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Abstract

Prior research finds that earnings restatements are linked to CEOs' excessive option-based compensation and equity holdings. In this paper, we investigate whether firms that experience earnings restatements recontract with their CEOs to reduce their option-based compensation and if so, whether this leads to improved firm performance. Based on 289 restatement firms over the period 1997-2001, we find that the proportion of CEOs' compensation in the form of options declines significantly in the two years following the restatement. Furthermore, we document that this reduction is accompanied by a decrease in the riskiness of investments, as reflected in lower stock return volatility and subsequent improvements in operating performance. Our results suggest that a decrease in option-based compensation reduces CEOs' incentives to take excessively risky investments, resulting in improved profitability. Overall, our findings provide insights into the design and efficacy of CEO compensation contracts.

JEL classification: G30, G32, J33, M4.

Keywords: Earnings restatements; Stock options; CEO compensation; Operating performance

1. Introduction

The purpose of this paper is to provide insights into the design and efficacy of chief executive officer (CEO) compensation contracts following an earnings restatement. In the late 1990s, corporate America was seemingly awash in financial reporting failures. The United States General Accounting Office (GAO 2002) documented an astounding total of 919 restatements from January 1997 to June 2002. A chorus of critics argues that stock-based compensation is responsible for these financial reporting failures (Levitt 1998; Knowledge at Wharton 2003). For example, Jensen (2005) suggests that overvalued equity can lead to agency problems, whereby managers use aggressive accounting to maintain the overvaluation when they cannot continue producing stellar results, thus reducing the core value of the firm. Jensen suggests that stock-based compensation, especially option-based compensation, is at the root of the damaging effects of aggressive accounting because it encourages managers to increase short-term stock prices (*The Economist* 2002; Jensen 2005).

Consistent with these claims, an emerging body of academic work has established a link between stock-based compensation and earnings restatements. For example, Efendi, Srivastava, and Swanson (2007) find a positive relation between the likelihood of an earnings restatement and the level of executive stock options that are deep in-the-money. Burns and Kedia (2006) find that incentives to misreport earnings increase with the sensitivity of CEO's option holdings to both stock price and volatility.

The cost of aggressive accounting to firms is substantial. Palmrose, Richardson, and Scholz (2004) document a decline of 10% in a restatement firm's market value at the announcement of the restatement. Karpoff, Lee, and Martin (2006) document substantial

penalties on firms involved in financial misreporting. These penalties include billions of dollars in monetary fines and reputation loss.

Given these costs and the importance of the relation between compensation contracts and accounting failures, rational firms should recontract with their CEOs to reduce such costs. However, there is little research on the changes in compensation contracts following a restatement. In this study, we seek to fill this gap by investigating the association between the revelation of an earnings restatement and subsequent changes in CEO option-based compensation, and economic consequences of these changes.

Because the findings in prior research imply that restatement firms' CEO equity incentives are "too high" relative to those of control firms, we expect restatement firms to reduce these incentives following a restatement, provided that doing so results in a net benefit. Given that firms have a limited ability to reduce CEOs' existing equity holdings, we focus our analyses on changes in new grants of stock options. We expect that option grants in the post-restatement period will be lower than those in the pre-restatement period. Our results are consistent with this expectation. Using a sample of 289 restatements and the year prior to restatement announcement as the benchmark year, we find that while total CEO compensation does not significantly change by the second year after the restatement announcement, there is a significant shift from option-based compensation to salary over this period. In univariate tests, we find that the proportion of the value of option grants to total compensation declined by 5.6 percentage points for the restatement firms, while control firms experienced an *increase* of 2.6 percentage points in this proportion over the same period. The analyses indicate that the *number* of option grants also declines for restatement firms compared to control firms. The reduction in the

use of option grants for restatement firms holds after we control for the level of stock and option holdings as well as other determinants of option-based compensation, such as firm size, growth opportunities, leverage, idiosyncratic risk, R&D intensity, stock returns, cash compensation, and industry and year fixed effects. Because about half of the restatement firms experienced CEO turnover after restatements, we also investigate the change in option grants separately for extant and new CEOs. We find that our results hold for both extant and new CEOs.

Because prior research that finds a relation between equity incentives and restatements uses the year prior to the earliest year restated as the benchmark year, we assess the sensitivity of our results using this benchmark instead of the year prior to the restatement announcement. Our inferences remain unaffected by this test, although the magnitude of the change in option grants is slightly smaller. We also test whether restatement firms changed option-based compensation from this alternative benchmark to the year prior to the restatement announcement and find that these firms actually *increased* option-based compensation over this period. This result indicates that restatement firms only made remedies after the problem with aggressive financial reporting was publicly known.

Our results are also robust to a battery of other sensitivity tests, including expanding the sample to include other top executives, using industry-year matched control firms, controlling for changes in the joint CEO/COB position and restatement specific characteristics, and using alternative sample years. We also find that there is a reduction in the sensitivity of the value of option grants to both stock price and return volatility,

consistent with reduced incentives to engage in opportunistic activities and excessive risk-taking.

If the reduction in option-based compensation is a result of *unwarranted* negative public perception of option usage, we would expect a decrease in firm performance as firms deviate from optimal contracting. However, if restatements result from too high a level of incentive compensation and the reduction in option compensation after the restatement better aligns managerial incentives with those of shareholders, we would expect to observe improved firm performance. To test this expectation, we examine subsequent performance and find that compared to control firms, restatement firms that reduced their CEO's option compensation on average experienced an increase in return on assets (ROA) of 2.1% (5.6%) in the first year (the first two years) after this reduction. For firms that did not reduce CEO option-based compensation, however, we do not find evidence of improved operating performance. Additional analyses indicate that self-selection bias (whether restatement firms reduce option grants or not), CEO turnover, "big bath" accounting charges, abnormal accruals, and mean reversion of ROA do not drive the ROA results.

One way that operating performance can improve is through a reduction in excessively risky investments. While options can be used to induce managers to take risky positive net present value projects, too high a level of options can induce *excessive* risk-taking in investment decisions. When these investments do not produce net positive returns, managers may engage in earnings management to mask underperformance. This can ultimately result in a restatement. After the reduction in option-based compensation, the convexity of CEOs' compensation contracts decreases. Consequently, the incentive to

take excessively risky projects is reduced and operating performance likely improves as a result. Consistent with this argument, we report that relative to control firms, restatement firms that reduce option compensation experience a significant decrease in stock return volatility, a common proxy for the riskiness of investments, while those restatement firms that do not reduce option compensation do not have such a reduction.

Overall, our results imply that economic benefits accrue to restatement firms that reduce their CEOs' option-based compensation, indicating that the reduction in option grants helps adjust managers' equity incentives toward optimal levels. A natural question that follows is if reducing option usage is associated with improved firm performance, why is it that all restatement firms do not do so? To help answer this question, we conduct a within-sample analysis. We find that the likelihood of a reduction in options usage is positively related to the level of option grants prior to the restatement and in some specifications, this likelihood is higher for income-decreasing restatements.

This paper contributes to the literature in two important ways. First, it extends the growing literature that examines changes in monitoring mechanisms following accounting failures by documenting a significant reduction in option-based compensation after a restatement. Our paper thus complements extant studies that investigate changes in management and board membership following accounting failures (e.g., Beneish 1999; Desai et al. 2006; Farber 2005; Srinivasan 2005). Taken together, these studies indicate that firms with financial reporting failures improve their monitoring mechanisms to address their agency problem. Our evidence may also be useful to restatement firms that are considering or are using compensation policy as part of a strategy to recover from the fallout of a restatement.

Second, our paper extends the literature on the relation between managerial ownership (including stock options) and firm performance. To date, the evidence of such a relation is mixed (e.g., Demsetz and Lehn 1985; Morck et al. 1988). It is difficult to identify a relation between stock-based compensation and firm performance in a general setting because in equilibrium firms choose the optimal level of CEO stock-based compensation (Hanlon et al. 2003; Larker 2003). Core et al. (2003, p.35) argue that "… an effective sample for testing the link between ownership and firm value is a set of firms for which managerial equity ownership levels are too low (high), but then recontract to increase (decrease) ownership." In this study, we have the advantage of being able to exploit an event (i.e., restatement) that highlights the off-equilibrium level of CEO equity incentives to examine the relation between equity ownership and firm performance.[1]

The remainder of this paper is organized as follows. In Section 2, we provide an overview of the related literature and develop our hypothesis for the change in option-based compensation. In Section 3, we present our sample and data. Section 4 reports the empirical results for the change in option-based compensation following restatements. Section 5 documents the efficacy of changes in option-based compensation after restatements. We summarize and conclude in Section 6.

2. Prior Research and Hypothesis for the Change in Option-based Compensation

Our paper is related to studies that investigate the association of equity incentives and aggressive financial reporting, and to studies that document the costs of financial

[1] Core and Larcker (2002) use an off-equilibrium setting in which firms adopt ownership target plans. They find that after the adoption of such plans, firms in which CEOs increase their equity ownership experience improved performance.

reporting failures. Below, we briefly review these studies and develop our hypothesis for the change in option-based compensation.

Managerial ownership and stock-based compensation, such as option grants and stock grants, are important mechanisms designed to align managers' incentives with those of shareholders (Jensen and Meckling 1976; Smith and Stulz 1985; Morck et al. 1988). Accordingly, the wealth of managers who receive stock-based compensation is sensitive to their firms' stock prices. While this sensitivity can motivate managers to make value-increasing operating, financing, and investment decisions, it can also induce managers, even those who are well-intentioned, to fixate on short-term stock prices. As argued and documented in Yermack (1995) and Cheng and Warfield (2005), there is a positive relation between CEOs' equity incentives and their insider selling activity. Accordingly, the wealth of these managers is sensitive to short-term stock prices. To increase the short-term stock price and their personal wealth, CEOs might engage in earnings management, which can lead to earnings restatements.

Equity incentives, especially option holdings, are also important for inducing risk-averse managers to choose risky positive net present value projects. Agrawal and Mandelker (1987) document a positive relation between ownership in the form of stock and option holdings and a firm's stock return variance, which reflects the underlying riskiness of investments.[2] Guay (1999) finds that stock return variance is positively related to the convexity of compensation contracts. Defusco et al. (1990) find an increase in stock return variance after the approval of stock option plans. All of these studies suggest that stock options motivate managers to increase stock return volatility by

[2] Using the context of Oil and Gas companies, Rajgopal and Shevlin (2002) find a positive relation between risk taking and stock return volatility.

undertaking risky projects. However, when option holdings are too high, managers might engage in *excessive* risk taking, such as over-investing in risky capital projects, research and development (R&D), or marketing activities. When these risky investments do not produce net positive returns, managers may attempt to mask the resulting underperformance with earnings management, which can ultimately result in a restatement (Burns and Kedia 2006).[3]

There is an emerging line of academic literature that examines the link between stock-based compensation and aggressive financial reporting. Using various proxies for earnings management, such as meeting or just beating analysts' forecasts and abnormal accruals, Cheng and Warfield (2005) and Bergstresser and Philippon (2006) find that CEOs with high equity incentives are more likely to engage in earnings management. More closely related to our study, a set of papers has found that incentive misalignment in the form of excessive option compensation led to restatements. Using 95 firms announcing earnings restatements over the period 2001-2002, Efendi et al. (2007) find a positive relation between the value of CEOs' options that are deep in-the-money and the probability of an earnings restatement. Burns and Kedia (2006) use 215 restatements announced over the period 1995-2002 and find that the sensitivity of CEOs' option portfolio to both stock price and return volatility is positively associated with the probability of misreporting earnings. Finally, Harris and Bromiley (2006) analyze 434 restatements announced over the period 1997-2002 and find that compared to counterparts in other firms, CEOs in restatement firms receive a higher proportion of their compensation in the form of stock options.

