Executive Equity Compensation and Financial Statement Fraud

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Abstract

I find the association between equity compensation and financial statement fraud is positive and significant for executives named as perpetrators of fraud by the SEC. The results hold in intra-firm analyses of over 1,500 executives at over 350 fraud firms comparing named and unnamed executives in the same firm and holding all environmental factors constant. The results hold in matched samples of fraud and non-fraud firms and in unmatched samples. The results hold when analyzing portfolio delta, vega, gamma, and their individual components. The results hold when analyzing all top 5 executives, CEOs alone, removing CEOs, and removing CFOs.

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1. INTRODUCTION

The agency problem between managers and shareholders is among the most studied issues in financial economics. Prior research posits compensating executives with the firm's equity is one way to mitigate this problem by tying the manager's wealth to the firm's performance. Prior research finds a strong positive association between firm value and CEO equity compensation, suggesting that paying executives with equity does create firm value and mitigate the agency issue. However, many have argued that executive equity compensation does not represent a free lunch and that while it may align manager and shareholder interests, it can also create incentives to conceal bad news about future growth prospects and even create incentives for managers to commit financial statement fraud.

The association between equity compensation and financial misreporting has been studied extensively with no consistent pattern of results emerging. Published studies have found positive, negative, and no association between various proxies for equity compensation and measures of misreporting. Prior research considers several proxies for misreporting (SEC Accounting and Auditing Enforcement releases, restatements, accruals models, etc.), several proxies for equity incentives (portfolio delta, vega, gamma, option 'moneyness', etc.), and uses both matched and unmatched samples in empirical tests.

While prior research has studied this question from many perspectives, it has not considered the equity incentives of the specific executives within the firm who were charged with manipulating the firm's financial statements. Reports released by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) indicate that CEOs are

involved in the manipulations about 70 percent of the time. This percentage tends to be lower in larger firms. Looking at CEO incentives without considering whether the CEO was involved will identify the wrong executive 30 percent of the time on average. Though firms often pay different executives similarly, executives' compensation preferences, tenure, and option exercise/stock selling behavior mean that at any given moment the equity incentives for different executives in the same firm are quite different. There is little reason to believe the equity incentives for individuals who were not involved in the manipulation are associated with the manipulation.

Analyzing the association between manipulations and named and non-named executives in the same firm offers many empirical advantages. The primary advantage is the use of firm fixed effects to perform intra-firm analysis. Prior research has struggled to find appropriate ways to match manipulation and non-manipulation firms; a match that truly rules out correlated omitted variables does not exist. Firm fixed effects allows for proper identification – everything about the firm is held constant and the only difference is the equity incentives of top-level managers. Additionally, analyzing the equity incentives of the firm's top 5 executives provides insight into whether any relation only holds for CEOs. CEOs tend to be much more highly compensated than other executives and given the cost of detection it is possible compensation based incentives are not strong enough to induce manipulation until they reach a certain absolute dollar level. Finally, analyzing the top 5 executives in the firm provides for a larger sample and potentially more powerful tests. Most prior studies analyze the

equity incentives of between 50 and 150 executives at fraud firms; this study analyzes over 1,500 executives at fraud firms.

I find incentives from equity compensation are positively associated with perpetrating fraud. The results hold in a specification with fraud firms, named and non-named executives, and firm fixed effects. The results hold in matched samples of fraud and non-fraud firms, and in unmatched samples. The results hold for CEOs, CFOs, and other top 5 paid executives. The results hold for multiple equity compensation variables including portfolio delta, vega, gamma, and their respective components.

The interpretation of the results relies on the accuracy with which the SEC identifies perpetrators. Given the professional and financial costs to being indicted for fraud, and the cost to the SEC for naming the wrong individual there is a high probability that named individuals were involved in the fraud. That said, it is unlikely that every senior executive directly involved in fraud is identified; while this adds noise to the empirical analyses, it is not clear how this creates bias. Results from a falsification test in which whether an executive is named is randomly assigned suggests the associations cannot be generated randomly.

This paper contributes to the literature in several ways. First, it provides strong evidence that equity incentives are associated with reporting risk. Firm fixed effects with multiple executives in the same firm allows for proper identification of equity incentives while holding all other factors constant. Second, results considering the executives who actually manipulate financial statements can explanation inconsistencies in the prior literature related to equity compensation proxy and research design choice. Third, it provides evidence that these

incentives influence the behavior of executives beyond the CEO. Few prior papers consider non-CEO executives (and those look only at CFOs) and the results from those papers are mixed.

2. PRIOR LITERATURE

The relation between managers' equity incentives and financial misreporting has been studied extensively (see Appendix B for a summary). The results of these studies are mixed with researchers finding positive, negative, or no association between equity incentives and misreporting. Possible explanations for these mixed results include differences in research design (regression versus matched pair), measurement of manipulations (Accounting and Auditing Enforcement Releases (AAERs), restatements, discretionary accruals models), and equity incentives proxy (portfolio delta, compensation mix, value of option grants).

Armstrong et al [2013] note that studies using a regression design (Burns and Kedia [2006]) are more likely to find an association than studies using a matched pair design (Armstrong et al [2010]) though this is not absolute. The different proxies for misreporting used in the literature capture everything from known cases of fraud (AAERs), to potentially unintentional errors (restatements), to academic estimates of manipulations, most of which would be perfectly legal under GAAP (discretionary accruals). It is not clear these varying outcomes are associated with equity incentives in the same manner. Prior studies have found differing results for the various components of portfolio delta. For example, Burns and Kedia [2006] find an association between manipulations and incentives from stock options while Johnson et al [2009] find an association between manipulations and incentives from unrestricted stock. Armstrong et al [2013] argue that the directional prediction between manipulations and

portfolio delta (wealth sensitivity to price) is ambiguous and an empirical question but that the expected association between portfolio vega (wealth sensitivity to volatility) and manipulations is positive. They find a positive association between portfolio vega and manipulations but no association with portfolio delta when both are included in the same model.

Still, academics find conflicting results even when employing similar designs. For example, Erickson et al [2006] find no association between portfolio delta and a sample of 50 AAERs while Feng et al [2011] find such an association for CEOs in a sample of 116 AAERs. Both studies use the same equity incentive proxy, the same measure of manipulation, and use a matched pair design based on industry, year, and assets. However, the small samples commonly employed in this literature make it difficult to have confidence in the results of one study versus another. Even if both studies had identical and perfect research designs it could simply be that there was no association in the 50 firms studied by Erickson et al [2006] and there was an association in the 116 firms studied in Feng et al [2011], leaving regulators and investors with little insight into this important question.

Another common attribute in this literature is a focus on the equity incentives of CEOs. 16 of the 18 papers listed in Appendix B do not consider the incentives of any individual executive other than the CEO (three of these studies take an average of the top 5 paid executives). The two studies which do consider incentives of other executives find conflicting results. Feng et al [2011] find a positive association between portfolio delta and misreporting for CEOs but not for CFOs while Jiang et al [2010] find the exact opposite results, a positive association for CFOs and no association for CEOs.

This focus on CEO incentives is understandable but potentially troubling considering CEOs appear to be involved in manipulations 70 percent of the time in practice, and notably less in many samples[1]. One possible explanation for mixed results in prior research is that different samples had significantly different proportions of executives who actually perpetrated the fraud. Research design and proxy measurement become secondary concerns when a large percentage of sample CEOs are not even involved in the fraud. Only one prior study discusses models estimated on known perpetrators of fraud[2].

In sum, prior research has argued that there is either a positive or unclear association between equity incentives and manipulating financial statements but has yet to actually consider the equity incentives of those who manipulated their firm's financial statements. I predict that there is a positive association between equity incentives and fraud after identifying the executives within a firm who perpetrated the fraud versus those who did not. I predict the results will hold for commonly used proxies of equity incentives and that the results will hold regardless of research design choices.

3. SAMPLE, DATA, AND SUMMARY STATISTICS

3.1 Sample

I use SEC Accounting and Auditing Enforcement Releases (AAERs) as a proxy for financial statement fraud. These releases summarize investigations the SEC brings against the

[1] When analyzing all fraud cases in the AAER sample I find CEOs are named at a similar rate as the COSO study (70 percent compared to 72 percent) but when looking at firms large enough to be included in the Execucomp database (the data source most prior studies use for compensation data) the rate drops to 56 percent.
[2] Feng et al [2011] mentions performing analyses on named executives. These results are not included in their paper and they only considers CEOs and CFOs.

agents of firms for violations of SEC and Federal rules. To collect my sample, I read AAERs 84 – 3,638 which were released between January 15, 1986 and February 13, 2015. I include only firms for which the following can be determined: whether the firm's financial statements were materially misstated; the year the violation began; and the names of those who committed the fraud[3].

