity grants decreases following mandated option expensing and the magnitude of the decline is increasing in a firm's ex-ante option exposure.*

An important aspect of executive compensation that has received attention in recent literature is the duration of executive compensation (Gopalan, Milbourn, Song, and Thakor, 2014; Manso, 2011). The duration of compensation encapsulates both the proportion of equity compensation and the vesting periods of each component of compensation. Duration is calculated as the average horizon over which all components of a CEO's compensation vests, and thus can change via either (i) a change in the proportion of a equity compensation to total compensation or (ii) a change in the vesting period(s) of the equity component of compensation. If either or both of the first two hypotheses holds true, it would follow that a decrease in duration would

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<sup>7</sup>The intuition of this idea is that longer expirations gives more time for the underlying asset to drift higher. Longer expirations also give more time for the underlying security to drift lower, but because a call option puts a floor on the downside risk, this has no impact on valuation.

occur. However, to formally test whether duration declined in the wake of FAS 123R and to quantify the magnitude of a decline, I test the following hypothesis:

**H1c:** *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.*

## 4.2 FAS 123R and Changes in Investment and Financing Policy

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). In addition, recent theory has emphasized the importance of pay duration in mitigating managerial short-termism and motivating value-creation over the long run (Manso, 2011; Bebchuk and Fried, 2010). Given changes in the degree to which the manager's pay is tied to firm performance (hypothesis H1a) and in the horizon of performance on which the manager's pay is based (hypotheses H2a and H2b), a natural next question is whether manager behavior changed in response to changes in his incentives. However, it is unclear how managers will react to diminished incentives in terms of investment and financing policy decisions. Now that managers pay is less tied to firm performance, managers may either overinvest and take on bad projects since their pay is not as exposed to downside risk, or they may underinvest and just take on less projects because they are not as rewarded for upside gains. To investigate, I test the following hypothesis about how option expensing ultimately affects investment:

**H2a:** *Investment decreases following mandated option expensing and the magnitude of the decline is increasing in a firm's ex-ante option exposure.*

By the same logic, managers may adopt a riskier financing policy since they personally do not face as much downside risk, or they may take less risks and adopt a more conservative financing policy - such as deleveraging and holding more cash - because they do not share as much of the upside gains. I test the following hypotheses about how option expensing ultimately affects financing policy:

**H2b:** *Firms adopt a more conservative financing policy following mandated option expensing and the magnitude of the change is increasing in a firm's ex-ante option exposure.*

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

## 5 Sample and Empirical Approach

Understanding the extent to which changes in accounting costs affect executive compensation is critical given the importance attributed to executive incentives for aligning manager and shareholder interests. In this section, I describe the data and design used to establish empirically how changes in accounting costs affect the design of executive compensation contracts and subsequent investment and financing policy decisions. I use detailed data on executive compensation contracts is drawn from Institutional Shareholder Services Inc.'s Incentive Lab (hereafter, Incentive Lab) supplemented with data from Execucomp and data on annual firm investment and other firm fundamentals come from Compustat and the Center for Research in Security Prices (CRSP) to describe how the design of executive compensation contracts and subsequent firm investment and financing policy changed in response to mandated option expensing. The variables of interest and empirical design are described below.

### 5.1 Difference-in-Differences Design

I use a difference-in-differences specification to test the affect of mandated option expensing on executive compensation and corporate investment and financing policy. I exploit variation in the degree to which firms were exposed to the accounting impact introduced when FASB required firms to begin expensing employee option compensation under FAS 123R. Importantly, while FAS 123R introduced an accounting cost of option compensation, the revised standard did not have any direct impact on cash flows or on firms' economic motivations for awarding option compensation as a means of providing managerial incentives. Specifically, to investigate the relationship between *ex-ante* exposure to FAS 123R and subsequent changes in compensation, I estimate the following difference-in-differences regression:

$$Outcome_{i,t} = \alpha_0 + \beta_1 Exposure * Post_{i,t} + \beta_2 X_{i,t-1} + \beta_3 Firm_i + \beta_4 Year_t + e_{i,t} \quad (1)$$

where  $Outcome_{i,t}$  takes the form of either a characteristic of compensation (such as equity compensation, vesting period, or duration of the CEO's compensation) or a firm outcome variable (such as investment or leverage). The dependent variables are described in more detail in section

5.2. *Exposure* is a firm's *ex-ante* reliance on option compensation and is defined in more detail in section 5.3; *Post* is an indicator equal to one for fiscal year 2003 and later, and zero otherwise. I use 2003 as the delineation between pre and post periods because it was announced in March 2003 that FASB would reconsider the accounting treatment of employee stock options. Firms would conceivably begin to decrease option grants at this point, since grants often vest over a period of years and the accounting impact of options granted in 2003 with vesting periods of 3 or more years would be realized in 2006. However, results are similar using 2004 or 2005 as the year of delineation.  $X_{i,t-1}$  is a vector of firm characteristics including firm size, market-to-book, CEO tenure, and other firm characteristics typically included in the existing literature and these controls are described in more detail in section 5.4;  $Firm_i$  and  $Year_t$  capture firm fixed effects and fiscal year fixed effects, respectively. The coefficient of interest in this regression is  $\beta_1$ . If mandated option expensing has no effect on compensation or corporate investment then  $\beta_1$  should not be significantly different from zero.

## 5.2 Dependent Variables

I use the specification in equation 1 to produce two groups of results. First, the outcome variable of interest is one of several characteristics of the CEO's annual compensation. I collect detailed data on CEO compensation contracts from Incentive Lab for the years 1999-2010, including how much of the CEO's pay came in the form of options, restricted stock, salary, and bonus. A key advantage to this dataset is that it provides detailed data on the vesting schedules of restricted stock and option grants making it possible to observe and quantify the CEO's pay duration, or the extent to which a CEO's pay is based on long-term performance. 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:

$$Duration = \frac{(Salary+Bonus) \times 0 + \sum_{i=1}^{n_{rs}} Restricted\ Stock\ Value_i \times t_i + \sum_{j=1}^{n_o} Option\ Value_j \times t_j}{Salary+Bonus + \sum_{i=1}^n Restricted\ Stock\ Value_i + \sum_{j=1}^m Option\ Value_j} \quad (2)$$

where  $i$  is a restricted stock grant,  $j$  is an option grant, and  $t$  is the time until grant  $i$  or  $j$  vests. Since salary and bonus vest in the current year, they are multiplied by zero in the numerator. In the case of graded vesting, I treat each installment as a separate grant. Additionally, I define total compensation as the sum of salary, bonus, options, and restricted stock and I define the proportion of equity compensation as the sum of options and restricted stock divided by total compensation.

In the second group of results, the outcome variable will take on the form of one of several firm outcomes. I collect data from Compustat on firm investment (defined as the sum of capital expenditures and R&D expenditures all scaled by total assets), cash payments to shareholders (repurchases plus dividends all scaled by total assets), cash holdings (scaled by total assets) and leverage (excluding cash and scaled by total assets).

### 5.3 Measure of Exposure to FAS 123R

To quantify a firm's exposure to mandated option expensing, I calculate the extent of a firm's use of option compensation prior to the sample period using data from Execucomp. I define  $Exposure_e$  as the average value of option compensation as a percentage of equity compensation over the five year period before entering the sample period. Similarly, I define a variable  $Exposure_t$  as being equal to the average value of option compensation as a percentage of total compensation. These measures capture the extent of firms' reliance on option compensation prior to the introduction of required option expensing. It can be interpreted as a firm's exposure to the accounting impact of option expensing; prior to the regulation, I assume firms optimally structure manager incentives. Once option expensing is introduced, maintaining that structure will impose an accounting costs to the extent that that structure is composed of option compensation. Additionally, this measure may proxy for firm's sensitivity to accounting costs as sensitive firms would be more likely to use options prior to the regulation, which had a low accounting cost relative to other forms of compensation. If accounting costs matter for compensation design, then firms more exposed to the rule will be more likely to alter the structure of the CEO's compensation and the coefficient on the interaction,  $\beta_1$ , will be significantly different from zero.

## 5.4 Controls

Following the literature, I control for a vector of firm-specific characteristics. Using firm financial data from Compustat and CRSP, I control for firm size (the log of sales), age (years since a firm first appeared in CRSP), return on assets (ROA), capital expenditures, and R&D expenditures, leverage, tangibility, and growth opportunities (Tobin's  $Q$ ). Additionally, I control for executive characteristics including the CEO's tenure with the firm and CEO age. All tests also include firm and year fixed-effects. All controls are measured at the beginning of the fiscal year all variables are defined in the appendix.

## 5.5 Summary Statistics

Table 1 provides descriptive statistics for firm characteristics at the start of the sample period. Panel A shows characteristics of the CEO's annual compensation package. CEO pay is comprised on average of 29% salary, 24% bonus, 27% options compensation, and 20% restricted stock compensation.

Panel B shows the potential impact of executive compensation on accounting earnings. Total CEO compensation amounts to an average of 30% of net income while option compensation amounts to an average of 12.6% of net income. These averages are largely driven by outliers among the highest paid CEOs. However, even at the 75<sup>th</sup> percentile, the value of all options awarded to the CEO during the year amounts to \$0.015 per share. This represents a significant accounting impact since many firms miss or beat earnings targets by pennies.

Panel C presents firm characteristics, including measures of *ex-ante* exposure to option expensing. At the 25<sup>th</sup> percentile,  $Exposure^e$  is zero, while by the 75<sup>th</sup> percentile,  $Exposure^e$  is equal to one. This means that a one-unit change in  $Exposure^e$  is analogous to moving from the 25<sup>th</sup> to the 75<sup>th</sup> percentile.



## 6 Empirical Results

This section presents the main empirical findings from difference-in-differences tests as described in the previous section. Results are divided into two main parts. Section 6.1 describes the effect of mandated option compensation on the design of CEO compensation contracts and shows that the proportion of equity compensation to total compensation, equity grant vesting periods, and the duration of the CEO's compensation 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 6.2 describes exposure to the accounting impact imposed by FAS 123R is also associated with changes in corporate investment and financing policy. Firms with greater *ex-ante* exposure are more likely to reduce investment and adopt a more conservative financing policy.

### 6.1 FAS 123R and Changes in Compensation Incentives

In this section I test whether concern over managing accounting costs is associated with the design of key aspects of executive compensation contracts by employing the difference-in-differences framework described in the previous section and estimate equation (1) 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 announcement of mandated option expensing. Table 2 gives an overview of how CEO compensation changed in firms with high exposure to the accounting impact of option expensing and reports results with respect to option compensation, restricted stock compensation, salary, bonus, and total compensation awarded to the CEO on an annual basis. Columns 1 through 4 report results with respect to different components of the CEO's annual compensation as proportions of total compensation. The dependent variable of interest is the interaction of *Exposure\*Post*. While this table only presents results with respect to *Exposure<sup>e</sup>*, the results are similar for the alternative definitions of *Exposure*. The coefficients for *Exposure\*Post* indicate that the percentage of option compensation fell, while the percentages of stock, salary, and bonus increased. Columns 5 through 9 report changes in nominal levels in the log of compensation. The level of option compensation decreased and the

level of restricted stock compensation increased, while positive (but not statistically significant) changes in salary and bonus compensation occurred.

The coefficient on *Exposure\*Post* represents the average difference in compensation between the pre and post periods for a one unit change in *Exposure*. Because the variable *Exposure* ranges from 0 to 1, the coefficient is interpreted as the average difference in compensation between firms that had zero *ex-ante* options exposure (i.e. firms in the 25<sup>th</sup> percentile) and firms that had 100% *ex-ante* options exposure (i.e. firms in the 75<sup>th</sup> percentile). Therefore the coefficient can be interpreted as the additional change in compensation after FAS 123R for firms that were in the 75<sup>th</sup> percentile of exposure and above compared to firms in the 25<sup>th</sup> percentile and below. Alternatively, the coefficient in column 1, for example, can be interpreted as meaning that every 10% increase in *ex-ante* options exposure is associated with an additional 2.1% decline option compensation (as a proportion of total compensation) in the post period.

