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# CEO Equity Incentives and Audit Fees

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## ABSTRACT

This study examines whether CEO equity incentives have an impact on audit pricing. Prior studies investigate whether CEO equity incentives motivate executives to manage earnings for personal financial gains. Our focus is on whether auditors perceive CEO equity incentives to be associated with greater earnings manipulation risk and incorporate such risk in their pricing decisions. We find that CEO equity portfolio vega is positively related to audit fees after controlling for other determinants of audit fees, while equity portfolio delta is not significantly related to audit fees. This result holds after we account for potential endogeneity. The evidence suggests that auditors are concerned about CEOs' incentives to manage earnings because equity holdings tie CEOs' wealth to risk and cause CEOs to be less risk-averse. The findings in our study improve our understanding of how executive compensation affects auditors' pricing decisions.

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*JEL classification:* M41; M42; J33

*Keywords:* Equity Incentives; CEO Compensation; Audit Fees; Earnings Management

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## 1. Introduction

The extensive use of equity-based compensation for corporate executives has come under attack in recent years, triggered by an unprecedented number of accounting and governance scandals. The concern expressed by investors and regulators is that equity incentives in executives' compensation package cause them to focus on increasing personal financial gains at the expense of long-run value creation.<sup>1</sup> A large literature in accounting and finance examines the relation between executive equity incentives and earnings management, and the results have been mixed. Some studies find that equity incentives encourage executives to manage earnings (Cheng and Warfield 2005; Bergstresser and Philippon 2006; Burns and Kedia 2006; Efendi, Srivastava, and Swanson 2007; Cohen, Dey, and Lys 2008; Feng, Ge, Luo, and Shevlin 2011), while others find no evidence that executive equity incentives are linked to accounting manipulation (Erickson, Hanlon, and Maydew 2006; Armstrong, Jagolinzer, and Larcker 2010). A recent study by Armstrong, Larcker, Ormazabal, and Talyor 2013 investigates the incentive effects of equity compensation based on both the sensitivity of a manager's wealth to stock return volatility (vega) and the sensitivity of a manager's wealth to stock price (delta). They find a strong positive relation between vega and misreporting, and that the effects of vega subsume those of delta.

While the implications of executive equity incentives for earnings management are well studied in the literature, there is relatively little research on how auditors' risk assessments and pricing decisions are affected by executive equity incentives. In this study, we explore this issue by investigating the relation between CEO equity incentives and audit fees. Auditing standards suggest that auditors consider management's equity compensation as a risk factor when evaluating clients' risk of material misstatement (SAS No. 99, AICPA 2002; SAS No. 109, AICPA 2006). A

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<sup>1</sup> For example, Alan Greenspan, the former Chairman of the Federal Reserve Board, identified stock options among the underlying causes of accounting frauds: "Too many corporate executives sought ways to 'harvest' some of those stock market gains. As a result, the highly desirable spread of shareholding and options among business managers perversely created incentives to artificially inflate reported earnings in order to keep stock prices high and rising" (Greenspan 2002).

recent proposed auditing standard by the Public Company Accounting Oversight Board (PCAOB) calls for auditors to understand how a company has structured its executive compensation and to perform specific procedures designed to identify risks of material misstatement related to the company's executive compensation (PCAOB Release No. 2012-001, PCAOB 2012).

In response to higher client risk, auditors should alter auditing procedures to reduce audit risk to an acceptable level. Academic literature finds evidence that auditors increase audit fees to reflect a greater level of audit effort and higher billing rates for clients with greater earnings manipulation risk (e.g., Bedard and Johnstone 2004). If auditors perceive CEO equity incentives to be associated with risk of misstatement and incorporate such risk into their pricing decisions, we expect CEO equity incentives to have an impact on audit fees.<sup>2</sup>

We measure CEO equity incentives based on portfolio vega and delta, following Armstrong et al. 2013. The hypotheses on the relation between vega / delta and earnings management are built on the premise that earnings management can increase both stock price and stock return volatility (i.e., risk). Since vega captures the increase in the value of a manager's equity portfolio from an increase in stock price volatility, it provides managers with incentives to engage in activities that increase risk. Earnings management has been shown to increase firm risk (e.g., Pastor and Veronesi 2003; Rajgopal and Venkatachalam 2011; Armstrong et al. 2013). Thus, we expect the relation between portfolio vega and earnings management to be positive. In contrast, the net effect of delta on earnings management is unclear since delta has two different effects on earnings management. Delta may encourage earnings management because higher delta indicates a greater increase in the value of a manager's equity portfolio from an increase in stock price; however it may also discourage

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<sup>2</sup> Consistent with our prediction, a Big-Four audit firm partner we spoke to believes that when Alan Greenspan accused stock options leading to accounting frauds (see footnote 1), all auditors listened. He indicates that in his practice, auditors recognize the potential risk associated with executive equity incentives and when such risk is believed to be present, auditors are likely to increase engagement effort and hence audit fees. For example, auditors might apply more effort to identify areas where management bias might occur to boost compensation and perform additional procedures to detect possible earnings manipulation.

earnings management because higher delta reflects a greater effect of stock return volatility on the volatility of a manager's equity portfolio value, which may reduce managers' desire to manage earnings. Due to this reward-risk tradeoff, the relation between delta and earnings management is ambiguous. Based on the theoretical relation between vega / delta and earnings management, we expect equity portfolio vega to be positively related to audit fees, and do not have a directional prediction on the relation between equity portfolio delta and audit fees.

Using a sample of S&P 1500 companies over 2000-2009, we find evidence of a positive relation between CEO portfolio vega and audit fees, but no evidence of a relation between CEO portfolio delta and audit fees. This result is robust after controlling for client, auditor, and engagement attributes that have been shown to affect audit fees in prior studies. The evidence suggests that auditors perceive higher earnings management risk associated with equity compensation because equity holdings tie managers' wealth to risk as captured by vega, not because equity holdings tie managers' wealth to stock price as captured by delta. In other words, auditors are most concerned about managers' incentives to increase the value of their equity holdings by increasing risk, because managers with a higher vega are less risk averse and are more likely to manage earnings.

Endogeneity is an important concern in investigating the relation between CEO equity incentives and audit fees due to the endogenous nature of both variables. To mitigate concerns on endogeneity, we conduct a battery of tests. We first examine whether auditors charge higher audit fees when firms increase the use of stock options in CEO compensation. We find a significant audit fee increase for firms that grant CEO stock options for the first time in three years. We also find that the positive effect of equity portfolio vega on audit fees is robust to including firm fixed effects in the regressions.

While the change analysis and the firm fixed effects estimation help mitigate concerns that the relation between CEO equity incentives and audit fees is caused by time-invariant unobservable factors, it does not necessarily mitigate endogeneity arising when an omitted time-variant factor (such as the adoption of a risky project) leads to an increase in both stock option compensation and audit fees. To mitigate this concern, we include additional controls for the riskiness of firm investment and financial policies in the regression, and employ an instrumental variables approach to estimate the audit fees model. We continue to find a positive relation between CEO equity portfolio vega and audit fees.

Endogeneity may also arise due to simultaneity (i.e., the explanatory variable is also a function of the dependent variable), or the dynamic nature of the relation (i.e., when current values of the explanatory variable are a function of past values of the dependent variable). Following Wintoki, Linck, and Netter 2012, we estimate a dynamic panel generalized method of moments (GMM) model and continue to find a significantly positive relation between CEO equity portfolio vega and audit fees.<sup>3</sup> In sum, our results are robust to various methodologies that attempt to address potential endogeneity arising from different sources. While these tests mitigate concerns about endogeneity, we acknowledge that endogeneity concerns cannot be completely ruled out due to the limitations of these methodologies.<sup>4</sup>

We focus on CEO equity incentives in our main analysis, but chief financial officers (CFOs) might also play an important role in earnings management since they have primary responsibility over financial reporting.<sup>5</sup> We thus also examine whether auditors consider CFO

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<sup>3</sup> The dynamic GMM estimator is developed in a series of studies by Holtz-Eakin, Newey, and Rosen 1988, Arellano and Bond 1991, Arellano and Bover 1995, and Blundell and Bond 1998, and has been recently applied in corporate finance research (Hoechle, Schmid, and Yermack 2012; Wintoki et al. 2012).

<sup>4</sup> We discuss these methodologies and their limitations in detail in Section 5.

<sup>5</sup> Several studies examine the relative importance of CEO and CFO equity incentives in earnings management and find mixed results. Section 6 provides a detailed discussion of these studies.

equity incentives in their pricing decisions. We find insignificant coefficients on CFO vega and delta, and continue to find a significantly positive coefficient on CEO vega and an insignificant coefficient on CEO delta. The results suggest that auditors perceive CEO equity incentives, but not CFO equity incentives, to play a significant role in earnings management.

While we interpret our results as auditors perceiving higher earnings management risk associated with CEO equity incentives and hence increasing audit fees, another possibility is that auditors might charge a higher fee simply because stock-based compensation is more difficult to audit and requires more audit effort and/or higher billing rates, which we refer to as the “direct” effect of equity incentives. To investigate this possibility, we measure the direct effect based on the fair value of stock options granted to non-executive employees and add this variable to the regressions. We find no evidence of a significant direct effect of stock option compensation on audit fees and our main results regarding CEO vega and delta remain unchanged. The results suggest that the positive relation between audit fees and CEO equity incentives reflects auditors’ perception of higher audit risk associated with equity incentives, rather than the direct effect of stock option accounting on audit fees.

As indicated earlier, prior studies find that CEO equity incentives are positively related to accrual-based earnings management. One potential concern is that any positive relation between audit fees and CEO equity incentives merely reflects the effect of abnormal accruals on audit fees. We find that all of our inferences remain unchanged after controlling for abnormal accruals in the regressions, while there is no evidence that audit fees are related to abnormal accruals.<sup>6</sup>

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<sup>6</sup> We argue that CEO equity incentives better capture the ex ante earnings management risk that auditors take into account when setting audit fees. On the other hand, abnormal accruals capture ex post earnings management activities as reflected in companies’ audited financial statements, which are jointly determined by managers’ incentives to manage earnings and auditors’ efforts to constrain such activities.

Our study makes several important contributions. First, executive compensation and auditor compensation are two large and important areas of research in the accounting literature. While there are numerous studies in each research stream, relatively few studies have attempted to connect these two literatures. Consequently, Wysocki (2010) calls for future research to “help us better understand the links between firms’ executive compensation and auditor compensation policies” (p. 159). Our study is among the first to explore this link and provides new evidence on how CEO equity compensation affects audit pricing.

Second, our study sheds light on whether executive equity incentives are perceived by auditors to be associated with heightened earnings management risk. While prior studies examine the link between executive equity incentives and earnings management, it is unclear whether auditors perceive executive equity incentives to increase audit risk and whether such risk is significant enough to affect their pricing decisions. Using survey data for a small sample of firms for one year, Chen, Chung, and Wynn (2009) find that when the chief internal auditor is paid by equity-based compensation, the external auditor charges higher audit fees. Our study differs from Chen et al. 2009 by investigating equity compensation for CEOs rather than internal auditors. Stock options and restricted stocks represent the most important components of compensation for many executives in the U.S. By focusing on CEO equity compensation, we provide new insight that will be of interest to investors and boards of directors who need to evaluate the costs and benefits of equity compensation for executives.