AAERs offer several advantages compared to other proxies for manipulation. First, it is clear whether managers of firms in the AAER sample intentionally manipulated the firm's financial statements[4]. This is not true for earnings restatements or for proxies of earnings management commonly used in the literature such as meeting/just beating an earnings benchmark or some variant of a discretionary accruals model. While a number of firms which meet/just beat an earnings benchmark likely did so as the result of earnings management, a larger number of firms likely did so legitimately. The proxy cannot distinguish the firms with legitimate earnings from those with managed earnings. Similarly, there are many reasons unrelated to earnings management for a firm to have large 'abnormal' or 'discretionary' accruals. Second, AAERs name specific members of the management team as perpetrators of the manipulation. To truly test whether manipulations are associated with incentives from equity compensation, the incentives for the specific individuals who perpetrated the manipulation need to be identified. Other proxies generally cannot or do not indicate who perpetrated the manipulation.

[3] I exclude 5 AAER firms with frauds related to earnings/asset understatement and 11 AAER firms with no top 5 paid executive named as a perpetrator.

[4] I focus on violations of Section 13(a) and Section 13(b)(2)(A) of the Securities Exchange Act of 1934.

That said, AAERs have limitations. AAERs only document manipulations that are detected[5] and ultimately enforced. Given that my primary method of analysis is at the person level and compares named and not named executives in the same firm this is less of a concern than it is in prior studies which rely on matched samples of manipulation and 'clean' firms. The accuracy and completeness with which the SEC identifies perpetrators is a potential problem if the SEC intentionally charges individuals *because* they had high levels of equity incentives. Given the reputation and legal cost to the SEC of fining and jailing innocent people, it seems reasonable that the SEC exercises extreme diligence before naming individuals and imposing severe penalties on them. It is perhaps even less likely that innocent executives with resources to spare would not fight erroneous charges and would instead accept what amounts to a death sentence for their career. What is more likely is that certain individuals involved in the fraud did not have enough evidence against them for the SEC to name them as perpetrators. While this has almost certainly happened, on average individuals with strong evidence against them are more likely to be perpetrators and individuals with no or weak evidence against them are more likely to be innocent. Any failure to detect all perpetrators will add noise to the sample, but does not appear to bias it. My results must be interpreted with this in mind.

I collect compensation data from definitive proxy statements (filing DEF 14A) available from the SEC. Specifically, I collect all person level data necessary to calculate an executive's portfolio delta, vega, and gamma. This data is available for a subset of firms from either Compustat's Execucomp database or from Equilar, but both databases are missing many fraud firms for which compensation data is available. Hand collecting this data allows me to create a

[5] This is true for all ex post measures of manipulation.

fraud firm sample with over 1,500 executive-fraud year observations compared to the 50-200 fraud year observations employed in most prior studies[6].

Table 1 provides data on the sample of named and non-named top 5 paid executives at fraud firms. The final sample consists of 355 fraud firms and 1,574 executives who were at the firms the period when the fraud began. The SEC named 37 percent of executives, 61 percent of CEOs, and 55 percent of CFOs. The percentages for CEOs and CFOs are consistent with those given in prior studies[7].

3.2 Summary Statistics

Consistent with prior literature (e.g., Core and Guay, 1999; Erickson, Hanlon, and Maydew, 2006; Burns and Kedia, 2006), I calculate *Delta* as the portfolio delta, defined as the (risk-neutral) dollar change in the executive's equity portfolio value for a one percent change in the firm's stock price. The value of stock and restricted stock is assumed to change dollar-for-dollar with changes in the price of the underlying stock. The value of stock options is assumed to change according to the option's delta, which is the derivative of its Black-Scholes value with respect to the price of the underlying stock (Core and Guay, 2002). Following Core and Guay (2002), I calculate *Vega* as the dollar change in the executive's equity portfolio for a one percent

[6] To verify the accuracy of hand collection I hand collect data for fraud firm executives who are listed on Execucomp and compare variables calculated using hand collected data to variables calculated using Execucomp data using the algorithm provided by Coles, Daniel, and Naveen [2013] and find the portfolio delta, vega, and gamma are correlated at 96 percent or higher. The primary reason for the small difference is that I calculate the variables at the end of the period before the fraud begins to try and accurately assess incentives as closely to when fraud begins as possible. The correlations increase to 98 percent or higher when calculating using the dates used in their methodology.

[7] CEOs were named 70 percent of the time in all AAER firms, however many of these firms do not have proxy filings available from the SEC. These are generally firms too small to be covered by Compustat and it appears CEOs are more often involved in frauds in smaller firms. Note that CFOs are top 5 paid executives in just under 50 percent of sample firms.

change in the firm's stock return volatility. I calculate *Gamma*, option convexity, as the second derivative of option value with respect to stock price following Burns and Kedia [2006][8]. I measure individual component deltas, vegas, and gammas in the same manner.

Table 2, Panel A, presents mean and median values for the equity incentive variables. Named executives have significantly higher portfolio deltas, vegas, gammas, and individual components than non-named executives (all at the 0.01 level). Table 2, Panel B, presents equity incentive variables for named and non-named executives by role. Named CEOs, CFOs, and non CEO/CFOs have significantly higher portfolio deltas, vegas, and gammas than their non-named counterparts (significant at the 0.05 level or better). The differences show that executives who perpetrate fraud have much stronger equity incentives than executives at fraud firms who did not perpetrate fraud. Finally, Table 2, Panel C, provides mean and median values for firm-level control variables across fraud and matched non-fraud firms. Fraud firms are significantly different on a number of dimensions; they are younger, have lower market capitalizations and return on assets, and have higher leverage, growth, accounts receivable, and financing needs.

Table 3 presents a correlation matrix of equity incentive measures by role. CEO measures are highly correlated with those for CFOs and other top 5 executives, but the correlations are far from 1.0. CEO delta is correlated with CFO delta at 0.56 and with other executives at 0.44. While it is not surprising that the correlation is high, this highlights how much noise is introduced into models when averaging across all executives or when comparing

[8] Appendix C details the specific computations for *Delta, Vega*, and *Gamma.*

incentives of named versus non-named executives. Portfolio vegas and gammas appear more strongly correlated than portfolio deltas across all executive types.

4. EMPIRICAL ANALYSIS

4.1 Intra-Firm Analysis

I test the prediction that executives with stronger equity incentives are more likely to commit fraud by estimating logistic regressions with firm fixed effects[9] of the following form:

$$Named_{i,j} = \alpha + \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \beta_4 CEO_{i,j} + \beta_5 CFO_{i,j} + \varepsilon_{i,j} \quad (1).$$

The dependent variable, *Named,* takes a value of 1 if the executive was named as a perpetrator of fraud and is 0 otherwise. *Delta, Vega,* and *Gamma* represent portfolio delta, vega, and gamma, respectively and are as defined in Section 3. *CEO* is an indicator variable set to 1 if the executive is the CEO and is 0 otherwise and CFO is an indicator variable set to 1 if the executive is the CFO[10] and is 0 otherwise.

Table 4 presents the results. Results in Panel A show that *Delta*, *Vega*, and *Gamma* are positively and significantly associated with perpetrating fraud at the 0.01 level in all cases save one (significant at the 0.05 level). The results hold when examining the variables individually and when they are included in the same model. The marginal effects suggest that a one standard deviation increase in *Delta* is associated with a 12 percent increase in perpetrating

[9] Logistic regression with firm fixed effects produces virtually identical results to conditional logistic regression in this dataset with multiple executives per firm and 1 year of data per firm.

[10] In firms without a CFO listed in the top 5 paid executives I treat the following roles as the CFO: treasurer, comptroller, senior vice president – finance, executive vice president – finance. Results are not sensitive to this choice.

fraud. One standard deviation increases in *Vega* and *Gamma* are associated with 16 and 19 percent increases in perpetrating fraud, respectively. The model in Panel B includes indicators for CEO and CFO and yields similar results. In the estimation with all three equity incentive variables *Delta* and *Gamma* are both significant at the 0.01 level and *Vega* is significant at the 0.05 level. The economic magnitudes are similar as well. Both CEOs and CFOs are more likely to perpetrate fraud, confirming the percentages reported in Table 1. Finally, Panel C reports results from estimations excluding either the CEO or CFO. *Delta*, *Vega*, and *Gamma* are significant at the 0.05 level or better when either the CEO or CFO is excluded from the model. The results in Panel C suggest that the results are not driven exclusively by the highest paid executive (the CEO) or the executives most likely to perpetrate fraud (CEO and CFO) and highlight the importance of considering the role other executives play in fraud.