The results in Table 2 suggest that restricted stock was substituted for options, but that the substitution did not fully offset the decline in option compensation. The coefficient in column 2 is about half the magnitude of the coefficient in column 1. Notably, total compensation decreases relatively more for exposed firms. Consistent with the presence of both substitution and income effects, greater *ex-ante* options exposure leads to greater curbs in total compensation. However, table 2 does not test whether the coefficients in columns 1 and 2 are statistically different. In Table 3 I test explicitly whether equity compensation decreased overall as a proportion of total compensation (hypothesis H1a).

In column 1 of Table 4, the coefficient on *Post* is negative and significant, indicating that equity compensation as a proportion of total compensation fell for all firms by an average of 2.09%, although this coefficient is not statistically significant. However, the coefficients in columns 2 and 3 indicate that firms highly exposed to the accounting impact of option expensing saw a decrease in the proportion of equity-to-total compensation of 9.2%-17.5% relative to firms with low exposure. These results are consistent with the notion that firms decreased the CEO's equity incentives in order to mitigate the negative impact on accounting earnings.<sup>8</sup>

<sup>8</sup>A lesser proportion of equity compensation means that the manager's pay is less tied to firm performance. This aspect of compensation is alternatively captured by the manager's delta (i.e. the change in the CEO's wealth given a change in the stock price). In unreported tests, I replicate Table 3 using delta in place of *Equity %* and obtain qualitatively similar results.

If a change in accounting costs of equity compensation matter for how firms design the CEO's compensation, then in addition to scaling back option compensation overall I would also expect firms to scale back the option grants which have the greatest accounting impact. All else equal, options with longer times to expiration have greater valuations because they have a greater probability of being in the money at the time of exercise. Executive option grants are typically set such that they expire sometime after they vest, giving the executive a window in which he can exercise the option after it vests. Thus, longer the vesting periods are associated with longer times to expiration. Because the vesting period and time to expiration are closely linked, if firms decrease the time to expiration of option grants it is plausible that they will also decrease vesting periods to maintain a similar exercisable window. In Table 4 I test whether firms reduced the time to expiration of executive equity grants overall, the vesting periods, or both.

A common type of long-term option grant in my sample vests in five years and expires in ten years. In columns 1 and 3 of Table 4 I test whether firms decrease the percentage of options of these vesting periods and times to expiration (or longer) that they award to the CEO. The negative and significant coefficients in these columns indicate that firms with high *ex-ante* exposure to option expensing decrease their usage of options with long expirations and vesting periods relative to firms with low exposure. In columns 2 and 4 I test to what extent firms decrease the average time to expiration and vesting periods of executive option grants following FAS 123R. Firms with high *ex-ante* exposure to option expensing decrease the average time to expiration and vesting period of option grants by 1.186 years and 0.206 years, respectively, relative to firms with low exposure.

Given the decreases in equity compensation and in vesting periods documented in Tables 3 and 4, a key dimension of compensation that is likely affected by mandated option expensing is the duration of executive compensation. Duration is a function of (i) the proportion of equity-to-total compensation, and (ii) the vesting periods of the equity components of compensation.<sup>9</sup> Thus, a decrease in duration does not directly follow given a decrease in equity compensation. In theory, firms can increase vesting periods to maintain duration levels. However, as Hall and

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<sup>9</sup>See equation (1)

Murphy (2002) show, firms are limited in their ability to lengthen vesting periods because for risk-averse managers, compensation that is less certain is worth less and so firms would have to issue a greater amount of options to maintain the same level of incentives. This problem is amplified by the fact that the vesting of most option grants are contingent on continued employment at the firm. Thus, the more firms lengthen vesting periods of equity grants, the more managers discount the value of those grants. The results in Table 4 support this idea.

Given decreases in both the proportion and the vesting periods of equity grants, a decrease in the durations of executive compensation is highly likely. In Table 5, I explicitly test whether the decreases in equity compensation and vesting periods of equity grants led to declines in duration. Across all firms, pay duration fell by 0.243 years, and this decrease is more pronounced for firms with greater *ex-ante* exposure to option expensing. Specifically, a one unit increase in *ex-ante* exposure is associated with an additional decrease of 0.213-0.403 years. This represents a substantial decrease since I find that average CEO pay duration firm's average pay duration is about one year.

Decreases in equity compensation, vesting periods, and duration are perhaps surprising given the importance attributed to these incentives in aligning manager and shareholder interests. One potential alternative explanation for the results reported above is that firms are simply using discretion in their option valuation models to produce lower option values. That is, firms have not changed the options themselves, only the inputs to their valuation models since firms to have a degree of discretion and flexibility in valuing their employee options. To mitigate this concern and to examine to what extent firms used discretion to minimize the impact of option valuation, I conduct two tests. First, I use a consistent valuation model, a Black-Sholes model that uses consistent estimates of variance across time and across firms, and show in Table 6 shows that option compensation, total equity compensation, average vesting periods, and duration declined (coefficients are reported in columns 1 through 4, respectively) even when using a consistent valuation model instead of relying on firm estimates of option value.

Second, the magnitudes of the coefficients in columns 1, 2, and 4 of Table 6 are not as large in absolute value as those in tests that rely on option values as reported by the firm (column 1 of Table 2, column 2 of Table 3, and column 2 of table 5, respectively). This suggests that firm

estimates of option value declined more than consistently valued estimates. Table 7 shows that the disparity between firm estimates of option value vs. consistent estimates of option value grew most post-FAS 123R among firms that were most impacted by the rule. That is, firms most impacted in an accounting sense by high option values were more likely to underestimate option values relative to a model that values options consistently across the sample period. Together, the results in Tables 6 and 7 suggest that firms used both accounting discretion (in this case underestimating the value of employee stock options) and real reductions in option compensation to minimize the impact of mandated option expensing.

Overall, the results in this section provide evidence that accounting costs are a significant determinant of the design of executive compensation contracts. After the introduction of mandated option expensing, firms more exposed to the rule were more likely to decrease the CEO's equity compensation, to decrease the vesting periods of the CEO's equity grants, which in turn drives declines in the duration of CEO pay. These decreases are in addition to accounting discretion used by firms to minimize the accounting impact of option compensation. These changes have important implications for firms' long-term outlook as they reflect shifts in incentives that are argued in the literature to be key in aligning manager behavior with long-term shareholder interests.

## **6.2 FAS 123R and Changes in Investment and Financing Policy**

The results in section 6.1 show that firms with greater exposure to the accounting costs imposed under FAS 123R more dramatically adjusted the CEO's compensation structure and the incentive embedded therein. While theory argues that the incentives embedded in compensation are important for aligning manager and shareholder interests (Holmstrom, 1979; Jensen and Murphy, 1990), how managers will respond to decreases in equity compensation and duration is unclear. With pay less tied to firm performance, managers are less rewarded for the upside of risky projects, but are also not as punished for the downside. Thus suboptimal investment may manifest itself either in overinvestment and excessive risk-taking, or under investment and insufficient risk-taking. This section establishes how exposure to FAS 123R ultimately affected corporate investment and financing policy.

Table 8 reports results with respect to changes in investment behavior post-FAS 123R and shows that firms with greater exposure to the accounting impact of option expensing decrease investment to a greater degree following FAS 123R. Columns 1 through 3 that while investment (defined as capital expenditures plus R&D expenditures as a percentage of total assets) did not decline for the average firm (the coefficient for *Post* in column 1 is not statistically significant), firms with high *ex-ante* exposure saw declines of 0.766 to 1.338 percentage points relative to firms with low exposure. This result is economically significant given at the beginning of the sample period the median firm's investment represents between 5 and 6 percent of total assets.

The results in columns 2 and 3 of Table 8 are consistent with the idea that managers whose firms were more impacted by FAS 123R and who saw greater decreases in their equity compensation and durations of compensation were more likely to decrease investment in long-term and risky projects. The results in columns 4 through 6 provide some evidenced that firms increased repurchases and dividends after mandated option expensing. This supports the idea that instead of investing in long-term and risky projects, managers are more likely to choose a low-risk method of returning capital to shareholders. Overall, the results in Table 8 are consistent the idea that with incentives less tied to long-term performance, managers are less likely to take on long-term projects and are more likely to return cash to shareholders instead of investing in projects with uncertain payoffs.

Table 9 shows that financing policy also changed post-FAS 123R. Column 1 shows that cash holdings as a percentage of total assets increased overall by 4.6 percentage points. The coefficients on *Exposure\*Post* in columns 2 and 3 are positive and significant and show that firms with high exposure to option expensing increased their cash holdings an additional 2.3 to 2.7 percentage points relative to firms with low exposure. Columns 4 through 6 show that while net leverage (leverage net of cash, i.e. total liabilities minus cash divided by total assets minus cash) decreased by 0.04 percentage points overall, firms with high *ex-ante* exposure to option expensing decreased net leverage an additional 0.02 percentage points relative to firms with low exposure. The results in Table 9, together with the results in Table 8, round out a picture of firms adopting less active and less risky investment and financing policy.

Overall, the results in this section support the idea that as manager incentives changed

as a result of option expensing, so did firm investment behavior and financing policy. Firms invest less, returning more cash directly to shareholders instead, and adopt a more conservative balance sheet, holding more cash and decreasing leverage.

## 7 Robustness Tests

To reduce the likelihood that the results in section 6 are due to spurious correlation and to address alternative explanations, I conduct a number of robustness checks.

### 7.1 Placebo Tests

It is possible that the results presented in the previous section are driven by mean reversion if option compensation occurs in waves. For example, if firms award their CEOs more or less options in conjunction with business cycles, then the firms which awarded more options during the *ex-ante* period would be classified as having greater exposure to FAS 123R, and their option compensation (and by extension, their duration) would fall mechanically as their business cycle reverted. Alternatively, firms at a relatively younger stage of their life cycle may offer higher proportions of option and equity compensation to their executives and investing more given their higher growth opportunities, but then reduce both option compensation and investment as the firm matures and growth opportunities wane. Therefore, to reduce the likelihood that the results are driven by mean reversion of life cycle explanations, I conduct a placebo test replicating the main results over a different sample period where no change in the accounting treatment of option compensation occurs.

Table 10 replicates the results of Table 2 over the period 1992-2002 and shows that high option usage is not associated with subsequent changes in compensation absent a change in the accounting treatment of compensation.<sup>10</sup> For this sample, *Exposure* is defined the same as in prior tables but is measured over the period 1992-1994. The sample is then split into a pre-period (1995-1998) and a post-period (1999-2002). Coefficients are reported for *Post* (Panel A), and  $Exposure_e * Post$  (Panel B),  $aExposure_t * Post$  (Panel C). While Panel A shows that option compensation increased on average, I find no evidence that higher *ex-ante* option exposure leads to subsequent mechanical declines in option or mean reversion over a sample period when the accounting treatment of executive compensation was unaffected.

Table 11 conducts placebo tests with respect to corporate investment in financing policy

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<sup>10</sup>For this sample period examining changes in duration is not possible since the Incentive Lab database does not begin coverage until 1998. Therefore, for an earlier period I am limited to examining overall changes in option compensation and other components of compensation.



variables, the same dependent variables used in tables 8 and 9. I find no evidence that high options usage is associated with future changes in investment, cash returned to shareholders, cash holdings, or net leverage over a period where the accounting treatment of compensation was unaffected. Overall, the results in Tables 10 and 11 support the idea that the reported changes in compensation and corporate investment behavior and financing policy surrounding FAS 123R are due to changes in the accounting treatment of options and not to life cycle or mean reversion explanations.

## 7.2 Matched Sample Tests

To further mitigate the concern that high option compensation leads to subsequent changes in compensation and investment behavior for some reason not captured by my model, I conduct matched sample tests. The concern is that firms that choose to use option compensation over other forms of compensation are inherently different from other firms and during my sample period these firms experience changes in compensation and investment behavior due to an unobserved, omitted variable. While I cannot measure such a variable, I attempt to minimize this concern by matching firms on observable characteristics. Specifically, I match a “treated” firm to a “control” firm such that: (i) treated and control firms are in the same age and size quartiles, (ii) treated and control firms award a similar amount of equity (options plus restricted stock) compensation overall,<sup>11</sup> and (iii) treated firms are in the top quartile of  $Exposure_{treat}^e$  while control firms are in the bottom quartile. The sample includes any and all matches that meet the criteria (i.e. matching with replacement). In sum, treated and control firms are similar in age and size<sup>12</sup>, are at similar life cycle stages, and rely on the same mix of equity vs. cash compensation while treated firms use relatively more options and control firms use relatively more restricted stock.

