



The impact of performance-based compensation on misreporting[☆]

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Abstract

This paper examines the effect of CEO compensation contracts on misreporting. We find that the sensitivity of the CEO's option portfolio to stock price is significantly positively related to the propensity to misreport. We do not find that the sensitivity of other components of CEO compensation, i.e., equity, restricted stock, long-term incentive payouts, and salary plus bonus have any significant impact on the propensity to misreport. Relative to other components of compensation, stock options are associated with stronger incentives to

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misreport because convexity in CEO wealth introduced by stock options limits the downside risk on detection of the misreporting.

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1. Introduction

In September 1998, Arthur Levitt, the then chairman of the Securities and Exchange Commission, remarked that the desire of executives to increase the value of their stock options gave them an incentive to manipulate their accounting numbers (Levitt, 1998). Back in 1997, when large option grants were becoming more prevalent, L. Dennis Kozlowski, former CEO of Tyco, characterized options as a “free ride... a way to earn megabucks in a bull market with a hot company.”¹ Is the earnings management referred to by Levitt motivated by firms that are trying to look like a “hot company” to earn “megabucks” during a bull market? Does the recent increase in the number of accounting restatements coinciding with the increase in the use of stock options serve as evidence of the concerns put forward by these men?

This paper examines whether and how management’s incentives, through their compensation contracts, affect the likelihood of engaging in unusual accounting practices that result in a restatement of financial statements. If aggressive accounting practices affect stock prices, then managers with equity-linked compensation might have an incentive to maximize their wealth through accounting choices. Given the increased linkage between a manager’s compensation and stock price, it is important to examine the relationship between compensation contracts and accounting choices.

We compare S&P 1,500 firms that announce a restatement of their financial statements over the period 1995 to 2002 with those firms that do not restate. Our sample of restating firms includes firms that restated because their original financial statements were not in accordance with Generally Accepted Accounting Principles (GAAP). We measure the sensitivity of all components of CEO compensation to firm performance and examine the effect of this sensitivity on the incentives to adopt aggressive accounting practices that result in a restatement.

In particular, we are interested in the effect of stock options on the adoption of aggressive accounting practices. Option compensation makes CEO wealth a convex function of stock price. Consequently, the CEO benefits from an increase in the stock price associated with aggressive accounting. However, the loss to CEO wealth in the event of a decline in stock price is limited. Management is rewarded in good times, but not penalized as much in bad times. We measure option sensitivity as the change in the value of stock options held resulting from a 1% change in firm value. In our

¹Wall Street Journal (1997), Executive Pay (A Special Report)- View From the Top: A CEO discusses his unusual pay package with a shareholder activist, by J. Lublin, April 10, 1997.

sample of 266 restated firm-years and approximately 8,000 nonrestated firm-years, we find strong evidence that option sensitivity is positively associated with misreporting. The greater is the sensitivity of CEO wealth to stock price arising from the CEO's option holdings, the greater is the propensity to misreport. Further, we find significant evidence that the greater the convexity of CEO wealth to stock price, the greater is the propensity to misreport. The evidence is consistent with the hypothesis that incentives from options encourage aggressive accounting practices that result in a restatement.

Like stock options, equity and restricted stock also tie CEO wealth to stock price. Equity and restricted stock might also generate incentives to misreport. However, in contrast to options, the payoff from equity and restricted stock has a symmetric relation to stock price, thereby exposing the CEO to price declines associated with the announcement of a restatement unless the CEO unwinds his equity and restricted stock holdings prior to the restatement. The vesting requirements associated with restricted stock and the possible loss of control benefits associated with sale of equity might limit the desire and ability of CEOs to unwind their holdings of equity and restricted stock. This suggests that equity and restricted stock expose the CEO to price declines and therefore may not be associated with a higher propensity to misreport. In line with this conjecture, we find no evidence that incentives from equity and restricted stock are associated with misreporting. Although equity and restricted stock holdings potentially bear the costs of misreporting, there is no evidence that the costs are large enough to mitigate the positive effect of stock options on misreporting.

Long-term incentive plans make CEO wealth a function of longer-term firm value. This reduces the incentives of CEOs to misreport to boost short-term stock prices. Consistent with this expectation, we find no evidence that long-term incentive payouts are associated with a propensity to misreport. The final component of CEO compensation that we examine is the cash component, i.e., salary plus bonus. Increased bonus payments associated with higher earnings are also likely to encourage CEOs to misreport. However, we find no evidence that an increase in salary plus bonus is a significant motivation for misreporting.

We collect data on the magnitude of the restatement, i.e., the effect of the restatement on net income. We find a positive significant association between option sensitivity and the magnitude of the restatement. Higher incentives from stock options are not only associated with a higher propensity to misreport but are also associated with higher magnitudes of misreporting. We continue to find no evidence that incentives from other components of CEO compensation are related to the magnitude of the restatement.

We also examine and control for other firm characteristics that might be associated with misreporting. We find that restating firms are somewhat larger than nonrestating firms. Further, restating firm-years are associated with higher leverage in comparison to nonrestating firm-years. There is no significant difference between restating firm-years and nonrestating firm-years in growth opportunities, research intensity, capital expenditures, and external finance in our multivariate analysis.

The firm's environment might affect the propensity to misreport. Bolton et al. (2003) argue that managers are more likely to use aggressive accounting in speculative periods associated with higher market valuations. We find weak evidence in support of this. Misreporting is more likely in periods in which the mean industry market-to-book ratio is high. However, we do not find that investor optimism, proxied by long-term analyst forecasts, is related to the incidence of misreporting.

Bebchuk et al. (2002) argue that options enable management to extract rents in the form of excessive compensation. This rent extraction is achieved when CEOs taking advantage of information asymmetry are able to pool with CEOs exercising to achieve liquidity or diversification objectives. A consequence of this camouflage is that the market underreacts to the negative information in CEO option exercises during periods of alleged misreporting. Consistent with this argument we find that large option exercises in periods of alleged misreporting are associated with a greater market reaction at the time of the announcement.

The positive effect of incentives from stock options on the propensity to misreport has important implications for the design of executive compensation plans. In the prior literature, Jensen and Meckling (1976) and Smith and Stulz (1985) show theoretically that a greater link between CEO compensation and firm performance is associated with better incentive alignment and higher firm values. This suggests that some option holdings may have a positive effect on firm value. However, the use of stock options beyond some "optimal" level might be associated with an increase in the incentives for misreporting. In other words, "excessive" option usage should be related to misreporting. We find some evidence that restating firm-years are significantly associated with "excessive" option sensitivity.

The rest of the paper is organized as follows: Section 2 reviews related literature, Section 3 develops our hypotheses, Section 4 discusses the data and its characteristics, Section 5 describes the measurement of key variables, Section 6 presents the empirical results, and Section 7 concludes.

2. Literature review

Jensen and Meckling (1976) analyze the conflicts between managers and shareholders and show that to reduce these agency costs a manager's compensation should be linked to shareholder wealth. Equity-linked compensation is a natural way to achieve this end. Smith and Stulz (1985) assert that stock options may be used to mitigate the effects of managerial risk aversion. Stock options make a manager's compensation a convex function of firm value and induce management to take on positive net present value, risky projects. Thus, traditionally, options are viewed as an influential means to align the interests of managers and shareholders. Morgan and Poulsen (2001) find empirical evidence to support this positive effect of stock options on firm value. They document that the market reacts positively to the adoption of performance-sensitive compensation plans.

However, of late, the assumption that options are used solely to align the interests of management with those of shareholders has come under scrutiny. Bebchuk et al.

(2002) argue that options enable management to extract rents in the form of excessive compensation. Especially important to the ability of management to extract rents is their ability to camouflage this rent extraction. Bergstresser and Philippon (2002) model this camouflage as the pooling of managers taking advantage of information asymmetry with those that exercise stock options for liquidity reasons. Bebchuk and Bar-Gill (2003) make a similar point arguing that the ability of management to take advantage of information asymmetry depends on the amount of shares that managers may sell relative to the number of shares that management would be able to sell for liquidity or diversification purposes.

We add to the literature by exploring the potential effect of stock options on the incentives to adopt aggressive accounting practices. The market uses accounting information to infer firm prospects and value. Given the recent increased linkage between manager compensation and firm value, it is important to examine the relation between compensation and accounting choices, if any. Implicit in the argument that aggressive accounting can be used to affect stock price is the assumption that manipulative accounting affects the market. The significant average negative return around the announcement of a restatement suggests the market is not able to detect the “purposeful” use of accounting practices that lead to the restatement, *ex ante*. This makes restatements an ideal venue in which to examine the effect of the sensitivity of compensation (to stock price) on accounting choices. There are recent papers that empirically examine restatements. For instance, Richardson et al. (2003) examine the usefulness of accounting information in predicting restatements whereas Agarwal and Chadha (2005) examine the effect of board characteristics on the propensity to restate. However, these studies do not concentrate on CEO compensation.