Prior research (Efendi et al [2007], Burns and Kedia [2006]) has also modeled the association between components of equity incentives and financial misreporting. To investigate whether perpetrators are responding to specific components of their equity portfolio I estimate the following logistic regressions with firm fixed effects:

$$Named_{i,j} = \alpha + \beta_1 Delta\ Share_{i,j} + \beta_2 Delta\ U\ Opt_{i,j} + \beta_3 Delta\ E\ Opt_{i,j} + \beta_4 CEO_{i,j} + \beta_5 CFO_{i,j} + \varepsilon_{i,j} \quad (2)$$

$$Named_{i,j} = \alpha + \beta_1 Vega\ U\ Opt_{i,j} + \beta_2 Vega\ E\ Opt_{i,j} + \beta_3 CEO_{i,j} + \beta_4 CFO_{i,j} + \varepsilon_{i,j} \quad (3)$$

$$Named_{i,j} = \alpha + \beta_1 Gamma\ U\ Opt_{i,j} + \beta_2 Gamma\ E\ Opt_{i,j} + \beta_3 CEO_{i,j} + \beta_4 CFO_{i,j} + \varepsilon_{i,j} \quad (4)$$

where *Delta Share* is the component of portfolio delta related to common shares, *Delta U Opt*, *Vega U Opt*, and *Gamma U Opt* are the respective components of *Delta*, *Vega*, and *Gamma* related

to unexercisable options, and *Delta E Opt, Vega E Opt*, and *Gamma E Opt* are the respective components of *Delta, Vega*, and *Gamma* related to exercisable options. *CEO* and *CFO* are as defined above.

Table 5 presents the results. Panel A presents results for components of *Delta*. When modeled individually, all three components are positively associated with perpetrating fraud at the 0.05 level or better. However, when included in the same estimation *Delta Share* and *Delta U Opt* remain significant at the 0.05 level or better but *Delta E Opt* is no longer significant. The individual portfolio components are highly correlated with one another, so the interpretation of the combined model is not perfectly clear, but the results do suggest that the association between perpetrating fraud and *Delta* is not driven by one single component. Panels B and C present analogous results for components of *Vega* and *Gamma* respectively and provide similar insights. When modeled individually, both components of *Vega* and *Gamma* are significantly associated with perpetrating fraud at the 0.01 level. However, when modeled together only *Vega U Opt* and *Gamma U Opt* remain significant. Again, given the high correlation between the two measures the interpretation is not clear, but the results do suggest that perhaps executives are responding more strongly to incentives from unexercisable options than they are from exercisable options[11].

To highlight the importance of identifying executives responsible for fraud I re-estimate equation (1) but randomly assign who is treated as a named versus non-named executive. To do this I randomly assign one executive in each firm as named and one executive in each firm as

[11] The results hold when the indicators for CEO and CFO are excluded and the results hold when excluding either the CEO or CFO but are not reported for brevity.

non-named (all firms have at least one of each in the actual sample) and then randomly assign named executives to everyone remaining such that the same number of executives are named in the falsification test as are named in the sample. I repeat this process 100 times and present the mean results in Table 6. None of the equity incentive variables are statistically significant when *Named* is randomly assigned, suggesting that results in prior tables cannot be achieved by chance and that the executives who perpetrate fraud have stronger equity incentives than those who do not.

To compare the equity incentives of named CEOs to non-named CEOs I re-estimate equation (1) excluding non-CEOs and dropping firm fixed effects as this analysis includes only one executive per firm. Table 7 presents the results. Named CEOs have significantly higher *Delta, Vega*, and *Gamma* (at the 0.05 level or better), highlighting the importance of analyzing the incentives of named executives. That there is such large variance in equity incentives across CEOs of fraud firms depending on whether they perpetrated the fraud (and that only 61 percent of CEOs are perpetrators) provides a possible explanation for the conflicting results in the literature.

4.2 Robustness Analysis

4.2.1 Matched Sample

While comparing named versus non-named executives in the same fraud firm holding all firm level factors constant provides superior identification to matched or unmatched sample

analysis, it provides less direct evidence on whether analyzing named versus non-named executives can explain discrepancies in the prior literature.

Following prior research (Denis et al [2006], Efendi et al [2007], Feng et al [2011]) I create an industry (2 digit SIC code), year (year prior to fraud), size (total assets) matched sample of fraud and non-fraud firms[12] and estimate the following logistic regression at the executive level for each of the top 5 paid executives at all firms:

$$Named_{i,j} = \alpha + \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \beta_{4-18} controls_{i,j} + \varepsilon_{i,j} \quad (5).$$

Named, Delta, Vega, and *Gamma* are as defined above. Control variables include *CEO* and *CFO* (as defined above), and a number of variables used in prior research including: *Mcap* (the natural logarithm of the firm's market capitalization), *MTB* (the ratio of market capitalization to book value of equity), *Leverage* (book value of debt divided by book value of equity), *ROA* (net income divided by total assets), *Capital* (net property, plant, and equipment divided by total assets), *AR* (accounts receivable divided by total assets), *Intangible* (research and development expense plus advertising expense all divided by sales), *Growth* (the percentage increase in sales in year t from year t-1), *Financing* (sum of equity and debt issued in the current period divided by total assets), *Acquisition* (an indicator variable set to 1 if current period acquisitions are more than 20 percent of total sales and 0 otherwise), *KZ* (the financial constraint proxy developed by Kaplan and Zingales [1997]), *Return* (buy and hold return from the prior 12 months), and *Firm*

[12] Armstrong et al [2010] and Armstrong et al [2013] also create propensity score matched samples but they find similar results when using an industry, year, size matched sample. Further, these studies calculate a propensity score on a firm-level measure of equity incentives and I calculate incentives at the executive level for multiple executives in the same firm.

Age (the number of years the firm has been on Compustat)[13]. All controls are measured as of the beginning of the year fraud began. All continuous controls are winsorized at 1 percent and 99 percent.

The results are presented in Table 8. Panel A presents results without control variables and Panel B includes control variables. In both panels *Delta, Vega*, and *Gamma* are positively associated with perpetrating fraud at the 0.01 level. The economic significant of *Delta, Vega*, and *Gamma* is similar to that in prior tables (a standard deviation increase is associated with between a 10 and 20 percent increase in perpetrating fraud), though the signifiance of *Gamma* is lower in this estimation. The results in Panel B suggest that fraud firms are smaller, more highly levered, have lower return on assets, have issued more debt/equity, and are more financially constrained. The results suggest that in matched sample settings the choice of equity incentive proxy does not influence the association between equity incentives and fraud when the incentives of the perpetrators are isolated from those of executives not involved in the fraud.

To more closely replicate the prior literature I estimate the following logistic regression separately for CEOs who are named perpetrators and the associated matched non-fraud firm CEOs and CEOs not named and the associated matched non-fraud firm CEOs:

$$Fraud_{i,j} = \alpha + \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \beta_{4-16} controls_{i,j} + \varepsilon_{i,j} \quad (6).$$

Fraud is an indicator variable equal to 1 for fraud firms and 0 for matched non-fraud firms. The results are presented in Table 9. CEOs who commit fraud have significantly higher *Delta, Vega*,

[13] All variables are defined in Appendix A.

and *Gamma* than do CEOs at matched non-fraud firms (at the 0.01 level). However, CEOs at fraud firms who did not commit fraud had *Delta, Vega*, and *Gamma* no different than those of CEOs at matched non-fraud firms. These results further underscore the importance of measuring the incentives of those involved in the fraud and suggest that conflicting results in the prior literature can be explained, at least in part, by the comingling of named and non-named CEOs in the sample of fraud firms.

4.2.2 Unmatched Sample

Previous studies have also used unmatched samples of misreporting firms and 'clean' firms (Cheng and Farber [2008], Jiang et al [2010], Burns and Kedia [2006]). In order to investigate whether prior results using unmatched samples are sensitive to selecting on named versus non-named executives I estimate the following Cox proportional hazards model:

$$Named_{i,j} = \alpha + \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \beta_{4-18} controls_{i,j} + \varepsilon_{i,j} \quad (7).$$

All variables are as defined above. As there is no matching on the fraud year in this sample, all years with required data are included in the sample. The results are presented in Table 10. Panel A presents results without control variables and Panel B with controls. In all estimations *Delta, Vega*, and *Gamma* are significantly associated with perpetrating fraud at the 0.05 level or better. The hazard rates of 1.030, 1.002, and 1.002 on *Delta, Vega*, and *Gamma* respectively indicate that a one standard deviation increase in the aforementioned proxies is associated with an increase in the probability of perpetrating fraud of 30 percent (*Delta*), 30 percent (*Vega*), and 12 percent

(*Gamma*). The control variables in the hazard model have similar signs and statistical significances compared to those in Table 8.