Table 12 reports the difference in means along a number of dimensions between treated and control firms at the beginning of the sample period prior to the implementation of required

<sup>11</sup>Specifically:  $\text{abs}(Equity\%_{treat} - Equity\%_{control}) \leq 0.05$ , where  $Equity\%$  is the sum of the value of option compensation and restricted stock compensation divided by total compensation awarded to the CEO averaged over the five years prior to the beginning of the sample period.

<sup>12</sup>Hadlock and Pierce (2010) show that firms age and size have extraordinary explanatory power in predicting financial constraint, investment behavior, and cash holdings.

option expensing. Panel A shows that firms do not differ in the level of total pay awarded to the CEO, or in the proportion of total pay made up of equity compensation. By design, treated firms do rely on more option compensation with options making up 46.1% of total compensation on average. Control firms, in contrast, rely much less on option compensation with options making up less than 1% of total compensation on average. Panel B shows that Treated and control firms do not differ statistically in their size, return on assets, capital expenditures, R&D expenditures, asset tangibility, leverage, Tobin's  $Q$ , or firm age.

In Table 13, I repeat the main tests of the paper with the matched sample, defining  $Exposure_m$  as an indicator variable equal to one for treated firms and zero for control firms in this matched sample. Among the matched sample, CEOs of treated firms, that is firms that are similar to control firms along observable dimensions but differ in their extent of option usage before the introduction of the new regulation, see greater declines in equity compensation, in the vesting periods of equity grants, and in the duration of compensation. These results are consistent with the main findings of this paper.

Table 14 shows that treated firms also saw a significantly greater decline in investment and increase in cash holdings. While the coefficients for *Cash to Shareholders* and *Net Leverage* are not significant, the signs are qualitatively similar to the main results. Overall, matched sample tests mitigate the concern that inherent difference between firms who choose options over restricted stock in the pre-period rather than a change in the accounting treatment of options is responsible for subsequent changes in CEO compensation contracts and firm outcomes.

### 7.3 Job Security

In unreported tests, I explore the role of job security on changes in compensation and corporate outcomes around the introduction of mandated option expensing. Manso (2011) suggests a potential interactive relationship between duration and job security in motivating managers to invest in long-term projects.<sup>13</sup> The general argument is that duration may be necessary, but not sufficient, in motivating long-term performance if the manager is less certain about continued employment at the firm.

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<sup>13</sup>Manso (2011) discusses motivating innovation specifically, but the results can plausibly be extended to any activity whose benefits are not immediately realized, such as investment and R%D.

To examine the interactive nature between job security and compensation and how they relate to subsequent changes in the compensation and corporate outcomes in the context of this paper, I use three measures to capture the extent of the CEO's job security: (i) whether the CEO is also the chairman of the board (i.e. CEO duality), (ii) the governance index used by Gompers, Ishii, and Metrick (2003), and (iii) board co-option as proposed by Coles, Daniel, and Naveen (2014). Replicating the main results of this paper and including these measures of job security as control variables, and including a triple interaction term ( $Exposure*Post*Job\ Security$ ), I do not find that job security plays a significantly role in determining whether firms were affected by the accounting impact of option expensing either through changes in compensation or corporate outcomes such as investment and financing policy.

#### 7.4 Other Robustness Tests

To ensure the results are not driven by outliers, I replicate the main results of the paper after winsorizing all continuous variables at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. The results from these tests are reported in Table 15 and show that with the exception of the coefficients for *Cash to Shareholders* and *Net Leverage*, whose signs remain consistent with the main results, all other coefficients are consistent in their signs and maintain statistical significance.

To ensure that the results are not driven by survivorship bias or other changes in the sample, I replicate the main results of the paper with a constant sample of firms who exist for the entire duration of the 1998-2010 sample period. The results from these tests are reported in Table 16 and qualitatively and quantitatively similar to those in Table 13.

Finally, I conduct tests employing an alternative definition of *ex-ante* exposure to the accounting impact of option expensing,  $Exposure_r$ , defined as a 5-year rolling average of option compensation divided by total equity (options plus restricted stock) compensation awarded to the CEO by the firm in the fiscal year. The rolling average continues through 2002, then is fixed at 2002's value in subsequent years. The results from tests using this alternative measure are reported in Table 17. With the exception of the coefficients for *Cash to Shareholders* and *Net Leverage*, whose signs remain consistent with the main results but lose statistical significance, all other coefficients are consistent in their signs and maintain statistical significance.

## 8 Changes in Innovative Output

This section tests whether the changes affected by mandated option expensing ultimately affected innovative output. The results in the previous two sections supports the idea that the accounting costs of compensation affect the design of executive incentives and subsequent behavior. Innovative activity represents another potential channel through which reduced incentives to invest in long-term projects can affect the firm. Innovation and is crucial for the long-run comparative advantage of firms and is one of the biggest drivers of economic growth, but little empirical evidence exists on the relationship between managerial incentives and innovative output and, in particular, the relationship between the duration of executive compensation and innovative output.

Recent theory predicts that the duration of executive compensation is critical for inducing innovative activity. Manso (2011) shows that a necessary condition to motivate managers to innovate is to provide them with compensation that vests over a long horizon. The results in section 6.2 show that mandated option expensing created a negative shock to the duration of executive compensation, creating a setting in which we can test whether a reduction in duration leads to diminished innovative output as theory predicts.

To test this prediction, I extract data on patents and citations from Innovacer's Datashop U.S. Patent Database. This database includes all patents applied for with the USPTO which are ultimately granted. I follow the literature (Bernstein (2014), Tian and Wang (2014), for example) and measure the quality of innovative output as the number of patent citations for patents applied for in a given year and measure the relative impact of each patent as the number of citations per patent for all patents applied for in a given year.<sup>14</sup>

Table 18 reports results from estimating equation (1) with respect to patent citations (citations garnered by all patents applied for during the fiscal year, scaled by year and technology class averages) and the number of citations per patent for patents applied for in the fiscal year.

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<sup>14</sup>I control for truncation biases inherent in patent data following the literature. Patents and citations data is truncated in two ways. First, patents take 2-4 years between application to grant, and patents only show up in the database once they are granted, so the final years of my sample see sharp declines in the number of patents, especially the last two years. Second, patents garner citations over time, so patents granted in earlier years have had more time to gather citations. To control for these truncation issues I follow Hall, Jaffe, and Trajtenbeg (2001) and include alternative measures of patents and citations adjusted for year and technology class averages. I call these variables Scaled Patents and Scaled Citations.

The results are qualitatively consistent with theoretical predictions. For the average firm, both citations and citations per patent declined post-FAS 123R (columns 1 and 4). In columns 2 and 3, the negative coefficients for *Exposure\*Post* suggest that citations may have fallen more dramatically for firms more exposed to the accounting impact of option expensing, and which therefore experienced larger declines in executive equity compensation and duration. While the results in columns 2 and 3 are not statistically significant, the coefficients in columns 5 and 6 are negative and statistically significant, consistent with the idea that for firms whose executives experienced declines in pay duration, the impact of newly patented technology was less impactful. Overall these results suggest that the changes in compensation brought by a change in the accounting impact of compensation ultimately affected firms' innovative output.

## 9 Conclusion

This paper shows that in managing the impact of a change in the accounting cost of option compensation, firms significantly redesign the CEO's compensation contract along several important dimensions. Specifically, in response to mandated option expensing under FAS 123R, firms decrease option compensation significantly and 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 their use of option grants that vest over a long period of time. Together, these changes contribute to a significant decline in the duration of the CEO's compensation. Importantly, these changes are most pronounced for firms with greater *ex-ante* reliance on option compensation and therefore greater exposure to the accounting impact of option expensing. Evidence also suggests that firms used accounting discretion in valuing employee stock options to minimize the impact of option expensing.

The changes in executive compensation I document in response to mandated option expensing have important implications for the incentives provided to align manager behavior with 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 with greater exposure to mandated option expensing reduce investment and adopt a more conservative balance sheet, holding more cash and reducing leverage.

The evidence in this paper supports the idea that changes in accounting treatment of compensation are not merely cosmetic. These accounting costs affect the design of executive pay which in turn influence real activity. An important implication of these findings is that as accounting standards for employee compensation continue to evolve, it's important to consider their effect not just on financial reporting but on both managerial incentives and firm investment behavior.

The findings of this paper also leave some questions unanswered and open up several avenues for future research. First, this paper, coupled with the findings of Hayes, Lemmon, and Qiu (2012) show that compensation evolved along several dimensions following mandated option

expensing. Therefore, the setting of this paper does not allow me to attribute any changes in investment or financial strategy to a change in any one characteristic of executive compensation, only the general effect of mandated option expensing on these outcomes. Thus, while the decreases in investment and the adoption of conservative financial policy that I document are consistent with declines in duration and equity incentives, they are likely the results of a combination of a changes in compensation. since the introduction of required option expensing has been shown does not identify the specific channel through which mandated option expensing ultimately affects firm outcomes. Future work may better disentangle the marginal effect of duration, for example, compared to other aspects of compensation.

Second, future work should also examine to what extent the results of this paper can be generalized. This paper covers a subsample of large firms with strong analyst coverage. Firms not covered by the ExecuComp and Incentive Lab databases likely have differences in their contracting environments (Cadman, Klasa, and Matsunga, 2010). Firms not included in my sample may therefore not be under as much scrutiny and not as subject to pressure to meet short-term earnings targets. Thus, the extent to which analyst coverage and visibility play a role in firms' sensitivity to changes in accounting costs is an important avenue for future research.

**Table 1: Summary Statistics**

This table presents descriptive statistics for firms at the start of the sample period. Panel (A) includes characteristics of the annual CEO compensation package. Panel (B) includes measures of the potential accounting impact of the cost of the CEO's compensation, including the value compensation components relative to net income and the value of compensation components in per-share terms. Panel (C) includes other firm characteristics including measures of *Exposure* to mandated option expensing.  $Exposure_e$  is the fraction of option compensation to total equity compensation (options plus restricted stock) averaged over the five years prior to the start of the sample period.  $Exposure_t$  is the fraction of option compensation to total compensation averaged over the five years prior to the start of the sample period. All variables are defined in the appendix.

<b>Panel A: Compensation Characteristics</b>					
Variable	N	Mean	25th Pctl	Median	75th Pctl
Total Compensation (\$MM)	532	5.396	1.499	2.631	5.544
Salary%	532	0.290	0.138	0.256	0.403
Bonus%	532	0.245	0.111	0.227	0.352
Option%	532	0.268	0	0.120	0.532
Stock%	532	0.197	0	0.009	0.361
Duration	532	0.956	0.260	0.730	1.282
<b>Panel B: Accounting Impact of Compensation</b>					
Variable	N	Mean	25th Pctl	Median	75th Pctl
Total Compensation (scaled by Net Income)	532	0.300	0.007	0.016	0.039
Options (scaled by Net Income)	532	0.127	0	0.0006	0.009
Stock (scaled by Net Income)	532	0.018	0	0.00006	0.006
Total Compensation (Value per share)	532	0.042	0.013	0.027	0.052
Option Compensation (Value per share)	532	0.014	0	0.002	0.015
Stock Compensation (Value per share)	532	0.010	0	0.00014	0.008
<b>Panel C: Explanatory Variables</b>					
Variable	N	Mean	25th Pctl	Median	75th Pctl
$Exposure_e$	532	0.596448	0	0.816385	1
$Exposure_t$	532	0.311499	0	0.302791	0.529033
Sales (\$MM)	532	7238.88	1277.89	2825.44	7597.69
ROA	532	0.024727	0.011136	0.041587	0.080838
Capex/Assets	532	0.06294	0.029068	0.052588	0.081501
R&D/Assets	532	2.396755	0	0	2.385045
Tangibility	532	0.34214	0.14911	0.293226	0.534523
Leverage	532	0.627618	0.507452	0.629907	0.741933
Tobin's $Q$	532	2.328591	1.229333	1.636369	2.527879
Firm Age	532	28.94528	9.928767	26.39452	41.11507
CEO Tenure	532	4.84	1.42	3.16	6.14