There is mixed evidence that executives manage earnings and other performance benchmarks to maximize their performance-based compensation. Healy (1985) documents that executives manage accruals to maximize bonus payments. Dechow et al. (1995) find no evidence that earnings management, proxied by firms subject to Accounting and Auditing Enforcement Releases (AAERs), is associated with insider equity sales to capitalize on higher market valuations. In contrast, Beneish (1999) finds that managers are more likely to exercise their stock appreciation rights and to be net sellers of equity in periods of overstated earnings. However, Beneish (1999) and Dechow et al. (1995) focus on periods prior to 1993. As this period pre-dates the rapid rise in the use of stock options, these studies are unable to address the impact of stock options on accounting choices. In more recent work, Gao and Shrieves (2002) find that earnings management intensity is significantly and positively associated with the sensitivity of the CEO’s option portfolio to stock price. Although Gao and Shrieves (2002) attribute this relation to the manager’s attempt to exploit the nonlinearity in his option compensation payoff, they do not test for this empirically.

3. Hypotheses

Option holdings tie the CEO’s wealth to the firm’s stock price. The use of aggressive accounting practices that increase the stock price will positively affect the

value of the CEO's option holdings while limiting losses due to price declines related to the detection of misreporting. The greater the sensitivity of CEO wealth to stock price the greater is his incentive to misreport.

H1: CEOs with higher pay-for-performance incentives from stock options are more likely to adopt aggressive accounting practices associated with restatements.

Stock options usually have vesting requirements of three to five years. Since stock options are granted every year, at any given time CEOs have a portfolio of vested as well as unvested options. As vested options can be exercised during periods of alleged misreporting, they are more likely to be associated with aggressive accounting practices.

H2: Aggressive accounting is more likely when pay-for-performance incentives from vested options are high.

Further, we know that stock options make the CEO wealth a convex function of the stock price. The pay-for-performance incentive from stock options is not constant but rather increasing in firm value. When the convexity of CEO wealth is large, there are significant changes in the pay-for-performance incentives of stock options for a unit change in stock price. In this case, an increase in stock price associated with the use of aggressive accounting practices not only increases CEO wealth, but does so at an increasing rate.

H3: Aggressive accounting is more likely to occur when a small change in price causes a large change in pay-for-performance incentives or when convexity is greater.

Similar to options, other components of CEO compensation such as equity, restricted stock, and long-term incentive payments (LTIPs) also tie a manager's wealth to firm performance. The asymmetric payoff structure of stock options mitigates the negative effect of a stock price decline on CEO wealth. In contrast, other components of compensation, such as stock and restricted stock, have a symmetric payoff structure and expose the CEO to stock price declines. Equity and restricted stock bear the cost of misreporting unless the CEO is able to sell before the price decline associated with detection. Further, unwinding equity and restricted stock may be more difficult than unwinding option positions. Large equity stakes are likely to generate control benefits. Restricted stock usually has three-to-five year vesting requirements and may also have several other restrictions on sale. LTIP payouts lengthen a manager's time horizon by making his wealth a function of longer-term firm value. This effectively increases the manager's time horizon and reduces his desire to cash out while market valuations are high (Shleifer and Vishny, 2003).

Consequently, equity, restricted stock and LTIPs should not be associated with higher incentives to misreport. Potential losses to large equity, restricted stock, and LTIP holdings may also counter the gains to option holdings from misreporting. A higher incidence of these components of compensation may mitigate the positive effect of stock option sensitivity on misreporting. This leads to the following hypothesis:

H4: Equity holdings, restricted stock, and long-term incentive payouts (LTIPs) are not associated with aggressive accounting practices. Large holdings of equity, restricted stock, and LTIPs might mitigate the positive effect of stock options on the incentive to misreport.

The level of bonus payments is usually linked to reported earnings and other accounting-based performance measures (Sloan, 1993). Healy (1985) documents that executives manage accruals to maximize their bonus payments. CEOs of firms, in which the sensitivity of salary plus bonus to reported firm performance is high will therefore have a greater incentive to misreport.

H5: Higher sensitivity of bonus payouts to firm performance should be associated with a greater incentive to misreport.

Bolton et al. (2003) and Bebchuk and Bar-Gill (2003) argue that misreporting is more likely in periods characterized by investor optimism. Bolton et al. (2003) show that the share price reflects not just the fundamental value of the firm, but also the “option” to sell the shares to overoptimistic investors. To maximize the value of this option, initial shareholders with short-term horizons will incentivize management to maximize the short-term stock price, especially in periods characterized by investor optimism. Bolton et. al argue that shareholders give short-term incentives to management by granting stock options that are easier to sell and that allow management to also gain from selling to overoptimistic investors. Bebchuk and Bar-Gill (2003) argue that in speculative periods the market puts greater weight on future growth prospects. In these periods management may have an incentive to misreport to fuel market expectations of future growth. This implies that the propensity to misreport is a function of the firm’s environment.

H6: Aggressive accounting is more likely to occur in speculative periods, or in periods with higher market valuations.

The prior literature documents that sales and purchases by insiders convey inside information to the markets and are associated with changes in market price (see, e.g. Seyhun, 1986). A CEO who exercises options during the period of alleged manipulation is able to camouflage his inside information by pooling with managers who are exercising for liquidity reasons (Bergstresser and Phillippon, 2002; Bebchuk and Bar-Gill, 2003). Because the markets do not fully incorporate the information in inside exercises during the alleged manipulation period, this information is likely to be incorporated at the time of the restatement announcement. The larger the option exercises in the period of alleged misreporting, the more negative will be the market reaction to the restatement announcement.

H7: The market reaction to the announcement of a restatement is negatively related to the option exercise activity of managers in periods with alleged misreporting.

In examining the effect of managerial incentives on the adoption of aggressive accounting practices, we focus on CEO incentives as opposed to the incentives of nonCEO executives. CEO compensation is likely to be a central issue because aggressive accounting practices would not be adopted without the explicit or implicit consent of the CEO.² Further, relative to other executives, CEOs hold more of their compensation in the form of performance-based compensation.

²Wall Street Journal, Why Boardroom Bad Guys Have Now Emerged en Masse. by D. Wessel, June 20, 2002.

Options are of particular interest because they are especially responsible for the increase in the sensitivity of CEO wealth to firm performance (Hall and Liebman, 1998).

4. Data and methodology

The sample consists of firms with data on the ExecuComp database that announce a restatement to their financial statements over the period 1995–2001. ExecuComp covers the S&P small-cap (600), mid-cap (400), and large-cap (500) indices. The sample consists of announced restatements that are due to accounting irregularities resulting in material misstatements of financial reports. Though firms could restate their financial statements due to changes in accounting practices, merger and acquisitions, stock splits, and isolated errors, they are included in our sample only if the original financial statements were not in accordance with GAAP.

This list of firms that restate their financial statements due to accounting irregularities was compiled by The General Accounting Office (GAO) for a report to the Chairman of the Committee on Banking, Housing, and Urban Affairs of the U.S. Senate, titled “Financial Statement Restatements: Trends, Market Impacts, Regulatory Response, and Remaining Challenges.” GAO identified 919 announcements of accounting restatements by 845 firms over the period January 1997 to June 2002. These announcements were identified by the GAO through a Lexus-Nexus search with variations of the word “restate”. We add to the GAO list observations from a Lexis-Nexis search that identifies S&P 1,500 firms that announce a restatement between 1995 and 1997, and through the end of 2002.

We match the list of restating firms to those covered in ExecuComp to obtain a sample of 215 restating firms. Conditioning on the availability of firm data in ExecuComp is likely to lead to the inclusion of firms larger than the average restating firm. However, these restatements are more likely to concern policy makers and investors. Moreover, recent studies indicate that the size of the average restating firm has increased over time (Richardson et al., 2003; GAO, 2002). We exclude financial firms (SIC 60-69) due to the difficulty in interpreting variables such as leverage and market-to-book that are used as controls.

By including firms that restated due to accounting irregularities, the sample attempts to capture restatements resulting from purposeful, aggressive accounting choices. The significant market reactions to the restatement announcements support the fact that the restatements are due to purposeful accounting practices. Restatements within the confines of GAAP are not associated with significant market reactions (Palmrose et al., 2004). The mean (median) cumulative abnormal return (CAR) from -5 to +5 days around the announcements is -10% (-5%) (see Table 8). These market reactions are in line with the mean CAR from day -1 to +1 of -10% reported by the GAO (2002) for their entire sample. Further, we find that 38 of the 215 restating firms were under formal SEC investigation and subject to AAERs. Since the sample includes firms that announced a restatement as late as the end of 2002, this list of firms that were subject to SEC enforcement action is

conservative as the SEC could still decide to charge more firms. This provides further support that our sample of restating firms consists of firms with purposeful accounting choices. The inclusion of the magnitude of restatement will also control for those restatements that did not have a significant impact.

4.1. *Summary statistics*

Table 1 presents summary statistics for our sample of restating firms. Panel A reports the distribution of the 215 restatement announcements from 1995 through 2002. There is an increase in the number of restatements over time. This finding is consistent with the general increase in the number of restatements over time reported by both Richardson et al. (2003) and GAO (2002).

For our sample of restating firms, we collect data on the fiscal years and quarters that were misreported and subsequently restated. For our sample of 215 restating firms, 266 firm-years were restated. The number of restated years is greater than the number of announcements because some firms restate multiple years. Panel B of Table 1 reports the distribution of these restating firm-years. For our sample, fiscal years 1998, 1999, and 2000 are the most likely to be misreported and restated.