To provide greater comparability to prior research and to provide further insight into whether equity incentives are associated with perpetrating fraud for different executive roles I estimate the follow Cox proportional hazards model separately for named and non-named CEOs, CFOs, and non CEO/CFOs:

$$Fraud_{i,j} = \alpha + \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \beta_{4-16} controls_{i,j} + \varepsilon_{i,j} \quad (8).$$

All variables are as defined above. Table 11 presents the results. Panel A presents evidence that *Delta, Vega*, and *Gamma* are significantly associated with fraud for CEOs who committed the fraud, but are not associated with fraud at fraud firms where the CEO was not involved. Panels B and C present similar results for CFOs and non CEO/CFOs respectively. Named CEOs, CFOs, and other senior executives all have strong equity incentives using multiple proxies for equity incentives when they commit fraud. Non named executives at fraud firms do not have significantly higher equity incentives than executives in the same role at non-fraud firms. The results provide further evidence that when capturing the incentives of those who actually perpetrate the fraud different research design choices (matched versus unmatched samples) yield the same results and different proxies for equity incentives yield the same results. The results also provide evidence that equity compensation is associated with perpetrating fraud for non CEOs and CFOs.

In sum, the results in tables 8-11 provide support for the hypothesis that equity incentives are associated with perpetrating fraud and that when the incentives of those involved with the fraud are distinguished from those not involved with the fraud the results are robust to equity incentive measurement and research design choices.

5. SUMMARY AND CONCLUSIONS

I examine the relation between executive equity incentives and financial statement fraud. Executives named as perpetrators of fraud have significantly higher equity incentives in analyses with over 1,500 executives at over 350 fraud firms. The results hold in intra-firm analysis examining the equity incentives of the top five paid executives and holding all firm-level and environmental factors associated with fraud constant. The results hold when measuring equity incentives using portfolio delta, vega, and gamma. The results hold for CEOs, CFOs, and other c-suite positions. The results hold in matched pairs of fraud and non-fraud firms and in unmatched specifications. The results suggest that equity compensation can create strong incentives to manipulate financial statements and that it is important to measure the incentives of the individuals who actually perpetrate the fraud.

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Table 1
Sample Composition and Statistics

AAERs	3690
AAER firms charged with financial statement fraud with DEF 14A filings containing compensation data in the year before fraud	355
Executives with compensation data in DEF 14A filing the year before fraud began	1574

	Total	Named	Percentage Named
CEOs	363	209	58%
CFOs	188	104	55%
Other top 5 executives	1023	260	25%
Total	1574	573	36%

Table 1 provides summary statistics on the number of financial statement fraud firms and executives for which compensation data is available and the proportion of various executives who were named as perpetrators of the fraud.

Table 2
Panel A: Summary Statistics - Equity Incentives

	Named Executives		Not Named Executives	
	Mean	Median	Mean	Median
Delta	4.82***	0.64***	2.52	0.28
Vega	77.50***	9.89***	42.63	4.39
Gamma	37.63***	6.66***	20.61	3.62
Delta Share	2.85***	0.24***	1.47	0.11
Delta U Opt	1.10***	0.24***	0.58	0.11
Delta E Opt	0.87***	0.12***	0.46	0.04
Vega U Opt	52.85***	7.33***	29.86	2.84
Vega E Opt	24.62***	2.50***	12.72	0.78
Gamma U Opt	20.34***	4.25***	11.41	2.35
Gamma E Opt	17.25***	2.35***	9.17	1.25

Table 2, Panel A provides mean and median values of proxies for equity incentives for named and not named executives at fraud firms in the period before fraud began and measures the statistical significance of differences between named and not named executives. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price; Share refers to shares an executive owns; U Opt refers to unexercisable options; and E Opt refers to exercisable options. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels

Table 2

Panel B: Summary Statistics - Equity Incentives by Role

	Named CEO		Not Named CEO		Named CFO		Not Named CFO		Named Other		Not Named Other	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Delta	8.92***	1.81***	5.80	1.08	2.29***	0.42**	0.96	0.22	3.19***	0.40***	1.93	0.21
Vega	115.18***	17.33***	71.83	7.31	48.88***	8.91**	26.50	5.63	65.57***	8.80***	36.88	3.99
Gamma	61.14***	14.48***	36.58	9.69	25.21***	4.72**	10.12	2.92	30.75***	6.15***	15.87	3.11

Table 2, Panel B provides mean and median values of proxies for equity incentives for named and not named executives by role at fraud firms in the period before fraud began and measures the statistical significance of differences between named and not named executives by role. Other executives include any top 5 paid executives who are not the CEO or CFO. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 2
Panel C: Summary Statistics - Firm-Level Variables

	Fraud Firms		Non-Fraud Firms	
	Mean	Median	Mean	Median
Mcap	6.07***	6.00**	6.61	6.30
MTB	4.46	2.61	3.85	2.47
Leverage	0.90***	0.31**	0.41	0.16
ROA	-0.19***	0.03***	0.01	0.05
Capital	0.32**	0.20	0.27	0.19
AR	0.33***	0.25***	0.24	0.19
Intangible	0.10*	0.01	0.19	0.02
Growth	0.54***	0.21***	0.20	0.11
Financing	0.73***	0.10***	0.25	0.04
Acquisition	0.09	0.00	0.06	0.00
KZ	0.57	0.83	0.64	0.75
Return	0.33	0.14	0.28	0.15
Firm Age	12.64***	8.00***	16.47	12.00

Table 2, Panel C provides mean and median values for fraud firms and matched control firms measured at the beginning of the violation year. *Mcap* is the natural logarithm of the firm's market capitalization; *MTB* is the ratio of the firm's market value of equity to book value of equity; *Leverage* is the total book value of debt scaled by the total book value of equity; *ROA* is net income divided by total assets; *AR* is accounts receivable divided by total assets; *Intangible* is research and development expense plus advertising expense all scaled by sales; *Growth* is sales in year t less sales in year t-1 all scaled by sales in year t-1; *Financing* is the sum of equity and debt issued in the current period divided by total assets; *Acquisition* is an indicator variable equal to 1 if current period acquisitions are more than 20 percent of sales and 0 otherwise; *KZ* is the financial constraint proxy developed by Kaplan and Zingales [1997]; *Return* is the buy and hold return for the previous 12 months; *Firm Age* is the number of years the firm has been listed on Compustat. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 3
Correlations of Equity Incentives by Role

	CEO Delta	CEO Vega	CEO Gamma	CFO Delta	CFO Vega	CFO Gamma	Other Delta	Other Vega	Other Gamma
CEO Delta	1								
CEO Vega	0.71*	1							
CEO Gamma	0.19*	0.31*	1						
CFO Delta	0.56*	0.59*	0.32*	1					
CFO Vega	0.54*	0.80*	0.36*	0.87*	1				
CFO Gamma	0.02	0.11	0.64*	0.23*	0.17*	1			
Other Delta	0.44*	0.33*	0.01	0.31*	0.31*	-0.07	1		
Other Vega	0.48*	0.69*	0.11*	0.19*	0.48*	-0.02	0.54*	1	
Other Gamma	0.01	0.08*	0.54*	-0.04	0.04	0.15*	0.12*	0.20*	1

Table 3 provides correlations between proxies for equity incentives across roles in fraud firms in the period before the fraud began. Other executives are any top 5 paid executives who are not the CEO or CFO. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price. * denotes statistical significance at or beyond the 0.10 level.

Table 4

Panel A: Intra Firm Analysis

$$Named_{i,j} = \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \varepsilon_{i,j}$$

Delta	0.034***			0.020***	0.027***		0.019***
	(4.97)			(2.76)	(3.89)		(2.61)
Vega		0.004***		0.003***		0.003***	0.002**
		(5.04)		(3.26)		(3.53)	(2.10)
Gamma			0.011***		0.009***	0.009***	0.009***
			(5.97)		(5.41)	(5.03)	(5.01)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-Squared	0.02	0.02	0.04	0.03	0.05	0.05	0.06
Firms	355	355	355	355	355	355	355
Executives	1,574	1,574	1,574	1,574	1,574	1,574	1,574

Table 4, Panel A provides results for estimates of equation (1) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 4

Panel B: Intra Firm Analysis with Role Indicators

$$Named_{i,j} = \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \beta_4 CEO_{i,j} + CFO_{i,j} + \varepsilon_{i,j}$$

Delta	0.026***			0.017**	0.021***		0.018***
	(3.66)			(2.33)	(3.01)		(2.74)
Vega		0.003***		0.002**		0.002***	0.002**
		(3.87)		(2.42)		(2.64)	(2.29)
Gamma			0.009***		0.008***	0.008***	0.008***
			(5.12)		(4.80)	(4.45)	(4.48)
CEO	0.911***	0.908***	0.901***	0.867***	0.805***	0.826***	0.780***
	(7.42)	(7.42)	(7.41)	(6.98)	(6.38)	(6.60)	(6.15)
CFO	1.600***	1.579***	1.580***	1.600***	1.617***	1.600***	1.621***
	(8.59)	(8.51)	(8.36)	(8.59)	(8.51)	(8.44)	(8.52)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Pseudo R-Squared	0.10	0.10	0.11	0.10	0.12	0.12	0.12
Firms	355	355	355	355	355	355	355
Executives	1,574	1,574	1,574	1,574	1,574	1,574	1,574