The rest of this paper is organized as follows. Section 2 discusses prior research. Section 3 presents the research design. Section 4 describes the sample and descriptive statistics. Section 5 reports empirical results. Additional analyses are presented in Section 6. We conclude in Section 7.



## **2. Prior literature**

There is a large literature on how equity-based compensation motivates executives to manipulate their firms' reported earnings. Cheng and Warfield (2005) and Bergstresser and Philippon (2006) show that CEO equity incentives are positively related to the level of earnings management, measured by discretionary accruals and the likelihood of beating analyst forecasts. Burns and Kedia (2006) and Efendi et al. (2007) show that CEOs engage in more egregious accounting manipulations, as reflected in a greater likelihood of earnings restatements, when they have greater equity incentives. Cohen et al. (2008) find that the increases in accruals management are concurrent with the increases in CEO equity compensation in the period prior to the passage of the Sarbanes-Oxley Act. Feng et al. (2011) suggest that CEO equity incentives are associated with accounting frauds evidenced by the SEC Accounting and Auditing Enforcement Releases.

While many studies find results consistent with the notion that equity-based compensation generates incentives for executives to manage earnings to increase their personal financial gains, other studies find no such evidence. Specifically, Erickson et al. (2006) and Armstrong et al. (2010) find no evidence that executive equity incentives are associated with accounting frauds or accounting irregularities.

The studies discussed above use various measures of CEO equity incentives, the most common of which is equity portfolio delta that measures the sensitivity of a manager's wealth to changes in stock price. A recent study by Armstrong et al. 2013 investigates the incentive effects of both portfolio delta and vega, where vega measures the sensitivity of a manager's wealth to changes in stock return volatility. They find a significantly positive relation between vega and misreporting and that the effects of vega subsume those of delta. The results suggest that equity holdings motivate executives to manage earnings by making executives' wealth increasing in stock return volatility and thus causing executives to be less averse to equity risk.

Consistent with the studies that find a positive link between executive equity incentives and earnings management, auditing standards suggest that auditors take into consideration management's equity compensation when evaluating clients' risk of misstatements arising from fraudulent financial reporting (SAS No. 99, AICPA 2002). SAS No. 99 identifies the incentive/pressure to perpetrate a fraud as a key risk factor related to fraudulent financial reporting. Specifically, auditors should consider "Information available indicates that management or the board of directors' personal financial situation is threatened by the entity's financial performance arising from the following: a. significant financial interests in the entity; and b. significant portions of their compensation (for example, bonuses, stock options, and earn-out arrangements) being contingent upon achieving aggressive targets for stock price, operating results, financial position, or cash flow" (SAS No. 99). Another auditing standard, SAS No. 109, also suggests that auditors consider management's incentive compensation when evaluating potential management bias in preparation of financial statements (SAS No. 109, AICPA 2006). In a recent proposed auditing standard on related parties, the PCAOB calls for auditors to understand their clients' executive compensation because "obtaining an understanding of how a company has structured its compensation for executive officers can assist the auditor in understanding whether such compensation arrangements affect the assessment of the risks of material misstatement" (PCAOB Release No. 2012-001, PCAOB 2012). The standard would require the auditor to perform procedures designed to identify risks of material misstatement related to the company's executive compensation. These procedures include, among other things, "reading employment and compensation contracts; and reading proxy statements and other relevant company filings with the SEC and other regulatory agencies that relate to the company's financial relationships and transactions with its executive officers." Auditors should also

consider inquiring of the chair of the compensation committee and any compensation consultants used by the company regarding the structuring of the company's compensation for executive officers, and inquiring of the audit committee regarding its view on executive compensation.

Auditors' primary responsibility is to plan and perform an audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. When higher client risk is determined, auditors have to adapt the nature and scope of audit procedures to reduce audit risk to an acceptable level.<sup>7</sup> Several accounting studies examine how auditors respond to various client-related risks (e.g., Bedard 1989; Davis, Ricchuite, and Trompeter 1993; Mock and Wright 1993; O'Keefe, Simunic, and Stein 1994; Johnstone 2000; Bell, Landsman, and Shackelford 2001; Bedard and Johnstone 2004). The most relevant to our study is Bedard and Johnstone 2004, who examine whether auditors' assessments of earnings manipulation risk and corporate governance risk affect their planning and pricing decisions. They utilize a public accounting firm's risk assessments of their clients made by engagement partners and find that auditors increase audit effort and charge higher billing rates for clients with earnings manipulation risk.<sup>8</sup>

The two links in prior research (i.e., the link between executive equity incentives and earnings management and the link between earnings manipulation risk and audit fees) provide a basis for our prediction on the relation between CEO equity incentives and audit fees. Since vega captures the increase in the value of a manager's equity portfolio from an increase in stock price volatility, it provides managers with incentives to engage in risky activities such as earnings management. If auditors perceive CEO equity portfolio vega to be associated with greater earnings

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<sup>7</sup> When the risk of misreporting is high, auditors should modify their audit procedures to obtain additional audit evidence (Auditing Standard No. 14, PCAOB 2010b). Auditors are also required to plan responses to the risk of material misstatement in audit planning (Auditing Standard No. 9, PCAOB 2010a).

<sup>8</sup> The higher billing rates may reflect the higher audit cost per hour of work performed by more experienced auditors and a premium to cover potential future litigation costs.

manipulation risk (hence greater audit risk), and incorporate such risk in their pricing decisions, we expect a positive association between CEO equity portfolio vega and audit fees. On the other hand, the net effect of delta on earnings management is unclear. Delta may encourage earnings management because higher delta indicates a greater increase in equity portfolio value from an increase in stock price; however it may also discourage earnings management because higher delta reflects a greater effect of stock return volatility on the volatility of a manager's equity portfolio value. Given the ambiguous relation between CEO equity portfolio delta and earnings management, we do not have a directional prediction on the relation between portfolio delta and audit fees.

Our study is related to two recent papers on CEO equity incentives. Kuang and Qin (2012) examine the effect of CEO equity incentives on credit rating decisions by rating agencies. Kuang and Qin (2012) and our study are similar to the extent that both studies examine the experts' use of information implied in CEO equity incentives. A concurrent paper by Fargher, Jiang, and Yu 2013 examines the relation between CEO equity incentives and audit fees as well as audit opinions. However, unlike Kuang and Qin 2012 and Fargher et al. 2013 who use CEO equity incentives as proxies for managerial risk-taking incentives, we focus on the relation between CEO equity incentives and risk of earnings management and whether auditors perceive this relation to be significant enough to affect their pricing decisions. Fargher et al. (2013) argue that equity portfolio delta reduces managerial risk-taking incentives and therefore has a negative effect on audit fees. In contrast, we argue that the net effect of delta on audit fees is unclear because it has both a positive and a negative effect on earnings management, as discussed earlier. We also provide more rigorous empirical analyses by undertaking extensive tests to mitigate the concerns about potential endogeneity.

### 3. Research design

The extant literature models audit fees as a function of client attributes (i.e., client size, risk, and complexity), auditor attributes, and engagement attributes (see Hay, Knechel, and Wong 2006 for a comprehensive review of the audit fees literature). To investigate the relation between CEO equity incentives and audit fees, we add CEO equity incentive variables to the audit fees model as our main test variables. Specifically, we estimate the following regression model:

$$\begin{aligned} LOG\_AUDITFEE = & \beta_0 + \beta_1(LOG\_CEOVEGA) + \beta_2(LOG\_CEODELTA) \\ & + \beta_3(LOG\_ASSETS) + \beta_4(INVREC) + \beta_5(LEVERAGE) + \beta_6(QUICK) + \beta_7(FOREIGN) \\ & + \beta_8(LOG\_SEGMENT) + \beta_9(ROA) + \beta_{10}(LOSS) + \beta_{11}(BIG4) + \beta_{12}(EXPERTISE) \\ & + \beta_{13}(LOG\_TENURE) + \beta_{14}(OPINION) + \beta_{15}(INTERNAL\_CONTROL) \\ & + \beta_{16}(AUDITOR\_CHANGE) + \beta_{17}(CEO\_TURNOVER) + \beta_{18}(LOG\_CEOTENURE) \\ & + \sum \beta_m(DYEAR) + \sum \beta_n(DINDUSTRY) + \varepsilon \end{aligned} \quad (1)$$

The dependent variable is the natural logarithm of audit fees. The variables of interest are CEO equity incentives measured as portfolio vega and delta. Both variables are estimated following Core and Guay 2002 and Armstrong et al. 2013. Equity portfolio vega is the risk sensitivity of portfolio value, estimated as the change in the dollar value of a CEO's equity holdings for a 0.01 change in the firm's stock return volatility. Equity portfolio delta is the price sensitivity of portfolio value, estimated as the change in the dollar value of a CEO's equity holdings for a 1 percent change in stock price. We estimate vega and delta separately for each component of the equity portfolio: stocks, new options granted in the current year, exercisable options, and unexercisable options (excluding new option grants), and aggregate all components to obtain portfolio vega and delta for a CEO.<sup>9</sup> Our test variables, *LOG\_CEOVEGA* and *LOG\_CEODELTA*, are the natural logarithm of one plus CEO equity portfolio vega and delta, respectively.

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<sup>9</sup> Based on the Black-Scholes model adjusted for dividend payouts (Black and Scholes 1973; Merton 1973), option vega is calculated as  $e^{-dT} \Phi'(Z) S T^{1/2} * 0.01$  and option delta is calculated as  $e^{-dT} \Phi(Z) * (price/100)$ , where  $Z = (\ln(S/X)$

We control for a series of variables that have been shown to relate to audit fees in prior studies. Specifically, we control for client attributes, including firm size (*LOG\_ASSETS*), receivable and inventory intensity (*INVREC*), leverage (*LEVERAGE*), liquidity (*QUICK*), complexity proxied by an indicator variable on whether the client has foreign assets (*FOREIGN*) and the number of business segments (*LOG\_SEGMENT*), and client performance measured as return on assets (*ROA*) and whether the firm incurs a loss (*LOSS*).<sup>10</sup> We also control for auditor attributes, including a Big 4 (or 5 or 6) auditor indicator (*BIG4*), auditor industry expertise (*EXPERTISE*), and auditor tenure (*LOG\_TENURE*).<sup>11</sup> For engagement attributes, we control for whether a going concern opinion is issued in the recent two years (*OPINION*), whether an internal control deficiency is reported (*INTERNAL\_CONTROL*), and whether there is an auditor change (*AUDITOR\_CHANGE*). We also control for two CEO variables that might affect audit fees: the incidence of CEO turnover (*CEO\_TURNOVER*) and CEO tenure (*LOG\_CEOTENURE*). Finally we include both year and industry fixed effects in the regression, where industry is defined based on the four-digit SIC codes. All variables are defined in Appendix.