Panel C reports the distribution of restating firms by the reason of restatement. Restatements due to revenue recognition usually involve reporting revenues sooner or later than allowed under GAAP rules or reporting fictitious revenues (approximately 40%). Restatements due to improper accounting of goodwill, inventory valuation, and asset write-downs are classified under restructuring, assets, and inventory, and account for 16% of the restatements. Cost or expense-related reasons for restatements usually involve improper cost recognition or other cost related improprieties (12% of the sample).³

The median sample firm restates one year of financial statements. The time elapsed from the misreported period to the announcement of the restatement is 1.08 years for the median firm (see Panel D of Table 1). We also collect data on the magnitude of the restatement, i.e., the effect of the restatement on net income.⁴ The average effect of the restatement on net income is a reduction of \$101.32 million (see Panel E). The median, however, is much lower, at \$10.5 million. If a firm restated more than one year, the effect on net income is the average annual effect on earnings over the entire misreported period. Approximately, 93% of the restatements involved overstating

³Other reasons include acquisition and merger-related restatements (involving the use of an incorrect method to account for the merger/acquisition or misreporting the related gains/losses), and in-process research and development-related restatements (involving the use of incorrect methodologies to value in-process research and development at the time of acquisition). Restatements due to reclassifications, related party transactions, and improper accounting of derivatives are classified in the category “other”.

⁴The data is collected from the restatement announcement when available. For firms that do not announce the impact of the restatement on income, the data is obtained from the amended 10-ks filed with the SEC. Data on the size of the restatement could not be obtained for some firms due to several reasons. First, some firms did not report the impact of the restatement on income. Some firms included events (such as restructuring charges, one-time charges) other than restatements in the amended earnings, which makes it difficult to isolate the impact of the restatement on income. Some firms did not file an amended 10-k. We also exclude outlier observations for which the size of the restatement was more than 200% of restated net income.

Table 1

Descriptive statistics for restating firms

Restating firms are firms that announce restating their financial statements over the period 1995–2002 due to accounting irregularities.

Panel A: Distribution of restating firms by announcement year

Announcement year	Number of announcements
1995	1
1996	4
1997	12
1998	16
1999	37
2000	33
2001	57
2002	55
Total	215

Panel B: Distribution of fiscal years that were restated

Fiscal year restated	Number of restatements
1994	3
1995	8
1996	17
1997	24
1998	51
1999	57
2000	64
2001	42
Total	266

Panel C: Reasons for restatement

Restatements due to revenue recognition usually involve reporting revenues sooner or later than allowed under GAAP rules, or reporting fictitious revenues. Restatements due to improper accounting of goodwill, inventory valuation, and asset write-downs are classified under restructuring, assets and inventory. Cost or expense-related reasons for restatements usually involve improper cost recognition or other cost-related improprieties. Acquisition and merger-related restatements involve the use of an incorrect method to account for the merger/acquisition or misreporting the related gains/losses. In-process research and development-related restatements involve the use of incorrect methodologies to value in-process research and development at the time of acquisition. All other restatements are under the category other.

Reasons for restatement	Number
Revenue recognition	84
Restructuring, assets or inventory	33
Cost or expense-related	26
Merger and acquisition	13
In-process R&D	11
Other	44

Table 1 (continued)

Panel D: Characteristics of Restatements

Time lapsed is the number of years between the first misreported year and the announcement year

	Number of years restated	Time lapsed
<i>Q1</i>	1.00	0.59
Mean	1.47	1.47
Median	1.00	1.08
<i>Q3</i>	2.00	2.40
<i>N</i>	215	215

Panel E: Size of restatements

Size of restatement is the average annual effect of the restatement on net income, in millions of dollars. Columns 2 and 3 display the average annual size of the restatement as a percentage of absolute value of restated net income and sales, respectively. Columns 4, 5, and 6 report statistics for the subsample of firms that overstated their earnings

	Size of restatement	Size/ net income (%)	Size/ sales (%)	Size of restatement (overstated earning)	Size/ Net income (%) (overstated earning)	Size/sales (%) (overstated earnings)
<i>Q1</i>	2.70	3.75	0.14	4.3	4.25	0.22
Mean	101.32	26.37	2.75	117.1	27.88	3.85
Median	10.50	13.62	0.48	13.8	15.57	0.59
<i>Q3</i>	43.00	38.63	1.70	47.0	38.84	2.05
<i>N</i>	135	135	135	125	125	125

Panel F: Distribution of restating firms across industries

	Two-digit industry	Number		Two-digit industry	Number
Metal mining	10	4	Air transportation	45	3
Oil and gas extraction	13	6	Transportation services	47	2
Heavy construction	16	3	Electric and gas	48	4
Food products	20	7	Electric power	49	10
Textile mill products	22	1	Durable goods	50	6
Apparel	23	3	Nondurable goods	51	7
Paper products	26	3	General merchandise	53	6
Printing	27	1	Good stores	54	2
Chemicals	28	9	Accessory stores	56	7
Refining	29	2	Home furniture	57	3
Rubber and plastics	30	2	Eating and drinking places	58	1

Table 1 (continued)

Panel F: Distribution of restating firms across industries

	Two-digit industry	Number		Two-digit industry	Number
Primary metals	33	3	Retail stores	59	3
Fabric metal	34	3	Personal services	72	1
Computer equipment	35	23	Business services	73	38
Electrical equipment	36	16	Motion pictures	78	2
Automotives	37	6	Recreation	79	2
Meas. inst. photo	38	13	Health services	80	6
Transit and passenger trans	41	1	Educational services	87	3
Motor freight	42	1	Other	99	3

net income in the year of misreporting. The mean (median) effect on net income for restating firms that overstated net income is higher at \$117.1 (\$13.8) million. The size of the restatement is a nontrivial percentage of net income. For the average firm, the size of the restatement is 26.37% of the absolute value of restated net income, where restated net income is the sum of the net income originally reported and the effect of the restatement on net income. The median value is lower at 13.62% of restated net income. The size of the restatement is also a nontrivial percentage of sales. On average, the effect of the restatement on net income is 2.75% of annual sales.

Panel F displays the distribution of restating firms by two-digit SIC industry. There is a higher incidence of restating firms in two-digit SIC codes 35 (computer equipment), 36 (electrical equipment), 38 (measuring instruments photo), and 73 (business services).

4.2. Characteristics of restating firms

In this section, we examine the characteristics of restating firms. The prior literature suggests several firm characteristics that may be associated with aggressive accounting practices. As we are interested in the misreported years, we measure firm characteristics relative to the violation period, which we refer to as restating firm-years. Data for restating firm-years is as initially reported for the fiscal year, that is, we do not use the revised accounting numbers. Nonrestating firm-years include observations for all S&P 1,500 firms that do not restate over the period 1995 to 2002. It also includes nonmisreported years for firms that announce restatements over this time period. We compare restating firms to all S&P 1,500 firms that do not restate instead of a control group of firms matched by relevant characteristics. This is done because in logistic regressions, a matched control group approach would overstate the likelihood of restatement.

Firms with a greater need to access external capital markets are more likely to misreport in order to reduce the cost of external financing (see Dechow et al., 1995; Beneish, 1999; Richardson et al., 2003). We proxy for equity finance raised as the ratio of additional cash raised from issuance of common and preferred stock in the misreported year to total assets. The value of total assets is the average value over the misreported year and the year prior. Similarly, the proxy for long-term debt raised is the ratio of cash raised from issuance of long-term debt in the misreported year to total assets. The mean value of equity finance raised during restating firm-years is 0.043 and is significantly higher than the mean of 0.036 for nonrestating firm-years (see Table 2). The mean value of long-term debt finance raised during restating firm-years is 0.111, which is also higher than 0.097 for nonrestating firm-years. The median equity and long-term debt raised during restating firm-years are also higher than those for nonrestating firm-years. There appears to be some evidence that restating firms raise more external finance in misreported years, i.e., years with higher market valuations.

Firms that are close to violating debt covenants are more likely to engage in aggressive accounting practices to avoid the penalties associated with the violations. We follow Richardson et al., (2003) by examining leverage as a proxy for closeness to debt covenant violations or costs of financial distress. Leverage is the ratio of short-term and long-term debt in the misreported year to total assets. The mean (median) value of leverage for restating firm-years is 0.256 (0.258) and is significantly higher than the mean (median) value of 0.225 (0.223) for nonrestating firm-years. There is some evidence that firms might adopt aggressive accounting practices to reduce the costs of financial distress.

Restating firms are likely to differ from nonrestating firms in their growth opportunities. Povel et al. (2003) show that high-growth firms facing reduced growth opportunities are most likely to adopt aggressive accounting practices. We use two proxies for growth opportunities, namely, earnings-to-price ratio and market-to-book. There is no statistical difference in the market-to-book value of restating and nonrestating firm-years. However, the average earnings-to-price ratio for restating firm-years (0.067) is lower than that for nonrestating firm-years (0.087).

We use market capitalization of the firm in the misreported year to proxy for firm size. The median market value for restating firm-years is \$2,007 million and is significantly greater than the \$1,047 million for nonrestating firm-years. The means are not significantly different from each other, however. The restating firms in our sample are larger than those of Richardson et al. (2003). This difference likely reflects the fact that we condition the sample on ExecuComp coverage.