Table 4, Panel B provides results for estimates of equation (1) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price; *CEO* is an indicator variable set to 1 if the executive is the firm's CEO and 0 otherwise; *CFO* is an indicator variable set to 1 if the executive is the firm's CFO and 0 otherwise. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 4

Panel C: Intra Firm Analysis Excluding Roles

$$Named_{i,j} = \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \varepsilon_{i,j}$$

	Drop CEO	Drop CFO
Delta	0.015**	0.031***
	(2.25)	(2.98)
Vega	0.002**	0.002**
	(2.18)	(2.05)
Gamma	0.012***	0.009***
	(3.69)	(4.66)
Firm Fixed Effects	Yes	Yes
Pseudo R-Squared	0.05	0.07
Firms	305	312
Executives	1,041	1,284

Table 4, Panel C provides results for estimates of equation (1) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 5

Panel A: Delta - Components

$$Named_{i,j} = \beta_1 Delta\ Share_{i,j} + \beta_2 Delta\ U\ Opt_{i,j} + \beta_3 Delta\ E\ Opt_{i,j} + \beta_4 CEO_{i,j} + \beta_5 CFO_{i,j} + \varepsilon_{i,j}$$

Delta Share	0.027***			0.025**
	(2.80)			(2.41)
Delta U Opt		0.196***		0.200***
		(3.70)		(3.31)
Delta E Opt			0.086**	-0.034
			(2.00)	(-0.62)
CEO	0.951***	0.944***	0.973***	0.889***
	(7.80)	(7.81)	(7.93)	(7.10)
CFO	1.589***	1.584***	1.562***	1.616***
	(8.57)	(8.49)	(8.46)	(8.61)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Pseudo R-Squared	0.09	0.10	0.09	0.10
Firms	355	355	355	355
Executives	1,574	1,574	1,574	1,574

Table 5, Panel A provides results for estimates of equation (2) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta Share* is the change in value of an executive's stock holdings for a 1 percent change in stock price; *Delta U Opt* is the change in value of an executive's unexercisable option holdings for a 1 percent change in stock price; *Delta E Opt* is the change in value of an executive's exercisable option holdings for a 1 percent change in stock price; *CEO* is an indicator variable set to 1 if the executive is the firm's CEO and 0 otherwise; *CFO* is an indicator variable set to 1 if the executive is the firm's CFO and 0 otherwise. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 5

Panel B: Vega - Components

$$Named_{i,j} = \beta_1 Vega\ U\ Opt_{i,j} + \beta_2 Vega\ E\ Opt_{i,j} + \beta_3 CEO_{i,j} + \beta_4 CFO_{i,j} + \varepsilon_{i,j}$$

Vega U Opt	0.006***		0.005***
	(4.79)		(4.10)
Vega E Opt		0.005***	0.001
		(2.92)	(0.68)
CEO	0.905***	0.949***	0.891***
	(7.42)	(7.81)	(7.23)
CFO	1.611***	1.565***	1.610***
	(8.59)	(8.49)	(8.59)
Firm Fixed Effects	Yes	Yes	Yes
Pseudo R-Squared	0.11	0.09	0.11
Firms	355	355	355
Executives	1,574	1,574	1,574

Table 5, Panel B provides results for estimates of equation (3) estimating the association between equity incentives and perpetrating financial statement fraud. *Vega U Opt* is the change in value of an executive's unexercisable option holdings for a 1 percent change in stock price volatility; *Vega E Opt* is the change in value of an executive's exercisable option holdings for a 1 percent change in stock price volatility; *CEO* is an indicator variable set to 1 if the executive is the firm's CEO and 0 otherwise; *CFO* is an indicator variable set to 1 if the executive is the firm's CFO and 0 otherwise. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 5

Panel C: Gamma - Components

$$Named_{i,j} = \beta_1 Gamma\ U\ Opt_{i,j} + \beta_2 Gamma\ E\ Opt_{i,j} + \beta_3 CEO_{i,j} + \beta_4 CFO_{i,j} + \varepsilon_{i,j}$$

Gamma U Opt	0.021***		0.020***
	(5.55)		(5.12)
Gamma E Opt		0.007***	0.003
		(3.16)	(1.22)
CEO	0.851***	0.945***	0.822***
	(6.91)	(7.76)	(6.54)
CFO	1.605***	1.566***	1.607***
	(8.45)	(8.49)	(8.47)
Firm Fixed Effects	Yes	Yes	Yes
Pseudo R-Squared	0.12	0.10	0.12
Firms	355	355	355
Executives	1,574	1,574	1,574

Table 5, Panel C provides results for estimates of equation (4) estimating the association between equity incentives and perpetrating financial statement fraud. *Gamma U Opt* measures the convexity of an executive's unexercisable option portfolio and captures the rate of change of option sensitivity to stock price; *Gamma E Opt* measures the convexity of an executive's exercisable option portfolio and captures the rate of change of option sensitivity to stock price; *CEO* is an indicator variable set to 1 if the executive is the firm's CEO and 0 otherwise; *CFO* is an indicator variable set to 1 if the executive is the firm's CFO and 0 otherwise. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 6

Randomization of Named Executives

$$Named_{i,j} = \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \varepsilon_{i,j}$$

Delta	0.003			0.000
	(0.61)			(0.03)
Vega		0.001		0.000
		(0.89)		(0.32)
Gamma			0.001	0.001
			(1.08)	(1.00)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Pseudo R-Squared	0	0	0	0
Firms	355	355	355	355
Executives	1,574	1,574	1,574	1,574

Table 6 provides results for estimates of equation (1) estimating the association between equity incentives and perpetrating financial statement fraud when perpetrators are randomly assigned. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 7

Named Versus Not Named CEOs At Fraud Firms

$$Named_{i,j} = \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \varepsilon_{i,j}$$

Delta	0.070***			0.046***
	(4.00)			(2.63)
Vega		0.006***		0.004**
		(3.92)		(2.32)
Gamme			0.005***	0.004***
			(3.51)	(2.72)
Intercept	-0.398***	-0.404***	-0.276**	-0.650***
	(-3.20)	(-3.22)	(-2.31)	(-4.56)
Pseudo R-Squared	0.07	0.07	0.03	0.11
Observations (CEOs)	363	363	363	363

Table 7 provides results for estimates of equation (1) estimating the association between equity incentives and perpetrating financial statement fraud comparing named and not named CEOs. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 8

Panel A: Matched Sample Analysis

$$Named_{i,j} = \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \varepsilon_{i,j}$$

Delta	0.030***			0.017***
	(6.30)			(2.74)
Vega		0.002***		0.001***
		(6.87)		(2.97)
Gamma			0.003***	0.002***
			(4.48)	(2.94)
Intercept	-1.662***	-1.685***	-1.652***	-1.741***
	(-29.65)	(-29.29)	(-28.76)	(-28.71)
Pseudo R-Squared	0.01	0.01	0.01	0.02
Firms	638	638	638	638
Executives	3,012	3,012	3,012	3,012

Table 8, Panel A provides results for estimates of equation (5) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 8

Panel B: Matched Sample Analysis with Controls

$$Named_{i,j} = \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \beta_{4-18} Controls_{i,j} + \varepsilon_{i,j}$$

Delta	0.042***			0.024***
	(6.44)			(2.68)
Vega		0.003***		0.002***
		(6.18)		(3.31)
Gamma			0.003***	0.002***
			(4.39)	(2.70)
Mcap	-0.160***	-0.197***	-0.110***	-0.207***
	(-4.50)	(-5.41)	(-3.19)	(-5.90)
MTB	-0.014	-0.014	-0.008	-0.015
	(-1.44)	(-1.51)	(-0.80)	(-1.50)
Leverage	0.092***	0.089***	0.083***	0.087***
	(3.53)	(3.34)	(3.10)	(3.31)
ROA	-0.229***	-0.232***	-0.195**	-0.212***
	(-3.07)	(-2.85)	(-2.42)	(-2.58)
Capital	-0.188	-0.139	-0.152	-0.111
	(-0.98)	(-0.74)	(-0.80)	(-0.58)
AR	0.319	0.258	0.342	0.358
	(1.18)	(0.93)	(1.26)	(1.28)
Intangible	-0.466**	-0.476**	-0.598**	-0.527**
	(-2.02)	(-2.10)	(-2.22)	(-2.16)
Growth	0.157***	0.172***	0.134***	0.155***
	(3.16)	(3.50)	(2.91)	(3.21)
Financing	0.122**	0.114**	0.140**	0.126**
	(2.15)	(2.01)	(2.51)	(2.19)
Acquisition	0.133	0.195	0.132	0.162
	(0.54)	(0.81)	(0.53)	(0.66)
KZ	0.103***	0.098***	0.103***	0.097***
	(4.47)	(4.32)	(4.68)	(4.29)
Return	0.082	0.103	0.103	0.106
	(1.16)	(1.54)	(1.43)	(1.58)
Firm Age	-0.009	-0.013**	-0.009	-0.011
	(-1.46)	(-2.02)	(-1.38)	(-1.64)
CEO	0.646***	0.675***	0.723***	0.546***
	(6.11)	(6.66)	(7.12)	(4.97)
CFO	0.757***	0.750***	0.721***	0.750***
	(5.39)	(5.30)	(5.09)	(5.27)
Intercept	-1.154***	-0.922***	-1.487***	-0.950***
	(-5.43)	(-4.25)	(-6.88)	(-4.37)
Pseudo R-Squared	0.08	0.08	0.07	0.09
Firms	546	546	546	546
Executives	2,552	2,552	2,552	2,552