In addition to model (1), we estimate a second model where we include abnormal accruals as an additional control to alleviate the concern that the positive relation between audit fees and CEO equity incentives reflects the effect of abnormal accruals. We do not expect the inclusion of abnormal accruals in the model to alter the relation between audit fees and CEO equity incentives,

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+  $T(r-d+\sigma^2/2)/(\sigma T^{1/2})$ . The underlying stock price ( $S$ ), exercise price ( $X$ ), volatility ( $\sigma$ ), natural logarithm of the dividend yield ( $d$ ), and expiration period of option grants ( $T$ ) are obtained or constructed using CEO option information from ExecuComp. We follow Core and Guay 2002 when making assumptions about certain information for previously granted options (e.g., exercise price and expiration date) when the information is not available in ExecuComp. More detailed stock option information is available in ExecuComp after the SEC expanded executive compensation reporting requirements in 2006, which may affect the relative accuracy of our stock option variables under different reporting regimes. In untabulated analysis we partition our sample into the pre- and post-2006 periods and find that our results hold in both periods.

<sup>10</sup> All of our results are robust to an alternative measure of size based on the market value of equity.

<sup>11</sup> Following recent studies (e.g., Ferguson, Francis, and Stokes 2003; Francis and Yu 2009) that measure auditor quality and auditor industry expertise based on individual office-level data, we also consider the city-industry leader as an alternative measure of auditor expertise. The untabulated results are qualitatively the same as those reported.

because CEO equity incentives capture the ex ante earnings management risk that auditors consider when planning auditing procedures and negotiating audit fees, while abnormal accruals reflect the realized level of earnings management after auditors conduct financial statement audits. Following DeFond and Subramanyam 1998, we measure abnormal accruals as the residuals from the cross-sectional Jones 1991 model estimated by each year and each 2-digit SIC code industry. We use the absolute value of abnormal accruals (*ABS\_ACC*) in our regression analysis. Using the modified Jones model to estimate abnormal accruals yields consistent results.

#### **4. Data and sample selection**

Our initial sample includes all firm-years with available audit fee information from the Audit Analytics database for the period 2000-2009. The sample period starts from 2000, the first year in which audit fee information is available in Audit Analytics. We then merge the audit fee data with CEO compensation data from Compustat's ExecuComp database. Our sample is thus restricted to the S&P 1500 companies due to the coverage of ExecuComp, which may limit the generalization of our results to smaller or less profitable firms. We further require data to be available in Compustat to compute abnormal accruals and other variables used in the multivariate regression analysis. We exclude financial firms from our sample because these firms' audit fees and accruals are influenced by factors unique to the financial industry. Our final sample consists of 11,726 firm-year observations.

Table 1 provides sample distribution and descriptive statistics for our main variables of interest. The sample is evenly distributed across the years except that in the first and last years there are a slightly smaller number of observations. Average audit fees increase markedly from a low of about \$1 million in 2000 to a high of \$3.6 million in 2006. The rise in audit fees is most dramatic from 2003 to 2004, when both mean and median audit fees almost double. This

increase is likely due to the increased costs of audits in order to comply with the requirements of the Sarbanes-Oxley Act.<sup>12</sup> CEO equity vega and delta appear to peak at around 2004 and then decrease slightly afterwards.

Table 2, panel A provides summary statistics for the variables used in our regression analysis. The average *LOG\_CEOVEGA* is 4 and the average *LOG\_CEODELTA* is 5.39, which are comparable to those in Armstrong et al. 2013. The average firm in our sample has total assets of \$1,620 million, an inventory and accounts receivable to total assets ratio of 24.3 percent, a leverage ratio of 0.21, a quick ratio of 1.86, about two business segments, and a return on assets (*ROA*) ratio of 3.4 percent. Thirteen percent of the sample firms have foreign assets, and 20 percent of the sample firm-years incur a loss. For auditor attributes, 96 percent of the sample firms use a Big 4 (or Big 5/Big 6) auditing firm;<sup>13</sup> average auditor expertise, measured as the auditor's industry market share based on client sales revenue in a four-digit SIC code industry, is 35 percent; and average auditor tenure is 9.2 years. Less than 1 percent of the sample firms receive a going concern audit opinion, and 7.4 percent of the sample firms report an internal control deficiency. About 5 percent of the sample firms experience an auditor change, 12 percent experience CEO turnover, and the average CEO tenure is 6.3 years.

Table 2, panel B provides correlations among variables used in our analysis. Audit fees are positively associated with CEO portfolio vega and delta. As expected, audit fees are highly correlated with total assets with a correlation coefficient of 74 percent, and total assets are positively correlated with CEO vega and delta. Thus, it is important to control for firm size when examining the relation between audit fees and CEO equity incentives in the multivariate regression analysis. Consistent with prior research, CEO vega and delta are positively correlated

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<sup>12</sup> Although this audit fee increase potentially affects the relation between CEO equity incentives and audit fees, as discussed later, we find that our results hold in both pre- and post-Sarbanes-Oxley Act periods.

<sup>13</sup> We repeat all analyses for Big N clients only and find that our results are robust to this alternative sample.



with abnormal accruals, our proxy for accrual-based earnings management. The two equity incentive variables, vega and delta, are positively correlated with a correlation coefficient of 55 percent.

## 5. Empirical results

### *CEO equity incentives and audit fees*

Table 3 reports results from regression analysis of the relation between CEO equity incentives and audit fees. We first estimate the effect of vega and delta separately, and report the results in columns (1) and (2). We find that the coefficient on *LOG\_CEOVEGA* is significantly positive. In contrast, the coefficient on *LOG\_CEODELTA* is not significantly different from zero. We then include both vega and delta simultaneously in the regression and report the results in column (3). We find that the coefficient on vega remains significantly positive, and the coefficient on delta remains insignificant. The coefficient on *LOG\_CEOVEGA* is 0.018, suggesting that CEOs with equity portfolio vega in the 75th percentile have audit fees that are, on average, 3.9 percent higher than audit fees of CEOs with equity portfolio vega in the 25th percentile ( $0.018 \times (5.228 - 3.075) = 0.039$ ). In columns (4) to (6), we report regression results after controlling for the absolute value of abnormal accruals (*ABS\_ACC*). Controlling for *ABS\_ACC* does not appear to affect the relations between *LOG\_AUDITFEE* and vega and delta: the effect of vega remains positive while the effect of delta remains insignificant. The coefficient on *ABS\_ACC* is statistically insignificant, suggesting that audit fees are not related to the level of abnormal accruals after controlling for other determinants of audit fees.

Results on the control variables are generally consistent with prior research. Audit fees are significantly higher for firms that are larger, have greater receivable and inventory intensity, have lower liquidity (a lower *QUICK* ratio), are more complex (have foreign assets or more

business segments), and have poorer accounting performance (a lower *ROA* or incurring a loss). Audit fees are also higher when the firm receives a going concern opinion in the recent two years or when the firm reports an internal control deficiency. Auditor changes appear to be associated with an increase in audit fees. One possible reason is that risky firms are dropped by auditors and incoming auditors demand higher fees to compensate for the risk. The coefficient on CEO tenure is significantly negative. One possible explanation is that auditors' perceived uncertainty of the firm, hence audit risk, decreases with the length of CEO tenure.

Overall, results in Table 3 suggest that auditors perceive higher audit risk associated with CEO equity incentives. This positive association is due to the incentive effect to increase risk as reflected in vega, rather than the incentive effect to increase stock price as reflected in delta. Auditors appear to be more concerned about the risk-taking incentives created by equity compensation because equity compensation causes CEOs to be less averse to equity risk and engage in financial misreporting.

In Table 3, we adjust the standard errors by firm clusters to account for possible serial correlation at the firm level. Alternatively, to control for cross-sectional correlation, we follow the Fama-MacBeth 1973 procedure.<sup>14</sup> We estimate the regression models annually and find that the mean coefficient on vega is 0.017 and is significantly positive with a *t*-statistic of 3.837. The mean coefficient on delta is -0.004 and is statistically insignificant.<sup>15</sup> Thus, results based on the annual regressions are consistent with those based on the full sample as reported in Table 3.

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<sup>14</sup> Petersen (2008) compares different approaches used in the finance literature to address potential biases in standard errors due to possible dependence in the residuals. Petersen (2008) suggests that, in the presence of time-series dependence (i.e., the residuals of a given firm may be correlated across years), the standard errors clustered by firm are unbiased and produce correctly sized confidence intervals. On the other hand, in the presence of cross-sectional dependence (i.e., the residuals of a given year may be correlated across different firms), the Fama-MacBeth (1973) procedure produces unbiased standard errors and correctly sized confidence intervals. We thus employ both approaches in our estimation. While the Fama-MacBeth approach is widely used in the asset pricing literature, it is also used in corporate finance studies (e.g., Anderson and Reeb 2003; Cornett, Marcus, and Tehranian 2008).

<sup>15</sup> The coefficient on CEO equity portfolio vega is positive in all ten years and statistically significant in five years. The coefficient on delta is significantly positive in two years and significantly negative in two years.

### *Endogeneity*

Our analysis so far suggests a systematic effect of CEO equity incentives on audit fees. However, the potential endogenous relation between CEO equity incentives and audit fees is a concern in our analysis. There are several potential sources of endogeneity that have been recognized in prior research and may arise in our setting. The first source of endogeneity is unobservable heterogeneity, which arises if there are unobservable firm-specific factors that affect both CEO equity compensation and the determination of audit fees. For example, firms with relatively high uncertainty may use more equity compensation because monitoring of managers is more costly in these firms (Prendergast 2000, 2002). However, firms with high uncertainty are also more difficult to audit, thus the positive relation between CEO equity incentives and audit fees may reflect the premium charged by auditors related to firm risk.

Simultaneity is another cause of endogeneity, which arises when the explanatory variable is also a function of the dependent variable. Endogeneity can also occur due to the dynamic relation between the dependent and explanatory variables, that is, when current values of the explanatory variable are a function of past values of the dependent variable. Dynamic endogeneity is a potential concern in our setting because of the possibility that past audit fees may affect the current level of executive equity incentives. Jayaraman and Milbourn (2012) find a positive relation between auditor expertise and one-year-ahead equity-based compensation, supporting the notion that greater auditor expertise reduces the incidence of earnings management, thus firms audited by an industry expert are able to use more equity-based compensation for executives because their ability to manipulate earnings will be mitigated by their auditors. While Jayaraman and Milbourn (2012) focus on auditor expertise and do not directly examine audit fees, audit fees have been shown to increase in auditor expertise (e.g.,

DeFond, Francis, and Wong 2000). Thus it is important to consider the effect of past audit fees on the current level of executive equity incentives in our analysis.

