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The effect of financial reporting quality on CEO compensation structure: Evidence from accounting comparability

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ABSTRACT

This study examines the effect of accounting comparability on the design of CEO compensation structure. After controlling for firm-specific attributes, we find that accounting comparability is positively associated with CEO equity-based compensation intensity and pay-performance sensitivity. This suggests that the improved comparability increases the usefulness of equity-based compensation and a firm is willing to offer more equity-based compensation contracts to CEOs and increase their pay-performance sensitivity. Further, we find that the impact of comparability on the CEO's compensation contract increases with information asymmetry, which is consistent with the notion that accounting comparability is a quality of financial reporting that facilitates the use of equity-based compensation in a poor information environment. Our analysis also reveals that the effect of accounting comparability on CEO compensation structure is greater when a firm's corporate governance is strong, consistent with the complementary relation between comparability and the exiting corporate governance in determining CEO compensation schemes. Overall, our evidence suggests that firms utilize more equity-based compensation as a proportion of total compensation under greater accounting comparability and enhance the alignment between equity-based compensation and firm performance.

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1. Introduction

This study investigates how accounting comparability relates to CEO compensation structure.[1] The FASB defines comparability as the quality of information that enables users to identify similarities and differences between two sets of economic phenomena (1980), and it recognizes comparability, verifiability, timeliness, and understandability as qualitative characteristics that enhance the usefulness of information that is relevant and faithfully represented (2010). The increased comparability, therefore, is beneficial to accounting information users including both internal and external participants under the U.S. financial reporting system (FASB, 2016). From the perspective of external information users, prior studies have examined the effects of comparability on analyst forecast properties (De Franco et al., 2011), credit risk (Kim et al., 2013), debt contracting (Fang et al., 2016), comparability signal to investors (Campbell and Yeung, 2017), stock price informativeness (Choi et al., 2017). From the perspective of internal information users, recent research has explored the implications of comparability on internal decision making such as accounting-based relative performance evaluation (Ozkan et al., 2012; Lobo et al., 2018), managers' incentives to withhold bad news (Kim et al., 2016), earnings management activities (Sohn, 2016), and M&A decisions (Chen et al., 2018).

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  [1] In this paper, we use 'financial statement comparability', 'accounting comparability', and 'comparability' interchangeably.

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However, the role of accounting comparability in designing CEOs' compensation schemes, in particular absolute performance evaluation, has not been actively explored as a primary subject in the literature. To fill this void in the literature, we examine how accounting comparability affects a firm's decision to build CEOs' compensation structure, focusing on equity-based compensation and its performance sensitivity.

A growing literature provides evidence that accounting comparability influences not only CEOs' performance evaluation (Ozkan et al., 2012; Lobo et al., 2018) but also their incentives of financial misreporting (Brochet et al., 2013). This suggests that comparability is one of important factors that affect the efficiency of CEO compensation contracts.[2] In addition, Choi et al. (2017) show that the quality of stock price, which is a primary component of equity-based compensation contracts, improves as firms' financial statements become more comparable with those of their industry peers. Considering the influence of comparability on the compensation contracts, we argue that the usefulness of equity-based contracts increases with a firm's accounting comparability as the benefits induced by comparability effectively mitigate the potential adverse consequences of equity-based compensation, such as misreporting and suboptimal investment.

We consider comparability as a distinct quality of accounting information that facilitates better compensation contracting with management by improving a firm's mechanisms for disciplining managerial misbehavior and consequently increasing the usefulness of equity-based contracts. Prior studies suggest that information acquisition costs faced by directors can affect the effectiveness of board monitoring (e.g., Jensen, 1993; Adams and Ferreira, 2007; Chen et al., 2015). As accounting information provides direct and indirect inputs to corporate governance mechanisms (Bushman and Smith, 2001), boards with more comparable accounting information can reduce their information acquisition costs through more precise performance comparisons with peer firms and, therefore, allows more efficient monitoring and better understanding of managers' performance. As the board of directors enhances its ability to monitor and detect management misbehaviors, the usefulness of equity-based compensation will increase because board monitoring attenuates the adverse consequences of equity-based compensation, such as misreporting and suboptimal investment. Thus, we hypothesize that increased financial comparability will lead to greater use of equity-based compensation and tighter alignment between equity-based compensation and firm performance. However, it is critical to note that the optimal pay structure is not fixed across firms as well as times because a number of firm characteristics affect the efficiency of compensation contracts. Therefore, we also examine whether these effects vary with the degree of information asymmetry and corporate governance to support the inherent role of comparability in improving the quality of accounting information available to boards.

Our research question is particularly important considering the recent financial crisis of 2007–2008. CEOs in collapsed financial institutions received huge amounts of equity-based compensation, which has raised inevitable concerns about the adverse consequences of equity-based compensation (Efendi et al., 2007; Cornett et al., 2008; Benmelech et al., 2010). For example, Benmelech et al. (2010) show that equity-based compensation may increase managers' incentives to make myopic decisions such as delaying the disclosure of bad news about future growth and making suboptimal investments, which leads to stock overvaluation and an increased risk of stock crashes. This view contradicts the classical view that compensation packages with heavily weighted equity-based components lengthen managers' decision horizon and motivate them to focus more on activities that are value-increasing in the long run (Murphy, 1985; Jensen and Murphy, 1990; Bebchuk and Fried, 2010). In this regard, our study is timely and provides useful insights into the role of accounting comparability in changing the nature of equity-based compensation in CEOs' compensation contracts.

To examine the association between comparability and CEO compensation structure, we primarily use output-based measures of accounting comparability following De Franco et al. (2011). The intuition of the output-based measures is that firms in the same industry should have similar accounting outputs such as earnings under the same economic events if they have similar accounting systems.[3] First, we find the positive association between CEOs' equity-based compensation intensity and comparability. We also document that accounting comparability is positively related to pay-performance sensitivity of equity-based incentives. Our results suggest that firms are more likely to use equity-based compensation and increase pay-performance sensitivity as financial statements become more comparable, consistent with firms expecting equity-based compensation to offer more benefits when the level of accounting comparability is high. Second, we show that comparability has a greater effect on CEO compensation contract when there is high information asymmetry, which indicates that the disciplinary effect of comparability on CEO decisions plays a more critical role when firms operate in a poor information environment. Finally, our evidence reveals that comparability as an additional factor affecting a firm's monitoring mechanism has a complementary relation with current corporate governance in determining its reliance on equity-based compensation in CEO compensation structure. Overall, these results all support the view that comparability is one of the critical determinants of the usefulness of equity-based compensation in CEO compensation structure. In particular, firms appear to increase CEO equity-based compensation intensity and pay-performance sensitivity when their financial statements are more comparable.

Our study contributes to the literature in the following ways. First, we add to the literature that examines the benefits of accounting comparability. While a number of studies examine the effects of comparability on external information users such as analysts, creditors, and investors (e.g., De Franco et al., 2011; Kim et al., 2013; Choi et al., 2017), more recent studies document the association between comparability and internal decision making (e.g., Kim et al., 2016; Sohn, 2016; Chen et al.,

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[2] In their analytical paper, Jongjaroenkamol and Laux (2017) report that the quality of financial reporting influences the board's ability to monitor a CEO's misbehaviors, which affects the incentive contracts offered to CEOs.

[3] We use the output-based measures rather than the input-based measures because the input-based measures are more likely to suffer from endogeneity issues arising from researchers' discretion over which accounting methods to use to measure comparability (De Franco et al., 2011).

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2018). More closely related research to our study is to examine the implication of comparability on the use of accounting-based relative performance evaluation (e.g., Ozkan et al., 2012; Lobo et al., 2018). Lobo et al. (2018) find that firms with higher comparability are more likely to use relative performance evaluation in CEO compensation with the accounting-based performance measure, return on assets. Using mandatory IFRS adoption setting, Ozkan et al. (2012) document the effect of comparability on accounting-based relative performance evaluation and pay-performance sensitivity with cash compensation itself.[4] However, our study differs from those papers in that we focus on how comparability affects a design of CEOs' compensation schemes regarding absolute performance evaluation with stock returns. We provide new evidence on the role of comparability in tying CEO compensation to absolute firm performance, in particular through equity-based compensation intensity and its performance sensitivity.

Second, we contribute to the literature on how to better motivate managers to enhance firms' value in the long run (e.g., Kaplan and Norton, 1996; Ittner et al., 1997; Ittner and Larcker, 1998a, 1998b, 2003; Banker et al., 2000; Said et al., 2003; HassabElnaby et al., 2005; Bebchuk and Fried, 2010). Treasury Secretary Geithner (2009) claims that boards should "pay top executives in ways that are tightly aligned with the long-term value and soundness of the firm." Our study joins this conversation by showing that improved comparability promotes a greater use of equity-based compensation in CEOs' compensation structure, which has longer horizons than cash compensation. In addition, recent studies on the role of equity-based compensation on agency problems between shareholders and managers have documented the mixed results (Efendi et al., 2007; Larcker et al., 2007; Cornett et al., 2008; Benmelech et al., 2010; Armstrong et al., 2013). We demonstrate the distinct role of accounting comparability though which CEO equity-based compensation is closely aligned with firm performance.

Finally, our findings are important to standard setters interested in understanding the economic consequences of accounting comparability. The FASB has implemented a three-part strategy for seeking greater comparability in accounting standards internationally: (1) developing high quality GAAP standards, (2) actively participating in the development of International Financial Reporting Standards (IFRS), and (3) enhancing relationships and communications with other national standards setters (FASB, 2016). By implementing the three-part strategy, the FASB desires higher comparability in accounting standards globally, and enhances the quality of financial reporting for the benefit of accounting information users. Hence, our study highlights and provides empirical evidence on the consequences of comparability associated with internal information users in designing CEOs' equity-based incentive contracts.

The remainder of this paper proceeds as follows. Section 2 reviews the related literature and develops the hypotheses. In Section 3, we explain the variable measurements and empirical models used in the analysis. Section 4 presents the empirical results, while Section 5 reports the results from extended analyses and robustness tests. Section 6 concludes the paper.

2. Literature review and hypothesis development

2.1. Accounting comparability

Recent research has examined the role of accounting comparability in capital markets and has found that greater comparability provides capital market participants with better benchmarks, which helps reduce their information-acquisition and processing costs (Bhojraj and Lee, 2002; De Franco et al., 2011; Kim et al., 2013; Fang et al., 2016; Kim et al., 2016; Campbell and Yeung, 2017; Choi et al., 2017; Chen et al., 2018). For example, Chen et al. (2018) show that in mergers and acquisitions, acquiring firms make more efficient investment decisions as target firms' comparability increases. Kim et al. (2013) provide evidence that debt comparability reduces debt investors' uncertainty about firms' credit risk. In addition, findings from prior studies suggest that comparability enhances analysts' information environment and leads to improvement in the quality of analysts' forecasts and valuations. Bhojraj and Lee (2002) report that analysts provide more accurate equity evaluation when they select more comparable peer firms in their evaluations. De Franco et al. (2011) also show that analyst forecasts become more accurate and less dispersed as a firm's financial statement comparability increases, suggesting that analysts take advantage of comparability in their earnings forecasts. These findings indicate that financial statement comparability reduces analysts' information access cost and consequently improves analysts' information environments.