[3] Cassidy (2002) and Madrick (2003) provide anecdotal evidence that fixation on short-term stock price and excessive risk taking are associated with the recent spate of accounting scandals and that option compensation underlies the problem.

Earnings management and particularly earnings restatements are costly to a firm and its managers. It is well-documented that restatements are associated with a decrease of about 10% in firm market value (GAO 2002; Palmrose et al. 2004; Wu 2002). Prior research (e.g., Ducharme et al. 2004; Lu 2003) also finds that the likelihood of litigation increases with the extent of earnings management. In particular, Peng and Roell (2004) find that executive incentive pay increases the probability of securities class-action litigation and that this correlation is at least partly driven by earnings management induced by executive incentive pay. Karpoff et al. (2006) provide detailed documentation of the outcome of such litigation. In particular, they find that companies involved in financial misrepresentations in the 1978-2002 period incurred about $13.6 billion in fines and class-action lawsuit damages and a reputational penalty of about $100 billion.

In sum, the extant literature has documented a positive relation between CEOs' equity incentives and costly financial reporting failures. Our paper extends this literature by examining whether firms mitigate their agency problems related to earnings restatements by adjusting CEOs' equity incentives. To induce managers to make more efficient strategic and operational decisions, such as reducing excessive risk-taking and to reduce the potential for future earnings management, restatement firms can reduce their CEOs' equity incentives. However, restatement firms have limited remedies available to make such a change because these firms cannot force their CEOs to liquidate their existing equity holdings. As argued and found in Core and Guay (1999), firms use the flow of equity incentives (i.e., stock and option grants) to adjust managers' total equity incentives to an optimal level. Thus, restatement firms can adjust CEOs' option-based compensation downward to a more optimal level. While firms can also adjust their

CEOs' restricted stock grants, doing so is unlikely to be effective because restricted stock grants have not been identified in the literature as an important determinant of earnings restatements and because restricted stock grants are less frequently used and have a smaller magnitude than option grants (Cheng and Warfield 2005; Burns and Kedia 2006; Efendi et al. 2007).

The preceding discussion leads to the following hypothesis, stated in the alternative form:

H1: Compared to control firms, restatement firms will experience a decrease in their CEOs' option-based compensation from the pre-restatement period to the post-restatement period.

A natural question that arises is why firms' compensation contracts with managers are suboptimal prior to a restatement and why they become more optimal afterward. To help explain this, we appeal to arguments in Core and Guay (1999) and Core, Guay, and Larcker (2003). The essence of these arguments is that compensation contracts may not always be optimal for two reasons. First, it is likely that firms do not know that the compensation contracts are suboptimal. In our case, it is possible that the effect of option-based compensation on earnings management and the corresponding costs of earnings restatements are unknown to the firm prior to the restatement announcements. The restatement announcement then highlights to firms that their CEOs' incentive compensation is suboptimal and therefore should be adjusted toward a more optimal level. Second, while firms may initially contract optimally with their CEOs, over time CEOs' equity incentives can become misaligned with optimal levels for a variety of reasons. For example, firm and/or manager characteristics can change – the firm grows or its investment opportunities shift and managers may exercise stock options for personal

consumption. The incentives provided by option grants can also change over time because of changes in firm volatility, for example. Because it is costly to recontract continuously, firms will only do it when a net benefit exists. One significant benefit of recontracting is the reduction in incentives to chase excessively risky projects. A potential cost of cutting option grants is that managers may not work as hard as before or may not make risky investments as preferred by shareholders. If this cost is too high, restatement firms will not reduce CEOs' option grants and we will not find results consistent with H1. Whether reducing option grants provides a net benefit ex post is an empirical question that we examine later in this paper.

Also, we may not find results consistent with H1 is if our assumption that CEOs' equity incentives are "too high" for restatement firms does not hold. A positive relation between equity incentives and the likelihood of reporting failures is not universal. In contrast to the above-mentioned studies, Erickson et al. (2006) fail to find such a relation using a sample of 50 firms cited by the Securities and Exchange Commission (SEC) for fraud. Although Erickson et al. (2006) do not reconcile their findings with studies that find such an association, the differences in the nature of the events examined (i.e., restatement vs. fraud) and sample size may explain the different results.[4, 5]

Note that our study is related to, but different from, studies that examine the link between accounting rules for option grants and the level of stock option compensation (Brown and Lee 2007; Carter et al. 2007; Darrough and Li 2006). These papers document a reduction in option usage in response to the passage of SFAS 123(R) and they attribute

[4] We note that the SEC cited only 15 of our sample firms for fraud.
[5] In untabulated analyses, we directly examine whether our restatement firms have higher equity incentives than control firms in the year immediately preceding restatement. We find significantly higher equity incentives for restatement firms, thus providing support for the critical assumption underlying H1.

the build-up in options usage to accounting rules in place prior to SFAS 123(R). Because these prior rules did not require firms to expense option-based compensation if the exercise price is the same as the stock price at the option grant date, they essentially provided firms with a subsidy that encouraged the use of options. This might help explain why restatement firms have excessive levels of option-based compensation. However, our sample precedes the passage of SFAS 123(R) and thus the phenomenon documented in these studies should not confound our results.

3. Sample and Data

3.1 Sample of Restatement Firms

We obtain restatement data from GAO (2002), which contains earnings restatements announced in the period January 1997 to June 2002. According to the GAO, these restatements include only those due to an accounting irregularity, which GAO (2002) defines as "…an instance in which a company restates its financial statements because they were not fairly presented in accordance with generally accepted accounting principles (GAAP). This would include material errors and fraud (GAO 2002, p2)."

Table 1, Panel A presents the restatement sample reconciliation. The GAO report identifies 919 restatements. Because we require a two-year post-restatement period and because ExecuComp only provided compensation data through 2003 at the time of data collection, we exclude 135 observations with fiscal years later than 2001. We lose another 204 and 55 observations because of missing data from Compustat and CRSP, respectively. We lose 228 observations because of missing compensation data for the pre- or post-restatement period. Finally, we lose eight observations because of multiple

restatements in the same year, bringing our final sample to 289 restatements. The sample size for specific analyses varies with the availability of additional data.

[Insert Table 1 here]

Panel B of Table 1 presents the yearly distribution of the sample restatements. Our sample period spans the years 1997 to 2001, with most of the restatements (79%) announced in the years 1999 to 2001. We provide the distribution of restatement characteristics in Panel C of Table 1. As indicated in that panel, company-initiated restatements account for the largest share of total restatements (40%). More than half of the restatement firms are Nasdaq-listed. The largest percentage of restatements involves revenue accounts (43.9%). Panel D of Table 1 shows that our sample firms are from a broad spectrum of industries. Panel E of Table 1 presents descriptive statistics of restatement firms' financial characteristics in the year of restatement. Our restatement firms have a market value of $3.9 billion on average and are profitable, with a mean net operating income of $166 million. The mean book-to-market and leverage ratios are 0.672 and 0.187, respectively.

These descriptive statistics are similar to those presented in the GAO (2002) report and in prior studies, indicating that our sample is similar to that used in prior research. Also consistent with prior studies, the average abnormal return for the three days centered on the restatement announcement date is -6.7% for our sample (untabulated).

3.2 Compensation Data

Generally, a CEO's compensation is comprised of salary, bonus, stock options, restricted stock, and other long-term incentives. Recall that because firms have a limited ability to reduce their CEOs' equity incentives, we hypothesize that restatement firms

will reduce option-based compensation for CEOs after the restatements. We measure option-based compensation in two alternative ways: (i) the ratio of the dollar value of option grants to total compensation (*$Option%*) and (ii) the ratio of the number of option grants in shares scaled by total shares outstanding (*#Option%*):

$$\$Option\% = \frac{Annual\ option\ grants(\$)}{Total\ compensation\ (\$)} * 100$$

$$\#Option\% = \frac{Annual\ option\ grants(in\ shares)}{Total\ shares\ outstanding} * 100$$

For *$Option%*, we use the dollar value of annual option grants provided by the company in its proxy statement.[6] The results are similar when we use the Black-Scholes value for the sub-sample of restatement firms that have this data available from ExecuComp.

We obtain executive compensation and management ownership data either from ExecuComp or directly from proxy statements. We are able to obtain compensation data for 125 restatement firms from ExecuComp, which contains executive compensation data for the S&P 1500 firms. For the remaining 164 restatement firms, we hand-collect compensation data, as well as the stock/option holding data from proxy statements. For each restatement firm, we collect compensation data for the four-year period [t-1, t+2] around the restatement announcement, where year t is the fiscal year in which the restatement was announced. Year t-1 is used as the benchmark to evaluate the change in option grants after restatements.[7]

[6] Per SEC rule, firms must provide in their proxy statements an estimate of the value of option grants using one of two methods. The first is to calculate the potential realizable value of option based on a 5% and 10% annual rate of appreciation for the stock over the term of the option. The second is to use an option pricing model, such as Black-Scholes. In our sample, the most common method is the 5% and 10% appreciation method, under which the option value is the present value of the difference between future stock price, which appreciates 5% and 10% every year, and the exercise price at the option expiration date. In our analyses, we use the potential realizable value based on the 5% annual appreciation rate for all firm-years.

[7] Because proxy statements are generally issued four or five months after the end of the fiscal year, the proxy statement for fiscal year t-1 might be issued after the restatement announcement for firms with

In Table 2, we provide distributional statistics of total CEO compensation and its components for restatement firms in the pre-restatement (year t-1) and post-restatement period (years t+1 and t+2). In year t-1, the mean total compensation is about 3.68 million dollars. The largest component of compensation is option grants, which averages 2.4 million dollars, almost 10 times the magnitude of restricted stock grants. Quartile analysis reveals that both the value and number of option grants are highly skewed, with mean values far in excess of the medians. Similarly, the distribution of the value of restricted stock is also highly skewed, with a median value of zero across all years presented. Cash-based compensation is a smaller component of total compensation, with an average salary of $431,300 and an average bonus of $371,900. Because the results for changes in means and medians from t-1 to t+2 are qualitatively similar, we only provide results for changes in means for brevity. From t-1 to t+1, total compensation and its components do not change significantly. While total compensation does not change significantly from t-1 to t+2, there are offsetting changes between option grants and other components of compensation – the mean dollar value of option grants declines significantly (p=0.08), while other components of compensation increase by a similar amount. However, of the changes in these other components, only the increase in salary is significant (p= 0.03).[8] Consistent with the decline in the dollar value of option grants, we also provide evidence that option grants as a percentage of outstanding shares significantly decline from t-1 to t+2 (p=0.03, two-sided).