**Table 2: Changes in Executive Compensation in Response to FAS 123R**

This table presents difference-in-difference estimates of the effect of mandated option expensing on various components of CEO compensation. The sample includes firm-year compensation data from 1999-2010. The dependent variables in columns (1)-(4) are expressed as percentages of total compensation, while the dependent variables in columns (5)-(9) are the log of the nominal level of compensation. The explanatory variable of interest is the interaction  $Exposure_e * Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure$  captures firms' *ex-ante* reliance on option compensation and its various forms are defined in the appendix. All controls are lagged one year and are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*) , 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Option%	Stock%	Salary%	Bonus%	Ln(Option)	Ln(Stock)	Ln(Salary)	Ln(Bonus)	Ln(Total)
Exposure <sub>e</sub> *Post	-0.210*** (-9.09)	0.110*** (5.11)	0.0487*** (3.40)	0.0510*** (3.66)	-4.361*** (-7.69)	4.067*** (7.27)	0.153 (1.65)	0.500 (1.18)	-0.142** (-2.33)
Ln(Sales)	0.00000810 (0.00)	0.0125 (0.93)	-0.0150 (-1.25)	0.00245 (0.29)	0.359 (0.90)	0.216 (0.56)	0.236*** (2.63)	-0.0833 (-0.27)	0.144*** (3.27)
ROA	0.0714 (1.37)	-0.00930 (-0.25)	-0.0725* (-1.70)	0.0104 (0.25)	0.214 (0.15)	-0.780 (-0.57)	0.106 (1.10)	0.795 (0.83)	0.406** (2.20)
Capex/Assets	0.193 (1.13)	-0.134 (-0.90)	0.0471 (0.34)	-0.106 (-0.92)	4.117 (0.80)	-4.704 (-1.13)	0.341 (0.60)	0.799 (0.21)	0.608 (0.99)
R&D/Assets	-0.00125 (-0.55)	0.000488 (0.24)	0.00122 (0.60)	-0.000461 (-0.33)	-0.0746 (-1.20)	-0.0337 (-0.52)	0.00384 (0.81)	-0.0231 (-0.40)	0.00679 (1.00)
Tangibility	-0.0921 (-1.00)	0.0182 (0.23)	0.0796 (1.18)	-0.00567 (-0.10)	-3.664 (-1.60)	0.763 (0.33)	-0.190 (-0.53)	-2.863 (-1.52)	-0.610* (-1.93)
Leverage	-0.0488 (-1.06)	-0.0336 (-0.77)	-0.00265 (-0.08)	0.0850** (2.50)	-1.047 (-0.83)	-0.800 (-0.63)	0.337** (2.05)	1.079 (1.10)	-0.0492 (-0.33)
Tobin's Q	0.00549 (1.15)	0.00543 (1.41)	-0.00733** (-2.37)	-0.00359 (-1.36)	0.0560 (0.57)	0.113 (0.99)	0.00223 (0.25)	-0.0731 (-0.68)	0.0480** (2.27)
Years since IPO	0.00371** (2.20)	-0.000141 (-0.07)	-0.00133 (-0.84)	-0.00223*** (-2.68)	0.0571 (1.48)	0.0277 (0.72)	0.000762 (0.28)	-0.0506 (-1.13)	0.00373 (0.80)
CEO Tenure	0.00536 (1.51)	-0.0000276 (-0.01)	0.00156 (0.59)	-0.00689*** (-2.74)	0.223** (2.33)	-0.0633 (-0.64)	0.0139 (1.31)	-0.180** (-2.16)	0.0125 (1.32)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	4,101	4,101	4,101	4,101	4,101	4,101	4,101	4,101	4,101
adj. R <sup>2</sup>	0.097	0.031	0.060	0.178	0.056	0.052	0.027	0.293	0.038

**Table 3: Changes in Equity Compensation in response to FAS 123R**

This table presents difference-in-difference estimates of the effect of mandated option expensing on the proportion of CEO equity compensation. The sample includes firm-year compensation data from 1999-2010. The dependent variable, *Equity%*, is the sum of the value of option compensation and restricted stock compensation divided by total compensation awarded to the CEO during the fiscal year. The explanatory variable of interest is the interaction *Exposure\*Post*, where *Post* is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise; *Exposure* captures firms' *ex-ante* reliance on option compensation and its various forms are defined in the appendix. All controls are lagged one year and are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*) , 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)
	Equity%	Equity%	Equity%
Post	-0.0209 (-0.88)		
Exposure <sub>e</sub> *Post		-0.0920*** (-5.14)	
Exposure <sub>t</sub> *Post			-0.175*** (-6.21)
Ln(Sales)	0.00961 (0.83)	0.0130 (1.15)	0.0140 (1.24)
ROA	0.0493 (1.04)	0.0474 (1.02)	0.0503 (1.10)
Capex/Assets	0.000694 (1.45)	0.000599 (1.25)	0.000463 (0.91)
R&D/Assets	0.00170 (1.38)	0.00176 (1.43)	0.00173 (1.40)
Tangibility	-0.0407 (-0.57)	-0.0471 (-0.68)	-0.0389 (-0.56)
Leverage	-0.0992** (-2.36)	-0.0993** (-2.36)	-0.0938** (-2.22)
Tobin's Q	0.00195 (0.42)	0.00240 (0.53)	0.00143 (0.35)
Years since IPO	0.00245** (1.98)	0.00241** (2.14)	0.00231** (2.12)
CEO Tenure	0.00617* (1.82)	0.00722** (2.18)	0.00669** (2.05)
CEO Age	-0.0468* (-1.82)	-0.0426* (-1.72)	-0.0375 (-1.53)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes
N	4,101	4,101	4,101
adj. R <sup>2</sup>	0.022	0.043	0.047

**Table 4: Changes in Vesting Periods in response to FAS 123R**

This table presents difference-in-difference estimates of the effect of mandated option expensing on the vesting schedules of CEO equity grants. The sample includes firm-year compensation data from 1999-2010. The dependent variables in columns 1 and 3 are the percentage of equity grants awarded to the CEO in the fiscal year with expirations longer than ten years (column 1) or vesting periods longer than 5 years (column 3). The dependent variables in columns 2 and 4 are the average time to expiration and vesting period, respectively, for equity grants awarded to the CEO in the fiscal year. The explanatory variable of interest is the interaction  $Exposure*Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure$  captures firms' *ex-ante* reliance on option compensation and its various forms are defined in the appendix. All controls are lagged one year and are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)
	% Grants Expiring in 10+ Years	Average Expiration	% Grants Vesting in 5+ Years	Average Vesting Period
$Exposure_e*Post$	-0.0889*** (-3.73)	-1.186*** (-4.08)	-0.0468** (-2.11)	-0.206* (-1.73)
Ln(Sales)	-0.00194 (-0.15)	-0.0281 (-0.21)	0.00490 (0.42)	-0.00892 (-0.11)
ROA	-0.00650 (-0.11)	0.511 (0.73)	-0.00190 (-0.06)	0.209 (0.85)
Capex/Assets	0.00125* (1.71)	0.00119 (0.26)	0.00000645 (0.01)	0.00317 (0.68)
R&D/Assets	-0.0000815 (-0.06)	-0.0245 (-1.39)	-0.000989 (-1.16)	-0.00385 (-0.45)
Tangibility	0.121 (1.33)	2.160** (2.42)	0.0843 (1.02)	-0.00159 (-0.00)
Leverage	0.000822 (0.02)	-0.450 (-0.88)	-0.0103 (-0.22)	-0.209 (-0.92)
Tobin's $Q$	-0.000802 (-0.15)	-0.00487 (-0.16)	0.00405 (1.16)	-0.0247* (-1.72)
Years since IPO	-0.000962 (-0.63)	-0.00969 (-0.53)	-0.000671 (-0.61)	0.0109* (1.74)
CEO Tenure	0.00670 (1.57)	0.0575 (1.62)	0.00534 (1.32)	0.0333 (1.58)
CEO Age	-0.0225 (-0.56)	-0.137 (-0.31)	-0.0193 (-0.64)	-0.132 (-0.91)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
$N$	4,101	4,101	4,101	4,101
adj. $R^2$	0.037	0.068	0.009	0.004

**Table 5: Changes in the Duration of Compensation in Response to FAS 123R**

This table presents difference-in-difference estimates of the effect of mandated option expensing on the duration of CEO compensation. The sample includes firm-year compensation data from 1999-2010. The dependent variable, *Duration*, is the value of each equity grant (option or restricted stock) 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); See equation (1). The explanatory variable of interest is the interaction *Exposure\*Post*, where *Post* is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise; *Exposure* captures firms' *ex-ante* reliance on option compensation and its various forms are defined in the appendix. All controls are lagged one year and are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)
	Duration	Duration	Duration
Post	-0.243*** (-3.25)		
Exposure <sub>e</sub> *Post		-0.213*** (-3.37)	
Exposure <sub>t</sub> *Post			-0.403*** (-3.94)
Ln(Sales)	0.0327 (0.94)	0.0298 (0.85)	0.0318 (0.92)
ROA	0.267** (2.45)	0.262** (2.45)	0.269** (2.52)
Capex/Assets	0.00210 (1.54)	0.00202 (1.53)	0.00172 (1.33)
R&D/Assets	0.00566* (1.67)	0.00595* (1.74)	0.00588* (1.71)
Tangibility	-0.0556 (-0.22)	-0.0312 (-0.12)	-0.0120 (-0.05)
Leverage	-0.293** (-2.46)	-0.298** (-2.54)	-0.285** (-2.43)
Tobin's Q	-0.00168 (-0.16)	-0.000258 (-0.02)	-0.00248 (-0.26)
Years since IPO	0.00558** (2.43)	0.00399* (1.75)	0.00376* (1.67)
CEO Tenure	0.0190* (1.92)	0.0183* (1.93)	0.0171* (1.79)
CEO Age	-0.00324 (-0.03)	-0.00622 (-0.06)	0.00529 (0.05)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes
N	4,101	4,101	4,101
adj. R <sup>2</sup>	0.009	0.012	0.014

**Table 6: Changes in Compensation Under Consistent Valuation Model**

This table presents difference-in-difference estimates of the effect of mandated option expensing on various characteristics of CEO compensation. The sample includes firm-year compensation data from 1999-2010. The dependent variables reflect characteristics of the CEO's compensation package for the fiscal year and are defined the same as in tables 3, 4, and 5, with the difference being that rather than rely on the fair value of options reported by firms, I use a Black-Scholes model to value options consistently across time. The explanatory variable of interest is the interaction  $Exposure_e * Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure_e$  captures firms' *ex-ante* reliance on option compensation and is defined as the value of CEO option compensation divided total CEO equity compensation (options plus restricted stock), averaged over the five years prior to a firm entering the sample. All controls are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)
	Option %	Equity %	Average Vesting Period	Duration
$Exposure_e * Post$	-0.0711*** (-2.60)	-0.0507** (-2.46)	-0.290** (-1.98)	-0.187** (-2.42)
Ln(Sales)	0.0272* (1.73)	0.0233* (1.75)	-0.0496 (-0.63)	0.0479 (1.13)
ROA	0.0355 (0.64)	0.0692 (1.29)	0.0277 (0.10)	0.358** (2.47)
Capex/Assets	-0.000316 (-0.27)	-0.000836 (-0.87)	0.00143 (0.29)	0.000853 (0.28)
R&D/Assets	-0.00185 (-1.10)	-0.000500 (-0.27)	-0.0127 (-1.37)	0.00258 (0.53)
Tangibility	-0.0835 (-0.80)	-0.0528 (-0.64)	-0.261 (-0.52)	-0.408 (-1.30)
Leverage	-0.0685 (-1.53)	-0.0983** (-2.43)	-0.195 (-0.83)	-0.271** (-2.02)
Tobin's $Q$	0.00770 (1.48)	0.00900** (2.51)	0.0198 (0.87)	0.0187 (1.34)
Years since IPO	0.000624 (0.33)	0.00144 (0.84)	0.0116** (2.14)	0.00375 (1.25)
CEO Tenure	0.00416 (0.86)	0.00271 (0.66)	0.0429** (2.46)	0.0108 (1.05)
CEO Age	-0.0812** (-2.03)	-0.0725** (-2.42)	-0.0196 (-0.07)	-0.0108 (-0.09)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
adj. $R^2$	4,101 0.073	4,101 0.029	4,101 0.006	4,101 0.019