While prior studies focus mainly on the benefits of comparability for external information users, there has been recent research exploring how comparability affects internal information users' decisions and behaviors (Sohn, 2016; Kim et al., 2016; Lobo et al., 2018). Kim et al. (2016) find that more comparable financial statements mitigate managers' incentive and ability to withhold bad news, which decreases firms' expected crash risk. Sohn (2016) provides evidence that firms tend to move from accrual-based earnings management to real earnings management as comparability increases. Recently, Lobo et al. (2018) document the positive relation between comparability and accounting-based relative performance evaluation (RPE). Specifically, they show that firms with high accounting comparability are more likely to include accounting-based RPE in executive compensation contract as comparability enhances the risk-sharing benefits of accounting-based RPE.[5] This sug-

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[4] Ozkan et al. (2012) assume that IFRS adoption increases comparability and do not directly examine the effect of accounting comparability on compensation structure. In fact, Cascino and Gassen (2015) directly test this assumption, and their results suggest that the overall comparability effect of mandatory IFRS adoption is marginal.

[5] Prior analytical studies show relative performance evaluation (RPE) increases risk sharing between the principal and the agent, and the agent is compensated for the performance under the agent's control after controlling for common systematic risks (Lazear and Rosen, 1981; Holmstrom, 1982; Nalebuff and Stiglitz, 1983).

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gests that accounting comparability plays a critical role of implementing RPE with accounting-based metrics in executive compensation schemes as it helps to control for the effect of common risk on firms' performance. Although absolute and relative performance evaluations capture distinct dimensions of CEO compensation contracting (Antle and Smith, 1986), there has been limited research that examines how accounting comparability affects firms' design of CEOs' absolute performance evaluation with equity-based incentive contracts.

2.2. Equity-based compensation

Cash-based compensation (e.g., bonus) based on performance evaluation with accounting earnings encourages actions that focus on current profits while overlooking long-term benefits, which results in a horizon problem (Smith and Watts, 1992; Dechow and Sloan, 1991; Ittner et al., 1997). Equity-based compensation plays a different role (Bizjak et al., 1993; Yermack, 1995), and, overall, is a key mechanism reducing agency problems arising from conflicts of interests due to the separation of ownership and control (Jensen and Meckling, 1976; Fama and Jensen, 1983). That is, as agency approach suggests risk-averse CEOs would avoid the uncertainty and prefer more certain, cash-based compensation in the forms of greater salary and less contingent compensation (Amihud and Lev, 1981; Shapira, 1995; Westphal, 1998), CEO compensation structure is a crucial factor in inducing them to take on riskier investments and pursue long-term profits in alignment with the interests of shareholders (Indjejikian, 1999).

Compensation packages with heavily weighted equity-based components lengthen managers' decision horizon and motivate them to focus more on activities that increase value in the long run (Murphy, 1985; Jensen and Murphy, 1990). That is, equity-based compensation (e.g., stock options and restricted stocks) addresses the long-term consequences of managers' actions (Baber et al., 1998), extends managers' decision horizons to enable long-term decisions aligned with shareholder interests (Lewellen et al., 1987; Dechow and Sloan, 1991; Gaver and Gaver, 1993), and induces managerial efforts to maximize firms' long-term value (Zhou, 2001) and long-term performance (Lambert and Larcker, 1987; Morck et al., 1988; Dechow and Sloan, 1991; Bizjak et al., 1993; Mehran, 1995; Yermack, 1995; Hanlon et al., 2003; Cheng, 2004; Banker et al., 2011; Karim et al., 2018). Bebchuk and Fried (2010) suggest that the optimal compensation structure ties executive compensation to long-term performance through equity-based compensation.

In contrast, another steam of research shows that equity-based compensation also leads to managerial misbehaviors including earnings management and misreporting (e.g., Healy, 1985; Burns and Kedia, 2006; Efendi et al., 2007; Cornett et al., 2008; Kedia and Philippon, 2010; Benmelech et al., 2010). Benmelech et al. (2010) provide evidence on the adverse effects of equity-based compensation on managers' disclosure and investment decisions. Burns and Kedia (2006) find a positive significant relation between the sensitivity of stock options of CEO compensation to stock price and the CEOs' incentives to misreport. Further, the financial crisis of 2007–2008 reiterated concerns about the adverse consequences of equity-based compensation as CEOs in collapsed financial institutions received huge amounts of equity-based compensation. In addition, recent studies on the relation between equity-based compensation and agency problems have documented the mixed results (Larcker et al., 2007; Armstrong et al., 2013). Hence, we extend the literature to investigate whether accounting comparability affects the nature of equity-based compensation in CEOs' compensation contracts.

2.3. Hypothesis development

2.3.1. Accounting comparability and CEO compensation structure

Regarding the selection of comparable firms in CEO compensation contracts, prior studies show that firms are more likely to benchmark against peers that pay their CEOs higher compensation. In this self-serving behavior, highly paid peers are selected to justify higher CEO pay. That is, firms choose higher executive-compensation peers to support upward executive compensation (Albuquerque et al., 2013; Frulkender and Yang, 2010; Bizjak et al., 2011), and executives are typically involved in the process of reviewing and providing feedback on the choice of peers (Reda et al., 2007).

Managers have better information than outsiders (information asymmetry). They also have incentives to favorably bias the information they supply to outsiders and take actions that result in deadweight losses (agency costs) and thereby reduce firm and equity values (Jensen and Meckling, 1976; Watts and Zimmerman, 1986). De Franco et al. (2011) suggest that comparability could assist boards in their objective selection of comparable firms. Brochet et al. (2013) also indicate that improved financial statement comparability across firms reduces private information benefits after mandatory IFRS adoption. That is, improving financial statement comparability not only reduces managers' incentives to take advantage of private information through self-serving behavior, but also enhances firms' ability to detect managerial misbehaviors such as earnings management. Bushman and Smith (2001) suggest that accounting information plays an important role in corporate governance by providing direct and indirect input to internal corporate control mechanisms. Similarly, a large literature examining board effectiveness shows that the ability of directors to monitor CEOs' performance varies with information acquisition costs necessary for monitoring (e.g., Jensen, 1993; Adams and Ferreira, 2007; Chen et al., 2015). This indicates that board members with more comparable accounting information can lower their information acquisition costs through more precise performance comparisons with peer firms, and will monitor CEOs more effectively. Thus, we argue that the usefulness of equity-based compensation increases with accounting comparability because the enhanced board's monitoring ability attenuates the adverse consequences of equity-based compensation, such as misreporting and suboptimal investment.

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Prior theoretical models show how the potential for financial statement manipulation influences managerial equity-based compensation (Goldman and Slezak, 2006; Peng and Roell, 2008; Laux and Laux, 2009). These theories predict that managers will be granted more equity-based compensation when financial misreporting is more likely to be detected. That is, as improving financial reporting comparability enhances firms' ability to detect managerial misbehaviors (Brochet et al., 2013), firms are more likely to offer equity-based incentives to CEOs. Given that accounting comparability improves the usefulness of equity-based compensation by inducing managers to focus on maximizing firm values rather than pursuing personal interests, firms with higher comparability are more likely to offer equity-based compensation contracts to CEOs. This leads us to the following hypothesis:

H1a. Accounting comparability is positively associated with CEOs' equity-based incentives.

Given the positive relation between accounting comparability and equity-based compensation intensity, we expect that placing more weight on equity-based compensation could be an optimal incentive contract for firms with greater comparability. Prior studies suggest that pay-performance sensitivity is a function of efficiency in managers' incentive packages (e.g., Jensen and Murphy, 1990; Hall and Liebman, 1998). If equity-based compensation becomes more effective in discouraging CEOs' misbehaviors as accounting comparability increases, comparability would be positively related to the pay-performance sensitivity of equity incentives. Building on this argument, we conjecture that comparability improves the link between CEO equity-based pay and firm performance if comparability succeeds in deterring CEOs' incentives for opportunistic manipulations and, in turn, facilitates the role of equity-based compensation. We therefore advance the following hypothesis:

H1b. Accounting comparability is positively associated with CEOs' pay-performance sensitivities.

2.3.2. The effect of information environment on the relation between accounting comparability and CEO compensation structure

Brau et al. (2005) and Yung and Zender (2010) argue that asymmetric information increases the need for clearer signaling mechanisms. Similarly, Richardson (2000) finds that firms with greater information asymmetry are more likely to manage accruals and earnings. These studies suggest that the usefulness of quality information is greater when there is higher information asymmetry. If comparability thus strengthens boards' monitoring abilities by improving the quality of accounting information available to boards, firms' information environment may influence the association between comparability and compensation structure. That is, the effect of comparability may vary with the extent to which comparability helps boards to monitor managers. As boards' monitoring costs may increase with information asymmetry, the incremental benefit of comparability, which reduces information-acquisition costs, would be higher for firms with greater information asymmetry. Thus, we hypothesize that the effect of comparability on the compensation structure would be stronger for firms under high information asymmetry than for other firms. Our second hypothesis is as follows:

H2a. The positive relation between accounting comparability and equity-based incentives is more pronounced for firms with high information asymmetry.

H2b. The positive relation between accounting comparability and pay-performance sensitivities is more pronounced for firms with high information asymmetry.

2.3.3. The effect of corporate governance on the relation between accounting comparability and CEO compensation structure

Thus far, we have conjectured that accounting comparability increases the incremental benefits of equity-based compensation by strengthening the board's disciplining effect on CEOs' misbehaviors. While the effect of comparability on the compensation structure has not yet been studied, extensive literature investigates how corporate governance, in particular the monitoring incentives of the board of directors, affects managers' opportunistic activities as well as firm performance (e.g., Beasley, 1996; Klein, 2002; Ashbaugh et al., 2006). Our third hypothesis expands on the interaction between corporate governance and comparability in monitoring CEOs' activities. Specifically, if the board's existing monitoring incentives and comparability are complementary (substitute) in restricting CEOs' opportunistic behaviors, the effect of comparability on the CEO's compensation structure will be greater for firms with good (poor) corporate governance. Consistent with the formats of Hypothesis 1 and 2, we formulate our third hypothesis as follows;

H3a. The positive relation between accounting comparability and equity-based incentives is more pronounced for firms with strong corporate governance.

H3b. The positive relation between accounting comparability and pay-performance sensitivities is more pronounced for firms with strong corporate governance.

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3. Research design

This section discusses (1) our proxy for accounting comparability, (2) our measures of executive-compensation structure, and (3) our empirical models.

3.1. Proxy for accounting comparability

Following the concept and method of financial statement comparability from De Franco et al. (2011), we construct the proxy for accounting comparability.[6] To compute the measure, we first predict individual firms' accounting systems. We obtain the coefficient estimates from Eq. (1) estimated by each firm-year using prior 16 quarter earnings and stock returns as proxies for economic events and their outcomes in the accounting system, respectively.

$$QIB_{it} = \beta_{1i} + \beta_{2i}QRET_{it} + \varepsilon_{it} \tag{1}$$

QIB is quarterly income before extraordinary items scaled by the beginning-quarter market value of equity, and $QRET$ is quarterly stock return. The predicted coefficients of $\widehat{\beta_{1i}}$ and $\widehat{\beta_{2i}}$ imply the accounting system of individual firm i for time t.