We conduct a battery of tests to mitigate these endogeneity concerns. We first estimate a “change” specification aimed at mitigating potential bias due to time-invariant unobservable heterogeneity (e.g., Nikolaev and Van Lent 2005). We also include firm fixed effects in the regression to further mitigate the unobservable heterogeneity problem. To address time-variant unobservable heterogeneity, we include additional controls for the riskiness of firm investment and financial policies in the regression. We also employ the instrumental variables approach to estimate the model. Finally, we apply the dynamic GMM approach, which has the ability to model the dynamic relation between audits fees and CEO equity incentives while accounting for other sources of endogeneity (Wintoki et al. 2012). Below we discuss these analyses in detail.

#### *First-time option grants and changes in audit fees*

In this section we estimate a “change” specification and investigate whether auditors adjust audit fees in response to changes in CEO equity incentives. We focus on a group of firms that experience a significant change in CEO option incentives, i.e., firms that grant stock options to their CEOs for the first time in three years. The regression model is specified as below:

$$\begin{aligned}
 \Delta LOG\_AUDITFEE = & \beta_0 + \beta_1(FIRST\_GRANT) + \beta_2(\Delta OWNERSHIP) + \beta_3(\Delta ABS\_ACC) \\
 & + \beta_4(\Delta LOG\_ASSETS) + \beta_5(\Delta INVREC) + \beta_6(\Delta LEVERAGE) + \beta_7(\Delta QUICK) \\
 & + \beta_8(\Delta FOREIGN) + \beta_9(\Delta LOG\_SEGMENT) + \beta_{10}(\Delta ROA) + \beta_{11}(\Delta LOSS) \\
 & + \beta_{12}(\Delta BIG4) + \beta_{13}(\Delta EXPERTISE) + \beta_{14}(\Delta LOG\_TENURE) + \beta_{15}(\Delta OPINION) \\
 & + \beta_{16}(\Delta INTERNAL\_CONTROL) + \beta_{17}(\Delta AUDITOR\_CHANGE) \\
 & + \beta_{18}(\Delta CEO\_TURNOVER) + \beta_{19}(\Delta LOG\_CEOTENURE) + \varepsilon
 \end{aligned} \tag{2}$$

The dependent variable is change in *LOG\_AUDITFEE*. The variable of interest is *FIRST\_GRANT*, a dummy variable equal to one if the firm grants CEO stock options in the current

year but does not grant CEO stock options in the past two years, and zero if the firm does not grant CEO stock options in all three years. We examine the concurrent changes in compensation structure and audit fees because auditors are likely to be aware of the upcoming adoption of stock option plans when setting audit fees for the year. Companies are required to obtain shareholder approval before adopting new executive equity compensation plans. In addition, they often discuss with their auditors about accounting and tax treatments of executive equity compensation. We find 357 first-time option-granting firms and 1,337 firms that do not grant CEO stock options in three years in our sample. Both the first-time option-granting firms (i.e., the treatment firms) and control firms experience similar changes in firm, auditor, and engagement attributes with a few exceptions. The treatment firms have a greater decrease in quick ratio, a greater increase in the number of business segments, and a greater decrease in the incidence of receiving a going concern opinion. Thus it is important to control for these attribute changes in the regression. We also run a second regression where we replace *FIRST\_GRANT* with *ΔLOG\_CEOVEGA* and *ΔLOG\_CEODELTA*, defined as the change in the log value of vega and delta for first-time option-granting firms and zero for firms that do not grant CEO options in three years, to capture the magnitude of the change in CEO equity incentives. We include the change in all control variables from model (1) except dummy variables that have the same value in both years.<sup>16</sup>

We report results in Table 4. Consistent with our prediction, the result in column (1) shows that *FIRST\_GRANT* has a significantly positive impact on the change in audit fees. The coefficient of 0.075 suggests that auditors increase audit fees by 7.5 percent more for first-time option-granting firms than for firms that do not grant CEO options in three years. When we replace *FIRST\_GRANT* with *ΔLOG\_CEOVEGA* and *ΔLOG\_CEODELTA* in column (2), we find that the

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<sup>16</sup> In the first change regression, we include changes in CEO stock ownership as an additional control variable because *FIRST\_GRANT* only captures changes in stock option grants but not stock ownership.

change in vega has a significantly positive impact on the change in audit fees, while the change in delta has no significant impact. This result is consistent with Table 3 that auditors appear to be more concerned about the incentive effects of vega.

Regarding control variables, we find that audit fees increase when firms become bigger (*ALOG\_ASSETS*) or less liquid (*AQUICK*), have a greater inventory and receivable intensity (*AINVREC*), or a lower *ROA*. Auditors also increase audit fees when the firm receives a going concern opinion or has deteriorating internal controls. On the other hand, changes in abnormal accruals are not significantly related to audit fee changes. The negative coefficient on *AFOREIGN* is inconsistent with expectation. Deleting the small number of firms that change their foreign assets (31 firm-years) does not affect our main results.

#### *Firm fixed effects*

Firm fixed effects estimation is another commonly used approach to mitigate potential omitted variables bias. We re-estimate our regression model (1) with firm fixed effects and report the results in column (1) of Table 5. The results from the fixed effects regression are consistent with the change analysis and suggest that the positive effects of vega on audit fees are robust to controlling for time-invariant unobservable heterogeneity. On the other hand, the coefficient on delta is negative. Thus, the relation between delta and audit fees does not appear to be robust across different research design choices.

#### *Additional controls for risk and instrumental variables approach*

While the “change” analysis and the firm fixed effects estimation help address the time-invariant unobservable heterogeneity problem, it does not necessarily mitigate endogeneity arising when

an omitted time-variant variable leads to both a change in equity compensation and a change in audit fees. For example, when a firm pursues certain risky projects, and it is difficult to monitor the CEO's actions with respect to this project, the board may increase the use of stock option compensation to provide incentives to the CEO. At the same time, the risky projects may also cause the auditor to charge a higher audit fee, resulting in a positive relation between CEO equity compensation and audit fees. To address this issue, we control for the riskiness of firm financial and investment policies by including three proxies to the regression model: idiosyncratic risk, cash flow volatility, and the book-to-market ratio (definitions are provided in the Appendix). As shown in column (2) of Table 5, idiosyncratic risk is positively related to audit fees, while cash flow volatility and the book-to-market ratio are not. More importantly, the coefficient on vega remains significantly positive after controlling for these variables.

We next turn to a more formal econometric approach to mitigate endogeneity concerns, that is, the instrumental variables method, which relies on instrumental variables that are correlated with the explanatory variable but have no direct effects on the dependent variable. Instrumental variables that satisfy these conditions are very difficult to identify in most accounting research settings (Ittner and Larcker 2001; Chenhall and Moers 2007). Following Lev and Sougiannis 1996 and Hanlon, Rajgopal, and Shevlin 2003, we use the average CEO equity portfolio vega and delta of other firms in the same four-digit SIC industry as our instrumental variable. Industry average vega and delta are used as instruments because firms often rely on industry-wide pay practice (e.g., survey data collected by compensation consultants) when setting executive pay, but industry-wide pay practices should not affect firms' idiosyncratic audit risk and audit fees.

To implement the instrumental variable method, we regress a firm's CEO equity portfolio vega and delta on its industry average CEO portfolio vega and delta, respectively, and compute the fitted value of vega and delta for each firm-year observation. We then use the fitted value to replace the actual value of vega and delta in model (1), and report the regression result in column (3) of Table 5. The coefficient on the fitted value of vega is significantly positive, suggesting that the positive relation between vega and audit fees holds after controlling for endogeneity based on the instrumental variables methodology.<sup>17</sup> The instrumental variables methodology, however, is subject to some important limitations. The industry average CEO vega and delta might not be truly exogenous instruments as other firms in the same industry could have unobserved heterogeneities that are correlated with the unobserved heterogeneities of the firm under examination, and these heterogeneities could affect both CEO compensation and auditor compensation. Further, since our system is just identified with only one instrumental variable, we cannot undertake a test for instrument validity, which requires the system to be over-identified. Due to the difficulty of identifying valid instrumental variables, the result from the instrumental variables approach should be interpreted with caution.

#### *Dynamic GMM estimation*

The dynamic panel GMM estimator is well developed in the economics literature and has recently been applied in corporate finance research to address potential endogeneity bias.<sup>18</sup> The first step in the dynamic GMM estimation is to expand our equation (1) to include lagged audit fees as an explanatory variable, referred to as the dynamic model in the following discussion. We

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<sup>17</sup> The results are qualitatively the same when we include all firm characteristics variables from the audit fees model in the first stage regression for the instrumental variable estimation.

<sup>18</sup> These studies include, for example, Holtz-Eakin, et al. 1988, Arellano and Bond 1991, Arellano and Bover 1995, and Blundell and Bond 1998. Wintoki et al. (2012) provide a detailed discussion of this method and its application to corporate finance studies.



include one lag of audit fees as Jayaraman and Milbourn (2012) suggest that auditor expertise (hence audit fees) in year  $t-1$  affects equity-based compensation in year  $t$ . Next, we apply the Arellano–Bond system GMM estimator, which is a system of two equations: the dynamic model transformed into first-differenced form, and the dynamic model in level form (Arellano and Bover 1995; Blundell and Bond 1998).<sup>19</sup> First-differencing the dynamic model addresses the problems of unobserved heterogeneity and potential omitted variables. The system of equations is estimated via GMM using lagged values of the endogenous variables as instruments. Specifically, in the Arellano–Bond system GMM estimation, lagged levels are used as instruments for the differenced equation and lagged differences are used as instruments for the level equation. The system dynamic GMM estimator thus fully accounts for unobservable heterogeneity, simultaneity, and the relation between past audit fees and current CEO equity incentives.

One issue in GMM panel estimation is whether or not we include enough lags for the instruments. Increasing the lag length of the instruments makes them more exogenous, while it may also reduce the strength of the instruments. We use endogenous variables lagged four periods as instruments in our estimation.<sup>20</sup> We use the Hansen test to examine whether the instruments as a group are exogenous, and find that the difference-in-Hansen test of exogeneity for the instruments is insignificant ( $p$ -value = 0.148), which fails to reject the null hypothesis that the instruments are exogenous. A limitation of the Hansen test is that it is valid only if at least one of the instruments is valid. In other words, the Hansen test is invalid if all the instruments

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<sup>19</sup> Wintoki et al. (2012) argue that there are several econometric shortcomings when only estimating the first-differenced model without the level model. First, the original model is conceptually in level and differencing may reduce the power of the tests (Beck, Levine, and Loayza 2000). Second, variables in level may be weak instruments for first-differenced regressors (Arellano and Bover 1995). Arellano and Bover (1995) and Blundell and Bond (1998) suggest that including both the level and differenced models can mitigate these concerns and improve the GMM estimator.