Both Dechow et al. (1996) and Richardson et al. (2003) find that misreported firm-years had higher accruals. We examine the use of discretionary accruals in restating firm-years versus nonrestating firm-years. We estimate discretionary current accruals using the methodology developed by Jones (1991) and modified by Dechow et al. (1995). Discretionary current accruals are the difference between current accruals and nondiscretionary or expected current accruals. To determine expected current accruals we regress current accruals on a constant and change in sales, with all variables normalized by total assets. This is a cross-sectional regression at the

Table 2
 Characteristics of restating and nonrestating firm-years
 Restating firm-years refers to misreported years of firms that announce restating their financial statements. Nonrestating firm years refers to years of firms that do not restate as well as to the nonmisreported years of restating firms. Market-to-book is the ratio of total assets minus the book value of equity plus the market value of equity to total assets. Leverage is ratio of short-term and long-term debt to total assets. Equity finance raised is additional cash raised from issuance of common and preferred stock normalized by average total assets. Average total assets is the average value of total assets over the misreported year and the year prior. Long-term debt raised is cash raised from issuance of long-term debt divided by average total assets. Market value is the number of shares outstanding multiplied by the price at fiscal year-end and is expressed in millions of dollars. Earnings price is net income from continuing operations divided by the market value. Discretionary current accruals are the deviation of current accruals from nondiscretionary or expected accruals (see Appendix A). CEO Tenure is the number of years served as CEO of the firm. Special items (Data 17) represents unusual or nonrecurring items. Significance levels are computed for the difference in mean (medians) using a *t*-test and Wilcoxon two-sided test. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Market-to-book	Leverage	Equity finance raised	Long-term debt raised	Market value	Earnings price	Discretionary accruals	CEO tenure	Special items/total assets
<i>Mean</i>									
Mean for restating firm-years	2.323	0.256	0.043	0.111	11115.71	0.067	0.004	6.80	-0.058
Mean for nonrestating firm-years	2.270	0.225	0.036	0.097	5638.47	0.087	-0.0017	6.92	-0.020
<i>p</i> -value (mean)	(0.712)	(0.003)***	(0.000)***	(0.281)	(0.345)	(0.090)*	(0.313)	(0.8)	(0.34)
<i>Median</i>									
Median for restating firm-years	1.651	0.258	0.009	0.049	2007.28	0.071	-0.0015	4	0.0
Median for nonrestating firm-years	1.634	0.223	0.007	0.035	1041.44	0.088	-0.0023	5	-0.0135
<i>p</i> -value (median)	(0.619)	(0.00)***	(0.056)*	(0.034)	(0.00)***	(0.00)***	(0.761)	(0.23)	(0.00)***
<i>N</i> for restating firm-years	253	252	244	239	266	253	252	229	235
<i>N</i> for nonrestating firm-years	8255	8247	7877	7777	8805	8255	8760	7321	7718

two-digit SIC level (see Defond and Jiambalvo, 1994; Teoh et al., 1998). Expected or non-discretionary accruals are the fitted value of current accruals while discretionary current accruals are the residuals from the above regression (see Appendix A for further details).

We find no difference in the discretionary accruals of restating firm-years and those of nonrestating firm-years. This is in contrast to higher accruals for restating firms documented by Richardson et al. (2003). The difference in results could be due to the difference in the construction of the sample. Richardson et al. (2003) study firms that restate over the period 1971–2000, though most of the restatements are in the nineties. Their nonrestating sample consists of all firms with data on Compustat over the period 1971 to 2000. Since restatements are not evenly spread out over time, this leads to a higher proportion of nonrestating firms in the early part of the sample. Part of the difference between restating and nonrestating firms documented by Richardson et al. (2003) may be due to time trends in the data.

We also examine whether the restatements are related to the use of special items. Special items include writing off in-process R&D, restructuring charges, and impairment of goodwill, among others. We find the median ratio of special items to total assets for restating firm-years is significantly higher than that for nonrestating firm-years. This suggests that some firms were using special items to manipulate earnings that eventually resulted in the restatement.

CEOs that are close to retirement with shorter horizons are likely to have higher incentives to adopt aggressive accounting practices for short-term gain. We use CEO tenure to proxy for how close the CEO is to retirement. The mean value of CEO tenure for restating firm-years is 6.8 years and is not significantly different from 6.92 years for nonrestating firm-years.

5. Measures of sensitivity of CEO compensation

In this section, we discuss the measures of pay-for-performance incentives of the various components of CEO compensation.

5.1. Option sensitivity

We measure the pay-for-performance sensitivity of stock options, which we refer to as option sensitivity, as the change in the value of stock options held for a percentage change in firm value. This measure, used by Core and Guay (2002), is obtained by multiplying the option delta by 1% of the stock price and the number of options held. Delta for options outstanding is the partial derivative of the option value with respect to stock price. Using the Black–Scholes model adjusted for dividend payouts (Black and Scholes, 1973; Merton, 1973) to value the options, option delta is given as $e^{-dT} \Phi(Z)$, where $Z = \frac{\ln(S/X) + T(r-d+0.5\sigma^2)}{\sigma\sqrt{T}}$. The stock price, S , is measured at fiscal year-end, and σ , volatility, is obtained from ExecuComp. Volatility is measured over the 60 months prior to the fiscal year in question. The risk free rate r is obtained from the Federal Reserve at St. Louis, and d , the natural

log of the dividend yield, is obtained from ExecuComp. The cumulative distribution function of the normal distribution is given by Φ . As ExecuComp does not offer details on previously granted options, we make assumptions about T , the time to maturity, and X , the exercise price. Time to maturity for unvested options is calculated as the time to maturity of the recent grant of options minus one year. The time to maturity of vested options is estimated as the time to maturity of unvested options minus three years. Exercise prices are calculated as the price at fiscal year-end minus the profit per option.⁵ The delta and the corresponding option sensitivity are estimated separately for newly granted options, vested options, and unvested options and are then summed to obtain total option sensitivity.

Our measure of option sensitivity is different from that used by Jensen and Murphy (1990) and Yermack (1995). Jensen and Murphy (1990) define option sensitivity as the change in the value of options held for a dollar change in firm value. Their measure is obtained by multiplying the option delta by the ratio of options outstanding to shares outstanding. Baker and Hall (1998) argue that the right measure of option sensitivity depends on the kind of activity under consideration. For activities in which the dollar impact does not depend on firm size, Jensen and Murphy (1990) provide the appropriate measure. For activities that affect the whole firm, Core and Guay's (2002) measure is appropriate. Since aggressive accounting practices affect the whole firm, we report all our results with Core and Guay's measure. However, to examine the robustness of our results, we also estimate our model with Jensen and Murphy's measure. We find that our results are qualitatively unchanged.

5.2. Sensitivity of restricted stock and equity holdings

Consistent with the measure of option sensitivity, sensitivity of restricted stock and equity holdings is defined as the change in the value of these holdings for a 1% change in firm value. For the purpose of this calculation we assume that the delta of both restricted stock and equity is one, i.e., there is a one-to-one change in their value for a change in stock price. The sensitivity of restricted stock (equity) is obtained by multiplying the number of shares of restricted stock (equity) held by 1% of the stock price.

5.3. Long-term incentive plans

We measure the effect of long-term incentive plans (LTIPs) as the payout from long-term incentive plans divided by total compensation including option grants. We are constrained in using the payouts on LTIPs because ExecuComp does not provide information on the details of the payout, but reports only its value. LTIPs are usually based on a three-to-five-year moving average of firm performance.

⁵Profit per option is calculated as the realizable value of options divided by the number of options at fiscal year-end. The realizable value for vested and unvested options is obtained from ExecuComp.

5.4. Sensitivity of salary and bonus payments

We estimate the sensitivity of salary plus bonus to earnings for firm i in year t at the two-digit SIC industry level.⁶ A cross-sectional regression of changes in salary plus bonus on changes in net income is estimated at time t for all firms in the same two-digit SIC as firm i (See Sloan, 1993 for further details). The estimated coefficient of change in net income in the above regression is the proxy for the salary plus bonus sensitivity at time t for firm i . This measure of salary plus bonus sensitivity is estimated at the industry level and is the same for all firms in the same industry for a given year.

5.5. Convexity of Stock Options

A feature that sets options apart from other forms of equity compensation is the convexity of the options. Convexity is measured as the second derivative of option value to stock price. This measure of convexity, gamma, captures the rate of change of option sensitivity (delta) to stock price. Based on the Black Scholes model of option valuation, it is given as

$$\Gamma = \frac{\partial^2 V}{\partial S^2} = \frac{e^{-dT} \phi(Z)}{S\sigma\sqrt{T}},$$

where S , Z , T , d , and σ are as defined above in the estimation of delta. Here, ϕ is the probability distribution function of the normal distribution. As with the estimation of option sensitivity, we estimate gamma separately for vested, unvested, and new option grants and aggregate it to obtain the total gamma of the portfolio of options. Gamma is largest when options are at-the-money. Aggressive actions may be more likely when the value of an option is more convex in stock price. Jensen (2001) explains that when targets are set for compensation, management has the incentive to meet that hurdle, even at the expense of the long-term value of the company.