Next, we compute predicted earnings of firms i and j by applying the predicted accounting systems from Eq. (1) for each firm with the presumption that both firms have the same economic event, $QRET_{it}$. For instance, $P(QIB)_{iit}$ is firm i's predicted QIB under firm i's accounting system ($\widehat{\beta_{1i}}$ and $\widehat{\beta_{2i}}$) and economic event ($QRET_{it}$), and $P(QIB)_{ijt}$ is firm j's predicted QIB under firm j's accounting system ($\widehat{\beta_{1j}}$ and $\widehat{\beta_{2j}}$) and firm i's economic event ($QRET_{it}$).

$$P(QIB)_{iit} = \hat{\beta}_{1i} + \hat{\beta}_{2i}QRET_{it} \tag{2}$$

$$P(QIB)_{ijt} = \hat{\beta}_{1j} + \hat{\beta}_{2j}QRET_{it} \tag{3}$$

Third, consistent with De Franco et al. (2011), we compute the average absolute difference between $P(QIB)_{iit}$ and $P(QIB)_{ijt}$ over prior 16 quarters for each firm i - firm j combination ($i \neq j$) for J firms (from j = 1 to J) within the same industry (two-digit SIC) for time t. By multiplying the difference by -1, we construct the measure of accounting comparability so that higher values indicate higher comparability between firm i and firm j.

$$AC_{ijt} = -\frac{1}{16} \times \sum_{t-15}^{t} \left| P(QIB)_{iit} - P(QIB)_{ijt} \right| \tag{4}$$

In order to build a firm-year-specific proxy for comparability, we establish AC_MD_{it} as the industry median AC_{ijt} for firm i for all J firms in the same industry as firm i for time t. Second, we establish AC_MN4_{it} as an average of the four highest values of AC_{ijt} for firm i for all J firms in the same industry as firm i for time t.

3.2. Measures of CEO compensation structure

To measure CEO compensation structure, we construct two proxies for CEO compensation structure: equity-based compensation intensity (EQUITY_TOT) and pay-performance sensitivity (DELTA). EQUITY_TOT is computed as the ratio of the CEO's equity-based compensation (the sum of stock option and restricted stock grants) to total compensation.[7] The total compensation is measured as the sum of salary, bonus, the value of stock option and restricted stock grants, non-equity incentive plan compensation, long-term incentive payouts compensation, and other compensation (i.e., TDC 1 from EXECUCOMP). The total compensation does not include the CEO's wealth changes from existing stock and option holdings. DELTA is computed as the natural logarithm of the change in the value of a CEO's stocks and options to a 1% change in stock price.[8]

3.3. Empirical model

3.3.1. The effect of accounting comparability on CEO compensation structure

Our first hypothesis (H1a and H1b) predicts that accounting comparability is positively related to equity-based compensation intensity as well as pay-performance sensitivity. In order to test H1a and H1b, we estimate the following model with year and firm fixed effects controlled. Specifically, as both CEO compensation structure and accounting comparability are largely related with firm-specific time-invariant omitted factors, including the firm fixed effects mitigates the effects of time-invariant unobserved factors and allows a change interpretation for the estimated coefficients.

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[6] The comparability measures of De Franco et al. (2011) are based on the following premise: "Two firms have comparable accounting systems if, for a given set of economic events, they produce similar financial statements."

[7] Regarding the stock option values, we use the Black-Scholes model values before FAS 123R, and the option fair values at the grant date after FAS 123R.

[8] Prior to 2006, like Core and Guay (2002), we calculate the DELTA of equity incentives including stocks and options based on the Black-Scholes valuation model. After 2006, we follow the methodology of Coles et al. (2013) to measure the DELTA.

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$$\begin{aligned}
\text{COMP\_ST}_{it} = {} & \beta_0 + \beta_1 \text{AC\_MN4}(\text{AC\_MD})_{it-1} + \beta_2 \text{COMP\_ST}_{it-1} + \beta_3 \text{LNASSET}_{it-1} + \beta_4 \text{MB}_{it-1} + \beta_5 \text{LEV}_{it-1} + \beta_6 \text{ROA}_{it-1} \\
& + \beta_7 \text{RETSUM}_{it-1} + \beta_8 \text{STDRET}_{it-1} + \beta_9 \text{XRD}_{it-1} + \beta_{10} \text{AQ}_{it-1} + \beta_{11} \text{CEOAGE}_{it-1} + \beta_{12} \text{BSIZE}_{it-1} \\
& + \beta_{13} \text{POUTSIDER}_{it-1} + \beta_{14} \text{CEODUALITY}_{it-1 + \beta_{15} \text{CORR\_ROA}_{it-1} + \beta_{16} \text{CORR\_CFO}_{it-1} + \beta_{17} \text{CORR\_RET}_{it-1} + \beta_{18} \text{VEGA}_{it-1}} \\
& + \text{YEAR\&FIRMFIXED} + \varepsilon_{it}
\end{aligned} \tag{5}$$

As executives' compensation is in general determined based on their performance for the previous year and prior studies such as Core et al. (1999) and Hill et al. (2016) have used independent variables at t-1 for executive compensation studies, we have also used independent variables at t-1 in the model. COMP_ST is the variable for CEO compensation structure, which represents equity-based compensation intensity (EQUITY_TOT) and pay-performance sensitivity (DELTA). The variables of interest are the proxies for accounting comparability, AC_MN4 and AC_MD. If CEOs from more comparable firms have a higher equity-based compensation intensity and greater pay-performance sensitivity, the coefficients of AC_MN4 and AC_MD, $\beta 1$, should be positive.

Following Denis and Xu (2013), we control for various factors that prior compensation literature identifies as associated with CEO compensation. In terms of general firm characteristics, we control for prior year's compensation structure (COMP_ST), firm size (LNASSET), market-to-book ratio (MB), leverage (LEV), return on assets (ROA), stock return (RETSUM), return volatility (STDRET), and R&D expense (XRD). Regarding board characteristics, board size (BSIZE) and board independence (POUTSIDER) are included as addition controls. At the CEO level, we control for CEO age (CEOAGE) and CEO board of director chairmanship (CEODUALITY). In addition, following Lobo et al. (2018), we control for similarity in economics among industry peers by including median correlations of return on assets (CORR_ROA), cash flow from operations (CORR_CFO), and annual stock return (CORR_RET) between firms and their industry peers. CEO risk-taking incentives (VEGA) are included as an additional control variable when the pay-performance sensitivity (DELTA) is a dependent variable. Appendix A defines all variables in detail.

3.3.2. The effect of information environment on the relation between accounting comparability and CEO compensation structure

If the effects of accounting comparability on CEO compensation structure are indeed driven by improved board monitoring facilitated by greater comparability, then the effect of comparability should be more valuable for firms with high information asymmetry, as boards' monitoring costs may increase with information asymmetry. Thus, we examine whether the relation between comparability and CEO compensation structure varies with the level of information asymmetry. To test the second hypothesis (H2a and H2b), we estimate the following regressions:

$$\begin{aligned}
\text{COMP\_ST}_{it} = {} & \beta_0 + \beta_1 \text{AC\_MN4}(\text{AC\_MD})_{it-1} + \beta_2 \text{HIGH\_IA}_{it-1} + \beta_3 \text{HIGH\_IA} * \text{AC\_MN4}(\text{AC\_MD})_{it-1} + \beta_4 \text{COMP\_ST}_{it-1} \\
& + \beta_5 \text{LNASSET}_{it-1} + \beta_6 \text{MB}_{it-1} + \beta_7 \text{LEV}_{it-1} + \beta_8 \text{ROA}_{it-1} + \beta_9 \text{RETSUM}_{it-1} + \beta_{10} \text{STDRET}_{it-1} + \beta_{11} \text{XRD}_{it-1} \\
& + \beta_{12} \text{AQ}_{it-1} + \beta_{13} \text{CEOAGE}_{it-1} + \beta_{18} \text{CORR\_CFO}_{it-1} + \beta_{19} \text{CORR\_RET}_{it-1} + \beta_{20} \text{VEGA}_{it-1} + \text{YEAR\&FIRMFIXED} \\
& + \varepsilon_{it}
\end{aligned} \tag{6}$$

Following Coller and Yohn (1997), we use average bid-ask spread over a 24-month period as a proxy for information asymmetry around a firm. To facilitate the interpretation of its interaction terms, we create an indicator variable of high information asymmetry, HIGH_IA, which equals one if a firm's bid-ask spread is greater than industry median for a given year and 0 otherwise.[9] The variable of interest is HIGH_IA * AC_MN4 (HIGH_IA * AC_MD), the coefficient of which reflects the extent to which the effect of comparability on the CEO compensation structure differs depending upon the level of information asymmetry. In the context of H2a and H2b, we expect the coefficients on HIGH_IA * AC_MN4 and HIGH_IA * AC_MD to be positive for EQUITY_TOT and DELTA, respectively.

3.3.3. The effect of corporate governance on the relation between accounting comparability and CEO compensation structure

To examine the relation between corporate governance and comparability, we replicate Eq. (6) by replacing HIGH_IA with the strong corporate governance indicator (i.e., STRONG_CG). STRONG_CG is an indicator variable of high outside director ownership, which equals 1 if outside directors' ownership is greater than the industry median value and 0 otherwise. Prior studies suggest that outside directors have stronger monitoring incentives, as they hold a higher percentage of shares (Beasley, 1996; Ashbaugh et al., 2006; Ahmed and Scott, 2007). If the outside directors' monitoring incentives and comparability play a complementary (substitute) role in monitoring CEOs' activities, the coefficients on STRONG_CG * AC_MN4 and STRONG_CG * AC_MD are expected to be positive (negative) for equity-based compensation intensity and pay-performance sensitivity.

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[9] When we alternatively use analyst forecast errors as a proxy of information asymmetry, our main results are not sensitive.

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4. Empirical evidence

4.1. Sample, descriptives, and correlation

Our sample is initially constructed with firm-year observations that have CEO compensation data from EXECUCOMP over the period 1998–2014. To estimate accounting comparability, we obtain stock return data from the monthly CRSP, and earnings data from the quarterly COMPUSTAT. Firm size (LNASSET), market-to-book ratio (MB), leverage (LEV), return on assets (ROA), R&D expense (XRD), accrual quality (AQ), and median correlations of return on assets (CORR_ROA) and cash flow from operations (CORR_CFO) are collected from the annual COMPUSTAT, while we obtain stock return (RETSUM), return volatility (STDRET), and median correlation of annual stock returns (CORR_RET) from the daily CRSP. RISKMETRICS is used to measure board characteristics including board size (BSIZE), board independence (POUTSIDER), and CEO board of directors chairmanship (CEODUALITY). Finally, these data requirements yield 5,231 and 5,095 firm-year observations for the EQUITY_TOT and DELTA, respectively, over the period 1998–2014.

Table 1 reports summary statistics for the variables used in the analysis. On average, CEO equity-based compensation accounts for 47% of total compensation. These numbers are within a similar range to those in previous research (i.e., Brandes et al., 2016; Humphery-Jenner et al., 2016). Our two measures of comparability are similar to those in De Franco et al. (2011). The averages of AC_MN4 and AC_MD are −0.40 and −2.96, respectively, similar to −0.6 and −2.5 in De Franco et al. (2011). In Table 2, we present the Pearson correlation coefficients between the variables in the final sample. Consistent with our first hypothesis, two comparability measures, AC_MN4 and AC_MD, are positively correlated with equity-based compensation intensity, which suggests that firms with greater accounting comparability offer more equity-based compensation contracts to CEOs. Further, we find that accounting comparability is positively correlated with pay-performance sensitivity, measured with the DELTA. This univariate analysis provides preliminary evidence of the impact of accounting comparability on compensation structure.