**Table 7: Changes in Discretionary Option Valuation**

This table presents difference-in-difference estimates of the effect of mandated option expensing on various characteristics of CEO compensation. The sample includes firm-year compensation data from 1999-2010. The dependent variables reflect differences in the fair value of options reported by firms (Options) and the value of options under a consistent Black-Scholes model (Options<sub>BS</sub>) that are awarded to the CEO during the fiscal year. *Option%* indicates the value of options is scaled by total compensation. The explanatory variable of interest is the interaction  $Exposure_e * Post$ , where *Post* is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure_e$  captures firms' *ex-ante* reliance on option compensation and is defined as the value of CEO option compensation divided total CEO equity compensation (options plus restricted stock), averaged over the five years prior to a firm entering the sample. All controls are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)
	Options – Options <sub>BS</sub>	Ln(Options) – Ln(Options <sub>BS</sub> )	Options/ Options <sub>BS</sub>	Option% – Option% <sub>BS</sub>
Exposure <sub>e</sub> *Post	-1225694.4 (-0.97)	-3.762*** (-8.70)	-0.174*** (-7.22)	-0.131*** (-7.54)
Ln(Sales)	-877278.1* (-1.91)	-0.140 (-0.65)	-0.0370** (-2.42)	-0.0283*** (-2.97)
ROA	-3469328.0* (-1.72)	-1.128 (-1.28)	-0.0975 (-1.13)	-0.0232 (-0.74)
Capex/Assets	-19872.8 (-0.53)	0.00000548 (0.00)	0.000256 (0.19)	0.000500 (0.76)
R&D/Assets	-27705.0 (-0.55)	0.0383 (1.24)	-0.00125 (-0.55)	0.00101 (0.96)
Tangibility	10443689.9** (2.08)	0.880 (0.59)	-0.0197 (-0.20)	0.0838 (1.24)
Leverage	-326887.2 (-0.15)	-0.741 (-0.91)	-0.0204 (-0.42)	-0.000374 (-0.01)
Tobin's Q	-424413.4 (-0.56)	0.0380 (0.58)	-0.00250 (-0.48)	0.000593 (0.21)
Years since IPO	62007.0* (1.79)	0.0337* (1.87)	0.00186 (0.51)	0.00132 (1.27)
CEO Tenure	328010.5 (1.57)	0.202*** (2.86)	0.00999** (2.22)	0.00476 (1.61)
CEO Age	653677.7 (0.45)	0.815 (1.47)	-0.0460 (-1.22)	0.0537** (2.40)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
adj. R <sup>2</sup>	4,101 0.014	4,101 0.211	4,101 0.031	4,101 0.126

**Table 8: Changes in Investment in Response to FAS 123R**

This table presents difference-in-difference estimates of the effect of mandated option expensing on the vesting schedules of CEO equity grants. The sample includes firm-year compensation data from 1999-2010. The dependent variable in columns 1 through 3, *Investment*, is the sum of capital expenditures and R&D expense scaled by the book value of assets. The dependent variable in columns 4 through 6 is the sum of dividends and repurchases scaled by the book value of assets. The explanatory variable of interest is the interaction *Exposure\*Post*, where *Post* is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise; *Exposure* captures firms' *ex-ante* reliance on option compensation and its various forms are defined in the appendix. All controls are lagged one year and are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)	(5)	(6)
	Investment	Investment	Investment	Cash to Shareholders	Cash to Shareholders	Cash to Shareholders
Post	-1.083 (-1.34)			-0.00544 (-1.02)		
Exposure <sub>e</sub> *Post		-0.766** (-2.10)			0.00437 (1.46)	
Exposure <sub>t</sub> *Post			-1.338* (-1.88)			0.0144*** (2.86)
Ln(Sales)	-1.240 (-1.50)	-1.262 (-1.56)	-1.259 (-1.58)	0.00255 (1.41)	0.00202 (1.16)	0.00179 (1.03)
ROA	-0.650 (-0.29)	-0.669 (-0.29)	-0.645 (-0.28)	0.00967 (1.59)	0.00975 (1.60)	0.00958 (1.57)
Capex/Assets	0.0979 (1.06)	0.0978 (1.06)	0.0968 (1.05)	-0.000239** (-2.10)	-0.000229** (-2.12)	-0.000214** (-2.07)
R&D/Assets	0.184* (1.86)	0.185* (1.87)	0.185* (1.87)	0.000375 (1.63)	0.000377 (1.65)	0.000378* (1.67)
Tangibility	5.839 (1.64)	5.969* (1.65)	6.040* (1.68)	-0.0293** (-2.03)	-0.0277* (-1.94)	-0.0280* (-1.96)
Leverage	-4.556*** (-3.07)	-4.577*** (-3.10)	-4.534*** (-3.09)	-0.0472*** (-6.37)	-0.0474*** (-6.43)	-0.0478*** (-6.53)
Tobin's Q	1.366*** (7.50)	1.371*** (7.53)	1.364*** (7.58)	-0.00128** (-1.99)	-0.00129** (-2.08)	-0.00122** (-2.12)
Years since IPO	0.0547*** (2.74)	0.0474** (2.33)	0.0465** (2.35)	0.000548*** (2.90)	0.000500*** (2.67)	0.000504*** (2.75)
CEO Tenure	0.0270 (0.45)	0.0210 (0.35)	0.0160 (0.27)	-0.000190 (-0.41)	-0.000344 (-0.77)	-0.000348 (-0.78)
CEO Age	0.434 (1.20)	0.409 (1.08)	0.444 (1.13)	-0.00173 (-0.53)	-0.00235 (-0.73)	-0.00296 (-0.93)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
N	4,101	4,101	4,101	4,101	4,101	4,101
adj. R <sup>2</sup>	0.214	0.215	0.215	0.081	0.082	0.084

**Table 9: Balance Sheet Changes in Response to FAS 123R**

This table presents difference-in-difference estimates of the effect of mandated option expensing on the vesting schedules of CEO equity grants. The sample includes firm-year compensation data from 1999-2010. The dependent variable in columns 1 through 3 is the value of cash scaled by the book value of assets. The dependent variable in columns 4 through 6 is the value of total liabilities minus the value of cash all scaled by the book value of assets. The explanatory variable of interest is the interaction  $Exposure*Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure$  captures firms' *ex-ante* reliance on option compensation and its various forms are defined in the appendix. All controls are lagged one year and are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)	(5)	(6)
	Cash	Cash	Cash	Net Leverage	Net Leverage	Net Leverage
Post	4.558*** (4.44)			-0.0379** (-2.30)		
$Exposure_e*Post$		2.259*** (3.54)			-0.0216** (-2.36)	
$Exposure_t*Post$			2.744** (2.39)			-0.0225 (-1.45)
Ln(Sales)	-3.266*** (-5.44)	-3.124*** (-5.24)	-3.098*** (-5.23)	0.0338*** (3.89)	0.0327*** (3.79)	0.0324*** (3.75)
ROA	-3.821* (-1.86)	-3.764* (-1.85)	-3.827* (-1.87)	-0.0232 (-0.66)	-0.0237 (-0.68)	-0.0231 (-0.67)
Capex/Assets	-0.00457 (-0.16)	-0.00535 (-0.18)	-0.00421 (-0.14)	-0.000283 (-0.66)	-0.000280 (-0.65)	-0.000286 (-0.66)
R&D/Assets	-0.0802 (-1.56)	-0.0848* (-1.66)	-0.0839 (-1.63)	0.000453 (0.33)	0.000493 (0.36)	0.000484 (0.35)
Tangibility	-13.95*** (-3.84)	-14.61*** (-4.11)	-14.84*** (-4.17)	0.153*** (3.41)	0.158*** (3.58)	0.160*** (3.62)
Leverage	-3.775** (-1.97)	-3.687* (-1.94)	-3.772** (-1.98)	0.691*** (20.37)	0.690*** (20.40)	0.691*** (20.40)
Tobin's $Q$	-0.138 (-0.52)	-0.157 (-0.61)	-0.138 (-0.53)	-0.00103 (-0.41)	-0.000857 (-0.34)	-0.00102 (-0.41)
Years since IPO	0.00157 (0.03)	0.0338 (0.61)	0.0364 (0.67)	-0.000580 (-0.63)	-0.000844 (-0.97)	-0.000870 (-1.00)
CEO Tenure	0.00123 (0.01)	0.0407 (0.35)	0.0613 (0.52)	-0.000113 (-0.07)	-0.000398 (-0.27)	-0.000614 (-0.41)
CEO Age	0.572 (0.96)	0.735 (1.24)	0.705 (1.19)	-0.0109 (-1.16)	-0.0121 (-1.30)	-0.0120 (-1.29)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
$N$	4,101	4,101	4,101	4,101	4,101	4,101
adj. $R^2$	0.100	0.101	0.098	0.367	0.367	0.366



**Table 10: Placebo Tests - Changes in Executive Compensation**

This table presents results from placebo tests replicating the results of Table 2 over the placebo period 1992-2002. The dependent variables in columns (1)-(4) are expressed as percentages of total compensation, while the dependent variables in columns (5)-(9) are the log of the nominal level of compensation. The explanatory variable of interest is the interaction  $Exposure * Post$ .  $Exposure$  is defined the same as in prior tables but is measured over the period 1992-1994. The sample is then split into a pre-period (1995-1998) and a post-period (1999-2002). All regressions include controls from table 2 (unreported) and firm fixed effects. Panels (B)–(C) include year fixed effects. All variables are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*) , 5% (\*\*), and 10% (\*) levels.

	Percent of Total Compensation				Ln(Compensation)				
	(1) Option %	(2) Stock %	(3) Salary %	(4) Bonus %	(5) Ln(Option)	(6) Ln(Stock)	(7) Ln(Salary)	(8) Ln(Bonus)	(9) Ln(Total)
<i>Panel A: Regressions of compensation characteristics on Post and controls (not reported).</i>									
Post	0.0420** (2.22)	-0.00855 (-1.31)	-0.0149 (-1.06)	-0.0140 (-1.41)	0.372* (1.91)	-0.0338 (-0.20)	0.119* (1.95)	-0.0315 (-0.21)	0.329*** (6.04)
N	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330
<i>Panel B: Regressions of compensation characteristics on Exposure<sub>e</sub> * Post and controls (not reported).</i>									
Exposure <sub>e</sub> * Post	-0.0264 (-0.49)	0.0350 (1.14)	-0.0315 (-0.41)	0.0889** (2.39)	0.159 (0.24)	1.899** (2.27)	0.985 (1.27)	1.163** (2.27)	0.257 (1.45)
N	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330
<i>Panel C: Regressions of compensation characteristics on Exposure<sub>t</sub> * Post and controls (not reported).</i>									
Exposure <sub>t</sub> * Post	0.0219 (0.25)	-0.00568 (-0.28)	0.00687 (0.11)	-0.0107 (-0.25)	0.486 (0.52)	0.385 (0.62)	0.378 (1.37)	0.352 (0.51)	0.413* (1.66)
N	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330	1,330

**Table 11: Placebo Tests - Changes in Corporate Outcomes**

This table presents results from placebo tests replicating the results of Tables 8 and 9 over the placebo period 1992-2002. The dependent variable in column 1, *Investment*, is the sum of capital expenditures and R&D expense scaled by the book value of assets. The dependent variable in column 2 is the sum of dividends and repurchases scaled by the book value of assets. The dependent variable in column 3 is the value of cash scaled by the book value of assets. The dependent variable in column 4 is the value of total liabilities minus the value of cash all scaled by the book value of assets. The explanatory variable of interest is the interaction *Exposure\*Post*. *Exposure* is defined the same as in prior tables but is measured over the period 1992-1994. The sample is then split into a pre-period (1995-1998) and a post-period (1999-2002). All regressions include controls from table 2 (unreported) and firm fixed effects. Panels (B)–(C) include year fixed effects. All variables are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)
	Investment	Cash to Shareholders	Cash	Net Leverage
<i>Panel A: Regressions of corporate outcomes on Post and controls (not reported).</i>				
Post	0.050 (0.23)	0.212 (0.77)	0.707 (1.60)	0.468 (0.39)
N	1,330	1,330	1,330	1,330
<i>Panel B: Regressions of corporate outcomes on Exposure<sub>e</sub>*Post and controls (not reported).</i>				
Exposure <sub>e</sub> *Post	0.093 (0.38)	0.240 (0.78)	0.754 (1.49)	0.494 (0.37)
N	1,330	1,330	1,330	1,330
<i>Panel C: Regressions of corporate outcomes on Exposure<sub>t</sub>*Post and controls (not reported).</i>				
Exposure <sub>t</sub> *Post	0.297 (0.29)	0.056 (0.04)	-2.249 (-0.89)	11.52 (1.58)
N	1,330	1,330	1,330	1,330