6. Empirical results

We begin by reporting summary statistics of the sensitivity of components of CEO compensation for restating and nonrestating firm-years (Table 3). The mean (median) value of option sensitivity for misreported firm-years is \$567,802 (\$132,367). On average, the value of the stock options held by the CEO changes by \$567,802 for a 1% change in stock price. This is significantly higher, at the 1% level, than the mean (median) value of \$263,595 (\$79,998) for nonrestating firm-years. There appears to be significant evidence, in univariate tests, that CEOs have larger incentives from stock options in misreported years. Along with the sensitivity of options, we also examine whether restating firm-years are associated with a higher fraction of option-based compensation. We use the value of options granted and

⁶We thank an anonymous referee for suggesting this test.

Table 3
Summary Statistics for Sensitivity of CEO Compensation

Restating firm-years refer to misreported years of firms that announce restating their financial statements. Nonrestating firm years refer to years of firms that do not restate as well as to the non-misreported years of restating firms. The table presents the characteristics of CEO compensation for restating and nonrestating firm-years. Option sensitivity is the dollar change in the value of stock options held by the CEO for a 1% change in stock price and is reported in thousands of dollars. Equity and restricted stock sensitivity is the dollar change in the value of the equity and restricted stock held by the CEO for a 1% change in stock price. It is also reported in thousands of dollars. LTIP is the long-term incentive payout. Salary and bonus sensitivity is a measure of the change in salary and bonus payments for a thousand dollar change in earnings. Stock option exercise is the ratio of options exercised by the CEO to outstanding exercisable options. Option compensation/ Total compensation is the ratio of the value of the options granted and exercised to total compensation. Total compensation is the sum of salary, bonus, equity, and option compensation. Significance levels are computed for the difference in mean (medians) using a *t*-test and Wilcoxon two-sided test. ***, **, * represent significance at the 1%, 5%, and 10% significance levels, respectively.

	Option sensitivity (000's)	Equity sensitivity (000's)	Restricted stock sensitivity (000s)	LTIP/total compensation	Salary and bonus sensitivity	Stock option exercises (%)	Option compensation/ total compensation	Total compensation
<i>Mean</i>								
Restating firm-years	567.802	745.352	23.012	0.030	0.357	38.75	0.567	9394.20
Nonrestating firm-years	263.595	586.526	26.872	0.025	0.442	22.66	0.463	4342.36
<i>P-value</i>	(0.0)***	(0.710)	(0.942)	(0.388)	(0.019)**	(0.03)**	(0.42)	(0.00)***
<i>Median</i>								
Restating firm-years	132.367	62.274	0	0	0.238	0	0.608	3315.47
Nonrestating firm-years	79.998	43.168	0	0	0.231	0	0.462	1913.73
<i>P-value</i>	(0.0)***	(0.047)**	(0.000)***	(0.288)	(0.17)	(0.49)	(0.0001)***	(0.00)***
<i>Q1</i>								
Restating firm-years	50.076	12.067	0	0	0.222	0	0.325	1004.55
Nonrestating firm-years	29.123	9.97	0	0	0.318	0	0.223	1730.62
<i>Q3</i>								
Restating firm-years	535.659	258.671	12.773	0	0.617	12.1	0.853	4007.92
Nonrestating firm-years	213.902	168.345	1.653	0	0.612	17.7	0.719	8428.54

exercised to total compensation to capture the fraction of total compensation that is option-based. The mean (median) percentage of total compensation that is option-based is 56.7% (60.7%) for restating firm-years relative to 46.3% (46.2%) for nonrestating firm-years. Both the level of CEO wealth, as well as the expected change in his wealth are higher for restating firm-years than for nonrestating firm-years.

The mean incentive from equity holdings for restating firm-years is \$745,352. Although this is higher than the mean incentives of \$586,526 for nonrestating firm-years, the difference is not statistically significant. The median incentive from equity for restating firm-years is \$62,274 and is much lower than the mean value. The mean (median) value of sensitivity from restricted stocks for restating firm-years is \$23,012 (\$0). This is not significantly different from the mean (median) value of \$26,872 (\$0) for nonrestating firm-years. Similarly, we find no difference between restating and nonrestating firm-years in LTIP payouts. Salary plus bonus sensitivity for restating firm-years is 0.357 and is actually lower than the estimated sensitivity of salary plus bonus for nonrestating firm-years. However, there is no difference in the median sensitivity of salary plus bonus.⁷

Finally, we examine whether CEOs have higher exercises in misreported years to capitalize on the higher market capitalization in these years. To capture CEO exercise activity we examine the ratio of CEO option exercises to exercisable outstanding options. CEOs exercise 38.75% of their outstanding exercisable options in restated firm-years. This is significantly higher than 22.6% by CEOs of nonrestating firm-years. However, there is no difference in exercises at the median. Total compensation is also significantly higher for restating firm-years in comparison to nonrestating firm-years.

Table 4 reports the results of a logistic regression estimating the effect of the sensitivity of the components of CEO compensation on the incidence of misreporting. The dependent variable is the log of option sensitivity as in Core and Guay (1999), because this measure increases at a decreasing rate with firm size. Column 1 shows that the coefficient of option sensitivity is positive and significant at the 1% level. These results support Hypothesis 1 that restated years are associated with higher incentives from stock options.

As discussed in Hypothesis 4, equity and restricted stock holdings are more likely to expose the CEO to price declines at the announcement of the restatement and should be associated with no incentives to misreport. In support of this hypothesis we do not find any evidence that incentives from equity and restricted stock are associated with greater incentives to misreport. We also do not find any evidence that LTIP is associated with greater incentives to misreport.

Hypothesis 5 states that salary plus bonus incentives should be associated with higher incentives to misreport. However, we do not find that salary plus bonus significantly affect the adoption of aggressive accounting practices. This result is in contrast to the finding of Healy (1985) who reports that executives manage accruals

⁷Salary plus bonus sensitivity for restating and nonrestating firm years appear to be different at the 25th percentile though not at the 75th percentile. This suggests that some restating firm-years have low values of bonus sensitivity, explaining the lower mean value for the restating firm-years.

Table 4

Logit regressions for model of misreporting

The dependent variable is one if the fiscal year was restated and zero otherwise. The sample consists of S&P 1,500 firms over the period 1992–2002. Option sensitivity is the change in option value for a 1% change in stock price. Sensitivity of vested (unvested) options is similarly defined. The sensitivity of equity and restricted stock is the change in the value of these instruments for 1% change in stock price. LTIP payouts are normalized by total compensation. Salary-bonus sensitivity is the change in cash compensation for a change in earnings. Market-to-book is total assets – book value of equity + market value of equity/total assets. Leverage is short-term debt+long term debt/ total assets. The industry dummy is set to one if the firm is in two-digit SIC industries 35, 36, 38, and 73. The predicted signs are in parentheses. The regressions comprise 243 restated firm-years. ***, **, * represent significance at the 1%, 5%, and 10% significance levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Option sensitivity (+)	0.291 (0.000)***	0.177 (0.000)***	0.177 (0.000)***	0.178 (0.000)***	0.178 (0.000)***	
Sensitivity of vested options (+)						0.115 (0.002)***
Sensitivity of unvested options (+)						0.074 (0.137)
Sensitivity of restricted stock (not significant or –)	–0.000 (0.137)	–0.000 (0.127)	–0.000 (0.127)	–0.000 (0.214)	–0.000 (0.124)	–0.000 (0.125)
Long-term incentive payouts (LTIP) (not significant or –)	0.517 (0.484)	0.823 (0.280)	0.820 (0.556)	0.835 (0.273)	0.806 (0.293)	0.785 (0.308)
Sensitivity of equity (not significant or –)	–0.000 (0.255)	–0.000 (0.238)	–0.000 (0.238)	–0.000 (0.235)	–0.000 (0.267)	–0.000 (0.237)
Salary–bonus sensitivity (+)	–0.599 (0.292)	–0.223 (0.694)	–0.223 (0.694)	–0.223 (0.695)	–0.217 (0.702)	–0.249 (0.662)
High equity ownership dummy* option incentives (–)					–0.011 (0.764)	
High restricted stock holding dummy* option incentives (–)				–0.017 (0.817)		
Large LTIP dummy* option incentives (–)			0.000 (0.997)			
Market value of equity t_{-1} (?)		0.000 (0.053)*	0.000 (0.054)*	0.000 (0.054)*	0.000 (0.058)*	0.000 (0.070)*
Market-to-book $_{t-1}$ (+)		–0.006 (0.822)	–0.006 (0.822)	–0.006 (0.818)	–0.006 (0.827)	–0.003 (0.916)
Leverage $_{t-1}$ (+)		0.996 (0.015)**	0.996 (0.015)**	0.996 (0.015)**	0.991 (0.016)**	0.987 (0.017)**
Industry dummy (+)		0.457 (0.003)***	0.457 (0.003)***	0.457 (0.003)***	0.457 (0.003)***	0.467 (0.002)***
Inclusion of year dummies	No	Yes	Yes	Yes	Yes	Yes
Observations	8208	8208	8208	8208	8208	8208
McFadden’s pseudo R^2	0.017	0.053	0.0689	0.052	0.052	0.054

to maximize bonus payments. The difference in results might be due to the use of restatements to proxy for earnings management versus the use of discretionary accruals within the confines of GAAP. It might also be due to the declining share of salary plus bonus in overall CEO incentives over this time period.⁸