4.2. Accounting comparability and CEO compensation structure

We first conjecture that firms put more weight on equity-based compensation in the CEO's compensation contract and increase the pay-performance sensitivity as their accounting information becomes more comparable with that of peers in the same industry. That is, we expect the advantages from equity-based compensation to be greater when greater accounting comparability strengthens the board's ability to detect CEO misbehaviors such as earnings management and misreporting, and, in turn, weakens the CEO's opportunistic intent to manipulate performance numbers.[10]

Table 3 tabulates the regression results of the association between accounting comparability and CEO compensation structure. In Columns 1 and 2, we find that both measures of comparability, AC_MN4 and AC_MD, are positively associated with equity-based compensation intensity at a 1% significance level.[11] This finding suggests that firms using more comparable accounting information offer higher levels of equity compensation intensity to CEOs. The intuition is that firms with greater accounting comparability expect equity-based compensation to be cost effective in monitoring and disciplining CEOs' activities. The effect of comparability on the equity compensation intensity is also economically significant. For instance, the coefficient of AC_MD implies that an increase of one standard deviation in AC_MD leads to an increase of 0.0231 (=1.54 * 0.015) in EQUITY_TOT, which represents a 5% proportional increase in the average of EQUITY_TOT. As predicted in H1b, Columns 3 and 4 provide evidence of the positive association of two comparability measures with pay-performance sensitivity. Specifically, the coefficients on AC_MN4 and AC_MD are significant and positive, suggesting that firms experience a greater CEO pay-performance sensitivity of equity-based compensation as their accounting information becomes more comparable. The results support the notion that comparability plays a role in motivating CEOs to act in shareholders' best interests by strengthening the link between equity-based compensation and firm performance.[12]

In summary, we largely show that greater comparability in accounting information increases equity-based compensation intensity as well as pay-performance sensitivity. These findings are again consistent with our main argument that firms rely more on equity-based compensation for CEOs' contracting because higher comparability enhances the board's monitoring ability and reduces the CEO's opportunistic incentives, which consequently increases the benefits of equity-based contracts. This evidence also indicates that the quality of financial reporting plays an important role in planning CEOs' compensation contracts.

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[10] Although Sohn (2016) provide evidence on the effect of comparability on earnings management, we cannot perfectly rule out the possibility that the relation between comparability and CEO compensation schemes is driven by the effect of managerial misbehaving. To address this concern, we stratify our sample into high and low earnings management groups, where earnings management is estimated as discretionary accruals from Modified Jones (1991) Model suggested by Dechow et al. (1995). We find that our results hold for both subsamples after controlling for the level of earnings management.

[11] Alternatively, when we use the natural logarithm of total CEO equity compensation as a proxy of CEO compensation structure, we find consistent inferences with those reported in the Columns 1 and 2 of Table3.

[12] In an untabulated test, we additionally examine the relation between comparability and CEOs' risk-taking incentives (VEGA) provided by equity-based compensation. We measure risk-taking incentives (Vega) by following Core and Guay (2002) and Coles et al. (2013). Vega is computed as the natural logarithm of the change in the value of a CEO's stocks and options to a 1% change in stock return volatility. We find significantly negative coefficients on both comparability measures when CEO's risk-taking incentives (Vega) is used as a dependent variable. The results indicate that CEOs facing higher accounting comparability have weaker incentives to adopt risky projects.

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Table 1
Descriptive statistics.

Variable	N	Mean	STD	10%	25%	Median	75%	90%
EQUITY_TOT	5231	0.47	0.26	0.00	0.33	0.53	0.66	0.77
DELTA	5095	5.46	1.45	3.62	4.48	5.45	6.47	7.33
AC_MN4	5231	−0.40	0.80	−0.83	−0.35	−0.16	−0.09	−0.05
AC_MD	5231	−2.96	1.54	−4.44	−3.58	−2.71	−1.98	−1.47
LNASSET	5231	7.40	1.53	5.55	6.34	7.25	8.38	9.52
MB	5231	3.02	2.98	1.02	1.48	2.26	3.55	5.60
LEV	5231	0.21	0.16	0.00	0.05	0.20	0.32	0.42
ROA	5231	0.06	0.09	−0.02	0.03	0.06	0.10	0.14
RETSUM	5231	0.15	0.45	−0.34	−0.12	0.11	0.33	0.63
STDRET	5231	0.11	0.05	0.06	0.08	0.10	0.14	0.19
XRD	5231	0.04	0.06	0.00	0.00	0.01	0.05	0.11
AQ	5231	0.04	0.03	0.02	0.03	0.04	0.05	0.08
CEOAGE	5231	53.45	6.81	45.00	49.00	53.00	57.00	62.00
BSIZE	5231	2.17	0.26	1.79	1.95	2.20	2.40	2.48
POUTSIDER	5231	0.73	0.16	0.50	0.64	0.77	0.86	0.90
CEODUALITY	5231	0.68	0.47	0.00	0.00	1.00	1.00	1.00
CORR_ROA	5231	0.12	0.23	−0.14	−0.03	0.09	0.26	0.43
CORR_CFO	5231	0.06	0.18	−0.12	−0.04	0.03	0.13	0.29
CORR_RET	5231	0.35	0.33	−0.12	0.13	0.41	0.62	0.73
VEGA	5095	3.81	1.76	1.07	2.88	4.04	5.06	5.86
HIGH_IA	5223	0.49	0.50	0.00	0.00	0.00	1.00	1.00
STRONG_CG	5080	0.51	0.50	0.00	0.00	1.00	1.00	1.00

This table provides summary statistics of the variables used in the analysis. The full sample includes 5231 and 5095 firm-year observations for the *EQUITY_TOT* and *DELTA*, respectively, over the period 1998–2014. The variables are defined in Appendix A. All continuous variables are winsorized at the top and bottom 1% level.

4.3. The effect of information environment on the relation between accounting comparability and CEO compensation structure

In Hypothesis 2a and 2b, we posit that the effect of comparability on compensation structure is stronger for firms experiencing more severe information asymmetry. Specifically, the marginal benefits of improving a firm's ability to monitor the CEO's activities will be greater for firms with a poor information environment, because the monitoring cost increases with deficiency in the information environment. If increased comparability does indeed lead to improved detection of CEOs' manipulations and, in turn, firms rely more on equity-based compensation, the positive association between comparability and incentive contracting should be more pronounced in a more asymmetric information environment.

In Table 4, we report the results on the impact of information asymmetry on the relation between comparability and compensation structure, where a firm's bid-ask spread is used as a proxy for information asymmetry. Consistent with H2a, firms experiencing high information asymmetry have greater equity-based compensation intensity as financial statements become more comparable. Columns 1 and 2 show that the coefficients on both interaction terms, HIGH_IA * AC_MN4 (AC_MD), are positive and statistically significant, which suggests that the impact of comparability on equity-based compensation intensity is stronger for firms with high information asymmetry. For instance, the effect of comparability (AC_MD) on equity intensity is approximately 10 times greater for high information asymmetry than for low information asymmetry, and the distinction is economically significant.[13] In Columns 3 and 4, the coefficients on HIGH_IA * AC_MN4(AC_MD) are significantly positive, indicating that the positive relation between comparability and pay-performance sensitivity appears to be more distinguishable when the information environment is more asymmetric. This result suggests that accounting comparability is more effective in improving the link between equity-based compensation and firm performance when firms have poor information environments. However, the coefficients on AC_MN4 (AC_MD) across Columns 1–4 are not significant, suggesting that the benefits of improving a firm's ability to monitor CEO are very marginal or limited when the level of information asymmetry is low.[14]

Overall, the results in Table 4 reveal that the effect of comparability on compensation structure varies with the degree of information asymmetry. Specifically, accounting comparability shows stronger incremental effects on equity compensation intensity and pay-performance sensitivity when firms are exposed to high information asymmetry. This finding implies that firms are more likely to rely on equity-based compensation when they encounter severe information asymmetry in which the marginal benefit of using equity-based compensation is greater. This is consistent with the notion that accounting comparability is a quality of financial reporting that improves firms' ability to monitor CEOs and, in turn, facilitates the use of equity-based compensation.

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[13] As AC_MD increases by one standard deviation, firms facing high information asymmetry increase their equity-based compensation intensity by 0.0252 more than other firms do.

[14] Comparability and information asymmetry could be jointly determined and, therefore, highly correlated. To check whether this correlation affects our results of Table 4, we conduct multicollinearity diagnostic tests for the regression results and confirm that VIF scores are less than 3 in all regressions.

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Table 2
Pearson correlation coefficients.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)
(1) EQUITY_TOT	1.00																					
(2) DELTA	0.18***	1.00																				
(3) AC_MN4	0.04***	0.13***	1.00																			
(4) AC_MD	0.03**	0.09***	0.81***	1.00																		
(5) LNASSET	0.36***	0.31***	0.01	0.08***	1.00																	
(6) MB	0.11***	0.29***	0.08***	0.03**	0.05***	1.00																
(7) LEV	0.08***	-0.06***	-0.11***	-0.07***	0.26***	0.00	1.00															
(8) ROA	0.07***	0.25***	0.20***	0.27***	0.17***	0.27***	-0.20***	1.00														
(9) RETSUM	0.10***	0.14***	-0.01	-0.04***	0.00	0.25***	-0.05***	0.16***	1.00													
(10) STDRET	-0.11***	-0.15***	-0.27***	-0.39***	-0.41***	-0.06***	-0.10***	-0.30***	0.08***	1.00												
(11) XRD	0.04***	0.04***	0.07***	-0.14***	-0.29***	0.14***	-0.25***	-0.25***	-0.00	0.26***	1.00											
(12) AQ	-0.06***	-0.09***	-0.09***	-0.16***	-0.28***	0.08***	-0.21***	-0.07***	0.02	0.36***	0.22***	1.00										
(13) CEOAGE	-0.05***	0.21***	-0.03**	-0.01	0.02	-0.04***	-0.00	0.02	-0.00	-0.09***	-0.03*	-0.05***	1.00									
(14) BSIZE	0.21***	0.04***	-0.02	0.02	0.58***	0.01	0.32***	-0.01	-0.02	-0.32***	-0.21***	-0.26***	-0.04**	1.00								
(15) POUTSIDER	0.40***	-0.06***	0.03**	0.03**	0.31***	-0.01	0.08***	0.03**	-0.01	-0.19***	-0.03*	-0.07***	0.03*	0.19***	1.00							
(16) CEODUALITY	-0.05***	0.19***	0.03**	0.03**	0.13***	0.01	0.07***	0.01	0.01	-0.04***	-0.08***	-0.04***	0.14***	0.07***	0.01	1.00						
(17) CORR_ROA	-0.02	-0.01	-0.09***	-0.02	0.06***	-0.09***	0.02	-0.04***	0.01	0.09***	-0.11***	-0.09***	0.00	0.00	-0.00	-0.00	1.00					
(18) CORR_CFO	-0.01	0.04***	-0.02	0.04***	0.08***	-0.05***	0.10***	0.01	0.00	-0.04***	-0.17***	-0.12***	0.05***	0.04***	-0.00	0.02	0.36***	1.00				
(19) CORR_RET	0.20***	-0.03**	-0.09***	-0.07***	0.18***	-0.09***	0.11***	-0.03**	0.01	-0.01	-0.08***	-0.07***	0.03*	0.13***	0.23***	-0.04***	0.20***	0.15***	1.00			
(20) VEGA	0.30***	0.50***	0.10***	0.02*	0.34***	0.16***	0.03*	0.11***	0.03**	-0.13***	0.11***	-0.10***	0.02	0.20***	0.14***	0.13***	-0.04***	-0.04**	0.01	1.00		
(21) HIGH_JA	-0.27***	-0.32***	-0.13***	-0.13***	-0.47***	-0.18***	-0.06***	-0.17***	-0.08***	0.24***	0.04***	0.16***	0.02	-0.28***	-0.17***	-0.14***	-0.00	-0.02	-0.11***	-0.28***	1.00	
(22) STRONG_CG	-0.18***	-0.19***	-0.06***	-0.04***	-0.41***	-0.08***	-0.02	-0.10***	-0.02	0.16***	0.01	0.12***	0.00	-0.14***	-0.03**	-0.08***	0.01	0.02	-0.06***	-0.15***	0.26***	1.00

This table reports Pearson correlation coefficients between the variables used in the analysis. The variables are defined in Appendix A. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

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Table 3
Effects of accounting comparability on CEO compensation structure.