<sup>20</sup> Using endogenous variables lagged two or three periods as instruments also produces qualitatively similar results, but the difference-in-Hansen test cannot reject the null hypothesis of exogenous instruments.

being tested are invalid.<sup>21</sup> To assess the strength of our instruments, we carry out a first-stage regression of the endogenous variables on the instruments and conduct F-tests. To be valid, instruments must provide a source of variation for explanatory variables. We find that the F-statistics for all the first stage regressions are significant at 1 percent and greater than 10, which is the “rule of thumb” critical value suggested by Staiger and Stock 1997.

Results from the dynamic GMM estimation are reported in column (4) of Table 5. We continue to find a significantly positive coefficient on vega, suggesting that the positive relation between vega and audit fees holds after controlling for endogeneity based on the dynamic GMM estimator.

## **6. Additional analysis**

### ***CEO equity incentives versus CFO equity incentives***

While most studies in the equity incentives literature focus on CEOs, a number of recent studies also examine equity incentives of CFOs, who have primary responsibility over financial reporting and thus might play a significant role in earnings management. These studies find mixed results. For example, Jiang, Petroni, and Wang (2010) show that CFO equity incentives have a stronger association with earnings management than CEO equity incentives, suggesting that the role of CFO equity incentives is greater than that of CEOs in financial reporting quality. On the other hand, several papers find evidence consistent with the notion that CEO equity incentives play a more significant role in earnings management relative to CFO equity incentives. For example, Feng et al. (2011) find that CEOs of earnings manipulation firms have higher equity incentives than CEOs of matched non-manipulation firms, but CFO equity incentives do not differ significantly between manipulation firms and matched non-manipulation firms. They conclude that CFOs are involved in

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<sup>21</sup> Larcker and Rusticus (2010) point out that the test of instrument validity "requires that at least one of the instruments be valid. If this assumption is violated, there can be a situation where the instruments have similar bias, so that the test will not reject (even in large samples), even though the IV estimates are severely biased" (p. 192).

earnings management not because of their equity incentives but rather because they succumb to pressure from CEOs. Mergenthaler, Rajgopal, and Srinivasan (2012) find that when missing the latest consensus analyst forecasts, CEOs are penalized via bonus cuts and fewer equity grants, while CFOs are penalized via bonus cuts but do not appear to be penalized with fewer equity grants.

To examine whether auditors consider CFO equity incentives in their pricing decisions, we construct CFO equity portfolio vega and delta similar to those for CEOs, and add the two variables to model (1). Results are reported in Table 6. When we include only CFO vega and delta without the CEO variables, we find a significantly positive coefficient on CFO vega and a significantly negative coefficient on CFO delta. We next include both the CEO and CFO equity incentives in column (2), and find that the coefficients on both CFO vega and delta become statistically insignificant. More importantly, the coefficient on CEO vega remains significantly positive, and the coefficient on CEO delta remains insignificant. The results suggest that auditors perceive CEO equity incentives to play a stronger role in earnings management relative to CFO equity incentives. The evidence is consistent with Feng et al. (2011) who find CEOs to be more culpable than CFOs for the positive relation between equity incentives and earnings manipulation.

### ***Controlling for the direct effects of equity incentives on audit fees***

In this section we consider a possible “direct” effect of equity incentives on audit fees. While we interpret our results as auditors perceiving higher earnings management risk associated with equity incentives and hence increasing audit fees, another possibility is that auditors might charge a higher fee simply because stock-based compensation is more difficult to audit and requires more audit effort and/or higher billing rates. We call this possibility the “direct” effect of equity incentives, in contrast to the “indirect” effect due to heightened earnings management risk

leading to higher audit fees. The direct effect presents an alternative explanation to our results especially in the post SFAS 123R period when companies have to report, and auditors have to audit, stock option expense in the income statement.

In order to investigate the direct effect of equity incentives on audit fees, we need a measure that captures the direct effect, but not the indirect effect, of equity incentives. The measures we construct are based on the fair value of stock options granted to non-executive employees. We use the fair value of option grants because SFAS 123R requires stock option expense to be computed based on fair value on option grant dates. We use non-executive employees' options because this measure is likely to reflect the direct effect of option accounting on audit fees, but not the indirect effect, since non-executive employees are presumably unable, or less able, to manage their firm's earnings.<sup>22</sup>

We report the regression results controlling for the direct effect in Table 7. *DIRECT\_EFFECT1* is the fair value of stock options granted to non-executive employees deflated by assets, and *DIRECT\_EFFECT2* is the natural logarithm of one plus the fair value of stock options granted to non-executive employees. The fair value of stock options granted to non-executive employees is estimated as the fair value of employee stock options minus the fair value of stock options granted to executives. The fair value of employee stock option grants is available after the issuance of SFAS 123R, hence the sample is reduced to the post-2003 period. Neither of the direct effect measures have a significant relation with audit fees. More importantly, the results on CEO equity incentives remain the same: CEO vega is significantly and positively related to audit fees, and delta remains insignificant. Taken together, the evidence is consistent with the indirect-effect story, that is, the positive relation between audit fees and CEO equity

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<sup>22</sup> We thank an anonymous reviewer for this insight.

incentives reflects auditors' perception of higher audit risk associated with equity incentives, rather than the direct effect of stock option accounting on audit fees.<sup>23</sup>

### ***Alternative measures of CEO equity incentives***

In this section we examine whether our results are robust to alternative measures of CEO equity incentives. The first measure, *OPTION*, is the number of total options held by the CEO at the end of the year divided by total common shares outstanding, following Cheng and Warfield 2005 and Cohen et al. 2008. The second measure, *LOG\_EQCOMP*, is the natural logarithm of CEO annual equity-based compensation including the fair value of option grants, restricted stocks, and other forms of non-cash compensation. The third measure, *EQCOMP\_%*, is the value of equity-based compensation divided by CEO total compensation. For an average CEO in our sample, equity-based compensation accounts for 58.2 percent of total compensation. We report regression results in Table 8. All three alternative measures of CEO equity incentives are positively associated with audit fees. The evidence supports the notion that audit risk perceived by auditors increases in CEOs' stock option holdings at the end of the year, in the dollar value of annual equity-based compensation, as well as in the importance of equity-based compensation in CEOs' compensation package.

### ***Other robustness checks***

Table 1 indicates that audit fees increase dramatically from 2003 to 2004, consistent with the higher audit costs companies bear in order to comply with the Sarbanes-Oxley Act. To examine the impact of this structural change on the relation between CEO equity incentives and audit fees,

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<sup>23</sup> The finding that CFO equity incentives are not related to audit fees (as discussed earlier) also provides indirect evidence that the positive relation between CEO equity incentives and audit fees is unlikely driven by the direct effect of stock option compensation.

we partition our sample into two periods, 2000-2003 and 2004-2009, and rerun our analyses.<sup>24</sup> We find that all of our inferences based on the full sample hold in both subsamples. We also find similar results after excluding former Arthur Andersen clients from our sample.<sup>25</sup>

Prior studies suggest that firm size is a primary determinant of audit fees. We control for total assets in all of our regression models. To provide further sensitivity check, we partition our sample into large and small firms based on the median value of total assets, and find that all of our results hold in both subsamples.<sup>26</sup>

## **7. Conclusions**

This study examines whether CEO equity incentives have an impact on audit pricing. Prior studies investigate whether CEO equity incentives motivate executives to manage earnings for personal financial gains. Our focus is on whether auditors perceive CEO equity incentives to be associated with greater audit risk and incorporate such risk in their pricing decisions. We measure CEO equity incentives based on portfolio vega (i.e., the sensitivity of a manager's equity portfolio value to stock return volatility) and portfolio delta (i.e., the sensitivity of a manager's equity portfolio value to stock price). We find that CEO equity portfolio vega is positively related to audit fees after controlling for other determinants of audit fees, while equity portfolio delta is not significantly related to audit fees. The evidence suggests that auditors perceive higher earnings management risk associated with equity compensation because equity compensation ties managers' wealth to

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<sup>24</sup> For the post-2004 subsample, we include a dummy variable for firms classified as non-accelerated filers because these firms are not fully subject to Section 404 of the Sarbanes-Oxley Act, hence might experience a smaller audit fee increase relative to accelerated filers.

<sup>25</sup> Prior studies find that firms increase the use of restricted stocks and decrease stock options in executive compensation after the issuance of SFAS 123R, which requires firms to expense the fair value of employee stock options on income statements (e.g., Brown and Lee 2007). We partition our sample into the pre- and post-123R period (2000-2004 and 2005-2009), and find that results in Table 3 hold in both periods.

<sup>26</sup> We also estimate the regression by size quintiles and find that the coefficient on CEO equity portfolio vega is positive in all size quintiles and statistically significant in four out of five size quintiles. Thus our results are generally robust across size quintiles.

risk as captured by vega, not because equity compensation ties managers' wealth to stock price as captured by delta. We also find a significant audit fee increase when firms issue CEO stock options for the first time in three years. The positive relation between CEO equity portfolio vega and audit fees is robust after controlling for potential endogeneity using the firm fixed effects estimation, the instrumental variables approach, the dynamic panel GMM estimation, and including additional controls for the riskiness of firm investment and financial policies in the model. We also consider CFO equity incentives and find no evidence of a significant relation between CFO equity incentives and audit fees, while our results on CEO equity incentives continue to hold. Finally, we find no evidence that the positive relation between CEO portfolio vega and audit fees is due to the complexity of stock option accounting that requires greater audit efforts.

Overall, our findings suggest that auditors perceive greater audit risk associated with CEO equity incentives and incorporate such risk in their pricing decisions. Auditors are most concerned about managers' incentives to increase the value of their equity holdings by increasing risk, because managers with a higher vega are less risk averse and are more likely to manage earnings. This evidence will be of interest to boards of directors who need to evaluate the costs and benefits of equity-based compensation, and to auditors who need to assess audit risk and make pricing decisions.