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restatements disclosed early in their fiscal year. Thus, the information provided in such proxy statements might be affected by restatements. To ensure that restatements do not affect option-based compensation in the benchmark year, if the proxy statement for year t-1 is filed after the restatement announcement, we use year t-2 as the benchmark year.

[8] While the magnitude of the change in restricted stock appears large, it is not statistically significant different from zero. For sensitivity, we use the sum of restricted stock and option grants as the dependent variable and obtain similar results to those reported. We also analyze restricted stock grants separately in a multiple regression test and find insignificant results.

[Insert Table 2 here]

Overall, these findings suggest a shift from incentive-based compensation to fixed compensation for restatement firms. The next section provides formal tests of this structural change.

4. Changes in CEO Option-based Compensation after Restatements

4.1 Research Design

To test H1, we adopt a difference-in-difference approach. We first compare the pre- and post-restatement levels of restatement firms' CEO option grants to calculate the change in option grants around restatements. This change controls for the impact of time-invariant firm characteristics on CEO compensation structure, such as industry membership. Then we compare this change to the change in option grants for control firms' CEOs over the same period. Comparing restatement firms with control firms is necessary because of the temporal trend in CEO compensation structure over our analysis period (Murphy 1999). Following Core and Larcker (2002), we identify a control sample by using all ExecuComp firm-years that have the required data over the period 1997-2001, but are not included in our restatement sample. For each control firm, in year t, we measure option grants in the year before and the two years afterward, and calculate the change in option grants as the corresponding difference.

Firm characteristics can change around earnings restatements. For example, firms become smaller and less profitable. Such changes can potentially confound our analyses. To address this issue, we use the following OLS regression to control for the impact of other determinants of stock-based compensation:

$$\Delta Option\_Grants = \alpha_0 + \alpha_1 \, Restatement + \boldsymbol{\beta} \, \Delta Controls + Year\,Dummies + \varepsilon, \qquad \textbf{(1)}$$

where *ΔOption_Grants* is defined as the difference in *$Option%* or *#Option%* between the post- and pre-restatement periods. *Restatement* is a dummy variable with value 1 for restatement firms and value 0 for control firms. *Controls* represent a set of variables known to influence stock-based compensation. Prior research finds that option-based compensation decreases with CEO stock and option ownership and financial leverage, and increases with firm size, growth opportunities (proxied by market-to-book ratio, R&D intensity), cash constraints, idiosyncratic risk, and current as well as past stock returns. Prior research also finds that the use of option grants is related to earnings constraints and cash compensation, but there is no conclusive evidence on the direction of the effect. To save space, we relegate details for the control variables – the argument underlying the predictions and the detailed measurement – to the Appendix. Because we investigate the change in stock-based compensation, we likewise use the change in control variables in our regression analyses. To be consistent with prior studies, we use the lagged changes of these controls (e.g., Core and Guay 1999). For example, when analyzing the change in option grants from year t-1 to year t+2, we use the difference in controls between t-2 and t+1, except as indicated otherwise. Finally, we include year dummies to control for year-specific effects.[9]

4.2 Empirical Tests of Changes in Option-based Compensation

Table 3 reports the mean difference in option grants between the pre-restatement period (i.e., year t-1) and the post-restatement period (years t+1, t+2). Because it is unclear when restatement firms will change their CEOs' compensation structure, we

[9] For sensitivity, we also include industry dummies, leaving our results unaffected. Results are also unaffected when we only include one observation from each control firm to address any potential cross-sectional correlation in the error term.

analyze years t+1 and t+2. We provide analyses of both *$Option%* (Panel A) and *#Option%* (Panel B) in this and subsequent tables whenever appropriate. As shown in Panel A of Table 3, there is no significant difference in the change in *$Option%* between restatement and control firms for the period t-1 to t+1. Over this period, both restatement and control firms experience an increase in *$Option%*, although only the increase for control firms is significantly different from zero. In contrast, for the period t-1 to t+2, restatement firms experience a decrease in *$Option%* of 5.6 percentage points, which is significantly less than the change in *$Option%* for the control sample, which actually increases its *$Option%* by 2.6 percentage points over this same period. [10, 11] Our inferences are the same when using the share-based measure of option grants. Specifically, for the period t-1 to t+2, restatement firms experience a decrease in *#Option%* of 0.13 percentage points, which is significantly less than the change in *#Option%* of 0.00 percentage points for the control sample.

[Insert Table 3 here]

Thus far, the results from our univariate analyses are supportive of our hypothesis that a restatement is associated with a subsequent reduction in the use of option compensation. Next, we use multiple regressions to examine whether other determinants of stock-based compensation drive our univariate results. Because we find no change in option grant usage over the period t-1 to t+1 in our univariate analyses, we focus our regression analyses on the period t-1 to t+2.

[10] The median decrease in *$Option%* over the period t-1 to t+2 is significantly less for restatement firms than for control firms, based on a Wilcoxon test (p=0.06, two-sided).

[11] Two years may seem to be a long period to elapse before restatement firms make significant changes in option grants. However, after a restatement, firms might need to institute other changes that would likely occur before changes in compensation structure. For example, a firm is likely to hire a new CEO and change its board, which take a non-trivial amount of time to complete.

Panel A of Table 4 provides descriptive statistics of the variables used in the regression analyses (for both the sample and control firms). Over our analysis period, there is a decreasing trend in share ownership and cash constraint, and an increasing trend in option holdings, firm size, book-to-market ratio, earnings constraint, and leverage.

[Insert Table 4 here]

Panel B of Table 4 reports the correlations between the variables used in our regression analysis. Consistent with the univariate analysis, the changes in both *$Option%* and *#Option%* are significantly negatively correlated with the *Restatement* dummy. The correlations between changes in option grants and the control variables are generally significant in the predicted directions. Also, relative to control firms, restatement firms experienced reduced equity holdings and cash constraint, and increased book-to-market ratio and earnings constraint. None of these correlations appears large enough to present collinearity problems. The largest correlation is between the size variable (*ΔSize*) and cash compensation (*ΔCash Compensation*), which has a correlation coefficient of -0.47.

Panel A of Table 5 presents the results of regressing *Δ$Option%* on the restatement dummy variable and controls. We report a coefficient of -7.8 on the restatement dummy variable (significant at the 1% level).[12] This finding implies that the change in option-based compensation as a percentage of total compensation is 7.8 percentage points lower for restatement firms than that for non-restatement firms over our analysis period, as predicted in H1. This change is economically significant; it implies that, holding total compensation constant, restatement firms reduce option grants by $290,554 (i.e.,

[12] Inferences are unaffected after deleting outliers with the absolute value of R-student greater than 2, or using decile ranks for the change in options usage.

7.8%×$3,677,900, which is the average total compensation in year t-1), relative to control firms.

[Insert Table 5 here]

Coefficients on the control variables for which we predict a sign are significant in the predicted direction, except that size, R&D, current returns, and cash compensation have insignificant coefficients and the coefficient on idiosyncratic risk has the sign opposite to our prediction. CEOs with high stock or option ownership and CEOs of firms with high leverage or idiosyncratic risk are awarded fewer option grants, while firms that have low book-to-market ratios, that have cash constraints, and that have high past returns award their CEOs more option grants.

Panel A of Table 5 also presents regression results of using *Δ#Option%* as the dependent variable; the inferences using this variable are the same as those based on *Δ$Option%.* Specifically, we find that the change in *#Option%* for restatement firms is 0.16 percentage points lower for restatement firms than for non-restatement firms.

One complication that arises in our setting is that a restatement is frequently associated with CEO turnover (e.g., Desai et al. 2006). We find that approximately one-half of our restatement firms experience CEO turnover from year t-1 to t+2 (untabulated). We expect H1 to hold not only for extant CEOs, but also for new CEOs. Our premise for H1 is that restatements are related to CEO equity incentives that are "too high". These incentives became too high because of the accumulation of high option (or stock) grants over time. That is, the options granted to CEOs in the pre-restatement period are likely to be higher than the optimal level. Thus, if the options granted to new CEOs after restatements are at the optimal level, they are likely to be lower than the options granted

to former CEOs, ceteris paribus. Furthermore, new CEOs might prefer more cash-based compensation in lieu of stock-based compensation because of the risk of further decline in the company's stock price subsequent to the restatement. On the other hand, because new CEOs are likely to have a lower level of ownership in the company than former CEOs, restatement firms may actually award new CEOs more option grants than those given to former CEOs (Gilson and Vetsuypens 1993; Blackwell and Farrell 2004). We control for this effect by including existing holdings.

To test whether the results from our main test of H1 hold for both extant and new CEOs, we estimate the following regression:

$$\Delta Option\_Grants = \alpha_0 + \alpha_{1a}\, Restatement\_ExtantCEO + \alpha_{1b}\, Restatement\_NewCEO + \boldsymbol{\beta}\, \Delta Controls + Year\ Dummies + \varepsilon, \quad \textbf{(2)}$$

where *Restatement_ExtantCEO* is a dummy variable equal to 1 if the restatement firm experienced no CEO turnover and *Restatement_NewCEO* is a dummy variable equal to 1 if the restatement firm experienced CEO turnover. Coefficients α_{1a} and α_{1b} thus capture the corresponding changes in option grant usage for these two groups, respectively. If H1 holds for both groups, we expect both coefficients to be negative.

Panel B of Table 5 reports results of regression (2). Consistent with H1, when using *$Option%*, we report a coefficient on *Restatement_ExtantCEO* of -6.3 that is significantly different from zero (p=0.05) and a coefficient of -9.4 on *Restatement_NewCEO* that is also significant (p=0.01).[13] The inferences are the same when using *#Option%:* the coefficient on *Restatement_ExtantCEO* is -0.161 and the coefficient on *Restatement_NewCEO* is -0.166, both significant at the 0.01 level. These results indicate

[13] These two coefficients are not significantly different from each other: the p-value based on an untabulated F-test is 0.55.

that relative to control firms, restatement firms grant both extant and new CEOs fewer option grants after restatements.

4.3 Assessment of the Benchmark Year

As discussed earlier, our benchmark year, year t-1, is the year before the restatement announcement year. However, prior research (e.g., Burns and Kedia 2006; Efendi et al. 2007) uses the year prior to the earliest year restated as the benchmark year when investigating whether restatement firms have higher equity incentives than other firms. To test whether our results are sensitive to this alternative benchmark, we identify from press releases and SEC filings the fiscal year prior to the earliest year restated and conduct our analyses using this as our benchmark year. For convenience, we refer to this benchmark year as t-n. We first estimate model (1) in Table 5 for the period t-n to t+2 and find coefficients of -6.3 and -0.9 on the restatement dummy for changes in *$Option%* and *#Option%*, respectively (untabulated). These results are qualitatively similar to those using t-1 as the benchmark year.