		Dep. Var.							
		EQUITY_TOT				DELTA			
Indep. Var.	Pred.	(1) Coeff. (t-stat)		(2) Coeff. (t-stat)		(3) Coeff. (t-stat)		(4) Coeff. (t-stat)	
AC_MN4	+	0.019***	(2.85)			0.049***	(2.59)		
AC_MD	+			0.015***	(4.60)			0.021**	(2.30)
LEQUITY_TOT	+	0.028*	(1.83)	0.024	(1.59)	0.090**	(2.07)	0.087**	(2.00)
LNASSET	+	0.038***	(3.06)	0.035***	(2.84)	0.215***	(6.07)	0.215***	(6.06)
MB	+	0.000	(0.29)	0.001	(0.39)	0.021***	(4.97)	0.021***	(4.94)
LEV	−	−0.064	(−1.62)	−0.060	(−1.51)	−0.495***	(−4.38)	−0.495***	(−4.38)
ROA	+	0.127**	(2.57)	0.110**	(2.21)	0.149	(1.05)	0.144	(1.02)
RETSUM	+	0.028***	(3.82)	0.029***	(3.97)	0.132***	(6.35)	0.133***	(6.40)
STDRET	+	0.094	(0.82)	0.167	(1.43)	0.877***	(2.67)	0.889***	(2.67)
XRD	+	0.006	(0.05)	0.009	(0.07)	−0.023	(−0.06)	−0.011	(−0.03)
AQ	+	−0.329	(−1.22)	−0.330	(−1.22)	4.159***	(5.32)	4.138***	(5.29)
CEOAGE	+	0.011**	(2.19)	0.011**	(2.11)	0.029*	(1.72)	0.029*	(1.68)
BSIZE	?	−0.019	(−0.66)	−0.022	(−0.77)	−0.139*	(−1.69)	−0.140*	(−1.71)
POUTSIDER	+	0.064*	(1.65)	0.063	(1.63)	0.047	(0.42)	0.046	(0.41)
CEODUALITY	−	−0.005	(−0.48)	−0.005	(−0.50)	−0.084***	(−3.02)	−0.084***	(−3.05)
CORR_ROA	−	−0.008	(−0.42)	−0.009	(−0.48)	−0.048	(−0.89)	−0.050	(−0.93)
CORR_CFO	−	0.004	(0.17)	0.005	(0.21)	0.053	(0.77)	0.054	(0.79)
CORR_RET	−	0.007	(0.52)	0.006	(0.40)	−0.099**	(−2.41)	−0.100**	(−2.44)
VEGA	+					0.163***	(14.73)	0.163***	(14.77)
Year Fixed		Yes		Yes		Yes		Yes	
Firm Fixed		Yes		Yes		Yes		Yes	
# of obs (N)		5231		5231		5095		5095	
Adj. R-sq		0.4959		0.4975		0.8752		0.8752	

This table reports regression results of the effect of accounting comparability on CEO compensation structure. *EQUITY_TOT* in Columns 1 and 2 is a CEO's equity-based compensation ratio to total compensation. *DELTA* in Columns 3 and 4 is the natural logarithm of the change in the value of a CEO's stocks and options to a 1% change in stock price Other variables are defined in Appendix A. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

4.4. The effect of corporate governance on the relation between accounting comparability and CEO compensation structure

Hypothesis 3a and 3b predict the positive effect of comparability on CEO compensation structure to be stronger for good corporate governance firms. Given that the existing corporate governance and comparability are complementary (substitute) in monitoring CEOs' opportunistic behaviors, firms with strong corporate governance are more (less) likely to use the equity-based compensation, as their accounting comparability increases.

Table 5 presents the results. Columns 1 and 2 present the positively significant coefficients on STRONG_CG * AC_MN4 and STRONG_CG * AC_MD, which suggest that the positive effect of comparability on equity-based compensation intensity is more pronounced when outside directors have stronger monitoring incentives. In Columns 3 and 4, we also find that the positive relation between comparability and pay-performance sensitivity is significantly different for weak and strong outsider directors' monitoring incentives. We interpret these findings as indicative that comparability and the monitoring incentives of the board of directors are complementary in mitigating CEOs' opportunistic incentives, which lead a firm to rely more on equity-based compensation contracting. The insignificant coefficients on AC_MN4 (AC_MD) suggest that as CEOs prefer a less risky compensation structure that easily facilitates their extraction of rents (Harris and Raviv, 1979; Westphal, 1998), weak corporate governance system aggravates CEOs' opportunistic behavior, resulting in lower proportion of equity-based compensation.

Taken together, the results in Table 5 suggest that accounting comparability has a more pronounced effect on CEO compensation structure when a firm's corporate governance is strong. These results are consistent with the complementary relation between comparability and the exiting corporate governance in determining the CEO's equity-based compensation and pay-performance sensitivity.

5. Robustness checks

5.1. Instrumental variable approach

Thus far, our results suggest that higher accounting comparability increases not only a firm's CEO equity-based compensation intensity but also pay-performance sensitivity. Comparability appears to reduce CEOs' opportunistic incentives and improve the utility of equity incentive contracts. However, one might argue that CEOs with higher equity incentives have less motivations to manipulate their performance and more incentives to disclose high-quality accounting information, which results in high-quality accounting information with higher comparability to that of peer firms. This possibility raises

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Table 4
Effects of information asymmetry (*IA*) on the relation between accounting comparability and CEO compensation structure.

| Indep. Var. | Pred. | Dep. Var. | | | | | | | |
| | | EQUITY_TOT | | | | DELTA | | | |
		(1) Coeff. (t-stat)		(2) Coeff. (t-stat)		(3) Coeff. (t-stat)		(4) Coeff. (t-stat)	
AC_MN4	+	−0.006	(−0.61)			−0.008	(−0.33)		
AC_MD	+			0.002	(0.44)			−0.014	(−1.17)
HIGH_IA	?	0.020**	(2.18)	0.034***	(2.90)	0.008	(0.26)	0.074*	(1.93)
HIGH_IA*AC_MN4	+	0.036***	(3.81)			0.094***	(3.89)		
HIGH_IA*AC_MD	+			0.016***	(3.37)			0.056***	(4.49)
LEQUITY_TOT	+	0.026*	(1.73)	0.023	(1.53)	0.088**	(2.03)	0.087**	(2.01)
LNASSET	+	0.036***	(2.95)	0.035***	(2.85)	0.209***	(5.88)	0.207***	(5.83)
MB	+	0.001	(0.36)	0.001	(0.39)	0.021***	(4.90)	0.021***	(4.89)
LEV	−	−0.064	(−1.62)	−0.062	(−1.57)	−0.467***	(−4.12)	−0.467***	(−4.12)
ROA	+	0.116**	(2.35)	0.104**	(2.09)	0.106	(0.75)	0.077	(0.54)
RETSUM	+	0.027***	(3.76)	0.029***	(3.94)	0.130***	(6.25)	0.130***	(6.28)
STDRET	+	0.114	(0.99)	0.172	(1.48)	0.816**	(2.49)	0.867***	(2.61)
XRD	+	−0.008	(−0.07)	0.013	(0.10)	−0.047	(−0.13)	−0.026	(−0.07)
AQ	+	−0.317	(−1.18)	−0.327	(−1.21)	4.106***	(5.26)	4.076***	(5.22)
CEOAGE	+	0.010*	(1.92)	0.010*	(1.89)	0.029*	(1.72)	0.030*	(1.76)
BSIZE	?	−0.020	(−0.70)	−0.022	(−0.78)	−0.138*	(−1.69)	−0.146*	(−1.79)
POUTSIDER	+	0.066*	(1.69)	0.063	(1.63)	0.052	(0.46)	0.055	(0.49)
CEODUALITY	−	−0.006	(−0.63)	−0.006	(−0.67)	−0.085***	(−3.07)	−0.085***	(−3.07)
CORR_ROA	−	−0.010	(−0.51)	−0.011	(−0.57)	−0.052	(−0.96)	−0.052	(−0.97)
CORR_CFO	−	0.007	(0.28)	0.008	(0.34)	0.061	(0.89)	0.065	(0.95)
CORR_RET	−	0.007	(0.53)	0.006	(0.44)	−0.096**	(−2.36)	−0.099**	(−2.41)
VEGA	+					0.162***	(14.64)	0.161***	(14.58)
Year Fixed		Yes		Yes		Yes		Yes	
Firm Fixed		Yes		Yes		Yes		Yes	
# of obs (N)		5223		5223		5092		5092	
Adj. R-sq		0.4978		0.4989		0.8755		0.8756	

This table reports regression results of the effect of information asymmetry (*IA*) on the relation between accounting comparability and CEO compensation structure. HIGH_IA is an indicator variable of high information asymmetry which equals 1 if a firm's bid-ask spread over 24 months prior to fiscal year end is greater than industry median of the bid-ask spread and 0 otherwise. Other variables are defined in Appendix A. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

concern about a causal relation running from CEO compensation structure to accounting comparability. To address this endogeneity concern of a potential reverse causality, we use an instrumental variable (IV) two-stage approach.

In the first stage, the fitted values of accounting comparability are extracted from the regression of AC_MN4 (AC_MD) on an instrument variable (IV) and the control variables used in Eq. (5). We employ a firm's geographic distance from its industry peers as the instrument variables. The geographic proximity (Ln_Gprox) is calculated as the average of natural logarithm of the distance in miles between the headquarters of firm *i* and J firms within the same industry. The rationale for using the instrument variable is that the geographic proximity to industry peers could influence a firm's accounting comparability with peers if the firms share the same legal, institutional, and regulatory environment (Kedia and Rajgopal, 2009; Choi et al., 2012).[15] In the second stage, we replicate Tables 3–5 by replacing the comparability measures with their fitted values obtained from the first stage estimation (FittedAC_MN4 and FittedAC_MD).