Table 8, Panel B - Continued

Table 8, Panel B provides results for estimates of equation (5) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price; *Mcap* is the natural logarithm of the firm's market capitalization; *MTB* is the ratio of the firm's market value of equity to book value of equity; *Leverage* is the total book value of debt scaled by the total book value of equity; *ROA* is net income divided by total assets; *Capital* is net property, plant, and equipment divided by total assets; *AR* is accounts receivable divided by total assets; *Intangible* is research and development expense plus advertising expense all scaled by sales; *Growth* is sales in year t less sales in year t-1 all scaled by sales in year t-1; *Financing* is the sum of equity and debt issued in the current period divided by total assets; *Acquisition* is an indicator variable equal to 1 if current period acquisitions are more than 20 percent of sales and 0 otherwise; *KZ* is the financial constraint proxy developed by Kaplan and Zingales [1997]; *Return* is the buy and hold return for the previous 12 months; *Firm Age* is the number of years the firm has been listed on Compustat. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 9
Matched Sample Analysis - CEOs

$$Fraud_{i,j} = \beta_1 Delta_{i,j} + \beta_2 Vega_{i,j} + \beta_3 Gamma_{i,j} + \beta_{4-16} Controls_{i,j} + \varepsilon_{i,j}$$

	CEO Named as Perpetrator	CEO Not Named as Perpetrator
Delta	0.064***	0.014
	(2.79)	(0.89)
Vega	0.006***	0.002
	(3.31)	(1.32)
Gamma	0.008***	-0.002
	(2.81)	(-0.94)
Mcap	-0.724***	-0.197**
	(-5.78)	(-2.14)
MTB	-0.004	-0.017
	(-0.10)	(-0.58)
Leverage	0.142	0.139*
	(1.14)	(1.75)
ROA	-0.065	-1.592***
	(-0.12)	(-2.62)
Capital	-0.134	0.287
	(-0.25)	(0.59)
AR	1.526**	1.180**
	(2.07)	(2.06)
Intangible	-1.709*	-0.431
	(-1.75)	(-1.49)
Growth	0.765**	0.330
	(2.05)	(1.47)
Financing	0.655**	0.134
	(2.33)	(0.78)
Acquisition	-0.309	0.005
	(-0.50)	(0.01)
KZ	0.194*	0.134**
	(1.76)	(2.09)
Return	0.392**	-0.127
	(2.20)	(-0.71)
Firm Age	-0.008	-0.010
	(-0.61)	(-0.88)
Intercept	2.528***	0.444
	(3.84)	(0.80)
Test of Difference Across Models	P-Value	
Delta	0.01	
Vega	0.01	
Gamma	0.01	
Pseudo R-Squared	0.30	0.12
CEOs	276	270

Table 9 - Continued

Table 9 provides results for estimates of equation (6) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price; *Mcap* is the natural logarithm of the firm's market capitalization; *MTB* is the ratio of the firm's market value of equity to book value of equity; *Leverage* is the total book value of debt scaled by the total book value of equity; *ROA* is net income divided by total assets; *Capital* is net property, plant, and equipment divided by total assets; *AR* is accounts receivable divided by total assets; *Intangible* is research and development expense plus advertising expense all scaled by sales; *Growth* is sales in year t less sales in year t-1 all scaled by sales in year t-1; *Financing* is the sum of equity and debt issued in the current period divided by total assets; *Acquisition* is an indicator variable equal to 1 if current period acquisitions are more than 20 percent of sales and 0 otherwise; *KZ* is the financial constraint proxy developed by Kaplan and Zingales [1997]; *Return* is the buy and hold return for the previous 12 months; *Firm Age* is the number of years the firm has been listed on Compustat. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 10

Panel A: Unmatched Sample - Survival Analysis

$$Named_{i,j,t} = \beta_1 Delta_{i,j,t} + \beta_2 Vega_{i,j,t} + \beta_3 Gamma_{i,j,t} + \varepsilon_{i,j,t}$$

Delta	1.062***			1.047***
	(22.64)			(7.43)
Vega		1.004***		1.001**
		(14.68)		(2.08)
Gamma			1.005***	1.003***
			(10.87)	(5.13)
Pseudo R-Squared	0.18	0.14	0.09	0.23
Firms	4,393	4,393	4,393	4,393
Executives	43,099	43,099	43,099	43,099
Observations	218,985	218,985	218,985	218,985

Table 10, Panel A provides results for estimates of equation (7) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 10

Panel B: Unmatched Sample - Survival Analysis with Controls

$$Named_{i,j,t} = \beta_1 Delta_{i,j,t} + \beta_2 Vega_{i,j,t} + \beta_3 Gamma_{i,j,t} + \beta_{4-18} Controls_{i,j,t} + \varepsilon_{i,j,t}$$

Delta	1.049***			1.030***
	(8.80)			(2.88)
Vega		1.004***		1.002***
		(8.69)		(2.79)
Gamma			1.003***	1.002***
			(5.36)	(3.08)
Mcap	0.734***	0.716***	0.783***	0.722***
	(-9.19)	(-7.96)	(-5.47)	(-7.97)
MTB	1.011	1.016	1.017	1.012
	(1.25)	(1.49)	(1.41)	(1.11)
Leverage	1.077***	1.065**	1.065**	1.070**
	(3.44)	(2.24)	(2.17)	(2.44)
ROA	0.806***	0.829***	0.856**	0.822***
	(-4.30)	(-2.67)	(-2.21)	(-2.83)
Capital	0.614***	0.637*	0.652*	0.648*
	(-2.76)	(-1.96)	(-1.88)	(-1.91)
AR	2.464***	2.485***	2.721***	2.536***
	(5.34)	(3.73)	(4.16)	(3.86)
Intangible	0.666**	0.650*	0.624*	0.655*
	(-2.28)	(-1.73)	(-1.69)	(-1.77)
Growth	1.122**	1.130*	1.113	1.121*
	(2.11)	(1.87)	(1.59)	(1.73)
Financing	1.174***	1.188***	1.190***	1.186***
	(3.33)	(2.81)	(2.84)	(2.79)
Acquisition	1.669***	1.619**	1.584**	1.629**
	(3.42)	(2.18)	(2.09)	(2.19)
KZ	1.078***	1.076***	1.075***	1.074***
	(4.67)	(3.46)	(3.51)	(3.46)
Return	1.072	1.081	1.102	1.079
	(1.33)	(1.09)	(1.36)	(1.06)
Firm Age	0.965***	0.963***	0.962***	0.964***
	(-7.65)	(-5.58)	(-5.72)	(-5.32)
CEO	3.591***	3.740***	4.018***	3.348***
	(11.25)	(13.34)	(14.46)	(11.59)
CFO	2.110***	2.102***	2.051***	2.099***
	(5.62)	(5.70)	(5.50)	(5.71)
Pseudo R-Squared	0.68	0.69	0.66	0.70
Executives	39,452	39,452	39,452	39,452
Observations	192,312	192,312	192,312	192,312

Table 10, Panel B - Continued

Table 10, Panel B provides results for estimates of equation (7) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price; *Mcap* is the natural logarithm of the firm's market capitalization; *MTB* is the ratio of the firm's market value of equity to book value of equity; *Leverage* is the total book value of debt scaled by the total book value of equity; *ROA* is net income divided by total assets; *Capital* is net property, plant, and equipment divided by total assets; *AR* is accounts receivable divided by total assets; *Intangible* is research and development expense plus advertising expense all scaled by sales; *Growth* is sales in year t less sales in year t-1 all scaled by sales in year t-1; *Financing* is the sum of equity and debt issued in the current period divided by total assets; *Acquisition* is an indicator variable equal to 1 if current period acquisitions are more than 20 percent of sales and 0 otherwise; *KZ* is the financial constraint proxy developed by Kaplan and Zingales [1997]; *Return* is the buy and hold return for the previous 12 months; *Firm Age* is the number of years the firm has been listed on Compustat. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 11