We then examine whether restatement firms made any changes to option compensation from t-n to t-1, representing the longest possible period prior to the market discovering information about the restatement. Since the earliest year restated is the year of the announcement for about one-half of our sample firms, we conduct this analysis on the other half of our sample firms. Using the model from Panel A in Table 5, we report in Table 6 that restatement firms actually *increased* their option usage over this period. Using the dollar value of option grants, we find a coefficient of 8.9 on the restatement dummy, implying that restatement firms increased option usage by 8.9 percentage points more than control firms. We obtain similar inferences when using the number of option

grants. These results imply that restatement firms became more aggressive with option usage during periods when their financial statements were misstated, therefore providing support for our assumption that restatement firms reduced options usage only after their agency problem became known.

[Insert Table 6 here]

4.4 Robustness tests for the Change in Option Grants

We conduct the following series of sensitivity tests to check the robustness of our results for H1. For brevity, we do not tabulate these analyses.

- We expand our tests to include Top 5 executives other than the CEO and find that Option% also decreases in the post-restatement period for these executives.
- We extend our analysis period to year t+3 and find further reductions in Option%.
- To ensure that the results are not driven by unidentified unusual events in year t-1, we use the average *$Option%* in t-2 and t-1 as the benchmark when calculating the change in options usage, and find similar results.
- Restatements vary in the nature (i.e., technical or not, income-decreasing or not) and magnitude. Controlling for these characteristics does not affect results.
- Restatement firms likely experience corporate governance changes after restatements, and these changes may affect our results. We control for CEO/COB decoupling and find similar results.
- To further control for industry and year fixed effects, we estimate the model in Table 5 using two control firms from ExecuComp for each restatement firm, matched on two-digit SIC codes and year. The tenor of our results remains unchanged. This test also indicates that our results are not driven by economy-wide changes (e.g., internet bubble).
- We measure the usage of option grants by the sensitivity of the value of option grants to both stock price (i.e., slope) and return volatility (i.e., convexity). We find that CEOs' option grants have a lower slope and convexity following a restatement, compared to control firms.

4.5 Within-Sample Analysis of Changes in Option Grants

While the above results indicate that, *on average*, restatement firms reduce options usage after the announcement of the restatement, not all restatement firms reduce option

usage after restatement announcements.[14] To investigate why some restatement firms do not reduce options usage following the restatement announcement, we use the following logit model to examine the determinants of the likelihood of reducing option compensation:

$$\begin{aligned} Pr\,(Reducing\ Option\ Grants) = {} & \alpha + \beta_1 Option\%\_High_{t-1} \\ & + \beta_2\ Tech\_Restatement + \beta_3\ Inc\_Restatement + \beta_4\ Small\_Restatement \\ & + \beta_5\ MktResponse + \beta_6\ CEO/COB\_Decouple + \gamma\ Controls + \varepsilon \end{aligned} \quad \textbf{(3)}$$

where the dependent variable is a dummy variable equal to one if the restatement firm reduced option grants from t-1 to t+2 and zero otherwise. We define this dummy variable alternatively based on *$Option%* and *#Option%.* Besides the factors that might affect option usage, namely CEO turnover and the independent variables in model (2), which are included as controls here, we identify six additional explanatory variables, as discussed below.

While prior research finds that, on average, restatement firms had too high a level of equity incentives, we conjecture that this is more likely to be true for restatement firms that have high option grants prior to the restatement announcement. Accordingly, these firms are more likely to reduce option grants, compared to other restatement firms. To capture this within-sample variation, we construct an indicator variable, $\$Option\%\_High_{t-1}$ *(#Option%_High$_{t-1}$)*, which equals 1 for restatement firms with *$Option% (#Option%)* in the top quartile of the sample distribution in year t-1.[15] We predict a positive sign on the coefficients of these variables.

As we argue in Section 2, restatement firms will change CEO compensation structure only when doing so yields a net benefit. Because the net benefit is likely to be

[14] In our sample, 42% (47%) of restatement firms reduce *$Option%* (*#Option%*) from t-1 to t+2.
[15] The inferences are the same if we use continuous values for these and other variables.

lower when the restatements are technical, income-increasing, or small in dollar magnitude, we expect that firms that have restatements with these characteristics are less likely to reduce Option%. We collect detailed information about the restatements – their nature as well as the direction and magnitude of their impact on earnings – from restatement firms' press releases or 10-Ks, whenever possible, and we construct three indicator variables to capture restatement-specific effects: *Tech_Restatement* for technical restatements, *Inc_Restatement* for income-increasing restatements, and *Small_Restatement* for firms with restatement magnitude in the bottom quartile of the sample distribution. See the legend to Table 7 for variable measurement. We predict negative coefficients on these variables.

The market response to the restatement announcement might also capture the extent of the agency problem related to suboptimal option usage and firms' incentive to reduce it. *MktResponse* is a dummy variable equal to one for firms with extremely negative (bottom quartile) size-adjusted abnormal returns for the three days centered around the announcement date of the restatement, and zero otherwise. We predict a positive sign on the coefficient of this variable.

We also investigate whether an improvement in corporate governance, along the dimension of decoupling the joint CEO/Chairman of the board (COB) position, can facilitate the change in CEO compensation structure. Prior research suggests that when corporate governance is weak, firms award CEOs excessive option grants (e.g., Bebchuk et al. 2002) and are more likely to have accounting frauds (Dechow et al. 1996; Erickson et al. 2006). It seems plausible, therefore, that restatement firms that experience improvement in the dimension of decoupling the joint CEO/COB position are more likely

to reduce option grant usage. Thus, we expect that firms decoupling the joint CEO/COB position are more likely to reduce option grants. *CEO/COB_Decouple* is a dummy variable equal to one for firms that had the joint CEO/COB position in year t-1 and decoupled it by year t+2.

We report the results of the logit regression in Table 7, first based on *$Option%* and then based on *#Option%*.[16] We find that the likelihood of reducing option usage is higher for restatement firms that have higher level of options usage in year t-1. This relation also holds for firms with income-decreasing restatements, but only in the analysis using *$Option%*. We find no evidence that the likelihood of reducing option usage is higher for restatement firms that experience improvement in corporate governance.

[Insert Table 7 here]

5. Efficacy of Option Compensation Changes

5.1 Subsequent Performance Improvement

Our findings of reduced option grant usage suggest that, ex ante, there is a net economic benefit associated with a more optimal compensation contract. Otherwise, rational firms would not make this costly adjustment (Core and Larcker 2002). In this section, we examine whether the reduction in CEO option-based compensation yields a net economic benefit *ex post*. In our setting, we argue that the reduction in option-based compensation is likely to mitigate restatement firms' agency problems related to the restatement and result in managerial decisions that are better aligned with shareholders' interests. If in the pre-restatement period too high a level of option-based compensation

[16] For the sake of brevity, we do not tabulate the results on control variables, which generally have insignificant coefficients except for firm size. Large firms are more likely to reduce option grants after restatement announcements.

resulted in excessive investments in risky projects and a fixation on the short-term stock price rather than a focus on operating efficiency, then a more optimal level of option-based compensation can motivate managers to reduce *excessive* investments in risky capital projects, R&D, or marketing activities and/or to implement cost-cutting strategies. Since these excessively risky investments likely resulted in poor operating performance, a reduction in such investments should lead to improved operating performance. In addition, by decreasing earnings management incentives, the reduction in option-based compensation can induce managers to devote their efforts to productive activities rather than to earnings management (Demski et al. 2004). Therefore, if the recontracting is successful, then the reduction in CEO option-based compensation should increase operating performance. We formalize this prediction in the following hypothesis, stated in the alternative form:

H2: Compared to matched control firms, restatement firms that reduce option-based compensation following a restatement will experience improved operating performance.

5.2 Primary tests of H2

Because we observe that there were no significant changes in option grant usage until year t+2, we examine whether operating performance improved in year t+2 and afterwards. We define ROA as operating income (Compustat data13) scaled by average total assets,[17] and calculate abnormal ROA using a matched-firm approach, as suggested by Barber and Lyon (1996). For each restatement firm, we select a firm that has the same 2-digit SIC code and closest ROA in year t+1. (Note that since the event of interest here is the change in option grant usage after the restatement and not the restatement itself, the

[17] The results based on operating income after depreciation are qualitatively similar.

benchmark year is thus one year before the occurrence of reduced option grant usage – year t+1.) For the restatement firms for which we are unable to find a matched firm using this approach, we choose a firm with the closest ROA without restrictions on industry membership, as suggested by Barber and Lyon (1996).

Table 8 presents the findings of our tests of the relation between changes in option grant usage and abnormal ROA in years t+2 and t+3.[18] We provide results for those restatement firms that decreased *$Option%* and those that had no change or increase in it. ROA for the restatement firms that reduce *$Option%* is significantly greater than that for their corresponding matched firms. In the first (two) year(s) where we document a decrease in *$Option%* (i.e., year t+2, and years t+2 and t+3), these restatement firms significantly outperform their matched firms in ROA by a mean of 2.1% (5.6%).[19] Results based on medians are similar to those based on means.

[Insert Table 8 here]

To investigate what drives this performance improvement, we decompose ROA into profit margin (operating income/sales) and asset turnover (sales/assets). We find that the improvement in ROA is due to improvements in profit margin. The difference in profit margin between restatement firms with reduced *$Option%* and their matched firms in year t+2 is significant at the 5% level, while the difference in asset turnover is insignificant (untabulated). Thus, it appears that restatement firms that reduce option-based compensation focus on improving profit margin, which can be achieved reasonably

[18] For year t+1, we find no differences in ROA between restatement firms and their corresponding matched firms, thus validating our matching procedure.

[19] Because most of the firms that experience a decrease in *$Option%* also experience a decrease in *#Option%*, the results are essentially the same when we conduct analyses based on the change in *#Option%*. In untabulated analyses, we find that the mean (median) change in ROA for firms with reduced number of option grants is 2.0% (0.7%) and 3.9% (2.9%) for year t+2 and years t+2 and t+3, respectively.

quickly by cutting *excessive* investments in R&D, marketing expenditures, unprofitable investments, or other operating costs.

In contrast, for the restatement firms that do not reduce $*Option%*, we find no evidence of improved performance. The mean and median abnormal ROA for these firms are insignificantly different from zero in the two years after the benchmark year.[20]

As noted above, there is significant CEO turnover in our sample. To investigate whether CEO turnover drives the improved operating performance, we partition our sample of restatement firms with reduced *$Option%* based on whether they experienced CEO turnover and analyze abnormal ROA separately for firms with and without CEO turnover. Results (untabulated) for each group are quantitatively similar to those reported in Table 8. Thus, CEO turnover is not driving our ROA results.