## Appendix Variable Definitions

Variable	Definition
Dependent variable:	
<i>LOG_AUDITFEE</i>	Natural logarithm of total audit service fees in \$
Equity incentive variables:	
<i>LOG_CEOVEGA</i>	Natural logarithm of one plus equity vega for CEOs, where equity vega is measured as the change in the value of the CEO's equity holdings for a 0.01 change in the standard deviation of stock returns
<i>LOG_CEODELTA</i>	Natural logarithm of one plus equity delta for CEOs, where equity delta is measured as the change in the value of the CEO's equity holdings for a 1% change in stock price
<i>LOG_CFOVEGA</i>	Natural logarithm of one plus equity vega for CFOs, where equity vega is measured as the change in the value of the CFO's equity holdings for a 0.01 change in the standard deviation of stock returns
<i>LOG_CFODELTA</i>	Natural logarithm of one plus equity delta for CFOs, where equity delta is measured as the change in the value of the CFO's equity holdings for a 1% change in stock price
<i>FIRST_GRANT</i>	An indicator variable that takes the value of one if the company grants CEO options in current year, but does not grant CEO options in the past two years, and zero if the company does not grant CEO options in all three years
<i>OPTION</i>	The number of CEO option holding at yearend divided by total shares outstanding
<i>LOG_EQCOMP</i>	Natural logarithm of CEO equity-based compensation, calculated as the sum of option grants, restricted stocks, and other forms of non-cash compensation
<i>EQCOMP_%</i>	CEO equity-based compensation as a percentage of total compensation, where equity-based compensation is the sum of option grants, restricted stocks, and other forms of non-cash compensation
<i>OWNERSHIP</i>	The number of shares owned by the CEO at yearend divided by total shares outstanding
Control variables:	
<i>ABS_ACC</i>	Absolute value of abnormal accruals estimated from the cross-sectional Jones model
<i>LOG_ASSETS</i>	Natural logarithm of total assets in millions \$
<i>INVREC</i>	Sum of inventory and accounts receivable divided by total assets
<i>LEVERAGE</i>	Total liabilities divided by total assets
<i>QUICK</i>	Current assets minus inventory, divided by current liabilities
<i>FOREIGN</i>	An indicator variable that takes the value of one if foreign assets are greater than zero, and zero otherwise
<i>LOG_SEGMENT</i>	Natural logarithm of the number of business segments
<i>ROA</i>	Net income before extraordinary items scaled by total assets
<i>LOSS</i>	An indicator variable that takes the value of one if net income is less than zero, and zero otherwise
<i>BIG4</i>	An indicator variable that takes the value of one if an auditor is one of Big 4 (or 5 or 6) auditor, and zero otherwise
<i>EXPERTISE</i>	Auditor's industry market share in a four-digit SIC code industry based on client sales revenue
<i>LOG_TENURE</i>	Natural logarithm of the number of years the auditor is with the company
<i>OPINION</i>	An indicator variable that takes the value of one if a going concern opinion is issued in either of the recent two years, and zero otherwise
<i>INTERNAL_CONTROL</i>	An indicator variable that takes the value of one if SOX 404 audit opinion indicates inefficient internal control or if SOX 302 disclosure indicates material weakness, and zero otherwise
<i>AUDITOR_CHANGE</i>	An indicator variable that takes the value of one if there is an auditor change in the year, and zero otherwise



<i>CEO_TURNOVER</i>	An indicator variable that takes the value of one if there is a CEO change in the year, and zero otherwise
<i>LOG_CEOTENURE</i>	Natural logarithm of the CEO's tenure
<i>LOG_IDIORISK</i>	Natural logarithm of standard deviation of the residual from a market model regression estimated over 36 months of returns ending with the fiscal year-end
<i>LOG_OPRISK</i>	Natural logarithm of standard deviation of cash flows from operations over three years ending with the fiscal year-end
<i>BM</i>	Book to market ratio
<i>DIRECT_EFFECT1</i>	Fair value of stock options granted to non-executives, deflated by assets
<i>DIRECT_EFFECT2</i>	Natural logarithm of one plus the fair value of stock options granted to non-executives

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TABLE 1  
Sample distribution and descriptive statistics

Year	N	<i>AUDIT FEE (\$)</i>		<i>LOG CEOVEGA</i>		<i>LOG CEODELTA</i>	
		Mean	Median	Mean	Median	Mean	Median
2000	889	1,003,890	466,000	3.86	3.96	5.40	5.29
2001	1,141	1,130,220	493,480	4.07	4.21	5.44	5.42
2002	1,190	1,497,730	657,350	4.09	4.18	5.17	5.18
2003	1,241	1,709,070	774,300	4.20	4.37	5.49	5.50
2004	1,236	3,122,320	1,585,030	4.23	4.40	5.58	5.59
2005	1,166	3,490,610	1,890,180	4.16	4.37	5.55	5.58
2006	1,215	3,585,950	1,917,400	3.96	4.18	5.59	5.58
2007	1,300	3,508,690	1,887,550	3.84	4.14	5.48	5.48
2008	1,277	3,488,280	1,925,000	3.77	4.04	4.93	4.98
2009	1,071	3,389,020	1,823,400	3.78	4.03	5.24	5.27

**Notes:**

Table 1 reports the sample distribution and descriptive statistics for audit fees and CEO equity incentive variables by year. The sample comprises 11,726 firm-year observations from 2000-2009. *AUDIT FEE* is total audit service fees in \$. See Appendix for definitions of other variables.

TABLE 2  
Summary statistics

**Panel A: Descriptive statistics**

Variable	N	Mean	Q1	Median	Q3	STD
<i>LOG_AUDITFEE</i>	11,726	14.095	13.298	14.078	14.859	1.151
<i>LOG_CEOVEGA</i>	11,726	4.000	3.075	4.193	5.228	1.760
<i>LOG_CEODELTA</i>	11,726	5.387	4.425	5.374	6.365	1.505
<i>LOG_CFOVEGA</i>	8,387	3.010	2.180	3.049	3.928	1.325
<i>LOG_CFODELTA</i>	9,416	3.613	2.756	3.679	4.528	1.356
<i>OPTION (%)</i>	11,726	1.330	0.382	0.942	1.803	1.347
<i>LOG_EQCOMP</i>	11,726	7.064	6.335	7.499	8.406	2.078
<i>EQCOMP_%</i>	11,726	0.582	0.419	0.653	0.804	0.279
<i>OWNERSHIP (%)</i>	11,726	1.964	0.094	0.304	1.078	4.896
<i>ABS_ACC</i>	11,726	0.301	0.040	0.121	0.455	0.356
<i>LOG_ASSETS</i>	11,726	7.390	6.281	7.263	8.389	1.577
<i>INVREC</i>	11,726	0.243	0.116	0.224	0.336	0.155
<i>LEVERAGE</i>	11,726	0.209	0.047	0.204	0.328	0.166
<i>QUICK</i>	11,726	1.859	0.887	1.338	2.104	1.686
<i>FOREIGN</i>	11,726	0.131	0	0	0	0.337
<i>LOG_SEGMENT</i>	11,726	0.659	0	0.693	1.386	0.676
<i>ROA</i>	11,726	0.034	0.015	0.048	0.085	0.108
<i>LOSS</i>	11,726	0.200	0	0	0	0.400
<i>BIG4</i>	11,726	0.961	1	1	1	0.195
<i>EXPERTISE</i>	11,726	0.351	0.151	0.302	0.515	0.247
<i>LOG_TENURE</i>	11,726	2.221	1.609	2.303	2.890	0.898
<i>OPINION</i>	11,726	0.009	0	0	0	0.094
<i>INTERNAL_CONTROL</i>	11,726	0.074	0	0	0	0.261
<i>AUDITOR_CHANGE</i>	11,726	0.049	0	0	0	0.216
<i>CEO_TURNOVER</i>	11,726	0.115	0	0	0	0.319
<i>LOG_CEOTENURE</i>	11,726	1.845	1.278	1.823	2.390	0.772
<i>LOG_IDIORISK</i>	11,322	-2.306	-2.639	-2.317	-1.997	0.485
<i>LOG_OPRISK</i>	11,725	-3.548	-4.115	-3.514	-2.941	0.896
<i>BM</i>	11,726	0.547	0.283	0.453	0.678	0.413
<i>DIRECT_EFFECT1</i>	6,029	0.656	0	0.151	0.778	1.159
<i>DIRECT_EFFECT2</i>	6,029	5.961	0	8.248	9.092	4.110

TABLE 2 (Continued)

**Panel B: Pearson correlation**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1 LOG_AUDITFEE	1.000																		
2 LOG_CEOVEGA	0.380 (0.000)	1.000																	
3 LOG_CEODELTA	0.316 (0.000)	0.545 (0.000)	1.000																
4 ABS_ACC	-0.014 (0.125)	0.034 (0.000)	0.037 (0.000)	1.000															
5 LOG_ASSETS	0.742 (0.000)	0.505 (0.000)	0.461 (0.000)	-0.138 (0.000)	1.000														
6 INVERC	-0.042 (0.000)	-0.141 (0.000)	-0.132 (0.000)	-0.040 (0.000)	-0.215 (0.000)	1.000													
7 LEVERAGE	0.194 (0.000)	0.056 (0.000)	-0.058 (0.000)	-0.169 (0.000)	0.341 (0.000)	-0.182 (0.000)	1.000												
8 QUICK	-0.286 (0.000)	-0.081 (0.000)	-0.021 (0.023)	0.184 (0.000)	-0.351 (0.000)	-0.173 (0.000)	-0.330 (0.000)	1.000											
9 FOREIGN	0.034 (0.000)	0.016 (0.086)	-0.006 (0.494)	0.038 (0.000)	-0.010 (0.267)	0.075 (0.000)	-0.001 (0.907)	-0.051 (0.000)	1.000										
10 LOG_SEGMENT	0.259 (0.000)	0.056 (0.000)	-0.001 (0.894)	-0.028 (0.002)	0.217 (0.000)	0.053 (0.000)	0.112 (0.000)	-0.160 (0.000)	-0.074 (0.000)	1.000									
11 ROA	0.066 (0.000)	0.190 (0.000)	0.302 (0.000)	-0.083 (0.000)	0.153 (0.000)	0.066 (0.000)	-0.138 (0.000)	-0.029 (0.001)	0.004 (0.648)	0.004 (0.671)	1.000								
12 LOSS	-0.080 (0.000)	-0.170 (0.000)	-0.268 (0.000)	0.089 (0.000)	-0.171 (0.000)	-0.037 (0.000)	0.074 (0.000)	0.095 (0.000)	0.008 (0.370)	-0.025 (0.007)	-0.685 (0.000)	1.000							
13 BIG4	0.104 (0.000)	0.158 (0.000)	0.094 (0.000)	-0.027 (0.004)	0.198 (0.000)	-0.071 (0.000)	0.103 (0.000)	-0.072 (0.000)	0.009 (0.350)	0.052 (0.000)	0.042 (0.000)	-0.050 (0.000)	1.000						
14 EXPERTISE	0.272 (0.000)	0.177 (0.000)	0.129 (0.000)	-0.097 (0.000)	0.312 (0.000)	0.036 (0.000)	0.128 (0.000)	-0.169 (0.000)	-0.001 (0.919)	0.136 (0.000)	0.051 (0.000)	-0.068 (0.000)	0.223 (0.000)	1.000					
15 LOG_TENURE	0.182 (0.000)	0.113 (0.000)	0.051 (0.000)	-0.068 (0.000)	0.189 (0.000)	0.044 (0.000)	0.038 (0.000)	-0.078 (0.503)	0.006 (0.000)	0.083 (0.000)	0.055 (0.000)	-0.046 (0.000)	0.160 (0.000)	0.105 (0.000)	1.000				
16 OPINION	-0.010 (0.276)	-0.103 (0.000)	-0.131 (0.000)	0.017 (0.072)	-0.050 (0.000)	0.013 (0.163)	0.031 (0.001)	-0.028 (0.003)	-0.002 (0.856)	-0.014 (0.143)	-0.150 (0.000)	0.119 (0.000)	-0.014 (0.143)	0.008 (0.412)	-0.026 (0.004)	1.000			
17 INTERNAL_CONTROL	0.133 (0.000)	-0.074 (0.000)	-0.076 (0.000)	0.037 (0.000)	-0.084 (0.000)	0.026 (0.005)	-0.022 (0.017)	-0.002 (0.799)	0.010 (0.303)	0.009 (0.337)	-0.084 (0.000)	0.096 (0.000)	-0.094 (0.000)	-0.037 (0.000)	-0.064 (0.000)	0.060 (0.000)	1.000		
18 AUDITOR_CHANGE	-0.102 (0.000)	-0.037 (0.000)	-0.026 (0.005)	0.035 (0.000)	-0.069 (0.000)	-0.002 (0.801)	0.027 (0.003)	0.013 (0.169)	0.010 (0.264)	-0.008 (0.391)	-0.063 (0.000)	0.067 (0.000)	0.005 (0.558)	-0.046 (0.000)	0.006 (0.502)	0.025 (0.007)	0.037 (0.000)	1.000	
19 CEO_TURNVOER	0.031 (0.001)	-0.088 (0.000)	-0.204 (0.000)	-0.001 (0.931)	0.018 (0.048)	0.011 (0.229)	0.008 (0.381)	-0.027 (0.003)	0.007 (0.439)	0.006 (0.486)	-0.063 (0.000)	0.076 (0.000)	0.010 (0.275)	0.011 (0.242)	0.015 (0.108)	0.040 (0.000)	0.025 (0.007)	0.004 (0.701)	1.000
20 LOG_CEO_TENURE	-0.078 (0.000)	0.043 (0.000)	0.366 (0.000)	-0.023 (0.012)	-0.053 (0.000)	-0.006 (0.532)	-0.028 (0.003)	0.083 (0.000)	-0.020 (0.030)	-0.012 (0.206)	0.070 (0.000)	-0.073 (0.000)	-0.052 (0.000)	-0.040 (0.000)	-0.012 (0.203)	-0.028 (0.002)	-0.014 (0.130)	0.010 (0.267)	-0.545 (0.000)