Panel A: Matched Sample Analysis - CEOs

$$Fraud_{i,j,t} = \beta_1 Delta_{i,j,t} + \beta_2 Vega_{i,j,t} + \beta_3 Gamma_{i,j,t} + \beta_{4-16} Controls_{i,j,t} + \varepsilon_{i,j,t}$$

	CEO Named as Perpetrator	CEO Not Named as Perpetrator
Delta	1.037***	1.001
	(3.70)	(0.12)
Vega	1.002***	1.001
	(2.89)	(0.75)
Gamma	1.002***	0.999
	(2.74)	(-0.34)
Mcap	0.666***	0.772***
	(-8.17)	(-3.54)
MTB	1.002	1.009
	(0.12)	(0.45)
Leverage	1.064**	1.140**
	(2.00)	(2.56)
ROA	0.880	0.884
	(-1.19)	(-1.48)
Capital	0.670	0.784
	(-1.27)	(-0.73)
AR	2.836***	2.824***
	(3.30)	(2.76)
Intangible	0.453*	0.944
	(-1.78)	(-0.41)
Growth	1.093	1.037
	(0.87)	(0.35)
Financing	1.155	1.200
	(1.49)	(1.44)
Acquisition	1.176	1.702*
	(0.52)	(1.74)
KZ	1.090***	1.010
	(3.22)	(0.22)
Return	1.167*	0.903
	(1.68)	(-0.83)
Firm Age	0.955***	0.956***
	(-4.90)	(-4.63)
Test of Difference Across Models	P-Value	
Delta	0.01	
Vega	0.02	
Gamma	0.01	
Pseudo R-Squared	0.66	0.53
CEOs	5,968	5,905
Observations	25,290	25,165

Table 11, Panel A - Continued

Table 11, Panel A provides results for estimates of equation (8) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price; *Mcap* is the natural logarithm of the firm's market capitalization; *MTB* is the ratio of the firm's market value of equity to book value of equity; *Leverage* is the total book value of debt scaled by the total book value of equity; *ROA* is net income divided by total assets; *Capital* is net property, plant, and equipment divided by total assets; *AR* is accounts receivable divided by total assets; *Intangible* is research and development expense plus advertising expense all scaled by sales; *Growth* is sales in year t less sales in year t-1 all scaled by sales in year t-1; *Financing* is the sum of equity and debt issued in the current period divided by total assets; *Acquisition* is an indicator variable equal to 1 if current period acquisitions are more than 20 percent of sales and 0 otherwise; *KZ* is the financial constraint proxy developed by Kaplan and Zingales [1997]; *Return* is the buy and hold return for the previous 12 months; *Firm Age* is the number of years the firm has been listed on Compustat. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 11

Panel B: Matched Sample Analysis - CFOs

$$Fraud_{i,j,t} = \beta_1 Delta_{i,j,t} + \beta_2 Vega_{i,j,t} + \beta_3 Gamma_{i,j,t} + \beta_{4-16} Controls_{i,j,t} + \varepsilon_{i,j,t}$$

	CFO Named as Perpetrator	CFO Not Named as Perpetrator
Delta	1.063**	0.974
	(2.51)	(-0.40)
Vega	1.003***	1.002
	(2.88)	(0.65)
Gamma	1.003**	0.998
	(2.10)	(-0.51)
Mcap	0.664***	1.021
	(-4.73)	(0.17)
MTB	0.994	1.017
	(-0.33)	(0.46)
Leverage	1.122**	1.153*
	(2.46)	(1.96)
ROA	1.081	0.932
	(0.57)	(-0.43)
Capital	0.833	1.144
	(-0.44)	(0.26)
AR	4.386***	6.909***
	(4.76)	(3.45)
Intangible	0.898	0.747
	(-0.55)	(-0.61)
Growth	1.125	1.328**
	(1.10)	(2.02)
Financing	1.187	0.730
	(1.56)	(-1.24)
Acquisition	1.525	1.646
	(1.07)	(0.89)
KZ	1.038	0.986
	(0.88)	(-0.21)
Return	1.187	1.422**
	(1.39)	(2.24)
Firm Age	0.961***	0.960***
	(-3.34)	(-3.02)
Test of Difference Across Models	P-Value	
Delta	0.01	
Vega	0.05	
Gamma	0.02	
Pseudo R-Squared	0.60	0.52
CFOs	6,850	6,878
Observations	27,297	27,525

Table 11, Panel B - Continued

Table 11, Panel B provides results for estimates of equation (8) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price; *Mcap* is the natural logarithm of the firm's market capitalization; *MTB* is the ratio of the firm's market value of equity to book value of equity; *Leverage* is the total book value of debt scaled by the total book value of equity; *ROA* is net income divided by total assets; *Capital* is net property, plant, and equipment divided by total assets; *AR* is accounts receivable divided by total assets; *Intangible* is research and development expense plus advertising expense all scaled by sales; *Growth* is sales in year t less sales in year t-1 all scaled by sales in year t-1; *Financing* is the sum of equity and debt issued in the current period divided by total assets; *Acquisition* is an indicator variable equal to 1 if current period acquisitions are more than 20 percent of sales and 0 otherwise; *KZ* is the financial constraint proxy developed by Kaplan and Zingales [1997]; *Return* is the buy and hold return for the previous 12 months; *Firm Age* is the number of years the firm has been listed on Compustat. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Table 11

Panel C: Matched Sample Analysis - Excluding CEOs and CFOs

$$Fraud_{i,j,t} = \beta_1 Delta_{i,j,t} + \beta_2 Vega_{i,j,t} + \beta_3 Gamma_{i,j,t} + \beta_{4-16} Controls_{i,j,t} + \varepsilon_{i,j,t}$$

	Executive Named as Perpetrator	Executive Not Named as Perpetrator
Delta	1.048***	1.010
	(3.05)	(0.53)
Vega	1.003***	1.001
	(2.98)	(0.79)
Gamma	1.002**	1.001
	(2.54)	(0.68)
Mcap	0.778***	0.788***
	(-4.44)	(-4.26)
MTB	1.014	1.013
	(1.07)	(0.99)
Leverage	1.076*	1.067**
	(1.89)	(2.09)
ROA	0.777***	0.830**
	(-3.08)	(-2.53)
Capital	0.578*	0.523***
	(-1.97)	(-2.60)
AR	3.304***	3.168***
	(4.03)	(5.00)
Intangible	0.725	0.840
	(-1.45)	(-1.36)
Growth	1.115	1.146*
	(1.26)	(1.67)
Financing	1.244***	1.203**
	(3.05)	(2.54)
Acquisition	2.025***	1.735**
	(2.85)	(2.50)
KZ	1.063**	1.040
	(2.23)	(1.55)
Return	0.942	0.941
	(-0.56)	(-0.64)
Firm Age	0.969***	0.972***
	(-4.12)	(-4.23)
Test of Difference Across Models	P-Value	
Delta	0.01	
Vega	0.01	
Gamma	0.05	
Pseudo R-Squared	0.61	0.44
Executives	33,090	34,253
Observations	135,226	137,918

Table 11, Panel C - Continued

Table 11, Panel C provides results for estimates of equation (8) estimating the association between equity incentives and perpetrating financial statement fraud. *Delta* is the change in value of an executive's stock and option portfolio for a 1 percent change in stock price; *Vega* is the change in value of an executive's option portfolio for a 1 percent change in stock price volatility; *Gamma* measures the convexity of an executive's option portfolio and captures the rate of change of option sensitivity to stock price; *Mcap* is the natural logarithm of the firm's market capitalization; *MTB* is the ratio of the firm's market value of equity to book value of equity; *Leverage* is the total book value of debt scaled by the total book value of equity; *ROA* is net income divided by total assets; *Capital* is net property, plant, and equipment divided by total assets; *AR* is accounts receivable divided by total assets; *Intangible* is research and development expense plus advertising expense all scaled by sales; *Growth* is sales in year t less sales in year t-1 all scaled by sales in year t-1; *Financing* is the sum of equity and debt issued in the current period divided by total assets; *Acquisition* is an indicator variable equal to 1 if current period acquisitions are more than 20 percent of sales and 0 otherwise; *KZ* is the financial constraint proxy developed by Kaplan and Zingales [1997]; *Return* is the buy and hold return for the previous 12 months; *Firm Age* is the number of years the firm has been listed on Compustat. ***, **, and * denote statistical significance at the 0.01, 0.05, and 0.10 levels respectively.