Table 6 reports the regression results based on the second stage of the instrumental variable approach. In Columns 1 and 2 (7 and 8), we find that the fitted values of comparability are positively associated with equity-based compensation intensity (pay-performance sensitivity), confirming the positive effect of comparability on the utility of equity incentives in CEOs' compensation contracts. Columns 3 and 4 (9 and 10) indicate that the coefficients on interaction terms, HIGH_IA * FittedAC_MN4 and HIGH_IA * FittedAC_MD, are positive and significant for equity-based compensation intensity (pay-performance sensitivity). This finding is consistent with Hypothesis 2 that the positive effect of comparability on CEO compensation structure is stronger for firms with high information asymmetry. Regarding Hypothesis 3, we find significantly positive coefficients on STRONG_CG * FittedAC_MN4 and STRONG_CG * FittedAC_MD in Columns 5, 6, 11 and 12. The result suggests that the usefulness of equity-based compensation increases with accounting comparability for firms with strong corporate governance.

In sum, the results in Table 6 confirm our argument that as accounting comparability increases, firms expect to obtain greater advantages from using equity-based incentives in CEOs' total compensation contracts and accordingly put more

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[15] We confirm that the instrument satisfies the exclusion restriction. First, we find a strong correlation between the instrument and comparability. Second, we identify no theoretical and empirical relation between the instrument and CEOs' compensation structure by including the instrument in the Eq. (5). In addition, to check the validity of the instrument variable, we perform the following statistical test. The weak-instrument test rejects the null hypothesis of no correlation between the IVs and comparability (*p*-values < 0.01).

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Table 5

Effects of corporate governance (CG) on the relation between accounting comparability and CEO compensation structure.

Indep. Var.	Pred.	Dep. Var.							
		EQUITY_TOT				DELTA			
		(1) Coeff. (t-stat)		(2) Coeff. (t-stat)		(3) Coeff. (t-stat)		(4) Coeff. (t-stat)	
AC_MN4	+	−0.006	(−0.55)			−0.008	(−0.35)		
AC_MD	+			−0.001	(−0.17)			−0.009	(−0.78)
STRONG_CG	+	0.003	(0.30)	0.026*	(1.96)	0.127***	(3.72)	0.169***	(4.10)
STRONG_CG*AC_MN4	+	0.031***	(3.10)			0.076***	(2.85)		
STRONG_CG*AC_MD	+			0.020***	(3.96)			0.042***	(2.98)
LEQUITY_TOT	+	0.020	(1.31)	0.017	(1.14)	0.096**	(2.24)	0.095**	(2.22)
LNASSET	+	0.039***	(3.05)	0.037***	(2.86)	0.235***	(6.46)	0.233***	(6.41)
MB	+	0.000	(0.16)	0.000	(0.31)	0.021***	(4.85)	0.021***	(4.79)
LEV	-	−0.050	(−1.22)	−0.045	(−1.11)	−0.425***	(−3.76)	−0.427***	(−3.78)
ROA	+	0.113**	(2.23)	0.103**	(2.04)	0.039	(0.28)	0.042	(0.30)
RETSUM	+	0.028***	(3.74)	0.028***	(3.78)	0.131***	(6.35)	0.131***	(6.36)
STDRET	+	0.088	(0.74)	0.150	(1.25)	0.828**	(2.52)	0.792**	(2.40)
XRD	+	0.083	(0.62)	0.087	(0.65)	0.091	(0.25)	0.122	(0.33)
AQ	+	−0.351	(−1.27)	−0.367	(−1.33)	4.125***	(5.29)	4.121***	(5.29)
CEOAGE	+	0.011**	(1.98)	0.011**	(2.00)	0.021	(1.21)	0.021	(1.23)
BSIZE	?	−0.009	(−0.32)	−0.011	(−0.38)	−0.195**	(−2.38)	−0.196**	(−2.40)
POUTSIDER	+	0.077*	(1.94)	0.077*	(1.94)	0.027	(0.24)	0.024	(0.21)
CEODUALITY	-	−0.008	(−0.84)	−0.008	(−0.85)	−0.074***	(−2.71)	−0.076***	(−2.77)
CORR_ROA	-	−0.013	(−0.67)	−0.014	(−0.71)	−0.059	(−1.12)	−0.062	(−1.16)
CORR_CFO	-	0.005	(0.22)	0.007	(0.27)	0.052	(0.77)	0.052	(0.78)
CORR_RET	-	0.010	(0.66)	0.008	(0.54)	−0.082**	(−2.00)	−0.082**	(−2.00)
VEGA	+					0.165***	(14.96)	0.165***	(14.98)
Year Fixed		Yes		Yes		Yes		Yes	
Firm Fixed		Yes		Yes		Yes		Yes	
# of obs (N)		5080		5080		4950		4950	
Adj. R-sq		0.4951		0.4968		0.8793		0.8793	

This table presents regression results of the effect of corporate governance (CG) on the relation between accounting comparability and CEO compensation structure. STRONG_CG is an indicator variable of strong corporate governance which equals 1 if outside directors' ownership (ODOWN) at the end of fiscal year is greater than industry median of the outside directors' ownership and 0 otherwise. Other variables are defined in Appendix A. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

weight on equity-based compensation. The results also indicate that causality runs in the direction from comparability to CEO equity incentives.

5.2. Alternative measures of accounting comparability

We conduct another robustness test using alternative measures of accounting comparability proposed by Barth et al. (2012). To estimate a firm's accounting system, unlike De Franco et al. (2011), Barth et al. (2012) additionally consider not only an asymmetric accounting system between net income and losses but also the accounting system between cash flow and net income, and regress economic outcomes on accounting outcomes. Specifically, we estimate Eqs. (7) and (8) on a firm-specific rolling basis over the last 16 quarters:

$$QRET_{it} = \beta_{1i} + \beta_{2i}QIB_{it} + \beta_{3i}\Delta QIB_{it} + \beta_{4i}LOSS_{it} + \beta_{5i}LOSS * QIB_{it} + \beta_{6i}LOSS * \Delta QIB_{it} + \varepsilon_{it} \tag{7}$$

$$QCFO_{it+1} = \beta_{1i} + \beta_{2i}QIBA_{it} + \varepsilon_{it} \tag{8}$$

In Eq. (7), ΔQIB represents changes in quarterly income before extraordinary items scaled by the beginning-quarter market value of equity. LOSS is an indicator variable that equals 1 if QIB is negative and zero otherwise. In Eq. (8), QCFO is quarterly net cash flow from operations scaled by the beginning-quarter total assets while QIBA is quarterly income before extraordinary items scaled by the beginning-quarter total assets. Following De Franco et al.'s (2011) algorithm to compute firm-year comparability measures, we calculate the system distance between firm i-j pairs in the same industry and then use the median and top four mean values as alternative comparability measures.

Panel A of Table 7 presents the results using alternative measures of comparability (AC_MN4_ALT1 and AC_MD_ALT1), which are estimated from Eq. (7). In Columns 1 and 2 (7 and 8), we find the positive coefficients on two alternative measures of comparability when EQUIT_TOT (DELTA) is a dependent variable. This indicates that alternative measures of comparability still show a positive effect on equity-based compensation intensity as well as pay-performance sensitivity. Similar to the results in Tables 4 and 5, Columns 3, 4, 9, and 10 (5, 6, 11, and 12) show that such effects are more pronounced for firms having high information asymmetry (strong corporate governance). Panel B of Table 7 shows the results from the second alternative measures of comparability (AC_MN4_ALT2 and AC_MD_ALT2) based on Eq. (8). The results are similar and inferences are unchanged when we alternatively construct the comparability measures using the relation between cash flow and

Table 6
Instrumental variable approach.

Indep. Var.	Pred.	Dep. Var.											
		EQUITY_TOT						DELTA					
		(1) Coeff. (t-stat)	(2) Coeff. (t-stat)	(3) Coeff. (t-stat)	(4) Coeff. (t-stat)	(5) Coeff. (t-stat)	(6) Coeff. (t-stat)	(7) Coeff. (t-stat)	(8) Coeff. (t-stat)	(9) Coeff. (t-stat)	(10) Coeff. (t-stat)	(11) Coeff. (t-stat)	(12) Coeff. (t-stat)
FittedAC_MN4	+	0.024*** (3.09)		−0.003 (−0.28)		0.004 (0.34)		0.060*** (2.74)		0.010 (0.39)		−0.006 (−0.22)	
FittedAC_MD	+		0.018*** (4.54)		0.004 (0.76)		0.004 (0.64)		0.030*** (2.76)		−0.003 (−0.22)		−0.006 (−0.46)
HIGH_IA	+			0.018* (1.73)	0.034** (2.56)					0.002 (0.06)	0.077* (1.82)		
HIGH _IA*FittedAC_MN4	+			0.041*** (3.61)						0.098*** (3.37)			
HIGH _IA*FittedAC_MD	+				0.018*** (3.30)						0.062*** (4.11)		
STRONG_CG	+					−0.008 (−0.71)	0.015 (0.99)					0.113*** (3.16)	0.169*** (3.76)
STRONG _CG*FittedAC_MN4	+					0.024** (2.11)						0.101*** (3.28)	
STRONG _CG*FittedAC_MD	+						0.018*** (3.14)						0.054*** (3.34)
Controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of obs (N)		4728	4728	4722	4722	4594	4594	4602	4602	4599	4599	4471	4471
Adj. R-sq		0.4855	0.4871	0.4871	0.4882	0.4877	0.4895	0.8770	0.8771	0.8773	0.8774	0.8814	0.8813

This table presents the second-stage regression results of the Table 3, 4 and 5 from the instrumental variable approach. *FittedAC_MN4 (FittedAC_MD)* is the fitted value of AC_MN4 (AC_MD) obtained from the first stage regression explained in the text. Other variables are defined in Appendix A. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

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Table 7
Alternative measures of accounting comparability.

Panel A:		Dep. Var.											
Alternative1		EQUITY_TOT						DELTA					
Indep. Var.	Pred.	(1) Coeff. (t-stat)	(2) Coeff. (t-stat)	(3) Coeff. (t-stat)	(4) Coeff. (t-stat)	(5) Coeff. (t-stat)	(6) Coeff. (t-stat)	(7) Coeff. (t-stat)	(8) Coeff. (t-stat)	(9) Coeff. (t-stat)	(10) Coeff. (t-stat)	(11) Coeff. (t-stat)	(12) Coeff. (t-stat)
AC_MN4_ALT1	+	0.003** (2.17)		-0.001 (-0.40)		0.000 (0.25)		0.007** (2.02)		0.002 (0.40)		-0.001 (-0.17)	
AC_MD_ALT1	+		0.002*** (5.44)		0.001 (1.32)		0.001 (1.04)		0.003*** (3.11)		0.001 (0.44)		0.002 (1.58)
HIGH_IA	+			0.037*** (2.73)	0.035*** (2.88)					-0.064* (-1.69)	-0.056 (-1.63)		
HIGH_IA*AC_MN4_ALT1	+			0.005*** (3.15)						0.008* (1.69)			
HIGH_IA*AC_MD_ALT1	+				0.002*** (3.57)						0.003** (2.39)		
STRONG_CG	+					0.014 (0.99)	0.020 (1.49)					0.119*** (2.92)	0.090** (2.13)
STRONG_CG*AC_MN4_ALT1	+					0.004** (2.34)						0.008* (1.70)	
STRONG_CG*AC_MD_ALT1	+						0.002*** (3.16)						-0.000 (-0.04)
Controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm Fixed		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of obs (N)		5003	5003	4997	4997	4863	4863	4825	4825	4823	4823	4700	4700
Adj. R-sq		0.4981	0.5013	0.4992	0.5029	0.4972	0.5004	0.8729	0.8731	0.8737	0.8739	0.8795	0.8796
Panel B:		Dep. Var.											
Alternative2		EQUITY_TOT						DELTA					
Indep. Var.	Pred.	(1) Coeff. (t-stat)	(2) Coeff. (t-stat)	(3) Coeff. (t-stat)	(4) Coeff. (t-stat)	(5) Coeff. (t-stat)	(6) Coeff. (t-stat)	(7) Coeff. (t-stat)	(8) Coeff. (t-stat)	(9) Coeff. (t-stat)	(10) Coeff. (t-stat)	(11) Coeff. (t-stat)	(12) Coeff. (t-stat)
AC_MN4_ALT2	+	0.011* (1.71)		0.004 (0.52)		−0.004 (−0.50)		0.041** (2.17)		−0.015 (−0.65)		0.010 (0.39)	
AC_MD_ALT2	+		0.006** (1.98)		0.008** (2.35)		0.001 (0.37)		0.023*** (2.62)		0.008 (0.77)		0.011 (1.06)
HIGH_IA	+			0.025* (1.88)	−0.008 (−0.44)					−0.022 (−0.64)	0.004 (0.08)		
HIGH_IA*AC_MN4_ALT2	+			0.016* (1.75)						0.092*** (3.69)			
HIGH_IA*AC_MD_ALT2	+				−0.004 (−1.19)						0.026** (2.50)		
STRONG_CG	+					0.005 (0.33)	0.019 (0.93)					0.147*** (3.59)	0.189*** (3.20)
STRONG_CG*AC_MN4_ALT2	+					0.027*** (2.75)						0.048* (1.67)	
STRONG_CG*AC_MD_ALT2	+						0.009** (2.32)						0.020* (1.72)
Controls		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 7 (*continued*)