5.3 Robustness tests for H2

A concern with our ROA results is whether the act of reducing options itself leads to better performance or whether the underlying reasons for a firm to reduce options is what leads to better performance. That is, the ROA results reported in Table 8 are subject to a self-selection issue. To address this issue, we implement the Heckman (1979) two-stage procedure. In the first stage, we obtain the inverse mills ratio from estimating the prediction model in Table 7. In the second stage, we include the inverse mills ratio in a regression of ROA on an indicator variable equal to one for firms that reduced the dollar value of options. For the regression of changes in ROA from t+1 to t+2, we obtain a

[20] We also examine the market performance of these restatement firms using the methodology described in Barber and Lyon (1997). We find significantly positive abnormal returns in the two years after the release of year t+2 proxy statements for restatement firms with reduced *$Option%*, but not for those firms without reduced *$Option%*. However, it is difficult to draw reliable inferences from these results because they might be confounded by other firm-specific information in the proxy statements and because it is unclear when the capital markets learn about the compensation changes (Gaver et al. 1992).

positive and significant coefficient of 0.029 ($p<0.05$) on the option reduction dummy, while the coefficient on the inverse mills ratio is insignificant (untabulated). In untabulated results for the regression of changes in ROA from t+1 to t+2 and t+3, we find a positive and significant coefficient of 0.067 ($p<0.05$) on the option reduction dummy and an insignificant coefficient on the inverse mills ratio. These results indicate that a self-selection bias, to the extent it exists, does not appear to affect our results.

We also perform additional sensitivity tests to control for CEO turnover, big bath write-offs, earnings management via accruals, and mean reversion of ROA, all of which leave our inferences unaffected. However, despite these robustness checks, we acknowledge that there are likely to be substantial changes to firm characteristics coincident to the change in compensation structure and that the performance results we document can be due in part to these changes.

5.4 Reduction in Return Volatility

A key component underlying our argument for H1 and H2 is that restatement firms had excessive risky investments in the pre-restatement period due to high levels of equity compensation and that the reduction in option compensation in the post-restatement period decreased the level of these investments. Consistent with this argument, we document in Section 4.4 that restatement firms experience a reduction in convexity following a restatement. Accordingly, we expect that the restatement firms that reduce option compensation will experience a decrease in stock return volatility. Following prior research, we use return volatility as a proxy for risky investments (e.g., Rajgopal and Shevlin 2002) and test whether restatement firms reduce the riskiness of their investments following the reduction in option grants. Specifically, we use the same matched firms

from our ROA tests (see Section 5.2), calculate the abnormal volatility for our sample of restatement firms as the difference between restatement firms and their matched control firms in the standard deviation of weekly stock returns, and then calculate the change in abnormal volatility from year t+1 to years t+2 or t+3.

In Table 9 we provide results from these tests. As expected, for restatement firms with a decrease in $*Option%*, we find a change in mean (median) abnormal volatility of -0.011 (-0.016) from t+1 to t+2 that is significant at the 5% (1%) level. We find similar results for the change in abnormal volatility from t+1 to t+3. Based on untabulated analyses, we find that the volatility of these restatement firms is greater than that of their matched firms in year t+1 (significant at the 1% level), but by year t+2, these restatement firms have volatility levels that are similar to those of their matched firms (p=0.71). For restatement firms with a zero change or an increase in *$Option%*, however, we find no significant changes in abnormal volatility. These restatement firms have higher return volatility than their matched firms in all years, all significant at the 1% level (results untabulated).

[Insert Table 9 here]

In sum, we document a decrease in return volatility for restatement firms with a reduction in CEOs' option grants. This finding, combined with the ROA results, suggests that these firms reduced the riskiness of their investments sufficiently to improve operating performance.

6. Summary and Conclusions

We examine whether firms with earnings restatements recontract with their CEOs after a restatement to reduce option-based compensation and, if so, whether this results in

improved operating performance. We predicate our study on the extant research that finds a positive relation between CEO equity incentives and the probability of earnings restatements, and on research that documents the costs of these restatements. Based on an analysis of 289 restatement firms over the period 1997-2001, we find that compared to control firms, restatement firms reduce the proportion of CEOs' total compensation that is option-based following a restatement. This result holds for both extant and newly hired CEOs. Thus, restatement firms are likely to view reducing option-based compensation as an important means of resolving their agency problem. Furthermore, we find evidence of improved operating performance following the reduction in option-based compensation. This result dismisses the alternative explanation that the decrease in option-based compensation results from the negative public perception of option usage. Under this alternative explanation, restatement firms will not experience improved performance. Further analysis indicates that the performance improvement is partly attributed to a reduction in stock return volatility, which reflects the underlying riskiness of these firms' investments. This result highlights that a significant economic benefit accrues to firms that adjust option-based compensation toward a more optimal level.

We contribute to the literature on the determinants of compensation structure by documenting that earnings restatements are strongly associated with subsequent reductions in CEO option-based compensation. In addition, our study complements Core and Larcker (2002), who use a setting in which managerial ownership levels are apparently too low and find that increases in managerial ownership are associated with improved firm performance. In contrast to Core and Larcker (2002), we utilize a setting

in which managerial ownership levels are apparently too high and provide evidence that reducing these levels is beneficial to the firm.

This paper also complements studies investigating other monitoring changes in response to financial reporting failures (e.g., Farber 2005; Srinivasan 2005; Desai et al. 2006). Collectively, these studies suggest that firms improve a broad spectrum of governance mechanisms to reduce the agency problems associated with financial reporting failures. An important limitation of our study is that we treat changes in these other mechanisms as exogenous. Investigation of how changes in these governance mechanisms are jointly determined appears to be a fruitful avenue for future research.

REFERENCES

Agrawal, A., Mandelker, G., 1987. Managerial incentives and corporate investment and financing decisions. Journal of Finance 42, 823-837.

Baber, W., Janakiraman, S., Kang, S. 1996. Investment opportunities and the structure of executive compensation. Journal of Accounting and Economics 21, 297-318.

Barber, B., Lyon, J., 1996. Detecting abnormal operating performance: The empirical power and specification of test statistics. Journal of Financial Economics 41, 359-399.

_____, 1997. Detecting long-run stock returns: The empirical power and specification of test statistics. Journal of Financial Economics 43, 341-372.

Bebchuk, L. A., Fried, J. M., Walker, D. I., 2002. Managerial power and rent extraction in the design of executive compensation. The University of Chicago Law Review 69, 751-846.

Beneish, M., 1999. Incentives and penalties related to earnings overstatements that violate GAAP. The Accounting Review 74 (4), 425-457.

Bergstresser, D., Philippon, T., 2006. CEO incentives and earnings management. Journal of Financial Economics 80, 511-529.

Blackwell, D., Farrell, K., 2004. Changes in the structure of CEO compensation and the firm's pay-performance sensitivity following CEO turnover. Working paper, University of Nebraska.

Brown, L. D., Caylor, M. L., 2006. Corporate governance and firm valuation. Journal of Accounting and Public Policy 25, 409-434.

Brown, L., Lee, Y-J. 2007. The Impact of SFAS 123R on Changes in Option-Based Compensation. Working paper, Georgia State University.

Bryan, S., LeeSeok, H., Lilien S., 2000. CEO stock-based compensation: An empirical analysis of incentive-intensity, relative mix, and economic determinants. Journal of Business 73(4), 661-693.

Burns, N., Kedia, S., 2006. The impact of performance-based compensation on misreporting. Journal of Financial Economics 79, 35-67.

Carter, M., Lynch, L., Tuna, I. 2007. The role of accounting in the design of CEO equity compensation. The Accounting Review 82, 327-357.

Cassidy, J., 2002. The Greed Cycle. New Yorker (September 23), 64-77.

Cheng, Q., Warfield, T., 2005. Equity incentives and earnings management. The Accounting Review 80 (2), 441-476.

Core, J., Guay, W., 1999. The use of equity grants to manage optimal equity incentive levels. Journal of Accounting and Economics 28, 151-184.

_____, 2002. Estimating the value of employee stock option portfolios and their sensitivities to price and volatility. Journal of Accounting Research 40, 613-630.

Core, J., Guay, W., Larcker, D., 2003. Executive equity compensation and incentives: A Survey. Federal Reserve Bank of New York Economic Policy Review (April), 27-50.

Core, J. R., Larcker, D., 2002. Performance consequences of mandatory increases in executive stock ownership. Journal of Financial Economics 64, 317-340.

Darrough, M., Li, J. 2006. The Restructuring of Compensation Practices in Response to Political Pressure- Evidence on Stock-option Compensation. Working paper, Baruch College.

Dechow, P., Sloan, R., Sweeney, A., 1996. Causes and consequences of earnings manipulation: An analysis of firms subject to enforcement actions by the SEC. Contemporary Accounting Research 13, 1-36.

Defusco, R., Johnson, R., Zorn, T., 1990. The effect of executive stock option plans on stockholders and bondholders. Journal of Finance 45, 617-627.

Demsetz, H., Lehn, K., 1985. The structure of corporate ownership: Causes and consequences. Journal of Political Economy 93, 1155-1177.

Demski, J. S., Frimor, H., Sappington, D. E. M., 2004. Efficient manipulation in a repeated setting. Journal of Accounting Research 42, 31-49.

Desai, H., Hogan, C., Wilkins, M., 2006. The reputational penalty for aggressive accounting: Earnings restatements and management turnover. The Accounting Review 81, 83-112.

DuCharme, L., Malatesta, P., Sefcik, S., 2004. Earnings management, stock issues, and shareholder lawsuits. Journal of Financial Economics 71, 27-40.

Efendi, J., Srivastava, A., Swanson, E., 2007. Why do corporate managers misstate financial statements? The role of option compensation and other factors. Journal of Financial Economics 85, 667-708.

Erickson, M., Hanlon, M., Maydew, E., 2006. Is there a link between executive equity incentives and accounting fraud? Journal of Accounting Research 44, 113-143.

Farber, D., 2005. Restoring trust after fraud: Does corporate governance matter? The Accounting Review 80, 539-561.

Gaver, J., Gaver, K., 1993. Additional evidence on the association between the investment opportunity set and corporate financing, dividend, and compensation policies. Journal of Accounting and Economics 16, 125-160.

Gaver, J., Gaver, K., Battistel, G., 1992. The stock market reaction to performance plan adoptions. The Accounting Review 67, 172-182.

Gilson, S., Vetsuypens, M., 1993. CEO compensation in financially distressed firms: An empirical analysis. Journal of Finance 48, 425-458.

Guay, W. 1999. An empirical analysis of the convexity of between stock price and CEO's wealth. Journal of Accounting and Economics 53, 43-71.

Hanlon, M., Rajgopal, S., Shevlin, T., 2003. Are executive stock options associated with future earnings? Journal of Accounting and Economics 36, 3-43.