**Table 12: Matched Sample Tests - Covariate Balance**

This table presents differences in means between treated and control firms from a matched sample. The means reflect values at the beginning of the sample period. Column 1 and 2 show mean values for treated and control firms, respectively. Column 3 shows the difference in means between treated and control firms with t-values in parentheses. Panel A presents differences in mean values of CEO compensation characteristics. Panel B presents differences in means of firm characteristics. Treated and control firms are matched on observable characteristics but differ in their *ex-ante* exposure to option expensing; treated firms have values of  $Exposure_e$  in the top quartile and control firms have values of  $Exposure_e$  in the bottom quartile, where  $Exposure_e$  captures firms' *ex-ante* reliance on option compensation and is defined as the value of CEO option compensation divided total CEO equity compensation (options plus restricted stock), averaged over the five years prior to a firm entering the sample. All variables are defined in the appendix. Statistical significance in the difference in means displayed in column 3 is denoted at the 1% (\*\*\*) , 5% (\*\*), and 10% (\*) levels.

Variable	(1) Treated (n=208)	(2) Control (n=43)	(3) Difference (t-value)
<i>Panel A: CEO compensation</i>			
Total CEO Pay	7.533	8.083	0.529 (0.29)
Equity % (of total)	0.643	0.596	0.047 (1.50)
Option % (of total)	0.461	0.006	0.455*** (9.56)
<i>Panel B: Firm characteristics</i>			
Ln(Sales)	8.175	8.230	-0.055 (-0.25)
ROA	0.052	0.045	0.007 (0.42)
Capex/Assets	7.219	7.427	-0.208 (-0.18)
R&D/Assets	0.027	0.026	0.001 (0.03)
Tangibility	0.317	0.324	-0.007 (-0.20)
Leverage	0.627	0.594	0.033 (0.97)
Tobin's Q	2.246	2.812	-0.566 (-1.28)
Years since IPO	29.17	30.49	-1.32 (0.36)

**Table 13: Matched Sample Tests - Changes in the Structure of Compensation**

This table presents difference-in-difference estimates from matched sample tests of the effect of mandated option expensing on various characteristics of CEO compensation. The sample includes firm-year compensation data from 1999-2010. The dependent variables reflect characteristics of the CEO's compensation package for the fiscal year and are defined the same as in tables 3, 4, and 5. The explanatory variable of interest is the interaction  $Exposure_m * Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure_m$  is an indicator equal to one for treated firms in a matched sample. Treated and control firms are matched on observable characteristics but differ in their *ex-ante* exposure to option expensing; treated firms have values of  $Exposure_e$  in the top quartile and control firms have values of  $Exposure_e$  in the bottom quartile, where  $Exposure_e$  captures firms' *ex-ante* reliance on option compensation and is defined as the value of CEO option compensation divided total CEO equity compensation (options plus restricted stock), averaged over the five years prior to a firm entering the sample. All controls are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)
	Equity %	% Grants w/ Vesting Periods of 5+ Years	Average Vesting Period	Duration
Exposure <sub>m</sub> *Post	-0.058** (-2.16)	-0.142*** (-4.03)	-0.577*** (-3.66)	-0.375*** (-2.96)
Ln(Sales)	0.015 (0.97)	0.017 (0.96)	0.046 (0.42)	0.070 (1.47)
ROA	0.086 (1.20)	0.072 (1.43)	0.378 (1.03)	0.335* (1.91)
Capex/Assets	0.001* (1.78)	0.000 (0.05)	0.010 (1.33)	0.004** (2.28)
R&D/Assets	0.004*** (3.00)	0.000 (0.21)	0.001 (0.07)	0.008 (1.59)
Tangibility	-0.065 (-0.67)	0.145 (1.34)	0.367 (0.67)	-0.037 (-0.11)
Leverage	-0.063 (-1.04)	0.057 (0.94)	0.082 (0.27)	-0.238 (-1.45)
Tobin's Q	0.009** (2.39)	0.006 (0.78)	0.016 (0.69)	0.036** (2.59)
Years since IPO	0.003** (2.23)	-0.000 (-0.28)	0.009 (1.41)	0.003 (0.99)
CEO Tenure	-0.001 (-0.24)	0.002 (0.46)	0.011 (0.37)	-0.001 (-0.08)
CEO Age	-0.038 (-1.13)	0.042 (0.95)	0.163 (0.85)	0.231 (1.04)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
N	1,961	1,961	1,961	1,961
adj. R <sup>2</sup>	0.027	0.030	0.011	0.032

**Table 14: Matched Sample Tests - Changes in Corporate Outcomes**

This table presents difference-in-difference estimates from matched sample tests of the effect of mandated option expensing on various characteristics of CEO compensation. The sample includes firm-year compensation data from 1999-2010. The dependent variables reflect firm investment and financing policy outcomes for the fiscal year and are defined the same as in tables 8 and 9. The explanatory variable of interest is the interaction  $Exposure_m * Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure_m$  is an indicator equal to one for treated firms in a matched sample. Treated and control firms are matched on observable characteristics but differ in their *ex-ante* exposure to option expensing; treated firms have values of  $Exposure_e$  in the top quartile and control firms have values of  $Exposure_e$  in the bottom quartile, where  $Exposure_e$  captures firms' *ex-ante* reliance on option compensation and is defined as the value of CEO option compensation divided total CEO equity compensation (options plus restricted stock), averaged over the five years prior to a firm entering the sample. All controls are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)
	Investment	Cash to Shareholders	Cash	Net Leverage
$Exposure_m * Post$	-1.797*** (-3.33)	0.005 (1.07)	1.506* (1.66)	-0.018 (-0.95)
Ln(Sales)	-1.849 (-1.41)	0.001 (0.43)	-3.032*** (-4.12)	0.068 (1.63)
ROA	4.255 (1.29)	0.010 (0.68)	-4.737 (-1.54)	-0.083 (-0.85)
Capex/Assets	0.035 (0.47)	-0.000 (-1.46)	0.017 (0.79)	-0.000 (-0.16)
R&D/Assets	0.486*** (5.62)	0.000 (0.66)	-0.114* (-1.77)	-0.001 (-0.21)
Tangibility	3.764 (0.66)	-0.026 (-1.30)	-15.290*** (-2.84)	0.134 (1.15)
Leverage	-5.932*** (-2.76)	-0.074*** (-5.29)	-2.725 (-0.87)	0.949*** (5.16)
Tobin's $Q$	0.901*** (3.80)	0.003 (1.63)	0.079 (0.24)	0.004 (0.53)
Years since IPO	0.084*** (2.86)	-0.000 (-0.05)	-0.047 (-1.06)	-0.001 (-1.55)
CEO Tenure	0.053 (0.63)	0.001 (0.84)	0.251 (1.45)	-0.001 (-0.32)
CEO Age	0.073 (0.10)	0.002 (0.45)	1.071 (0.93)	0.013 (0.40)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
adj. $R^2$	1,961	1,961	1,961	1,961
	0.227	0.102	0.105	0.260

**Table 15: Winsorized Sample**

This table presents difference-in-difference estimates of the effect of mandated option expensing on CEO compensation and ensuing investment and financial policy. The sample includes firm-year compensation data from 1999-2010. The dependent variables in panel A reflect characteristics of the CEO's compensation package for the fiscal year and are defined the same as in tables 3, 4, and 5. The dependent variables in panel B reflect firm investment and financing policy outcomes for the fiscal year and are defined the same as in tables 8 and 9. The explanatory variable of interest is the interaction  $Exposure_e * Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure_e$  captures firms' *ex-ante* reliance on option compensation and is defined as the value of CEO option compensation divided total CEO equity compensation (options plus restricted stock), averaged over the five years prior to a firm entering the sample. All continuous variables are winsorized at the 1% and 99% levels. All controls are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

<i>Panel A: CEO Compensation</i>				
	(1)	(2)	(3)	(4)
	Equity %	% Grants w/ Vesting Periods of 5+ Years	Average Vesting Period	Duration
$Exposure_e * Post$	-0.0879*** (-4.94)	-0.0430* (-1.93)	-0.225** (-2.02)	-0.186*** (-3.29)
Controls from tables 3 & 4	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
$N$	4,101	4,101	4,101	4,101
adj. $R^2$	0.044	0.009	0.003	0.012
<i>Panel B: Investment and Financial Policy</i>				
	(1)	(2)	(3)	(4)
	Investment	Cash to Shareholders	Cash	Net Leverage
$Exposure_e * Post$	-0.745* (-1.81)	0.00347 (1.05)	2.172*** (3.37)	-0.0209 (-1.50)
Controls from tables 3 & 4	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
$N$	4,101	4,101	4,101	4,101
adj. $R^2$	0.196	0.139	0.094	0.252

**Table 16: Survivorship Bias**

This table presents difference-in-difference estimates of the effect of mandated option expensing on CEO compensation and ensuing investment and financial policy. The sample includes firm-year compensation data from 1999-2010, and the sample is restricted to firms that exist for the entire sample period. The dependent variables in panel A reflect characteristics of the CEO's compensation package for the fiscal year and are defined the same as in tables 3, 4, and 5. The dependent variables in panel B reflect firm investment and financing policy outcomes for the fiscal year and are defined the same as in tables 8 and 9. The explanatory variable of interest is the interaction  $Exposure_e * Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure_e$  captures firms' *ex-ante* reliance on option compensation and is defined as the value of CEO option compensation divided total CEO equity compensation (options plus restricted stock), averaged over the five years prior to a firm entering the sample. All controls are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*) , 5% (\*\*), and 10% (\*) levels.

<i>Panel A: CEO Compensation</i>				
	(1)	(2)	(3)	(4)
	Equity %	% Grants w/ Vesting Periods of 5+ Years	Average Vesting Period	Duration
$Exposure_e * Post$	-0.107*** (-5.23)	-0.0467* (-1.82)	-0.244* (-1.73)	-0.242*** (-3.34)
Controls from tables 3 & 4	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
$N$	3,454	3,454	3,454	3,454
adj. $R^2$	0.047	0.013	0.003	0.012
<i>Panel B: Investment and Financial Policy</i>				
	(1)	(2)	(3)	(4)
	Investment	Cash to Shareholders	Cash	Net Leverage
$Exposure_e * Post$	-0.863* (-1.72)	0.00324 (0.68)	1.842** (2.55)	-0.0264 (-1.47)
Controls from tables 3 & 4	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
$N$	3,454	3,454	3,454	3,454
adj. $R^2$	0.153	0.102	0.113	0.273

**Table 17: Changes Under Alternative Exposure Measure**

This table presents difference-in-difference estimates of the effect of mandated option expensing on CEO compensation and ensuing investment and financial policy. The sample includes firm-year compensation data from 1999-2010. The dependent variables in panel A reflect characteristics of the CEO's compensation package for the fiscal year and are defined the same as in tables 3, 4, and 5. The dependent variables in panel B reflect firm investment and financing policy outcomes for the fiscal year and are defined the same as in tables 8 and 9. The explanatory variable of interest is the interaction  $Exposure_r * Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure_r$  captures firms' *ex-ante* reliance on option compensation and is defined as a 5-year rolling average of option compensation divided by total equity (options plus restricted stock) compensation awarded to the CEO by the firm in the fiscal year. The rolling average continues through 2002, then is fixed at 2002's value in subsequent years. All controls are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