Panel B:		Dep. Var.											
Alternative2		EQUITY_TOT						DELTA					
Indep. Var.	*Pred.*	*(1) Coeff. (t-stat)*	*(2) Coeff. (t-stat)*	*(3) Coeff. (t-stat)*	*(4) Coeff. (t-stat)*	*(5) Coeff. (t-stat)*	*(6) Coeff. (t-stat)*	*(7) Coeff. (t-stat)*	*(8) Coeff. (t-stat)*	*(9) Coeff. (t-stat)*	*(10) Coeff. (t-stat)*	*(11) Coeff. (t-stat)*	*(12) Coeff. (t-stat)*
Firm Fixed		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
# of obs (N)		4750	4750	4747	4747	4750	4750	4636	4636	4633	4633	4636	4636
Adj. R-sq		0.5057	0.5058	0.5058	0.5057	0.5070	0.5069	0.8771	0.8772	0.8781	0.8779	0.8775	0.8776

This table reports the results from the replication of the tables 3, 4 and 5 with alternative measures of accounting comparability. In Panel A and B, *AC_MN4_ALT1* and *AC_MN4_ALT2* (*AC_MD_ALT1* and *AC_MD_ALT2*) are the AC_MN4 (AC_MD) obtained from Barth et al. (2012)'s two alternative measures of accounting system comparability explained in the text, respectively. Other variables are defined in Appendix A T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

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net income. Overall, these findings suggest that none of our findings in Tables 3–5 is affected by using the alternative measures of accounting comparability adopted by Barth et al. (2012).

5.3. Change specification

So far, our analysis has mainly focused on the cross-sectional comparison of CEO compensation structure across different levels of the comparability because a firm's financial statement comparability is rather stable over time. We complement our analyses by investigating the influence of the change in the firm's comparability on changes in the compensation structure, which assures the causality while controlling for the omitted variable bias, although the cross-year stickiness of accounting comparability and the decrease in available observations for changes reduce the power of statistical tests. Specifically, if the change in the comparability leads to the change in the compensation structure in the predicted directions, it is likely the firm's accounting comparability that induces the equity-based compensation intensity and pay-performance sensitivity to increase. To conduct the change analysis, we require information on comparability, equity-based compensation intensity (pay-performance sensitivity) and control variables for two consecutive years to generate those change variables, reducing the sample size to 3987 (3876) firm year observations for multivariate analysis.

The results are reported in Table 8. Consistent with our earlier results, columns 1 and 2 show that the changes in the comparability are positively and significantly associated with the change in the equity-based compensation intensity, suggesting the positive causal impact of the comparability on the equity-based compensation intensity. The positive coefficients on ΔAC_MN4 and ΔAC_MD in columns 3 and 4 indicate that the changes in the comparability lead to the changes in the pay-performance sensitivity. Overall, the results in Table 8 suggest that our findings in Table 3 are not due to firm characteristics but are driven by comparability, supporting the positive impact of comparability on the compensation structure.

5.4. Cross-sectional dependences and serial correlations

As noted in Section 3.3, we mainly use pooled cross-sectional regressions of CEO compensation structure on accounting comparability. The pooled regressions with panel data are inherently subject to issues from cross-sectional dependences unless all observations are independent across individuals. For example, the usefulness of equity compensation have changed over time so that our inference can be driven by the time effect of equity incentives. More importantly, our comparability measures are estimated over previous 16 quarters on a rolling basis. That is, the overlapping estimation periods induce strong serial correlations between consecutive comparability measures.

To address concerns about cross-sectional dependences and serial correlations, we have conducted two sensitivity tests using Fama and MacBeth (1973) and industry-year fixed models. First, we estimate annual cross-sectional regressions of Eq. (5) and use Fama and MacBeth (1973) t-statistics to test the positive relation between accounting comparability and CEO

Table 8
Change specification.

Indep. Var.	Pred.	$\Delta EQUITY\_TOT$				$\Delta DELTA$			
		(1) Coeff. (t-stat)		(2) Coeff. (t-stat)		(3) Coeff. (t-stat)		(4) Coeff. (t-stat)	
ΔAC_MN4	+	0.009*	(1.72)			0.024***	(2.61)		
ΔAC_MD	+			0.013***	(2.77)			0.026***	(3.10)
$\Delta LNASSET$	+	0.043*	(1.81)	0.038	(1.59)	0.353***	(8.18)	0.348***	(8.03)
ΔMB	+	0.005***	(2.83)	0.005***	(2.82)	0.023***	(7.68)	0.023***	(7.67)
ΔLEV	−	−0.011	(−0.19)	−0.003	(−0.06)	−0.647***	(−6.13)	−0.635***	(−6.02)
ΔROA	+	−0.166***	(−3.35)	−0.179***	(−3.59)	0.550***	(6.12)	0.536***	(5.94)
$\Delta RETSUM$	+	−0.035***	(−5.79)	−0.035***	(−5.75)	0.363***	(32.43)	0.363***	(32.47)
$\Delta STDRET$	+	0.059	(0.35)	0.099	(0.59)	−0.392	(−1.29)	−0.353	(−1.16)
ΔXRD	+	−0.160	(−1.33)	−0.168	(−1.40)	0.545**	(2.51)	0.536**	(2.47)
ΔAQ	+	0.472	(1.09)	0.459	(1.06)	1.605**	(1.97)	1.568*	(1.93)
$\Delta CEOAGE$	+	0.003	(0.14)	0.003	(0.13)	−0.080**	(−1.97)	−0.081**	(−1.99)
$\Delta BSIZE$	?	−0.002	(−0.05)	−0.004	(−0.13)	0.047	(0.76)	0.043	(0.70)
$\Delta POUTSIDER$	+	0.031	(0.65)	0.030	(0.61)	0.088	(1.00)	0.084	(0.96)
$\Delta CEODUALITY$	−	−0.001	(−0.13)	−0.001	(−0.13)	0.023	(1.16)	0.023	(1.15)
$\Delta CORR\_ROA$	−	−0.026	(−1.21)	−0.026	(−1.20)	−0.071*	(−1.79)	−0.070*	(−1.78)
$\Delta CORR\_CFO$	−	−0.044	(−1.57)	−0.045	(−1.60)	−0.065	(−1.27)	−0.066	(−1.28)
$\Delta CORR\_RET$	−	−0.006	(−0.36)	−0.005	(−0.31)	−0.002	(−0.07)	−0.001	(−0.03)
$\Delta VEGA$	+					0.292***	(29.60)	0.291***	(29.50)
Year Fixed		Yes		Yes		Yes		Yes	
Firm Fixed		No		No		No		No	
# of obs (N)		3987		3987		3876		3876	
Adj. R-sq		0.0222		0.0233		0.5265		0.5269	

This table reports regression results of the change analysis on the relation between accounting comparability and CEO compensation structure. All variables are defined in Appendix A. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

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Table 9
Cross-sectional dependences and serial correlations.