**Notes:**

Table 2 presents summary statistics. Panel A reports descriptive statistics for key variables and Panel B reports the Pearson correlation coefficients with two-tailed *p*-values in parenthesis. The sample period is 2000-2009. See Appendix for variable definitions.



TABLE 3  
Regression analysis on the relation between CEO equity incentives and audit fees

	Dependent variable = <i>LOG AUDITFEE</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>LOG_CEOVEGA</i>	0.017*** (2.579)		0.018*** (2.735)	0.017*** (2.579)		0.018*** (2.735)
<i>LOG_CEODELTA</i>		0.001 (0.090)	-0.007 (-0.726)		0.001 (0.090)	-0.007 (-0.726)
<i>ABS_ACC</i>				0.004 (0.240)	0.003 (0.188)	0.004 (0.245)
<i>LOG_ASSETS</i>	0.551*** (56.500)	0.562*** (54.340)	0.554*** (51.797)	0.551*** (56.501)	0.562*** (54.333)	0.554*** (51.796)
<i>INVREC</i>	0.711*** (7.400)	0.693*** (7.218)	0.706*** (7.342)	0.711*** (7.400)	0.693*** (7.218)	0.706*** (7.342)
<i>LEVERAGE</i>	0.050 (0.720)	0.041 (0.589)	0.042 (0.609)	0.050 (0.722)	0.041 (0.590)	0.042 (0.610)
<i>QUICK</i>	-0.038*** (-5.549)	-0.038*** (-5.560)	-0.038*** (-5.524)	-0.038*** (-5.545)	-0.038*** (-5.556)	-0.038*** (-5.520)
<i>FOREIGN</i>	0.090*** (3.173)	0.091*** (3.218)	0.090*** (3.163)	0.090*** (3.173)	0.091*** (3.218)	0.090*** (3.163)
<i>LOG_SEGMENT</i>	0.105*** (6.456)	0.103*** (6.349)	0.104*** (6.397)	0.105*** (6.455)	0.103*** (6.349)	0.104*** (6.396)
<i>ROA</i>	-0.493*** (-5.374)	-0.475*** (-5.117)	-0.484*** (-5.218)	-0.493*** (-5.373)	-0.475*** (-5.117)	-0.484*** (-5.217)
<i>LOSS</i>	0.083*** (4.163)	0.080*** (4.043)	0.081*** (4.093)	0.083*** (4.161)	0.080*** (4.042)	0.081*** (4.092)
<i>BIG4</i>	0.034 (0.594)	0.040 (0.713)	0.034 (0.596)	0.033 (0.593)	0.040 (0.712)	0.034 (0.595)
<i>EXPERTISE</i>	0.069 (1.640)	0.072* (1.705)	0.069 (1.643)	0.069 (1.638)	0.072* (1.704)	0.069 (1.641)
<i>LOG_TENURE</i>	-0.001 (-0.077)	-0.000 (-0.030)	-0.001 (-0.128)	-0.001 (-0.077)	-0.000 (-0.030)	-0.001 (-0.128)
<i>OPINION</i>	0.167** (2.358)	0.153** (2.160)	0.163** (2.300)	0.167** (2.351)	0.152** (2.154)	0.162** (2.293)
<i>INTERNAL_CONTROL</i>	0.428*** (16.326)	0.428*** (16.284)	0.428*** (16.284)	0.428*** (16.326)	0.428*** (16.285)	0.428*** (16.284)
<i>AUDITOR_CHANGE</i>	0.053** (2.141)	0.053** (2.120)	0.054** (2.156)	0.053** (2.140)	0.053** (2.119)	0.054** (2.155)
<i>CEO_TURNOVER</i>	-0.003 (-0.149)	-0.010 (-0.534)	-0.002 (-0.110)	-0.003 (-0.147)	-0.010 (-0.532)	-0.002 (-0.107)
<i>LOG_CEOTENURE</i>	-0.044*** (-3.357)	-0.043*** (-3.069)	-0.039*** (-2.786)	-0.044*** (-3.355)	-0.043*** (-3.067)	-0.039*** (-2.784)
<i>Constant</i>	9.005*** (24.698)	8.982*** (25.203)	9.012*** (24.679)	9.005*** (24.695)	8.982*** (25.201)	9.011*** (24.677)
Observations	11,726	11,726	11,726	11,726	11,726	11,726
Adjusted R-squared	0.809	0.808	0.809	0.809	0.808	0.809
Year FE	YES	YES	YES	YES	YES	YES
Industry FE	YES	YES	YES	YES	YES	YES

**Notes:**

Table 3 reports the regression results on the relation between CEO equity incentives and audit fees. It reports the regression coefficients and firm cluster adjusted *t*-statistics in parenthesis based on the sample from 2000-2009. See Appendix for variable definitions.

\*, \*\*, \*\*\* denote significance levels of 0.10, 0.05, and 0.01, respectively, all two-tailed.

TABLE 4  
Regression analysis of first time option grants and audit fee changes

	Dependent variable = change in <i>LOG_AUDITFEE</i>	
	(1)	(2)
<i>FIRST_GRANT</i>	0.075*** (3.660)	
<i>ΔLOG_CEOVEGA</i>		0.020*** (2.705)
<i>ΔLOG_CEODELTA</i>		0.009 (0.944)
<i>ΔOWNERSHIP</i>	0.004 (0.854)	
<i>ΔABS_ACC</i>	0.003 (0.136)	-0.002 (-0.067)
<i>ΔLOG_ASSETS</i>	0.439*** (8.435)	0.428*** (8.197)
<i>ΔINVREC</i>	0.563** (2.271)	0.551** (2.228)
<i>ΔLEVERAGE</i>	0.067 (0.500)	0.075 (0.558)
<i>ΔQUICK</i>	-0.038*** (-2.642)	-0.039*** (-2.726)
<i>ΔFOREIGN</i>	-0.101* (-1.921)	-0.100* (-1.806)
<i>ΔLOG_SEGMENT</i>	-0.033 (-0.924)	-0.026 (-0.735)
<i>ΔROA</i>	-0.213* (-1.766)	-0.248** (-2.018)
<i>ΔLOSS</i>	-0.027 (-1.134)	-0.024 (-0.983)
<i>ΔBIG4</i>	-0.168 (-1.210)	-0.175 (-1.241)
<i>ΔEXPERTISE</i>	-0.025 (-0.951)	-0.025 (-0.930)
<i>ΔLOG_TENURE</i>	-0.051 (-0.549)	-0.052 (-0.565)
<i>ΔOPINION</i>	0.188* (1.777)	0.181* (1.692)
<i>ΔINTERNAL_CONTROL</i>	0.199*** (5.721)	0.196*** (5.714)
<i>ΔAUDITOR_CHANGE</i>	0.027 (0.597)	0.023 (0.510)
<i>ΔCEO_TURNOVER</i>	-0.012 (-0.431)	-0.011 (-0.404)
<i>ΔLOG_CEOTENURE</i>	0.011 (0.498)	0.000 (0.018)
<i>Constant</i>	0.063*** (6.860)	0.080*** (9.151)
Observations	1,694	1,694
Adjusted R-squared	0.113	0.109

**Notes:**

Table 4 reports the regression results on the relation between CEO equity incentives and change in audit fees when companies grant CEO stock options for the first time in three years. It reports the regression coefficients and firm cluster adjusted *t*-statistics in parenthesis based on the sample from 2000-2009. See Appendix for variable definitions.

\*, \*\*, \*\*\* denote significance levels of 0.10, 0.05, and 0.01, respectively, all two-tailed.