<i>Panel A: CEO Compensation</i>				
	(1)	(2)	(3)	(4)
	Equity %	% Grants w/ Vesting Periods of 5+ Years	Average Vesting Period	Duration
$Exposure_r * Post$	-0.0817*** (-4.44)	-0.0435* (-1.88)	-0.227* (-1.85)	-0.204*** (-2.90)
Controls from tables 3 & 4	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
$N$	4,101	4,101	4,101	4,101
adj. $R^2$	0.042	0.008	0.004	0.011
<i>Panel B: Investment and Financial Policy</i>				
	(1)	(2)	(3)	(4)
	Investment	Cash to Shareholders	Cash	Net Leverage
$Exposure_r * Post$	-0.731* (-1.73)	0.00604 (1.26)	1.484** (1.99)	-0.0238 (-1.26)
Controls from tables 3 & 4	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
$N$	4,101	4,101	4,101	4,101
adj. $R^2$	0.219	0.103	0.111	0.273



**Table 18: Changes in Innovation in response to FAS 123R**

This table presents difference-in-difference estimates of the effect of mandated option expensing on innovative output. The sample includes firm-year observations from 1999-2010. The dependent variable in columns 1 and 2, *Scaled Citations* is the sum of citations received by all patents applied for during the fiscal year. Citations are scaled by year and technology class averages following Hall, Jaffe, and Trajtenberg (2001). The dependent variable in columns 3 and 4 is *Scaled Citations* divided by the number of patents applied for in the fiscal year. The explanatory variable of interest is the interaction  $Exposure_e * Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure_e$  captures firms' *ex-ante* reliance on option compensation and is defined as the value of CEO option compensation divided total CEO equity compensation (options plus restricted stock), averaged over the five years prior to a firm entering the sample. All controls are lagged one year and are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*) , 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)	(5)	(6)
	Scaled Citations	Scaled Citations	Scaled Citations	Cites/ Patent	Cites/ Patent	Cites/ Patent
Post	-262.9*** (-2.60)			-5.713*** (-4.56)		
$Exposure_e * Post$		-63.27 (-0.76)			-1.954** (-2.48)	
$Exposure_t * Post$			-229.1 (-1.19)			-3.455*** (-2.82)
Ln(Sales)	110.8** (2.08)	99.21* (1.92)	103.3** (2.03)	0.855** (2.24)	0.633* (1.75)	0.645* (1.78)
ROA	149.5 (1.08)	147.6 (1.08)	150.2 (1.09)	-2.456 (-1.29)	-2.509 (-1.34)	-2.449 (-1.32)
Capex/Assets	-1.338 (-0.77)	-1.212 (-0.74)	-1.458 (-0.82)	-0.007 (-0.45)	-0.005 (-0.32)	-0.008 (-0.49)
R&D/Assets	14.96* (1.96)	15.19** (1.98)	15.18** (2.00)	0.0228 (0.50)	0.0281 (0.62)	0.0275 (0.61)
Tangibility	303.9 (0.72)	349.6 (0.82)	353.8 (0.82)	4.776** (2.33)	5.703*** (2.74)	5.882*** (2.85)
Leverage	-154.6 (-1.07)	-159.8 (-1.11)	-152.4 (-1.06)	2.021 (1.26)	1.908 (1.21)	2.017 (1.28)
Tobin's Q	21.13 (1.32)	21.94 (1.33)	20.93 (1.33)	0.409** (2.18)	0.429** (2.21)	0.409** (2.20)
Years since IPO	1.476 (0.40)	-0.473 (-0.13)	-0.525 (-0.14)	-0.0350 (-1.53)	-0.0765** (-2.29)	-0.0787** (-2.31)
CEO Tenure	-2.318 (-0.16)	-5.600 (-0.40)	-5.439 (-0.38)	-0.0850 (-0.69)	-0.148 (-1.23)	-0.160 (-1.34)
CEO Age	166.0* (1.86)	152.6* (1.74)	162.7* (1.81)	0.727 (1.29)	0.470 (0.84)	0.561 (1.00)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes	No	Yes	Yes
N	4,101	4,101	4,101	4,101	4,101	4,101
adj. R <sup>2</sup>	0.019	0.018	0.019	0.113	0.109	0.110

## A Appendix: Variable Definitions

### Panel A: Dependent Variables

Variable	Definition and Sources
Duration	The value of each equity grant (option or restricted stock) 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); See equation (1). Source: Incentive Lab.
Bonus%	The value of bonus compensation divided by total compensation awarded to the CEO during the fiscal year. Source: Incentive Lab.
Equity%	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. 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.
Salary%	The value of salary 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. Source: Incentive Lab.
Ln(Bonus)	The log of bonus compensation awarded to the CEO during the fiscal year. Source: Incentive Lab.

Ln(Option	The log of option compensation awarded to the CEO during the fiscal year. Source: Incentive Lab.
Ln(Salary)	The log of salary compensation awarded to the CEO during the fiscal year. Source: Incentive Lab.
Ln(Stock)	The log of salary compensation awarded to the CEO during the fiscal year. Source: Incentive Lab.
Ln(Total)	The log of total compensation awarded to the CEO during the fiscal year. Source: Incentive Lab.
Market Share	Sales divided by aggregate sales of the firm's 2-digit SIC industry. Source: Compustat.
Non-Equity Incentive Compensation%	The value of non-equity incentive plan compensation divided by total compensation awarded to the CEO during the fiscal year. Source: Incentive Lab.
Other Compensation%	The value of all compensation awarded to the CEO during the fiscal year in excess of salary, options, restricted stock, non-equity incentive plan compensation, changes in pension value and non-qualified deferred compensation (NQDC) earnings. Source: Incentive Lab.
Scaled Patents	The sum of patents applied for during the fiscal year that were ultimately granted. This value is scaled by the total number patents applied for in the same year and technology class that were ultimately granted. Source: Innovaccr.
Scaled Cites	The sum of citations received by all patents applied for during the fiscal year that were ultimately granted. This value is scaled by the average of number citations received by patents in the same year and technology class following Hall, Jaffe, and Trajtenberg (2001). Source: Innovaccr.

Total Compensation      The sum of the value of salary, bonus, options, and restricted stock awarded to the CEO during the fiscal year. Source: Incentive Lab.

### Panel B: Explanatory Variables

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Variable      Definition and Sources (Compustat variable designations in parentheses where applicable).

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Exposure<sup>e</sup>      The value of option compensation divided by total equity compensation (options plus restricted stock), averaged over the five years prior to 1998 (the beginning of the sample period). If the firm entered the sample after 1998 but before 2003 then it is the average over the five years prior to entering the sample. Source: ExecuComp.

Exposure<sup>m</sup>      An indicator variable equal to one for treated firms and zero for control firms in a matched sample. Matched meet the following criteria: (i) treated and control firms are in the same age and size quartiles, (ii)  $\text{abs}(\text{Equity}\%_{treat} - \text{Equity}\%_{control}) \leq 0.05$ , and (iii)  $\text{Exposure}_{treat}^e > \text{Exposure}_{control}^e$ .

Exposure<sup>t</sup>      The value of option compensation divided by total compensation, averaged over the five years prior to 1998 (the beginning of the sample period). If the firm entered the sample after 1998 but before 2003 then it is the average over the five years prior to entering the sample. Source: ExecuComp.

Intermediate      Indicator variable equal to one for fiscal years 2003-2005 (the intermediate period between announcement and implementation of mandated option expensing), and zero otherwise.

Post	Indicator variable equal to one for fiscal years 2003 and later, and zero otherwise.
Capex/Assets	Capital expenditures divided by total assets ( $CAPX/AT$ ). Source: Compustat.
Leverage	Total liabilities divided by total assets ( $LT/AT$ ). Source: Compustat.
Ln(Sales)	The log of sales (in US\$ million) for the fiscal year ( $SALE$ ). Source: Compustat.
R&D/Assets	R&D expense divided by total assets ( $XRD/AT$ ). This value is set to zero if missing. Source: Compustat.
ROA	Net income divided by total assets ( $NI/AT$ ). Source: Compustat.
Tangibility	Net property, plant, and equipment divided by total assets ( $PPENT/AT$ ). Source: Compustat.
Tenure	The number of years since the CEO was appointed to his position as of year $t$ . Source: ExecuComp.
Tobin's $Q$	Total assets plus the market value of equity minus the book value of equity all divided by total assets ( $(AT+PRCC.F \times CSHO-CEQ)/AT$ ). Source: Compustat.
Firm Age	Years since first observed in CRSP. Source: CRSP.

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## B Appendix: Journal Entries Under FAS 123R

The following example illustrates how the recording of journal entries for the expensing of option compensation differ under the fair value method under FAS 123R and its predecessor, the intrinsic value method under APB 25.<sup>15</sup>

Suppose an employee receives an option grant for 1 common share. The market value of the stock is \$200 per share on the grant date and the strike price of the option is set equal to the market value of \$200 per share. Assume the option is determined (using Black-Scholes or a binomial or lattice model) to have a market value of \$30. The option is granted on January 1, 2010, vests on January 1, 2011, and has an expiration of January 1, 2012. On July 1, 2011, the employee exercises the option when the stock price is \$250. The following entries are recorded:

### Journal Entry 1a: Option is granted and vested.

<i>Date</i>	<i>Account</i>	<i>Debit</i>	<i>Credit</i>
1/1/2010	No entries		
1/1/2011	Compensation Expense	\$30	
	Paid-in capital, stock options		\$30

### Journal Entry 2a: Option is exercised.

<i>Date</i>	<i>Account</i>	<i>Debit</i>	<i>Credit</i>
7/1/2011	Cash	\$200	
	Paid-in capital, stock options (account balance)	\$30	
	Common Stock (no-par)		230

If the option were not exercised (i.e. if the option were not in the money between vesting and expiration) then the following journal entry would be recorded instead at expiration:

<sup>15</sup>For simplicity, this example pertains to a cliff-vesting, fixed stock option plan, with no repricing or resetting of the exercise price. Journal entries grow more complex when graded-vesting and performance-based contingencies are introduced.

**Journal Entry 3a: Option is not exercised and expires.**

<i>Date</i>	<i>Account</i>	<i>Debit</i>	<i>Credit</i>
1/1/2012	Paid-in capital (account balance)	\$30	
	Paid-in capital, expired stock options		\$30

Additionally, firms record a deferred tax asset to reflect the difference in timing between the accounting recognition of the expense and the tax recognition of the expense. For the example above, assuming a 30% tax rate, these entries are recorded as follows:<sup>16</sup>

**Journal Entry 1b: Option is granted and vested.**

<i>Date</i>	<i>Account</i>	<i>Debit</i>	<i>Credit</i>
1/1/2011	Deferred tax asset (30*.30)	\$9	
	Tax expense		\$9

At exercise, the deferred tax asset is written off and the discrepancy between the true and estimated tax benefits is reconciled. The eligible deduction is \$50 (\$250-\$200), which yields a tax benefit of \$15 (\$50\*.30), which exceeds the \$9 deferred tax asset by \$6.

**Journal Entry 2b: Option is exercised.**

<i>Date</i>	<i>Account</i>	<i>Debit</i>	<i>Credit</i>
7/1/2011	Tax expense	\$9	
	Deferred tax asset		\$9
7/1/2011	Current taxes payable	\$15	
	Tax Expense		\$9
	Additional paid-in capital		6

<sup>16</sup>cite Options and the Deferred Tax Bite NANCY NICHOLS AND LUIS BETANCOURT, Journal of Accountancy )

If the option is not exercised (i.e. if the option were not in the money between vesting and expiration) then no tax benefit is realized and the deferred tax asset is simply written off:

**Journal Entry 3b: Option is not exercised and expired.**

<i>Date</i>	<i>Account</i>	<i>Debit</i>	<i>Credit</i>
7/1/2011	Tax expense	\$9	
	Deferred tax asset		\$9

Under the intrinsic value method, the journal entries are much simpler. Because options are usually granted at the money and the intrinsic value is zero, there is no recognition of an expense (or an associated deferred tax benefit) at the time an option is granted/vested and therefore no need for a journal entry. At option exercise, a journal entry would be recorded as follows:

**Journal Entry 2c: Option is exercised.**

<i>Date</i>	<i>Account</i>	<i>Debit</i>	<i>Credit</i>
7/1/2011	Cash	\$200	
	Common Stock (no-par)		\$200

Because no deferred asset exists under the intrinsic value method, there is also no need to reconcile the difference between the deferred tax benefit and true deductible amount from the compensation expense. Likewise, if the options are not exercised and are instead left to expire, there is no accounting event under the intrinsic value method and no need for a journal entry.