In Column 2, we control for industry and time trends that might explain the above results. We include an industry dummy that takes the value of one if the firm belongs to two-digit SIC industries 35, 36, 38, and 73. As can be seen in Panel F of Table 1, these industries are highly represented in the restating sample. This industry dummy controls for industry characteristics that may be correlated with the incidence of aggressive accounting practices. We also include dummies for the years 1995 through 2001. Further, we include lagged market value of equity to control for firm size, lagged market-to-book to control for growth opportunities and lagged firm leverage. The coefficient on the industry dummy is positive and significant suggesting that industry characteristics explain the propensity to misreport. Consistent with the univariate evidence, we find that larger firms are more likely to restate (the coefficient of the market value of equity is positive and significant). We also find that highly levered firms, with larger expected costs of financial distress, are more likely to restate. However, there is no evidence that growth opportunities as proxied by market-to-book explain misreporting. After controlling for the above factors there still is a significant positive effect of option sensitivity on misreporting. There is no significant effect of other components of compensation on the propensity to misreport. The effect of option sensitivity on the probability of misreporting is not only statistically significant, but also economically significant. At the mean, a 3.52% increase in option sensitivity increases the probability of restating by 0.35%.

Next, we test for whether large holdings of equity, restricted stock, and LTIPs influence the effect of option sensitivity on misreporting. As stated in Hypothesis 4, large equity, restricted stock, and LTIP payouts may mitigate the positive effect of option sensitivity on misreporting. To capture large equity holdings we create a dummy that takes the value of one when the percentage of the firm owned by the CEO is above the median value for the sample. If large equity holdings mitigate the effect of option sensitivity then the coefficient of the interaction of the large equity holding dummy with option sensitivity will be negative and significant. We find that the coefficient is negative but not statistically significant (Table 4, Model 5). Similarly, we create a dummy for large holdings of restricted stock. This dummy takes the value of one if the CEO percentage ownership in restricted stock is above the median value for the sample. The median value is calculated by including all firm-years with nonzero restricted stock holdings. The coefficient of the interaction of the high restricted stock dummy and option sensitivity is negative as expected, but again is not significant. Finally, we create a dummy for large LTIP that takes the value of one if the LTIP is higher than the median value for the sample. The coefficient of the interaction of the large LTIP dummy and option sensitivity is again not significant. Though equity, restricted stock, and LTIPs do not generate any

⁸The share of cash compensation in overall compensation declined from 69.4% in 1992 to 48.3% in 2001 for all firms with data in ExecuComp.

incentives for misreporting, there is little evidence to suggest that they mitigate the positive effect of option sensitivity on misreporting.

Finally, we examine whether vested options are associated with greater incentives for misreporting as discussed in Hypothesis 2. If managers who misreport are focusing on the short-term, then vested options should be relatively more important in influencing the adoption of aggressive accounting practices. The coefficient of vested option sensitivity is positive and significant. The coefficient of unvested options is positive though it is significant only at the 14% level. As expected, we find that vested options are associated with higher incentives for misreporting than unvested options.

6.1. *Further tests and robustness checks*

We test for the robustness of our results by the inclusion of other variables, as well as the use of different empirical proxies (Table 5). First, we examine the need for raising external finance at lower costs as a motivation for adopting aggressive accounting practices. We include in our estimation total external finance raised by the firm. This is the ratio of cash raised from the issuance of common stock, preferred stock, and long-term debt to total assets. We do not find any evidence that higher external finance is a motivation for earnings management in a multivariate framework (Table 5, Model 1).

As discussed earlier, restating firms have greater representation in two-digit SIC codes 35, 36, 38, and 73. An industry dummy for these SICs is significant in explaining misreporting. We explore industry characteristics common to these two-digit SICs that might explain the higher representation of restating firms. In particular, we examine whether greater information asymmetry in these industries might explain misreporting. As it is harder to verify that a service or other intangible asset has been provided than it is to verify a tangible asset, we include the ratio of the sum of research and development expenses and advertising expenses to total assets. We find no evidence that research intensity explains the higher representation of restating firms in these industries (Table 5, Model 2). However, as R&D and advertising are expensed, they do not lead to the creation of misvalued assets. We also examine investing activities from the statement of cash flows scaled by total assets, as these are costs that the firm capitalized.⁹ The estimated coefficient of investing activities, however, is not significant.

Hypothesis 6 states that misreporting is more likely to occur in speculative periods or periods with higher market valuations. We use two proxies for the firm's environment. First, we include the average market-to-book ratio for the firm's industry-year. The firm's industry consists of all S&P 1,500 firms in the same two-digit SIC. Second, we include analyst forecasts of long-term industry growth rates. The long-term industry growth forecast is the average value of long-term growth

⁹For example, Worldcom manipulated its long-term investment accruals by capitalizing periodic expenses, which subsequently resulted in a large restatement. We thank an anonymous referee for pointing this out.

Table 5

Logit regressions: robustness tests and other specifications

The dependent variable is one if the fiscal year was restated, and zero otherwise. The sample consists of S&P 1500 firms from 1992–2002. Option sensitivity is the change in option value for a 1% change in stock price. The sensitivity of equity and restricted stock is the change in the value of these instruments for 1% change in stock price. LTIP payouts have been normalized by total compensation. Salary-bonus sensitivity is the change in cash compensation for a change in earnings. Market-to-book is total assets – book value of equity + market value of equity / total assets. Leverage is short-term debt + long-term debt / total assets. The industry dummy is one if the firm's two-digit SIC is 35, 36, 38, and 73. Finance raised is the cash raised from the issuance of common stock, preferred stock, and long-term debt scaled by total assets. CEO tenure is the number of years as CEO of the firm. Abnormal option and equity incentives are measured as deviations from the optimal. ***, **, * represent significance at the 1%, 5%, and 10% significance levels, respectively.

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Option sensitivity (+)	0.173 (0.001)***	0.189 (0.000)***	0.191 (0.0)***	0.248 (0.000)***	0.264 (0.000)***	0.176 (0.000)***	0.15 (0.029)**		
Abnormal option sensitivity (+)	–0.000	–0.000	–0.000	–0.000	0.000	–0.000	–0.000	0.192 (0.008)***	0.120 (0.113)
Sensitivity of restricted stock (insignificant or –)	(0.152) 0.917	(0.109) 0.725	(0.106) 0.718	(0.172) 0.382	(0.501) 0.433	(0.105) 0.389	(0.088) 0.392	(0.679) –0.000	(0.523) –0.000
Long term incentive payouts (insignificant or –)	(0.239) –0.000	(0.347) –0.000	(0.353) –0.000	(0.616) –0.000	(0.570) –0.000	(0.652) –0.000	(0.649) –0.000	(0.416) 0.529	(0.330) 0.922
Sensitivity of equity (insignificant or –)	(0.111)	(0.259)	(0.25)	(0.279)	(0.274)	(0.24)	(0.168)	(0.525) –0.085	(0.264) 0.443
Abnormal equity sensitivity (–)	–0.158 (0.783)	–0.722 (0.210)	–0.703 (0.23)	–0.470 (0.408)	–0.638 (0.461)	–0.001 (0.998)	0.01 (0.986)		(0.875) (0.383)
Salary-bonus sensitivity (+)	0.000 (0.047)**	0.000 (0.109)	0.000 (0.132)	0.000 (0.046)**	0.000 (0.080)*	0.00 (0.068)*	0.000 (0.06)*	0.000 (0.001)***	0.000 (0.003)***
Market value of equity $t-1$ (?)	–0.003 (0.897)	0.001 (0.960)	0.003 (0.8960)	0.003 (0.8960)	0.003 (0.8960)	–0.001 (0.973)	–0.001 (0.986)	0.035 (0.017)**	0.013 (0.503)
Market-to-book $t-1$ (+)	1.099	0.614	0.619	0.938	0.788	0.987	0.979	0.413	0.663
Leverage $t-1$ (+)	(0.009)***	(0.132)	(0.119)	(0.015)**	(0.040)**	(0.017)**	(0.018)**	(0.336)	(0.135)
R&D + advertising expense / total assets (+)		–0.152 (0.853)							

Table 5 (continued)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
CAPEX/total assets (+)			0.130 (0.659)						
Long-term growth forecast (+)					0.008 (0.588)				
S&P mean market-to-book (+)				0.099 (0.076)*					
Finance raised (+)	-0.069 (0.680)								
CEO tenure (+)						0.001 (0.92)	-0.017 (0.548) 0.004 (0.506)		
CEO tenure * option sensitivity (+)									
Inclusion of year and Industry dummies	Yes, Yes	Yes, No	Yes, No	No, No	No, No	Yes, Yes	Yes, Yes	No, No	Yes, Yes
Observations	8208	8208	8192	8208	8208	7550	7550	6818	6818
McFadden's pseudo R^2	0.053	0.049	0.049	0.018	0.017	0.048	0.047	0.007	0.04

forecasts for all firms in the two-digit SIC industry for that year in I/B/E/S. The coefficient for average industry market-to-book ratio is positive and significant at the 8% level. However, the coefficient of the average long-term growth forecast is not significant (Table 5, Models 3 and 4). Thus, there appears to be weak evidence in support of Hypothesis 6, that misreporting is greater in years associated with greater market valuations.