Harris, J., Bromiley, P., 2006. Incentives to cheat: The influence of executive compensation and firm performance on financial misrepresentation. Organization Science 18, 350-367.

Heckman, J. 1979. Sample selection error as a specification bias. Econometrica 47,153-161.

Jensen, M., Meckling, W., 1976. Theory of the firm: Managerial behavior, agency costs, and ownership structure. Journal of Financial Economics 3(4), 305-360.

Jensen, M., 2005. Agency costs of overvalued equity. Financial Management 34, 5-19.

Jones, J. 1991. Earnings management during import relief investigation. Journal of Accounting Research 29: 193-228.

Karpoff, J., Lee, D., Martin, G., 2006. The cost to firms of cooking the books. Journal of Financial and Quantitative Analysis, forthcoming.

Knowledge at Wharton. 2003. Stock options: The end of the affair. http://knowledge.wharton.upenn.edu/.

Levitt, A., 1998. The numbers game. Remarks by the Chairman of the Securities and Exchange Commission delivered at the NYU Center for Law and Business, NY, September 28, 1998.

Lu, Y., 2003. Earnings management and securities litigation. Working paper, University of Southern California.

Madrick, J., 2003. A theory of corporate greed. New York Times (February 20): C2.

Morck, R., Schleifer, A., Vishney, R., 1988. Management ownership and market valuation: An empirical analysis. Journal of Financial Economics 20, 293-315.

Murphy, K., 1999. Executive compensation, in Handbook of Labor Economics (Orley Ashenfleter and David Card, eds.) North Holland: Amsterdam.

Palmrose, Z-V., Richardson, V., Scholz, S., 2004. Determinants of market reactions to restatement announcements. Journal of Accounting and Economics 37, 59-89.

Peng, L., Roell, A., 2004. Executive pay, earnings management, and shareholder litigation. Working paper, Baruch College / CUNY.

Rajgopal, S., Shevlin, T., 2002. Empirical evidence on the relation between stock option compensation and risk taking. Journal of Accounting and Economics 33, 145-171.

Smith, C., Stulz, R., 1985. The determinants of firms' hedging policies. Journal of Financial and Quantitative Analysis 20, 391-405.

Smith, C., Watts, R., 1992. The investment opportunity set and corporate financing, dividends, and compensation policies. Journal of Financial Economics 32, 263-292.

Strong, J., Meyer, J., 1987. Asset writedowns: Managerial Incentives and security returns. Journal of Finance 42, 643-661.

Srinivasan, S., 2005. Consequences of financial reporting failure for outside directors: Evidence from accounting restatements and audit committee members. Journal of Accounting Research 43, 291-334.

The Economist, 2002. How to pay bosses. November 14, 2002.

United States General Accounting Office. 2002. Report to the Chairman, Committee on Banking, Housing, and Urban Affairs, U.S. Senate. Financial statement restatements: Trends, Market impacts, regulatory responses, and remaining challenges. (GAO-03-138) http://www.gao.gov/new.items/d03138.pdf

Wu, M., 2002. Earnings restatements: A capital market's perspective. Unpublished dissertation, New York University.

Yermack, D., 1995. Do corporations award CEO stock options effectively? Journal of Financial Economics 39, 237-269.

Appendix
Description of Control Variables

CEO stock ownership. Low stock ownership may indicate that the CEOs' interests are not optimally aligned with those of shareholders. Prior research finds that when a CEO's stock or option ownership is low, the firm tends to award this manager more option or stock grants (Core and Guay 1999; Bryan et al. 2000). To measure CEO ownership, we use the actual number of shares owned (*Shares_Own*) and the number of both exercisable (*Exercisable_Options*) and unexercisable options (*Unexercisable_Options*), all scaled by shares outstanding. We predict negative signs on the coefficients of these variables.[21]

Firm size. Prior research argues that the optimal level of equity incentives increases with firm size (*Size*) (Core and Guay 1999). The larger the firm, the more complex it becomes, giving rise to agency conflicts. Also, CEOs of large firms tend to be wealthier and need more stock-based compensation to be motivated to work in the interests of shareholders. We therefore predict a positive sign on the coefficient of *Size*, which we measure as the natural logarithm of sales.

Growth opportunity. It is difficult for shareholders to determine the appropriate corporate/operational strategy for a growth firm. Thus, it is likely that growth firms provide their managers with higher equity incentives to align their interests with those of shareholders (Smith and Watts 1992; Gaver and Gaver 1993). Consistent with prior research (Core and Guay 1999; Hanlon et al. 2003), we use the book-to-market ratio

[21] We choose not to use the dollar value of the equity holdings for two reasons. First, agency theory (e.g., Jensen and Meckling 1976) suggests that the percentage of shares owned by the CEO is an appropriate measure of agency problem and thus a good determinant of option-based compensation. Second, the value of existing holdings is confounded by the restatement. As discussed before, restatements are associated with large decreases in stock price, which decreases the value of CEOs' existing holdings. This may lead to an increase in *Option%* if shareholders want to maintain the same level of CEOs' equity incentives (in dollars). That is, the decrease in stock and option values biases against finding results consistent with H1.

(*B/M*) and research and development intensity (*R&D*) to proxy for growth. We predict a negative coefficient on (*B/M*) and a positive coefficient on *R&D*.

Cash Constraints.[22] Compared to cash-based compensation, such as salary and bonus, stock-based compensation exerts relatively little pressure on a company's current cash flow. Thus, firms with cash constraints are more likely to use stock-based compensation (Yermack 1995; Dechow et al. 1996). As in prior research, we measure cash constraints (*Cash Constraint*) as common and preferred dividends plus cash flows used in investment activities minus cash flows from operations, divided by total assets. We predict a positive sign on the coefficient of this variable.

Earnings constraints. Firms with earnings constraints (*Earn Constraint*) are also more likely to use option-based compensation because it was not expensed in our sample period if the exercise price is set at the stock price on the grant date. We use a dummy variable to indicate firms with an operating loss. However, because the empirical evidence on the relation between *Earn Constraint* and stock-based compensation is mixed (Yermack 1995; Core and Guay 1999; Bryan et al. 2000), we make no directional prediction for the coefficient on this variable.

Leverage. If a CEO's stock-based compensation induces risk-taking, then shareholders receive a benefit over debtholders. It follows that shareholders will bear this debt agency cost in the form of higher interest. Therefore, stock-based compensation will be negatively related to debt. In addition, debt financing also serves as a monitoring mechanism that can reduce the need for stock-based compensation. Consistent with these arguments, Bryan et al. (2000) identify a negative relation between incentive-intensity

[22] We also considered using free cash flow to control for the extent of agency problems, but because it is closely related to cash constraints, we opted not to use it.

and leverage (*Lev*). We measure *Lev* as long-term debt divided by total assets and predict a negative sign on the coefficient of this variable.

Idiosyncratic Risk. Prior research finds a positive relation between equity incentives and a firm's idiosyncratic risk (*Idiosyncratic Risk*) (e.g., Core and Guay 1999; Hanlon et al. 2003). When the uncertainty (i.e., idiosyncratic risk) surrounding a firm's performance is higher, it is more difficult for shareholders to monitor managers, thus making it more likely that the firm will use option-based compensation to motivate managers. We measure *Idiosyncratic Risk* as the standard deviation of the residual from the market model over the prior 12 months and predict a positive sign on its coefficient.

Stock Returns. Prior research finds a positive relation between a firm's current returns (*Current Return*) and CEO compensation (Baber et al. 1996 and Hanlon et al. 2003), consistent with CEOs being compensated for good firm performance. Hanlon et al. (2003) also find that firms with greater lagged stock returns (*Past Return*) grant more stock options to their CEOs. We likewise use these variables and predict positive signs on their coefficients.

Cash Compensation. With greater cash compensation - a proxy for outside wealth - managers can reduce their risk-aversion through better diversification, thus reducing the need of using options grants to encourage managers to invest in risky projects (Guay 1999). In support of this prediction, Hanlon et al. (2003) find that firms with greater CEO cash compensation (*Cash Compensation*) grant fewer stock options. However, this relation can be positive as firms might award managers additional cash compensation to offset the additional risk they bear through increased option grants. We therefore do not predict a sign on the coefficient on this variable.

Table 1
Sample reconciliation and descriptive statistics of restatement firms

This table describes the sample selection process of our restatement sample – 289 restatements announced in the period 1997-2001, and the characteristics of the restatements and restatement firms.

Panel A: Sample reconciliation

Restriction		Sample Size
Number of restatements per GAO in the period 1997-2002		919
Less:		
Firms with fiscal year of restatement announcement later than 2001 [a]	135	
Firms without basic financial data from Compustat (i.e., sales, total assets, book value, net income)	204	
Firms without returns data from CRSP in the three trading days around the restatement announcement	55	
Firms with missing compensation data for the pre- or post-restatement period	228	
Firms with multiple restatements in the same year [b]	8	630
Final restatement sample		289

[a] This restriction ensures that we have compensation data available at least for the second year after restatements.
[b] We keep only the first observation for firms with multiple restatements in the same year.

Table 1 (cont'd)

Panel B: Yearly distribution of restatements

	Restatement Announcement Year					
	1997	1998	1999	2000	2001	Total
n	37	24	77	70	81	289
% of total	12.8%	8.3%	26.6%	24.2%	28.1%	100%

Panel C: Restatement characteristics

	Frequency	Percentage of total
Full sample	289	100%
Initiated by		
SEC	54	18.7%
Auditor	23	8.0%
Company	116	40.1%
Unknown	96	33.2%
Exchange Listing		
NYSE	117	40.5%
AMEX	12	4.1%
Nasdaq	160	55.4%
*Reason**		
Revenue recognition	127	43.9%
Restructuring	35	12.1%
Cost or expense	32	11.1%
Merger and acquisition	22	7.6%
In-process R&D	18	6.2%
Securities related	15	5.2%
Other	40	13.9%

*Reason is per GAO (2002) report.