TABLE 5  
Regression analysis to mitigate endogeneity concerns

	Dependent variable = <i>LOG AUDITFEE</i>			
	(1) Firm fixed effect	(2) Control for risk	(3) IV	(4) Dynamic GMM
<i>LOG_CEOVEGA</i>	0.018*** (3.005)	0.020*** (2.929)		0.020** (2.126)
<i>LOG_CEODELTA</i>	-0.014** (-2.006)	-0.011 (-1.142)		-0.012 (-1.011)
<i>LOG_CEOVEGA_FITTED_IV</i>			0.229*** (3.116)	
<i>LOG_CEODELTA_FITTED_IV</i>			-0.156** (-2.372)	
<i>LAG_LOGAUDITFEE</i>				0.459*** (18.441)
<i>ABS_ACC</i>	0.003 (0.268)	-0.008 (-0.499)	0.309*** (11.304)	-0.000 (-0.015)
<i>LOG_ASSETS</i>	0.417*** (20.621)	0.571*** (49.454)	0.563*** (50.126)	0.299*** (13.948)
<i>INVREC</i>	0.320*** (3.023)	0.741*** (7.477)	0.921*** (8.814)	0.339** (2.195)
<i>LEVERAGE</i>	0.163** (2.538)	-0.019 (-0.270)	-0.433*** (-4.850)	0.075 (0.831)
<i>QUICK</i>	-0.043*** (-7.207)	-0.041*** (-5.809)	-0.003 (-0.286)	-0.035*** (-3.182)
<i>FOREIGN</i>	-0.035 (-1.192)	0.095*** (3.341)	0.121*** (3.334)	0.054 (1.218)
<i>LOG_SEGMENT</i>	0.043** (2.341)	0.111*** (6.739)	0.152*** (7.175)	0.063** (2.564)
<i>ROA</i>	-0.227*** (-3.568)	-0.477*** (-4.920)	-0.305*** (-2.629)	-0.095 (-0.558)
<i>LOSS</i>	0.030** (2.107)	0.064*** (3.229)	0.044 (1.510)	0.068 (1.611)
<i>BIG4</i>	0.100* (1.690)	0.033 (0.589)	-0.250*** (-3.211)	-0.001 (-0.012)
<i>EXPERTISE</i>	0.036 (0.984)	0.079* (1.864)	0.113 (1.644)	0.039 (0.635)
<i>LOG_TENURE</i>	0.006 (0.595)	0.007 (0.597)	0.067*** (4.674)	0.000 (0.038)
<i>OPINION</i>	0.185*** (2.637)	0.063 (0.738)	0.169* (1.823)	0.053 (0.633)
<i>INTERNAL_CONTROL</i>	0.266*** (12.453)	0.405*** (15.557)	0.853*** (24.912)	0.194*** (5.996)
<i>AUDITOR_CHANGE</i>	0.017 (0.745)	0.042* (1.655)	-0.302*** (-7.813)	0.120 (1.609)
<i>CEO_TURNOVER</i>	0.010 (0.747)	0.004 (0.193)	-0.051* (-1.791)	-0.037 (-1.065)
<i>LOG_CEOTENURE</i>	-0.002 (-0.190)	-0.033** (-2.283)	-0.051*** (-2.804)	-0.005 (-0.352)
<i>LOG_IDIORISK</i>		0.133*** (4.977)		
<i>LOG_OPRISK</i>		0.002 (0.167)		
<i>BM</i>		-0.021 (-0.885)		

<i>Constant</i>	9.739*** (58.615)	9.045*** (21.425)	9.610*** (36.601)	5.410*** (12.382)
Observations	11,726	11,322	8,992	9,429
Adjusted R-squared	0.936	0.813	0.624	
Year FE	YES	YES	NO	YES
Industry FE	NO	YES	NO	YES

**Notes:**

Table 5 reports the results from analyses to mitigate endogeneity concerns. It reports the regression coefficients and firm cluster adjusted *t*-statistics in parenthesis based on the sample from 2000-2009. See Appendix for variable definitions.

\*, \*\*, \*\*\* denote significance levels of 0.10, 0.05, and 0.01, respectively, all two-tailed.

TABLE 6

Regression analysis on the relation between CEO and CFO equity incentives and audit fees

Dependent variable = <i>LOG_AUDITFEE</i>		
	(1)	(2)
<i>LOG_CEOVEGA</i>		0.021** (2.066)
<i>LOG_CEODELTA</i>		0.001 (0.114)
<i>LOG_CFOVEGA</i>	0.022* (1.648)	0.003 (0.198)
<i>LOG_CFODELTA</i>	-0.021* (-1.678)	-0.016 (-1.163)
<i>ABS_ACC</i>	0.003 (0.163)	0.003 (0.167)
<i>LOG_ASSETS</i>	0.565*** (50.536)	0.559*** (45.688)
<i>INVREC</i>	0.699*** (6.451)	0.707*** (6.508)
<i>LEVERAGE</i>	0.023 (0.293)	0.028 (0.359)
<i>QUICK</i>	-0.038*** (-5.330)	-0.038*** (-5.348)
<i>FOREIGN</i>	0.095*** (3.059)	0.096*** (3.082)
<i>LOG_SEGMENT</i>	0.110*** (6.163)	0.111*** (6.213)
<i>ROA</i>	-0.519*** (-4.870)	-0.527*** (-4.935)
<i>LOSS</i>	0.085*** (3.606)	0.086*** (3.662)
<i>BIG4</i>	0.096 (1.557)	0.095 (1.500)
<i>EXPERTISE</i>	0.077 (1.618)	0.073 (1.542)
<i>LOG_TENURE</i>	0.003 (0.274)	0.003 (0.241)
<i>OPINION</i>	0.179** (1.988)	0.187** (2.065)
<i>INTERNAL_CONTROL</i>	0.430*** (14.957)	0.430*** (14.967)
<i>AUDITOR_CHANGE</i>	0.035 (1.161)	0.035 (1.165)
<i>CEO_TURNOVER</i>	-0.011 (-0.494)	-0.001 (-0.043)
<i>LOG_CEOTENURE</i>	-0.035** (-2.431)	-0.037** (-2.326)
<i>Constant</i>	9.194*** (51.626)	9.199*** (51.163)
Observations	8,387	8,387
Adjusted R-squared	0.813	0.813
Year FE	YES	YES
Industry FE	YES	YES

**Notes:**

Table 6 reports the regression results on the relation between CEO and CFO equity incentives and audit fees. It reports the regression coefficients and firm cluster adjusted *t*-statistics in parenthesis based on the sample from 2000-2009. See Appendix for variable definitions.

\*, \*\*, \*\*\* denote significance levels of 0.10, 0.05, and 0.01, respectively, all two-tailed.

TABLE 7  
Additional analysis controlling for direct effects of equity-based compensation

Dependent variable = <i>LOG_AUDITFEE</i>		
	(1)	(2)
<i>LOG_CEOVEGA</i>	0.013** (1.978)	0.015** (2.144)
<i>LOG_CEODELTA</i>	0.003 (0.234)	0.005 (0.302)
<i>ABS_ACC</i>	-0.024 (-0.848)	-0.023 (-0.815)
<i>LOG_ASSETS</i>	0.550*** (43.368)	0.541*** (42.996)
<i>INVREC</i>	0.807*** (8.731)	0.802*** (8.650)
<i>LEVERAGE</i>	-0.036 (-0.421)	-0.046 (-0.534)
<i>QUICK</i>	-0.017** (-2.255)	-0.017** (-2.146)
<i>FOREIGN</i>	0.111*** (4.001)	0.113*** (4.069)
<i>LOG_SEGMENT</i>	0.106*** (6.679)	0.106*** (6.664)
<i>ROA</i>	-0.456*** (-3.953)	-0.443*** (-3.896)
<i>LOSS</i>	0.058*** (2.884)	0.055*** (2.760)
<i>BIG4</i>	0.102** (2.092)	0.101** (2.053)
<i>EXPERTISE</i>	0.069 (1.535)	0.069 (1.520)
<i>LOG_TENURE</i>	-0.018 (-1.283)	-0.019 (-1.332)
<i>OPINION</i>	0.052 (0.929)	0.050 (0.875)
<i>INTERNAL_CONTROL</i>	0.400*** (15.853)	0.398*** (15.826)
<i>AUDITOR_CHANGE</i>	0.149** (2.344)	0.149** (2.296)
<i>CEO_TURNOVER</i>	0.004 (0.130)	0.004 (0.112)
<i>LOG_CEOTENURE</i>	-0.034* (-1.681)	-0.035* (-1.712)
<i>DIRECT_EFFECT1</i>	0.016 (1.615)	
<i>DIRECT_EFFECT2</i>		-0.003 (-1.351)
<i>Constant</i>	10.128*** (44.392)	10.201*** (45.103)
Observations	6,029	6,029
Adjusted R-squared	0.764	0.764
Year FE	YES	YES
Industry FE	YES	YES



**Notes:**

Table 7 reports the regression results on the relation between CEO equity incentives and audit fees after controlling for the direct effect of equity-based compensation. It reports coefficients and firm cluster adjusted *t*-statistics in parenthesis based on the sample from 2000-2009. See Appendix for variable definitions.

\*, \*\*, \*\*\* denote significance levels of 0.10, 0.05, and 0.01, respectively, all two-tailed.

TABLE 8  
Additional analysis based on alternative CEO equity incentive measures

	Dependent variable = <i>LOG_AUDITFEE</i>		
	(1)	(2)	(3)
<i>OPTION</i>	0.034*** (4.327)		
<i>LOG_EQCOMP</i>		0.014*** (3.230)	
<i>EQCOMP_%</i>			0.057** (1.967)
<i>OWNERSHIP</i>	0.001 (0.271)	0.001 (0.306)	-0.000 (-0.013)
<i>ABS_ACC</i>	0.004 (0.258)	0.003 (0.201)	0.003 (0.181)
<i>LOG_ASSETS</i>	0.573*** (62.019)	0.553*** (58.277)	0.558*** (60.245)
<i>INVREC</i>	0.714*** (7.488)	0.707*** (7.394)	0.704*** (7.340)
<i>LEVERAGE</i>	0.021 (0.312)	0.043 (0.630)	0.042 (0.618)
<i>QUICK</i>	-0.038*** (-5.543)	-0.038*** (-5.505)	-0.039*** (-5.583)
<i>FOREIGN</i>	0.092*** (3.219)	0.092*** (3.231)	0.092*** (3.221)
<i>LOG_SEGMENT</i>	0.106*** (6.553)	0.104*** (6.412)	0.104*** (6.410)
<i>ROA</i>	-0.455*** (-4.990)	-0.475*** (-5.177)	-0.472*** (-5.149)
<i>LOSS</i>	0.081*** (4.081)	0.082*** (4.153)	0.081*** (4.064)
<i>BIG4</i>	0.036 (0.629)	0.034 (0.600)	0.034 (0.604)
<i>EXPERTISE</i>	0.071* (1.683)	0.073* (1.729)	0.073* (1.733)
<i>LOG_TENURE</i>	-0.001 (-0.057)	0.000 (0.041)	0.000 (0.015)
<i>OPINION</i>	0.149** (2.111)	0.159** (2.274)	0.156** (2.225)
<i>INTERNAL_CONTROL</i>	0.425*** (16.265)	0.430*** (16.441)	0.429*** (16.394)
<i>AUDITOR_CHANGE</i>	0.052** (2.104)	0.054** (2.161)	0.053** (2.131)
<i>CEO_TURNOVER</i>	-0.001 (-0.060)	-0.010 (-0.521)	-0.010 (-0.532)
<i>LOG_CEOTENURE</i>	-0.052*** (-3.765)	-0.041*** (-3.013)	-0.040*** (-2.963)
<i>Constant</i>	8.875*** (24.851)	8.948*** (25.243)	8.977*** (25.270)
Observations	11,726	11,726	11,726
Adjusted R-squared	0.809	0.809	0.808
Year FE	YES	YES	YES
Industry FE	YES	YES	YES

**Notes:**

Table 8 reports the regression results on the relation between CEO equity incentives and audit fees using alternative measures of CEO equity-based compensation. It reports coefficients and firm cluster adjusted *t*-statistics in parenthesis based on the sample from 2000-2009. See Appendix for variable definitions.

\*, \*\*, \*\*\* denote significance levels of 0.10, 0.05, and 0.01, respectively, all two-tailed.