To examine the effect of the CEO's time horizon, we include CEO tenure. There is no evidence that CEOs with longer tenures, and therefore, closer to retirement, are more likely to misreport. The coefficient of the interaction of CEO tenure with option sensitivity is not significant (Model 6), indicating that option sensitivity does not have a greater effect on CEOs who are closer to retirement.

Jensen and Murphy (1990) document that the pay-for-performance incentives of managers appear to be low. Some of the increased use of stock options in the past decade was intended to increase firm value through improved alignment of manager and shareholder incentives. This suggests that some of the option incentives should be associated with a positive effect on firm value. Increased incentives for misreporting should be associated with the use of stock options beyond this optimal level. In other words, "excessive" option usage should be positively related to the misreporting.

We examine this issue by estimating CEO option sensitivity that is beyond the desired level, i.e., abnormal option sensitivity. Abnormal option sensitivity is the deviation of option sensitivity from optimal option incentives. Optimal option incentives are estimated using the methodology of Core and Guay's (1999). Specifically, we regress CEO option sensitivity on market value of equity, idiosyncratic risk, book-to-market, CEO tenure, free cash flow, and industry dummies (see Appendix B for further details). Abnormal option sensitivity is the residual from this cross-sectional regression. The abnormal incentives from equity are similarly defined. A positive (negative) residual indicates that incentives are above (below) their optimal level. The model explains a large portion of the cross-sectional variation in option sensitivity, with an adjusted *R*-square of 57% and explains the variation in equity incentives to a lesser extent, with an adjusted *R*-square of 40%. Results of the model's estimation are available from the authors upon request.

The coefficient of abnormal option sensitivity is positive and significant at the 1% level (Table 5, Model 7). Abnormal equity incentives do not generate any incentives for misreporting. The results for other components of compensation are unchanged. Though industry and year effects have been controlled for in the estimation of abnormal option sensitivity, we include industry and year dummies as a robustness check. We find that though the coefficient of abnormal option sensitivity is positive, it is significant only at the 11% level. These results suggest that CEOs have incentives from options that deviate from optimal incentive levels in the year of misreporting.

6.2. Magnitude of earnings restated

Though our sample of restating firms consists of firms that made "purposeful" accounting choices, there is likely to be substantial variation in the degree of

aggressiveness across choices. In other words, the impact of the misreporting on earnings could vary across the restating group. Egregious misreporting associated with substantially restated earnings is more likely to be associated with CEOs whose wealth is highly sensitive to stock prices, i.e., those with large option sensitivity. We examine whether option sensitivity is related not only to the propensity to misreport but also to the magnitude of the misreporting.

We use the effect of the restatement on net income to capture the size of the restatement. For firms that restate multiple years, this is the average annual effect.¹⁰ This change in net income due to the restatement is scaled by the restated value of net income. The restated value of net income is the sum of the originally reported net income and the change in net income due to the restatement. For firms that do not misreport, the size of the restatement is zero. This creates censoring in the data and consequently we estimate a Tobit model (see Table 6). The coefficient of option sensitivity continues to be positive and significant. Larger restatements are associated with higher values of CEO option sensitivity. The other results are also unchanged. There is no effect of incentives from equity, restricted stock and LTIP on the magnitude of misreporting. Similarly, incentives from salary plus bonus do not appear to be related to the magnitude of the restatement.

As the above measure normalizes the size of the restatement by the absolute value of net income, it may be biased when net income is negative. To examine whether our results are sensitive to this scaling we also estimate the Tobit model with the dependent variable being the size of the restatement scaled by firm sales. The coefficient of option sensitivity continues to be significant with little material effect on the results (see Table 6, Model 3).

6.3. Convexity of stock options

In this section, we examine the effect of the convexity of stock options on the incentives to adopt aggressive accounting practices as discussed in Hypothesis 3. We use gamma, the second derivative of option value to stock price, to capture the convexity in CEO wealth introduced by stock options. The coefficient on gamma is positive and significant (Table 7). CEOs that hold options with greater convexity are more likely to misreport. To further explore the effect of components of the option portfolio, we include the delta and gamma of the vested and unvested components of the portfolio (delta and gamma are significantly correlated with a Pearson's coefficient of 0.11, which is significant at the 1% level).

We find, consistent with results of Table 4, that only the coefficient of the sensitivity of vested options is positive and significant. Interestingly, though misreporting is positively related to the convexity of both vested and unvested options, only the coefficient of convexity of unvested options is significant. The unvested portion of the CEO's option portfolio has a positive significant effect on

¹⁰For firms with multiple years we estimate the sum of the effect on earnings for the years that were misreported. The average annual effect is obtained by dividing the above cumulative effect by the number of misreported years.

Table 6

Tobit regressions: effect of option sensitivity on size of restatement

The dependent variable, for Model 1 and Model 2, is the absolute average annual effect of restatements on earnings normalized by the absolute value of restated earnings. The dependent variable for Model 3 is the absolute annual effect of the restatement on earnings normalized by total sales. The variable takes the value of zero for nonrestated years. The sample consists of S&P 1,500 firms over the period 1992–2002. Option sensitivity is the change in option value for a 1% change in stock price. The sensitivity of equity and restricted stock is similarly defined as the change in the value of these instruments for a 1% change in stock price. Long-term incentive payouts are normalized by total compensation. Salary-bonus sensitivity is measured as the coefficient of a cross-sectional regression at the two-digit industry level of the change in salary and bonus on the change in earnings. Market-to-book is total assets – book value of equity + market value of equity/total assets. Leverage is short-term debt + long-term debt/ total assets. The industry dummy is set to one if the firm is in two-digit SIC industries 35, 36, 38, and 73. These industries are highly represented in the restating sample. A constant and year dummies for years 1995 through 2001 are included, and not reported here. They are all significant. Predicted signs are in parentheses. ***, **, * represent significance at the 1%, 5% and 10% significance levels, respectively.

	Model 1	Model 2	Model 3
Option sensitivity (+)	0.067 (0.00)***	0.040 (0.037)**	0.018 (0.044)**
Sensitivity of restricted stock (insignificant or –)	–0.000 (0.840)	–0.000 (0.837)	–0.000 (0.854)
Long-term incentive payouts (LTIP) (insignificant or –)	0.305 (0.251)	0.380 (0.166)	0.178 (0.175)
Sensitivity of equity (insignificant or –)	–0.000 (0.570)	–0.000 (0.532)	–0.000 (0.514)
Salary–bonus sensitivity (+)	–0.296 (0.373)	–0.143 (0.680)	–0.113 (0.505)
Market value of equity t_{-1} (?)		0.000 (0.342)	0.000 (0.37)
Market-to-book $_{t-1}$ (+)		–0.004 (0.697)	–0.002 (0.739)
Leverage $_{t-1}$ (+)		0.332 (0.052)*	0.147 (0.072)*
Industry dummy (+)		0.158 (0.008)***	0.059 (0.037)**
Year dummies	No	Yes	Yes
Observations	8121	8121	8121
R^2	0.004	0.03	0.028

the propensity to misreport when it has higher gamma, i.e., when a small change in price results in a large change in incentives.

6.4. Announcement period return

The market reaction to the announcement of a restatement is likely to be negatively related to option exercises by the CEO during the alleged manipulation

Table 7

Effect of option convexity on the incentives to misreport

The dependent variable is one if the fiscal year was restated and zero otherwise. The sample consists of S&P 1,500 firms over the period 1992 to 2002. Option sensitivity is the change in option value for a 1% change in stock price. Sensitivity of vested (unvested) options is the change in the value of vested (unvested) option portfolio for a 1% change in stock price. The sensitivity of equity and restricted stock is similarly defined as the change in the value of these instruments for 1% change in stock price. Long-term incentive payouts are normalized by total compensation. Salary-bonus sensitivity is measured as the coefficient of a cross-sectional regression at the two-digit industry level of the change in salary and bonus on the change in earnings. Market-to-book is total assets – book value of equity + market value of equity/total assets. Leverage is short-term debt + long-term debt/total assets. The industry dummy is set to one if the firm is in two-digit SIC industries 35, 36, 38 and 73. These industries are highly represented in the restating sample. Gamma is the second derivative of option value with respect to stock price. A constant and year dummies for years 1995–2001 are included, and not reported here. They are all significant. The regressions comprise 243 restated firm-years. The predicted signs are in parentheses. ***, **, * represent significance at the 1%, 5% and 10% significance levels, respectively.