Table 1 (cont'd)

Panel D: Industry classification of restatement firms

Industry	2-Digit SIC Code	n	%
Oil and Gas	13	5	1.73
Food Products	20	6	2.08
Paper and Paper Products	24-27	6	2.08
Chemical Products	28	17	5.88
Manufacturing	30-34	10	3.46
Computer Equipment and Services	35, 73	75	25.95
Electronic Equipment	36	24	8.30
Transportation	37, 39, 40, 42, 44, 45	14	4.84
Scientific Instruments	38	19	6.57
Durable Goods	50	7	2.42
Retail	53-57, 59	25	8.65
Eating and Drinking Establishments	58	2	0.69
Entertainment Services	70, 78, 79	6	2.08
Health	80	5	1.73
Professional Services	87	8	2.77
All Others	All others	60	20.76
Total		289	100%

Panel E: Restatement firms' financial characteristics in the restatement year

Variable	Mean	Std. Dev.	Q1	Median	Q3
Market Value ($ million)	3,878.4	12,292.2	62.9	289.8	1,786.8
Total Assets ($ million)	3,553.3	8,825.7	118.4	419.7	2,348.6
Sales ($ million)	2,628.3	6,392.3	81.3	349.0	1,671.3
Book Value ($ million)	1,016.7	2,363.6	29.3	156.2	821.1
Operating Income ($ million)	165.7	873.1	-7.3	15.6	132.9
Book-to-Market Ratio	0.672	0.641	0.219	0.494	0.881
Leverage	0.187	0.192	0.004	0.139	0.318

Table 2
Distributional statistics of annual CEO compensation and its components for restatement firms

This table reports descriptive statistics of CEO compensation and its components in the pre- and post-restatement periods for restatement firms. All variables are measured in $000, except for **#Option%**, which is the number of option grants (in number of shares) scaled by total shares outstanding, in percentage. The two-sided p-values are based on t-statistics for the difference in the means. (Because the variables are highly skewed, we take logs and then compute t-statistics.)

Year relative to Restatement Announcement		Salary	Bonus	Stock Option Grants	Restricted Stock Grants	Other Comp.	Total Comp.	#Option%
-1 (n=286)	Mean	431.3	371.9	2,405.7	251.5	217.5	3,677.9	0.494
	Q1	200.0	0.0	0.0	0.0	1.2	391.4	0.000
	Median	316.0	112.5	283.0	0.0	15.2	1,164.2	0.110
	Q3	583.9	382.5	2,039.3	0.0	136.5	3,435.7	0.413
+1 (n=271[†])	Mean	483.6	422.1	2,347.5	323.4	256.6	3,833.1	0.544
	Q1	247.7	0.0	0.0	0.0	3.8	522.6	0.000
	Median	397.7	133.0	362.5	0.0	20.6	1,233.8	0.158
	Q3	650.0	434.2	2,382.7	0.0	120.2	4,206.4	0.536
+2 (n=286)	Mean	503.8	393.6	1,948.9	393.9	424.0	3,664.3	0.369
	Q1	255.0	0.0	0.0	0.0	4.4	442.4	0.000
	Median	400.0	100.0	118.3	0.0	21.1	1,035.6	0.081
	Q3	700.0	447.7	1,149.6	0.0	128.7	3,520.1	0.374
p-value for the difference in means between years t-1 and t+2		0.033	0.484	0.078	0.993	0.182	0.858	0.033

[†] Because we focus on year t+2 in our main analyses, we require all observations of sample or control firms to have compensation data in year t+2. Some of these observations have missing compensation data in year t+1, resulting in a smaller sample in year t+1.

Table 3
Univariate analyses of mean changes in CEO stock option grants for restatement and control firms

This table reports the mean difference in CEO option grants between the pre- and post-restatement period for restatement firms and control firms. Year t is the restatement announcement year. Control firms are non-restatement firms with compensation data from ExecuComp.

Panel A: Option grants measured as the value of CEO annual stock option grants scaled by the value of CEO total annual compensation ($Option%)

	Mean difference in $Option% between years t-1 and t+1	Mean difference in $Option% between years t-1 and t+2
Restatement firms (1)	1.9% (n=271)†	-5.6%*** (n=286)
Control firms (2)	3.2%*** (n=7,329)†	2.6%*** (n=7,343)
(1) – (2)	-1.3%	-8.2%***
(p-value)	(0.275)	(0.001)

Panel B: Option grants measured as the number of CEO annual stock option grants (in number of shares) scaled by total shares outstanding (#Option%)

	Mean difference in #Option% between years t-1 and t+1	Mean difference in #Option% between years t-1 and t+2
Restatement firms (1)	0.07% (n=271)†	-0.13%** (n=286)
Control firms (2)	0.01%* (n=7,329)†	0.00% (n=7,343)
(1) – (2)	0.06%	-0.13%**
(p-value)	(0.450)	(0.032)

*** (**, *) Indicates significance at the 1% (5%, 10%) level, one-sided for restatement firms and the difference between restatement firms and control firms, and two-tailed for control firms.
† Because we focus on year t+2 in our main analyses, we require all observations of sample or control firms to have compensation data in year t+2. Some of these observations have missing compensation data in year t+1, resulting in a smaller sample size for the comparison between t-1 and t+1 than for the comparison between t-1 and t+2.

Table 4
Descriptive statistics and correlations of variables
for restatement and control firms

Panel A: Descriptive statistics (n=5,948)

Variable	Mean	Std. Dev.	Q1	Median	Q3
Δ$Option%	2.401	33.684	-13.451	0.000	19.921
Δ#Option%	0.006	0.505	-0.070	0.000	0.113
Restatement	0.031	0.174	0.000	0.000	0.000
ΔShares_Own (%)	-0.703	3.239	-0.409	0.000	0.116
ΔExercisable_Options (%)	0.133	0.820	-0.102	0.054	0.385
ΔUnexercisable_Options (%)	0.068	0.689	-0.125	0.009	0.249
ΔSize	0.284	0.450	0.041	0.240	0.506
ΔB/M	0.088	0.436	-0.107	0.023	0.197
ΔR&D	-0.001	0.025	0.000	0.000	0.000
ΔCash_Constraint	-0.017	0.148	-0.090	-0.011	0.057
ΔEarn_Constraint	0.042	0.308	0.000	0.000	0.000
ΔLev	0.018	0.119	-0.036	0.000	0.069
ΔIdiosyncratic Risk	0.009	0.024	-0.005	0.007	0.022
ΔCurrent Return	-0.115	0.789	-0.443	-0.074	0.290
ΔPast Return	-0.054	0.683	-0.403	-0.039	0.288
ΔCash Compensation	-0.333	1.848	-0.434	-0.085	0.089

Δ$Option% is the difference in the dollar value of annual CEO option-based compensation scaled by annual CEO total compensation (in percent) between year t-1 and t+2, where year t is the restatement year. **Δ#Option%** is the difference in option grants in number of shares scaled by total shares outstanding between year t-1 and year t+2. **Restatement** is 1 for restatement firms and 0 otherwise. All control variables are measured as the difference (Δ) between years t-2 and t+1, except for current return, which is measured between years t-1 and t. **Shares_Own (%)** is CEO ownership in shares scaled by outstanding shares; **Exercisable_Options (%)** is the CEO's exercisable options in shares scaled by outstanding shares; **Unexercisable_Options (%)** is the CEO's unexercisable options in shares scaled by outstanding shares; **Size** is the natural log of sales (in $million, Compustat data12); **B/M** is the book-to-market ratio, measured as book value (data 60) divided by market value (data25*data199); **R&D** is research and development expense (data46) scaled by total assets (data6); **Cash_Constraint** is measured as common and preferred dividends (data127) plus net cash flow used in investment activities (data311) minus net cash flow from operations (data308), divided by total assets (data6); **Earn_Constraint** equals one if there is an operating loss (i.e., if data178 is negative) and zero otherwise; **Lev** is measured as long-term debt (data9) divided by total assets (data6); **Idiosyncratic Risk** is the standard deviation of the residual from the market model using weekly returns over 12 months; **Current Return** is the accumulated monthly stock return for the current year; **Past Return** is the accumulated monthly stock return for the last year; **Cash Compensation** is the sum of salary and bonus scaled by sales.

All means are different from zero at the 1% level.

Table 4 (cont'd)

Panel B: Spearman Correlations between option grants and independent variables, with p-values in parentheses (n=5,948)

	Δ$Option%	Δ#Option%	Restatement	ΔShares_ Own (%)	ΔEx. Options (%)	ΔUnex. Options (%)	ΔSize	ΔB/M	ΔR&D	ΔCash_ Constraint	ΔEarn_ Constraint	ΔLev	ΔIdio. Risk	ΔCurrent return	ΔPast return
Δ#Option%	**0.578**														
Restatement	**-0.059**	**-0.059**													
ΔShares_Own (%)	**-0.080**	**-0.055**	-0.022												
ΔExercisable_ Options (%)	**-0.118**	**-0.132**	-0.019	**0.104**											
ΔUnexercisable_ Options (%)	**-0.086**	**0.071**	**-0.034**	0.009	**0.080**										
ΔSize	**0.056**	**-0.041**	0.019	**-0.123**	-0.080	**-0.075**									
ΔB/M	**-0.106**	**0.047**	**0.066**	**-0.036**	**0.008**	**-0.052**	**-0.066**								
ΔR&D	-0.017	**0.027**	**0.040**	0.003	0.007	0.019	**-0.103**	0.008							
ΔCash_ Constraint	**0.037**	0.011	**-0.051**	0.020	**0.028**	-0.002	-0.008	**-0.066**	**0.033**						
ΔEarn_Constraint	**-0.074**	0.013	**0.095**	0.008	-0.004	**-0.061**	**-0.172**	**0.208**	**0.152**	0.023					
ΔLev	**-0.029**	0.011	-0.001	-0.003	-0.008	0.012	**0.071**	-0.015	-0.018	**0.189**	**0.046**				
ΔIdiosyncratic Risk	**-0.026**	**0.051**	**0.087**	0.023	**-0.067**	0.009	**-0.038**	**0.199**	**0.078**	0.012	**0.163**	**0.099**			
ΔCurrent return	**0.060**	**-0.027**	**-0.025**	**0.049**	0.018	**0.105**	**-0.064**	**-0.382**	**-0.041**	**-0.037**	**-0.221**	**-0.095**	**-0.042**		
ΔPast return	**0.059**	**-0.043**	-0.001	**0.042**	**0.027**	**0.041**	**0.049**	**-0.260**	**-0.084**	**0.076**	**-0.149**	**-0.095**	**-0.090**	**0.029**	
ΔCash Compensation	**-0.028**	**0.034**	-0.020	**0.066**	**0.069**	**0.101**	**-0.474**	**-0.027**	**0.129**	**0.040**	**0.050**	**-0.075**	**0.003**[†]	**0.137**	0.002

Note: See Panel A of this table for variable definitions. Items in bold indicate significance at the 0.05 level.

Table 5
Regression analyses of changes in CEO option-based compensation

This table reports regression results of the following equations for the period t-1 to t+2, where t is the restatement announcement year:

$$\Delta Option\_Grants = \alpha_0 + \alpha_1 Restatement + \boldsymbol{\beta}\,\Delta Controls + Year\,Dummies + \varepsilon \quad \textbf{(1)}$$

$$\Delta Option\_Grants = \alpha_0 + \alpha_{1a} Restatement\_ExtantCEO + \alpha_{1b} Restatement\_NewCEO + \boldsymbol{\beta}\,\Delta Controls + Year\,Dummies + \varepsilon, \quad \textbf{(2)}$$

Option_Grants is defined as either **$Option%** or **#Option%. $Option%** is the dollar value of annual CEO stock option compensation scaled by annual CEO total compensation, in percent. **#Option%** is option grants in number of shares scaled by shares outstanding, in percent. **Restatement_ExtantCEO (Restatement_NewCEO)** is a dummy variable equal to one if the restatement firm did not experience (experienced) CEO turnover during the analysis period and zero otherwise. All other variables are defined in Panel A of Table 4.