The above example illustrates how the intrinsic value and fair value methods for accounting for employee stock options differ in their accounting treatment. Most importantly, while both intrinsic and fair value methods reflect balance sheet effects (see Journal Entries 2a and 2c) when employee stock options are exercised, the fair value method mandated by FAS 123R introduced



income statement effects (see Journal Entries 1a and 1b) which is incurred when options are granted and/or vested. In other words, FAS 123R introduced an accounting cost of option compensation by requiring firms to recognize the fair value of employee option compensation while having no impact on cash flows.<sup>17</sup>

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<sup>17</sup>It is important to emphasize that fair value accounting has not affected firms' tax liability, it has only introduced deferred asset accounting as a means of recognizing a tax benefit at the time of recognizing the compensation expense which is ultimately reconciled with the realized tax benefit.

## C Appendix: Additional Insight Into Changes in Compensation

In this section, I document several additional changes in executive compensation after the introduction of mandated option expensing.

### *C.1 Changes in Total Compensation in Response to FAS 123R*

Table Table C.1 reports changes in total compensation in after the announcement of mandated option expensing under FAS 123R. Column 1 shows that total compensation does not significantly change across firms on average. However, the negative and significant coefficient for *Exposure\*Post* in columns 2 and 3 show that for firms with high *ex-ante* reliance on option compensation, total compensation did decline significantly relative to firms with low exposure.

The results in Table 3 indicate that managing accounting costs in response to FAS 123R led to reductions in total CEO compensation. One of the motivations behind FAS 123R was a push for greater transparency amidst distrust of corporate managers in the wake of the accounting scandals of the early 2000s (e.g., Enron, Qwest Communications, Tyco, etc.). Some managers were perceived to be inflating their pay partially due to the beneficial accounting treatment of option compensation. Table 3 provides evidence that FAS 123R may have successfully curbed total CEO compensation in some cases. However, the decline in total compensation is also consistent with risk-averse managers being willing to accept less total compensation in exchange for less uncertainty of compensation as a higher proportion of compensation is now comprised of cash compensation. While the decrease in total pay could be due to either a crackdown of excessive manager pay or simply the result of risk-averse managers trading off risky pay for more certain pay as standard contracting models predict, determining definitively the reason for the decrease is beyond the scope of this paper.

### *C.2 Other Components of Compensation*

This paper measures total compensation as the sum of options, restricted stock, salary, and bonus. One shortcoming of this measure is that it does not capture some other long-term incentives given to the CEO, such as non-equity incentive compensation. It's possible that firms offset the observed decline in duration by increasing non-equity incentive compensation or other

forms compensation. Non-equity incentive compensation includes all other forms of incentive compensation other than options and restricted stock and is comprised primarily of performance-dependent cash units. I classify all other forms of compensation as “other” compensation. These components are not included in the duration calculation because the vesting periods of these components are difficult to obtain, but I can observe the proportion of total income that these components comprise and show that use of these alternative forms of compensation does not change post-FAS 123R.

In Table C.2, I test whether declines in duration were offset by increases in other types of compensation by estimating equation (2) for non-equity incentive compensation and other compensation. Results are presented in panels A and B, respectively. In each case, the coefficients for *Post* and *Exposure\* Post* are not significantly different from zero. Therefore, it appears that the substitution for options was primarily achieved through increases in restricted stock (see Table 2) and not through increases in non-equity incentive compensation or other forms of compensation. These results help minimize the probability that the decrease in duration observed in Table 5 was offset through an unobservable channel. Also, further mitigating this concern are the changes in corporate outcomes documented in section 6.2, which suggest that incentives did indeed change as firms altered their investment strategy and financing policy.

### *C.3 Long-Term Changes in Compensation*

Table C.3 shows that the changes in compensation documented in the paper persisted over the long-term. These tests use an augmented difference-in-differences model to incorporate interactions for individual years following the implementation of FAS 123R. I define *Intermediate* as an indicator equal to one for years in the period 2003-2005, that is, years after the announcement of the proposed standard revision but before implementation in 2006. This indicator, along with separate indicators for each year in the period 2006-2010 are interacted with *Exposure<sub>e</sub>* to determine how compensation evolved in the periods following the announcement and implementation of mandated option expensing.

Columns 1 through 4 show that declines option compensation, equity compensation, vesting periods of equity grants, and duration persisted through the end of the sample period. These

results suggest that mandated option expensing introduced a permanent accounting cost associated with option compensation and firms are cognizant of this cost as they structure the manager's compensation.

**Table C1: Changes in Total Compensation in response to FAS 123R**

This table presents difference-in-difference estimates of the effect of mandated option expensing on the level of total CEO compensation. The sample includes firm-year compensation data from 1999-2010. The dependent variable,  $\ln(\text{Total})$ , is the log of total CEO compensation. The explanatory variable of interest is the interaction  $\text{Exposure} \times \text{Post}$ , where  $\text{Post}$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $\text{Exposure}$  captures firms' *ex-ante* reliance on option compensation and its various forms are defined in the appendix. All controls are lagged one year and are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)
	Ln(Total)	Ln(Total)	Ln(Total)
Post	-0.0632 (-0.63)		
Exposure <sub>e</sub> *Post		-0.105* (-1.89)	
Exposure <sub>t</sub> *Post			-0.327*** (-3.34)
Ln(Sales)	0.189*** (3.79)	0.190*** (3.99)	0.195*** (4.06)
ROA	0.325** (2.38)	0.323** (2.38)	0.327** (2.43)
Capex/Assets	0.00335* (1.73)	0.00328* (1.66)	0.00294 (1.46)
R&D/Assets	0.00390 (1.25)	0.00400 (1.29)	0.00398 (1.29)
Tangibility	-0.344 (-1.24)	-0.343 (-1.27)	-0.335 (-1.26)
Leverage	0.0339 (0.24)	0.0329 (0.24)	0.0435 (0.31)
Tobin's Q	0.0237 (1.47)	0.0242 (1.52)	0.0227 (1.51)
Years since IPO	0.00236 (0.70)	0.00201 (0.62)	0.00192 (0.59)
CEO Tenure	0.0121 (1.36)	0.0127 (1.49)	0.0127 (1.49)
CEO Age	-0.0630 (-0.88)	-0.0608 (-0.87)	-0.0473 (-0.69)
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes
N	4,101	4,101	4,101
adj. R <sup>2</sup>	0.033	0.035	0.038

**Table C2: Changes in Non-Equity Compensation in Response to FAS 123R**

This table presents difference-in-difference estimates of the effect of mandated option expensing on non-equity incentive plan compensation and other compensation. The sample includes firm-year compensation data from 1999-2010. The dependent variable in panel A, *Non-Equity Incentive Compensation %*, is the value of non-equity incentive plan compensation divided by total compensation awarded to the CEO during the fiscal year. The dependent variable in panel B, *Other Compensation %*, is the value of all compensation awarded to the CEO during the fiscal year in excess of salary, options, restricted stock, non-equity incentive plan compensation, changes in pension value and nonqualified deferred compensation (NQDC) earnings. The explanatory variable of interest is the interaction  $Exposure \times Post$ , where  $Post$  is an indicator equal to one for fiscal years ending after the 2003 announcement of proposed mandated option expensing, and zero otherwise;  $Exposure$  captures firm's *ex-ante* reliance on option compensation and its various forms are defined in the appendix. All controls are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*), 5% (\*\*), and 10% (\*) levels.

<i>Panel A: Non-Equity Incentive Compensation</i>			
	(1)	(2)	(3)
	Non-Equity Incentive Compensation %		
Post	-0.00537 (-0.68)		
Exposure <sub>e</sub> *Post		-0.00380 (-0.24)	
Exposure <sub>t</sub> *Post			0.000227 (0.01)
Controls from tables 3 & 4	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes
<i>N</i>	4,101	4,101	4,101
adj. <i>R</i> <sup>2</sup>	0.000	0.006	0.006
<i>Panel B: Other Compensation</i>			
	(1)	(2)	(3)
	Other Compensation %		
Post	0.00780 (0.69)		
Exposure <sub>e</sub> *Post		-0.00244 (-0.10)	
Exposure <sub>t</sub> *Post			-0.0117 (-0.36)
Controls from tables 3 & 4	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	No	Yes	Yes
<i>N</i>	4,101	4,101	4,101
adj. <i>R</i> <sup>2</sup>	0.012	0.014	0.014

**Table C3: Long-Term Changes in Executive Compensation**

This table presents difference-in-difference estimates of the effect of mandated option expensing on the proportion of CEO equity compensation and the duration of CEO compensation in the individual years following the implementation of FAS 123R. The sample includes firm-year compensation data from 1999-2010. The dependent variable in columns 1, 3 and 5, *Equity%*, is the sum of the value of option compensation and restricted stock compensation divided by total compensation awarded to the CEO during the fiscal year. The dependent variable in columns 2, 4, and 6, *Duration*, is the value of each equity grant (option or restricted stock) 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); See equation (1). The explanatory variables of interest are the interaction *Exposure\*Intermediate*, where *Intermediate* is an indicator equal to one for fiscal years 2003-2005, and zero otherwise, and the interactions between *Exposure* and individual year dummies for years 2006-2010. *Exposure* captures firms' *ex-ante* reliance on option compensation and its various forms are defined in the appendix. All controls are defined in the appendix. Standard errors are clustered at the firm level. Statistical significance is denoted at the 1% (\*\*\*) , 5% (\*\*), and 10% (\*) levels.

	(1)	(2)	(3)	(4)
	Option %	Equity %	Average Vesting Period	Duration
Exposure <sub>e</sub> *Intermediate	-0.0627*** (-3.38)	-0.0454** (-1.97)	-0.166 (-1.35)	-0.196*** (-2.79)
Exposure <sub>e</sub> *2006	-0.129*** (-3.50)	-0.0475 (-1.35)	-0.404** (-2.13)	-0.286** (-2.57)
Exposure <sub>e</sub> *2007	-0.128*** (-3.84)	-0.0148 (-0.43)	-0.0461 (-0.25)	-0.112 (-1.06)
Exposure <sub>e</sub> *2008	-0.137*** (-4.05)	-0.0746** (-2.14)	-0.240 (-1.17)	-0.267*** (-2.60)
Exposure <sub>e</sub> *2009	-0.0785** (-2.08)	-0.0225 (-0.60)	-0.215 (-1.13)	-0.206** (-2.10)
Exposure <sub>e</sub> *2010	-0.132*** (-3.89)	-0.0772** (-2.13)	-0.275 (-1.30)	-0.287** (-2.55)
Controls from Tables 3 & 4	Yes	Yes	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
<i>N</i>	4,101	4,101	4,101	4,101
adj. <i>R</i> <sup>2</sup>	0.046	0.009	0.004	0.012

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### RESEARCH INTERESTS

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Empirical Corporate Finance, Executive Compensation, Labor Economics, Innovation

### RESEARCH

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**The Impact of Mandated Option Expensing on Executive Compensation and Corporate Investment.** (Dissertation)

- Dissertation committee: Laura Field (co-chair), Matthew Gustafson (co-chair), David Haushalter, Karl Muller.

**Firing Frictions and the Mergers and Acquisitions Market,** with Matthew Gustafson and Robert Chatt. (Working paper)

**How Do Managers Respond to Short Selling?** (preliminary work)

**Strategic Timing of Seasoned Equity Offerings.** (preliminary work)

### TEACHING EXPERIENCE

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Penn State University:

- Instructor: FIN 301 - Corporation Finance, Summer 2015 (6.75/7 instructor quality rating)
- Instructor: FIN 301 - Corporation Finance, Summer 2013 (7.00/7 instructor quality rating)
- Teaching Assistant: FIN 305W - Financial Management of the Business Enterprise, Fall 2014 and Spring 2016

Utah State University:

- Teaching Assistant: FIN 4410 - Financial Institutions, Spring 2011 and Spring 2012
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