Appendix A: Variable Definitions and Data Sources

Variable	Measurement
Data Source: AAERs	
Named	Indicator variable equal to 1 for individuals named as a perpetrator of fraud in the year fraud occurs and 0 otherwise.
Fraud	Indicator variable equal to 1 in the year fraud occurs and 0 otherwise.
Data Source: DEF 14A Filings/Execucomp	
Delta	Change in value of an executive's stock and option holdings for a 1% change in share price.
Vega	Change in value of an executive's option holdings for a 1% change in share price volatility.
Gamma	Rate of change in the value of an executive's option holdings for a 1% change in share price.
Delta Share	Change in value of an executive's stock holdings for a 1% change in share price.
Delta U Opt	Change in value of an executive's unexercisable option holdings for a 1% change in share price.
Delta E Opt	Change in value of an executive's exersisable option holdings for a 1% change in share price.
Vega U Opt	Change in value of an executive's unexercisable option holdings for a 1% change in share price volatility.
Vega E Opt	Change in value of an executive's exercisable option holdings for a 1% change in share price volatility.
Gamma U Opt	Rate of change in the value of an executive's unexercisable option holdings for a 1% change in share price.
Gamma E Opt	Rate of change in the value of an executive's exercisable option holdings for a 1% change in share price.
CEO	Indicator variable equal to 1 if the individual was the CEO during the current year and 0 otherwise.
CFO	Indicator variable equal to 1 if the individual was the CFO during the current year and 0 otherwise.
Data Source: Compustat	
Mcap	Natural logarithm of the firm's market capitalization.
MTB	Market value of equity divided by book value of equity.
Leverage	Total book value of debt divided by total book value of equity.
ROA	Net income divided by total assets.
Capital	Net property, plant, and equipment divided by total assets.
AR	Accounts receivable divided by total assets.
Intangible	Research and development expense plus advertising expense all scaled by sales.
Growth	Sales in year t less sales in year t - 1 all scaled by sales in year t - 1.
Financing	Sum of equity and debt issued in the current period divided by total assets.
Acquisition	Indicator variable equal to 1 if current period acquisitions are more than 20% of sales and 0 otherwise.
KZ	Financial constraint proxy developed in Kaplan and Zingales (1997)
Return	Buy and hold return for the previous 12 months.
Firm Age	Number of years the firm has been listed on Compustat.

Appendix B: Prior Research Summary

Study	Primary Equity Incentives Proxy	Accounting Irregularity Proxy	Sample	Sample Period	Unit of Analysis	Research Design	Observed Association
Armstrong, Jagolinzer, Larcker (2010)	Portfolio Delta	AAERs, Restatements, Litigation	Between 157 and 464 firm years plus matches depending on irregularity proxy	2001-2005	CEO	Matched pair, propensity score and year, industry, assets. Conditional logistic regression	None or Negative
Armstrong, Larcker, Ormazabla, Taylor (2013)	Portfolio Delta and Portfolio Vega	Discretionary Accruals, Restatements, AAERs	20,445 firm years in non-matched samples; 568 or 361 firm years in matched samples	1992-2009	Average of top 5 executives	Matched pair - propensity score and year, industry, size matched and OLS and probit models	Positive for Vega, no association for Delta when Vega included in the model
Baber, Kang, Liang (2007)	Compensation Mix, Exercisable Options scaled by Shares Outstanding	Restatements	193 firm years plus matches	1997-2002	CEO	Matched pair - year, industry, exchange, assets. Logistic regression	None
Burns, Kedia (2006)	Portfolio Delta, Component Deltas	Restatements, Restatement Magnitude	266 firm years plus all other Execucomp firm years	1995-2002	CEO	Pooled logistic regression, pooled OLS regression	Positive only for incentives related to stock options
Bergstressor, Philippon (2006)	Incentive Ratio (Portfolfio Delta scaled by compensation)	Discretionary Accruals	4,761 firm years	1994-2000	CEO	OLS regression	Positive

Appendix B: Prior Research Summary

Study	Primary Equity Incentives Proxy	Accounting Irregularity Proxy	Sample	Sample Period	Unit of Analysis	Research Design	Observed Association
Cheng, Farber (2008)	Value of option grants scaled by total compensation	Restatements	289 firm years plus control firms	1997-2001	CEO	OLS regression	Positive
Cheng, Warfield (2005)	Equity Holdings in Shares scaled by Shares Outstanding	Meet/Just Beat Forecast, Abnormal Accruals	All firms with available data during sample	1993-2000	CEO	Logistic regression	Positive for unexercisable options and stock holdings
Cheng, Warfield, Ye (2011)	Equity Holdings in Shares scaled by Shares Outstanding	Discretionary Loan Loss Provision	600 firm year observations	1994-2005	CEO	OLS regression	Positive only when capital ratios are close to minimum regulatory requirements
Cornett, Marcus, Tehranian (2008)	Equity Compensation scaled by total compensation	Discretionary Accruals	All firms in the S&P 100 Index over the sample period	1994-2003	CEO	OLS regression	Positive, mitigated by institutional ownership, board independence, and institutional investor representation on the board

Appendix B: Prior Research Summary

Study	Primary Equity Incentives Proxy	Accounting Irregularity Proxy	Sample	Sample Period	Unit of Analysis	Research Design	Observed Association
Denis, Hanouna, Sarin (2006)	Option Intensity	Litigation	358 firm years plus matches	1993-2002	CEO	Matched pair - industry, year, market capitalization. Logistic regression	Positive
Efendi, Srivastava, Swanson (2007)	Component Value, Option Intrinsic Value, Option Delta	Restatements, Severe Restatements	95 firm years plus matches	2001-2002	CEO	Matche pair - year, industry, assets. Logistic regression, ordered logistic regression	Positive for option intrinsic value and option delta
Erickson, Hanlon, Maydew (2006)	Portfolio Delta	AAERs	50 firm years plus matches	1996-2003	Average of top 5 executives	Matched pair - year, industry, assets. Logistic regression	None
Feng, Ge, Luo, Shevlin (2011)	Portfolio Delta	AAERs	116 firm years plus matches	1993-2005	CEO and CFO	matched pair - year, industry, assets. Conditional logistic regression	Positive CEO, no relation CFO
Harris, Bromiley (2007)	Option and Bonus Value scaled by Total Compensation Value	Restatements	434 firm years plus matches	1997-2002	CEO	Matche pair - year, industry, sales. Conditional logistic regression	Positive for Option Value scaled by Total Compensation Value

Appendix B: Prior Research Summary

Study	Primary Equity Incentives Proxy	Accounting Irregularity Proxy	Sample	Sample Period	Unit of Analysis	Research Design	Observed Association
Jiang, Petroni, Wang (2010)	Portfolio Delta	Discretionary Accruals, Meet/Just beat Forecast	All Execucomp firms over the sample period with both CEO and CFO data	1993-2006	CEO andCFO	OLS regression	No relation CEO, Positive CFO, no results in the Post SOX period
Johnson, Ryan, Tian (2009)	Portfolio Delta, Component Deltas	AAERs	53 firm years plus matches	1992-2001	Average of top 5 executives and CEO only	Matched pair - year, industry, revenue. Conditional logistic regression	Positive only for incentives related to unrestricted stock
Larcker, Richardson, Tuna (2007)	Compensation Mix	Restatements, Abnormal Accruals	1,484 firm years, 118 firm years plus all other firm year observations 2002-2003	2002-2003	CEO	OLS regression, pooled logistic regression	Positive, None
O'Connor, Priem, Coombs, Gilley (2006)	Black Scholes option value	Restatements	65 firm years plus matches	2000-2004	CEO	Matched pair - year, industry, sales, income, option vesting schedules	Positive if (1) CEO is board chairman and other board members do not receive options, or (2) CEO is not board chairman and other board members receive options

Appendix C: Variable Computations

Delta	$\frac{\partial V}{\partial S} * \frac{S}{100} = \frac{e^{-dT} N(Z) * S}{100}$
Vega	$\frac{\partial V}{\partial \sigma} * 0.01 = e^{-dT} N'(Z) S T^{\frac{1}{2}} * 0.01$
Gamma	$\frac{\partial^2 V}{\partial S^2} = \frac{e^{-dT} N(Z)}{S\sigma\sqrt{T}}$
V	$Se^{-dT} N(Z) - Xe^{-rT} N(Z - \sigma T^{\frac{1}{2}})$
Z	$\left[\ln\left(\frac{S}{X}\right) + T\left(r - d + \frac{\sigma^2}{2}\right)\right] / \sigma T^{1/2}$
N	Cumulative probability function for the normal distribution
N'	Normal density function
S	Price of the underlying stock
X	Exercise price of the option
σ	Expected stock return volatility over the life of the option
r	Natural Logarithm of the risk-free rate
T	Time to maturity of the option in years
d	Natural logarithm of expected dividend yield over the life of the option
KZ	$-\frac{1.002 CF_{i,t}}{A_{i,t-1}} - \frac{39.368 D_{i,t}}{A_{i,t-1}} - \frac{1.315 C_{i,t}}{A_{i,t-1}} + 3.139 B_{i,t} + 0.283 Q_{i,t}$
CF	Cash Flows
D	Cash Dividends
C	Cash Balance
B	Book leverage = book debt divided by the sum of book debt and book equity
Q	Tobin's Q = market value of equity plus assets minus book value of equity all scaled by assets
A	Total assets