Panel A: Impact of restatement on option grants for full sample

		Δ$Option% (A)		Δ#Option% (B)	
Variable	Predicted sign	Coefficient Estimate	t-statistic	Coefficient Estimate	t-statistic
Intercept	?	9.142	8.02***	0.116	6.68***
Restatement	-	-7.829	-3.17***	-0.164	-4.37***
ΔShares_Own	-	-0.785	-5.94***	-0.008	-3.86***
ΔExercisable_Options	-	-4.089	-7.83***	-0.075	-9.49***
ΔUnexercisable_Options	-	-4.447	-7.14***	-0.051	-5.38***
ΔSize	+	-0.237	-0.21	-0.065	-3.91
ΔB/M	-	-5.133	-4.54***	0.049	2.83
ΔR&D	+	-0.992	-0.06	0.353	1.35
ΔCash_Constraint	+	7.267	2.48***	0.026	0.58
ΔEarn_Constraint	?	-3.363	-2.25**	-0.022	-0.95
ΔLev	-	-10.665	-2.88***	0.017	0.30
ΔIdiosyncratic Risk	+	-74.343	-3.72	0.299	0.99
ΔCurrent Return	+	0.253	0.40	-0.021	-2.26
ΔPast Return	+	2.022	3.00***	-0.016	-1.55
ΔCash Compensation	?	-0.241	-0.91	0.008	2.02**
n (restatement/control)		186/5,762		186/5,762	
Adj. R^2		0.068		0.045	

*** (*) indicates significance at the 1% (10%) level (one-sided for variables with predicted signs, two-sided otherwise). The results for year dummies are omitted for brevity.

Table 5 (cont'd)

Panel B: Impact of restatement on option grants across New and Extant CEOs

		Δ$Option% (A)		Δ#Option% (B)	
Variable	Predicted sign	Coefficient Estimate	t-statistic	Coefficient Estimate	t-statistic
Intercept	?	9.137	8.02***	0.116	6.68***
Restatement_ExtantCEO	-	-6.322	-1.84**	-0.161	-3.09***
Restatement_NewCEO	-	-9.355	-2.71***	-0.166	-3.17***
ΔShares_Own	-	-0.788	-5.94***	-0.008	-3.86***
ΔExercisable_Options	-	-4.113	-7.83***	-0.075	-9.49***
ΔUnexercisable_Options	-	-4.436	-7.14***	-0.051	-5.38***
ΔSize	+	-0.238	-0.21	-0.066	-3.91
ΔB/M	-	-5.121	-4.54***	0.049	2.83
ΔR&D	+	-1.238	-0.06	0.352	1.35
ΔCash_Constraint	+	7.214	2.48***	0.026	0.58
ΔEarn_Constraint	?	-3.339	-2.25**	-0.022	-0.95
ΔLev	-	-10.586	-2.88***	0.017	0.30
ΔIdiosyncratic Risk	+	-73.892	-3.72	0.300	0.99
ΔCurrent Return	+	0.262	0.40	-0.021	-2.26
ΔPast Return	+	2.017	3.00***	-0.016	-1.55
ΔCash Compensation	?	-0.236	-0.90	0.008	2.02**
n (restatement/control)		186/5,762		186/5,762	
Adj. R^2		0.068		0.045	

*** (**,*) indicates significance at the 1% (5%, 10%) level (one-sided for variables with predicted signs, two-sided otherwise). The results for year dummies are omitted for brevity.

Table 6
Analyses of changes in CEO option compensation from the year prior to the earliest year restated to the year prior to the restatement announcement

This table reports regression results of the following equations for the period t-n to t-1, where t is the restatement announcement year and t-n is the year prior to the earliest year restated:

$$\Delta Option\_Grants = \alpha_0 + \alpha_1 \, Restatement + \boldsymbol{\beta} \, \Delta Controls + Year\,Dummies + \varepsilon \qquad \textbf{(1)}$$

Option_Grants is defined as either **$Option%** or **#Option%. $Option%** is the dollar value of annual CEO stock option compensation scaled by annual CEO total compensation, in percent. **#Option%** is option grants in number of shares scaled by shares outstanding, in percent. All other variables are defined in Panel A of Table 4. The restatement firm sample restricts to restatement firms with different t-n and t-1.

	Δ$Option% (A)		Δ#Option% (B)	
Variable	Coefficient Estimate	t-statistic	Coefficient Estimate	t-statistic
Intercept	3.165	3.11***	0.045	2.95***
Restatement	8.923	2.50***	0.152	2.92***
ΔShares_Own	0.005	7.73**	0.000	4.15***
ΔExercisable_Options	-7.438	-7.81***	0.061	4.31***
ΔUnexercisable_Options	-0.056	-32.47***	-0.001	-41.33***
ΔSize	-1.032	-0.47	-0.108	-3.27***
ΔB/M	-1.701	-0.65	0.185	4.68***
ΔR&D	15.714	0.70	1.229	3.64***
ΔCash_Constraint	-5.050	-1.68*	-0.154	-3.43***
ΔEarn_Constraint	2.512	1.37*	-0.015	-0.53
ΔLev	-7.486	-1.23	0.048	0.52
ΔIdiosyncratic Risk	-43.679	-1.55*	-0.188	-0.45
ΔCurrent Return	2.094	2.46***	-0.012	-0.92
ΔPast Return	0.558	0.72	-0.015	-1.28
ΔCash Compensation	-1.457	-3.51***	-0.004	-0.63
n (restatement/control)	67/5,580		72/5,584	
Adj. R^2	0.167		0.260	

*** (**,*) indicates significance at the 1% (5%, 10%) level based on two-sided tests. The results for year dummies are omitted for brevity.

Table 7
Cross-sectional analysis of changes in CEO option compensation

This table reports the results from the following logit regression:

$$Pr\,(Reducing\ Option\ Grants) = \alpha + \beta_1 Option\%\_High_{t-1} + \beta_2\ Tech\_Restatement + \beta_3\ Inc\_Restatement + \beta_4\ Small\_Restatement + \beta_5\ MktResponse + \beta_6\ CEO/COB\_Decouple + \gamma\ Controls + \varepsilon \quad \textbf{(3)}$$

The dependent variable is a dummy variable equal to one if the restatement firm reduced option grants from t-1 to t+2 and zero otherwise, defined alternatively based on **$Option%** and **#Option%**. **$Option%_High$_{t-1}$ (#Option%_High$_{t-1}$)** is an indicator variable equal to 1 for restatement firms with **$Option% (#Option%)** in the top quartile of the sample distribution in the year prior to the restatement announcement. **Tech_Restatement** is a dummy variable equal to one for technical restatements. Technical restatements refer to those related to SAB 101, in-process R&D, and other restatements that we deemed to be not clearly in violation of GAAP. **Inc_Restatements** is a dummy variable equal to one for restatements in which the restated earnings are the same as or lower than original earnings. There are 43 restatements in our sample where the originally reported numbers are the same or lower than the restated earnings. **Small_Restatement** is a dummy variable equal to one for restatements in the bottom 75% of the magnitude of restatements. Restatement magnitude refers to the dollar magnitude of the restatement, scaled by total assets in year t-1. **MktResponse** is a dummy variable equal to one for restatement firms with extremely negative (bottom 25%) size- adjusted returns for a three day window around the restatement announcement. **CEO/COB_Decouple** is a dummy variable equal to one if the restatement firm had the joint CEO/COB position in year t-1 and decoupled this position by year t+2. **Size** is the log of total assets in year t-1. **Controls** represent all control variables used in Table 5 and the CEO turnover indicator variable, which equals to one if there is a new CEO in t+2 compared to t-1. Please refer to Table 5 for the list of the control variables.

		Indicator for reduction in **$Option%**		Indicator for reduction in **#Option%**	
Variable	Predicted sign	Coefficient Estimate	p-value (two-sided)	Coefficient Estimate	p-value (two-sided)
Intercept	?	-2.782	0.001	-4.335	0.001
$Option%_High $_{t-1}$	+	2.406	0.001		
#Option%_High $_{t-1}$	+			4.703	0.001
Tech_Restatement	-	-0.229	0.678	-0.246	0.655
Inc_Restatement	-	-1.992	0.002	-0.807	0.159
Small_Restatement	-	0.960	0.111	0.663	0.224
MktResponse	+	0.515	0.349	0.642	0.271
CEO/COB_Decouple	+	0.340	0.423	-0.707	0.156
Control variables		Yes		Yes	
n		152		154	
Pseudo Adj. R^2		0.441		0.538	

Table 8
Operating performance after changes in CEO option-based compensation

This table reports abnormal operating performance for restatement firms after the changes in CEO option-based compensation in year t+2 (t = restatement announcement year). We calculate abnormal ROA using a matched-firm approach, as suggested by Barber and Lyon (1996), where the matched firm is the firm in the same industry (2-digit SIC codes) with ROA closest to that of the restatement firm in year t+1. $Option% is the ratio of the dollar value of annual CEO option compensation to total annual CEO compensation. p-values are one-sided for the subsample with reduced $Option% and two-sided otherwise. The tests of means are based on t-statistics and the tests of medians are based on Wilcoxon signed tests.

	Predicted sign	t+2	t+2 and t+3
Restatement firms with decrease in $Option%			
Mean	+	2.1%	5.6%
(p-value)		(0.037)	(0.008)
Median	+	0.6%	2.9%
(p-value)		(0.065)	(0.003)
N		115	106
Restatement firms with zero change or increase in $Option%			
Mean	?	-0.4%	-0.8%
(p-value)		(0.972)	(0.722)
Median	?	-0.9%	-2.3%
(p-value)		(0.101)	(0.113)
N		157	143

Table 9
Analysis of changes in Return Volatility

This table provides an analysis of the change in abnormal stock return volatility from year t+1 to the second (t+2) and third (t+3) year following restatement. We measure abnormal volatility as the difference in the standard deviation of weekly stock returns between restatement firms and their corresponding matched firms. See Table 8 for the choice of matched firms. $Option% is the ratio of the dollar value of annual CEO option compensation to total annual CEO compensation. p-values are one-sided for the subsample with reduced $Option% and two-sided otherwise. The tests of means are based on t-statistics and the tests of medians are based on Wilcoxon signed tests.

	Predicted sign	t+2	t+3
Restatement firms with decrease in $Option%			
Mean	-	-0.011	-0.011
(p-value)		(0.043)	(0.061)
Median	-	-0.016	-0.014
(p-value)		(0.009)	(0.007)
N		108	103
Restatement firms with zero change or increase in $Option%			
Mean	?	-0.000	-0.004
(p-value)		(0.958)	(0.464)
Median	?	0.001	-0.005
(p-value)		(0.857)	(0.373)
N		146	141