	Model 1	Model 2
Option sensitivity (+)	0.175 (0.000)***	
Option convexity (Gamma) (+)	0.005 (0.000)***	
Sensitivity of vested options (+)		0.145 (0.000)***
Sensitivity of unvested options (+)		–0.034 (0.506)
Gamma of vested options (+)		0.042 (0.255)
Gamma of unvested options (+)		0.245 (0.000)***
Sensitivity of restricted stock (insignificant or –)	–0.000 (0.152)	–0.000 (0.210)
Long-term incentive payouts (LTIP) (insignificant or –)	0.979 (0.191)	1.101 (0.145)
Sensitivity of equity (insignificant or –)	–0.000 (0.101)	–0.000 (0.154)
Salary-bonus sensitivity (+)	–0.232 (0.686)	–0.235 (0.688)
Market value of equity $t-1$ (?)	0.000 (0.247)	0.000 (0.373)
Market-to-book $_{t-1}$ (+)	–0.002 (0.934)	0.009 (0.723)
Leverage $_{t-1}$ (+)	0.891 (0.030)**	0.764 (0.068)*
Industry dummy (+)	0.482 (0.002)***	0.566 (0.000)***
Inclusion of year dummies	Yes	Yes
Observations	8208	8208
McFadden's pseudo R^2	0.06	0.067

period (Hypothesis 7). To test for this we calculate cumulative abnormal returns (CARs) around the announcement of the restatement. For each announcement date, abnormal returns around the announcement date are estimated using market model regressions with the estimation period from 397 to 127 days prior to the event date.¹¹ The average (median) CAR over the -120 to $+120$ day period is -24.9% (-6%) (Table 8, Panel A). CARs over smaller windows around the announcement date are all negative and significant at the 1% level. The mean (median) CAR from -5 to $+5$ days around the announcement are -10% (-5%). These market reactions are in line with the mean CAR from day -1 to $+1$ of -10% reported by the GAO (2002) for their entire sample. We use the ratio of the value of options exercised by the CEO to the market value of the firm during the misreported period to proxy for intensity of option exercises.

Panel C of Table 8 presents the results of the weighted least squares regression of the CARs over the 11-day window (from five days prior to five days subsequent to the announcement) on CEO exercise activity. We control for firm size, leverage, and market-to-book over the restated year as these variables might affect the magnitude of the market reaction. There is a significant positive effect of CEO exercise activity in the misreported period on announcement day returns. In the second regression, we control for the effect of the size of the restatement on firm performance. The larger the size of the restatement the greater should be the market reaction. Surprisingly, we do not find that the size of the restatement is significantly related to the market reaction. This might be due to the fact that only some firms disclose the size of the restatement at the time of announcement. However, the results with respect to CEO exercise continue to be significant.

7. Conclusion

In this paper, we examine and find significant evidence that CEO compensation packages affect the adoption of aggressive accounting practices that result in a restatement. In particular, CEOs with option portfolios that are more sensitive to the stock price are significantly more likely to misreport. We do not find that the sensitivity of other components of CEO compensation, i.e., equity, restricted stock, long-term incentive payouts, and salary plus bonus have any significant impact on the propensity to misreport. The incentives to misreport are stronger with stock options relative to other components because (1) convexity in CEO wealth introduced by stock options limits the downside risk on the discovery of misreporting, and (2) stock options allow CEOs to pool with other executives that exercise for liquidity and diversification reasons, i.e., options facilitate easy exit strategies for CEOs.

¹¹For the market model regression, the market return is the return on the cum-dividend, value-weighted market portfolio of all NYSE/AMEX/Nasdaq stocks. Firm return is the cum-dividend return on firm i for day t .

Table 8

Announcement period returns and exercise activity

***, **, * represent significance at the 1%, 5% and 10% significance levels, respectively.

Panel A: Cumulative abnormal returns around announcement (CARs)

CARs have been estimated using a standard market model regression, with the estimation period as 397 to 127 days prior to the event date. Z-statistics are reported in brackets

	<i>Mean</i>	<i>Median</i>
(-120,120)	-24.96	-6.12
[z-stat] p-value	[8.11] (0.000)***	(0.071)*
(-10,10)	-11.6	-5.05
[z-stat] p-value	[10.94] (0.000)***	(0.000)***
(-5,5)	-9.94	-5.06
[z-stat] p-value	[12.53] (0.000)***	(0.000)***
(0,1)	-7.04	-2.43
[z-stat] p-value	[22.96] (0.000)***	(0.000)***
(-1,1)	-8.78	-3.85
[z-stat] p-value	[21.67] (0.000)***	(0.000)***

Panel B: Exercise activity in the initial year of misreporting

Exercise activity is measured as the market value of options exercises in the initial year of misreporting scaled by the lagged market value of the firm

Q1	0.00
Mean	0.11
Median	0.00
Q3	0.04

Panel C: Regression of CARs (-5,5) exercise activity

The dependent variable is the (-5,5) day CAR. Exercises are the market value of option exercises in the misreported period scaled by the lagged market value of the firm. Leverage is the ratio of short-term and long-term debt to total assets. Magnitude is the ratio of the absolute value of the average annual impact of the restatement on net income to restated net income. Predicted signs are in parentheses

	Intercept	Exercises	Leverage	Market value	Market-to-book	Magnitude	Adjusted R-square	N
		(-)	(-)	(+)	(-)	(+)		
Coefficient	-0.000	-0.257	-0.135	0.001	-0.002			
p-value	(0.469)	(0.000)***	(0.272)	(0.008)**	(0.696)		0.261	146
Coefficient	-0.000	-0.205	-0.299	0.002	-0.008	0.003		
p-value	(0.977)	(0.000)***	(0.085)	(0.004)**	(0.260)	(0.864)	0.311	97

This paper contributes to the literature by documenting the importance of managerial self-interest as a motivation for aggressive accounting practices. The results of this paper suggest that misreporting appears to be related to “excessive”

option incentives. This has implications for the relative weight of stock options and equity in future CEO compensation contracts. Concerns about mitigating incentives to misreport may lead to the greater use of equity and restricted stock instead of options. This shift away from stock options can already be seen in firms such as General Electric and Microsoft, which have announced that they will no longer use stock options to compensate their CEOs.¹²

There is little research into the implications and costs of restatements for managers. A recent study by Desai et al. (2003) documents significant costs borne by managers of restating firms in the labor market. Further examination of the costs borne by managers, through changes in compensation contracts, loss of opportunity in the labor market, or high costs of lawsuits, is necessary to understand the effect of accounting choices on the trade-off between managerial costs and benefits.

Appendix A. Estimation of discretionary current accruals

The estimation of discretionary current accruals uses the methodology developed by Jones (1991) and modified by Dechow (1995). Current assets are defined as

$$CA = \Delta [\text{Accounts Receivable (2) + inventory (3) + other current assets (68)}] \\ - \Delta [\text{accounts payable (70) + tax payable (71) + other current liabilities (72)}]. \quad (\text{A.1})$$

We estimate the following cross-sectional regression by two-digit SIC and year on all firms in Compustat, as developed by Defond and Jiambalvo (1994) (see also Teoh, 1998)

$$\frac{CA_{j,t}}{TA_{j,t-1}} = a_0 \left(\frac{1}{TA_{j,t-1}} \right) + a_1 \left(\frac{\Delta SALES_{j,t}}{TA_{j,t-1}} \right) + \varepsilon_{j,t}, \quad (\text{A.2})$$

where TA is total assets. Nondiscretionary or expected current accruals ($NDC A_{i,t}$) are the fitted values from the above regression, and are calculated as

$$NDC A_{i,t} = \hat{a}_0 \left(\frac{1}{TA_{i,t-1}} \right) + \hat{a}_1 \left(\frac{\Delta SALES_{i,t} - \Delta TR_{i,t}}{TA_{i,t-1}} \right) + \varepsilon_{i,t}. \quad (\text{A.3})$$

where TR is trade receivables. Teoh (1998) indicate that change in trade receivables should be subtracted from sales to adjust for potential credit manipulation by a firm. Restating firms are not included in the estimation of parameters. Finally, discretionary current accruals (DCA) is calculated as the difference between current accruals divided by total assets and the estimated $NDC A$.

¹²The Financial Times, September 19, 2003, “The Largest Groups rein in Excessive deals,” by Adrian Michaels.

Appendix B. Estimation of abnormal option and equity incentives

We use the methodology of Core and Guay (1999) to estimate deviations of option and equity incentives from optimal levels. Optimal incentives are the fitted values from the following cross-sectional regression:

$$\begin{aligned} \log(\text{incentives}) = & \beta_0 + \beta_1 \log(\text{market value of equity})_{it} \\ & + \beta_2 \log(\text{idiosyncratic risk})_{it} \\ & + \beta_3 \text{book-to-market}_{it} + \beta_4 \log(\text{CEO tenure})_{it} \\ & + \beta_5 \text{Free-cash-flow}_{it} \\ & + \beta_6 \text{Industry controls}_{it} + \varepsilon_{it}. \end{aligned} \quad (\text{B1})$$

Equity and option incentives are the change in the value of these holdings for a 1% change in stock price. Idiosyncratic risk is the standard deviation of the residual from the market model regression, estimated over a 36-month period. Free cash flow is the three-year average of (operating cash flow—common and preferred dividends)/total assets if the firm has low growth options, and zero otherwise. Industry dummies are dummies for two-digit SIC code.¹³ The residuals from the above cross-sectional regression is a measure of the deviation of incentives from optimal levels, i.e., a measure of abnormal incentives.

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¹³Core and Guay (1999) use 19 industry dummies. However, they do not report the industries used so we used two-digit SIC codes.

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