Panel A:		Dep. Var.							
Fama-Macbeth		EQUITY_TOT				DELTA			
Indep. Var.	Pred.	(1) Coeff. (t-stat)		(2)Coeff. (t-stat)		(3) Coeff. (t-stat)		(4) Coeff. (t-stat)	
AC_MN4	+	0.022**	(2.52)			0.082**	(2.15)		
AC_MD	+			0.013***	(3.06)			0.071**	(2.81)
LEQUITY_TOT	+	0.292***	(9.98)	0.290***	(10.13)	0.061	(0.44)	0.053	(0.38)
LNASSET	+	0.037***	(7.59)	0.037***	(7.50)	0.311***	(5.53)	0.314***	(5.42)
MB	+	0.004***	(3.70)	0.005***	(3.89)	0.063***	(7.38)	0.064***	(7.54)
LEV	−	0.094***	(5.35)	0.098***	(5.40)	−0.490**	(−2.60)	−0.467**	(−2.60)
ROA	+	0.056	(0.71)	0.037	(0.46)	1.464***	(3.36)	1.369***	(3.03)
RETSUM	+	0.077***	(4.94)	0.077***	(4.80)	0.324***	(4.37)	0.334***	(4.29)
STDRET	+	0.251	(1.09)	0.309	(1.36)	−1.250	(−1.55)	−1.061	(−1.25)
XRD	+	0.163*	(2.12)	0.157*	(2.11)	1.700**	(2.16)	1.751**	(2.28)
AQ	+	−0.186	(−1.17)	−0.178	(−1.09)	−1.583	(−1.70)	−1.421	(−1.45)
CEOAGE	+	−0.001***	(−3.63)	−0.001***	(−3.78)	0.037***	(9.04)	0.037***	(8.88)
BSIZE	?	0.019	(1.19)	0.020	(1.23)	−0.732***	(−3.88)	−0.731***	(−3.83)
POUTSIDER	+	0.204***	(6.56)	0.201***	(6.55)	−1.332***	(−9.63)	−1.334***	(−9.76)
CEODUALITY	−	−0.001	(−0.08)	0.000	(0.01)	0.199**	(2.37)	0.200**	(2.45)
CORR_ROA	−	−0.036**	(−2.19)	−0.039**	(−2.31)	0.047	(0.41)	0.032	(0.27)
CORR_CFO	−	−0.038	(−0.93)	−0.038	(−0.92)	0.253*	(1.84)	0.252*	(1.79)
CORR_RET	−	0.024	(1.37)	0.021	(1.20)	−0.023	(−0.23)	−0.031	(−0.32)
VEGA	+					0.284***	(8.77)	0.281***	(8.41)
# of obs (N)		5231		5231		5095		5095	
R-sq		0.4478		0.4488		0.5858		0.5860	
Panel B:		Dep. Var.							
Industry-fixed		EQUITY_TOT				DELTA			
Indep. Var.	Pred.	(1) Coeff. (t-stat)		(2)Coeff. (t-stat)		(3) Coeff. (t-stat)		(4) Coeff. (t-stat)	
AC_MN4	+	0.015***	(2.79)			0.083*	(1.89)		
AC_MD	+			0.011***	(3.40)			0.047**	(2.39)
LEQUITY_TOT	+	0.315***	(11.76)	0.313***	(11.74)	0.151	(1.30)	0.143	(1.23)
LNASSET	+	0.035***	(6.16)	0.035***	(6.21)	0.286***	(8.37)	0.286***	(8.40)
MB	+	0.004***	(3.38)	0.004***	(3.46)	0.064***	(6.03)	0.064***	(6.05)
LEV	−	0.092***	(3.11)	0.096***	(3.22)	−0.438**	(−2.05)	−0.426**	(−1.99)
ROA	+	0.060	(1.19)	0.048	(0.95)	1.631***	(4.62)	1.599***	(4.53)
RETSUM	+	0.054***	(7.03)	0.055***	(7.12)	0.236***	(6.15)	0.239***	(6.21)
STDRET	+	0.247***	(2.61)	0.290***	(3.00)	−0.888	(−1.19)	−0.771	(−1.05)
XRD	+	0.157	(1.49)	0.164	(1.57)	1.852***	(2.64)	1.907***	(2.74)
AQ	+	−0.038	(−0.25)	−0.035	(−0.23)	−1.367	(−1.31)	−1.365	(−1.31)
CEOAGE	+	−0.002**	(−2.40)	−0.002**	(−2.43)	0.040***	(7.92)	0.039***	(7.90)
BSIZE	?	0.028	(1.28)	0.028	(1.30)	−0.713***	(−4.24)	−0.712***	(−4.25)
POUTSIDER	+	0.185***	(5.86)	0.184***	(5.83)	−1.345***	(−5.03)	−1.344***	(−5.04)
CEODUALITY	−	0.007	(0.85)	0.007	(0.85)	0.293***	(4.89)	0.293***	(4.90)
CORR_ROA	−	−0.021	(−1.31)	−0.023	(−1.40)	0.073	(0.55)	0.065	(0.49)
CORR_CFO	−	−0.036	(−1.64)	−0.037*	(−1.68)	0.298*	(1.95)	0.296*	(1.95)
CORR_RET	−	0.033***	(2.60)	0.032**	(2.56)	−0.001	(−0.01)	−0.004	(−0.05)
VEGA	+					0.275***	(10.33)	0.276***	(10.34)
Year Fixed		Yes		Yes		Yes		Yes	
Industry Fixed		Yes		Yes		Yes		Yes	
# of obs (N)		5231		5231		5095		5095	
Adj. R-sq		0.4373		0.4386		0.4954		0.4956	

This table reports regression results of the effect of accounting comparability on CEO compensation structure using other model specifications. Panel A show the results from the Fama and MacBeth (1973) models while Panel B presents the results from the industry and year fixed models. All variables are defined in Appendix A. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

compensation structure. In Panel A of Table 9, we confirm the findings in Table 3 that accounting comparability is positively related with CEO compensation schemes such as equity-based compensation intensity and pay-performance sensitivity. Second, we run Equation (5) with industry and year fixed effects controlled and standard errors clustered at the firm level. Panel B of Table 9 presents regression results for industry and year fixed effects models. As predicted in H1a and H1b, they show that firms with higher accounting comparability have a significantly larger equity-based compensation intensity and higher pay-performance sensitivity. Taken together, the results from Fama and MacBeth (1973) and industry and year fixed effects models are qualitatively similar with those reported in Table 3.

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Table 10
Effect of accounting comparability on other executives' compensation structure.

Indep. Var.	Pred.	Dep. Var.							
		EXE_EQUITY_TOT				EXE_DELTA			
		(1) Coeff. (t-stat)		(2) Coeff. (t-stat)		(3) Coeff. (t-stat)		(4) Coeff. (t-stat)	
AC_MN4	+	0.012***	(3.77)			0.052***	(3.59)		
AC_MD	+			0.007***	(4.45)			0.021***	(2.89)
LEQUITY_TOT	+	0.166***	(22.12)	0.166***	(22.06)	0.190***	(5.26)	0.191***	(5.28)
LNASSET	+	0.027***	(5.26)	0.027***	(5.21)	0.160***	(6.63)	0.160***	(6.61)
MB	+	0.000	(0.56)	0.000	(0.60)	0.027***	(9.16)	0.027***	(9.13)
LEV	−	−0.050***	(−2.71)	−0.048***	(−2.60)	−0.489***	(−5.75)	−0.486***	(−5.71)
ROA	+	0.142***	(5.75)	0.139***	(5.60)	0.621***	(5.43)	0.630***	(5.50)
RETSUM	+	0.018***	(4.84)	0.019***	(4.92)	0.181***	(10.40)	0.181***	(10.42)
STDRET	+	0.140**	(2.49)	0.155***	(2.75)	1.642***	(6.34)	1.601***	(6.15)
XRD	+	0.077	(1.13)	0.084	(1.24)	0.407	(1.30)	0.427	(1.36)
AQ	+	0.029	(0.24)	0.030	(0.24)	2.083***	(3.62)	2.076***	(3.61)
CEOAGE	+	−0.003***	(−14.16)	−0.003***	(−14.16)	0.040***	(37.15)	0.040***	(37.16)
BSIZE	?	0.031**	(2.35)	0.030**	(2.32)	−0.368***	(−6.08)	−0.369***	(−6.08)
POUTSIDER	+	0.074***	(3.99)	0.074***	(4.00)	−0.267***	(−3.13)	−0.267***	(−3.13)
CEODUALITY	−	0.012***	(2.64)	0.012***	(2.61)	0.038*	(1.80)	0.038*	(1.80)
CORR_ROA	−	−0.007	(−0.79)	−0.008	(−0.83)	0.109**	(2.56)	0.109**	(2.57)
CORR_CFO	−	0.016	(1.36)	0.015	(1.29)	0.020	(0.37)	0.016	(0.31)
CORR_RET	−	−0.021***	(−3.11)	−0.021***	(−3.09)	−0.104***	(−3.26)	−0.103***	(−3.25)
VEGA	+					0.410***	(60.03)	0.410***	(60.02)
Year Fixed		Yes		Yes		Yes		Yes	
Firm Fixed		Yes		Yes		Yes		Yes	
# of obs (N)		19,906		19,906		18,938		18,938	
Adj. R-sq		0.4333		0.4335		0.7141		0.7140	

This table reports regression results of the effect of accounting comparability on other executives' compensation structure. *EXE_EQUITY_TOT* in Columns 1 and 2 is other executives' equity-based compensation ratio to total compensation. *EXE_DELTA* in Columns 3 and 4 is the natural logarithm of the change in the value of other executives' stocks and options to a 1% change in stock price. Other variables are defined in Appendix A. T-statistics are in parentheses. ***, **, and * represent significance at the 1%, 5%, and 10% levels (two-sided), respectively.

5.5. Executive-compensation structure

Our analysis focuses mainly on the variation in CEOs' compensation structures, especially equity-based compensation intensity and pay-performance sensitivity across different levels of accounting comparability. Although CEOs are key players in allocating the firm's limited resources, other top executives also make strategic decisions. If accounting comparability truly influences a firm's cost of monitoring managers' behaviors, other executives' compensation contracts might also be affected by comparability, and we can predict that executives' compensation structures will vary with comparability. Thus, we extend our analysis by examining how accounting comparability affects the compensation schemes of the top five executives (excluding CEOs).

We replicate Tables 3 using the top five executives' compensation. Table 10 tabulates the results of the replication. Columns 1 and 2 of Table 10 present significantly positive coefficients on AC_MN4 and AC_MD with EXE_EQUITY_TOT. This indicates that, like CEOs, top executives are offered higher equity-based compensation intensity as their firms' accounting information becomes more comparable with that of peers. In Columns 3 and 4, we show that the comparability is positively associated with executives' pay-performance sensitivity (EXE_DELTA). Table 10 concludes that our main results are not sensitive when we alternatively use the top five executives' compensation schemes in the analysis.

6. Conclusions

In this study, we address the fundamental question of how the quality of financial reporting influences CEOs' compensation structure. Recently, Jongjaroenkamol and Laux (2017) proposed that CEOs' incentive contracts can be affected by financial reporting that determines the quality of accounting information the board relies on in designing CEOs' compensation schemes. Extending Jongjaroenkamol and Laux (2017), we argue that accounting comparability increases the usefulness of equity-based compensation by helping firms to detect CEOs' misbehaviors with lower cost and, in turn, by reducing CEOs' opportunistic incentives. Accordingly, we predict that firms are more likely to rely on equity-based compensation and increase pay-performance sensitivity as their financial statements become more comparable with those of their industry peers.

Using a relative proportion of equity compensation and pay-performance sensitivity as proxies for CEO compensation schemes, we provide evidence that equity-based compensation intensity and pay-performance are greater for firms with more comparable accounting information. This suggests that firms with greater accounting comparability expect equity-based compensation to be cost effective in monitoring and disciplining CEOs' activities, which consequently leads to a higher

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proportion of equity-based compensation and stronger pay-performance sensitivity in CEOs' compensation schemes. Further, we find that the effect of comparability on the CEO's compensation structure is more pronounced when a firm's information environment is less transparent and a firm's corporate governance is stronger. Finally, our robustness tests show that our results are robust in a variety of sensitivity tests, including the instrumental variable approach, alternative measures of accounting comparability, change analysis, Fama and MacBeth (1973) specification. In sum, our findings are consistent with the notion that accounting comparability affects the desirability of equity-based compensation by enhancing the monitoring abilities of the board of directors, which leads to greater equity-based compensation intensity and higher pay-performance sensitivity.

In this study, we primarily use the output-based measures of accounting comparability following De Franco et al. (2011) who constructed the comparability measure with several assumptions on the relation between earnings and stock returns, which could yield potential limitations of the output-based measure. Specifically, the measure of De Franco et al. (2011) is not sophisticated as the measure simply regards earnings as a key financial reporting metric although balance sheet information is also important to information users. De Franco et al. (2011) also state that their measure is required to specify and estimate the accounting system, which is advantageous by controlling for the economic event to isolate accounting comparability, but accounting earnings could achieve a comparability role to investors even when the accounting functions per se are not identical. Thus, the findings using De Franco et al. (2011) measure may capture single dimensional aspect, and cannot provide a firm's optimal level of comparability.

Recently, both FASB and SEC highlight benefits of accounting comparability.[16] The FASB states that having accounting standards more comparable both within the U.S. and internationally is consistent with its core mission to provide useful information to investors and potential information users (FASB, 2016). The SEC also emphasizes the role of comparability as high-quality financial reporting that plays in investor protection and the efficiency and effectiveness of capital formation and allocation (SEC, 2008).[17] Specifically, the SEC expects more comparable standards to reduce potential costs for preparers as well as users of accounting information and make capital market more efficient. Our results support FASB's argument (improving firms' decisions for providing resources) and SEC's position (fostering the efficient allocation of capital) about the role of comparability by providing evidence that comparability enhances the usefulness of equity-based compensation, thereby reducing agency problems associated with CEOs' compensation contracts.

Appendix A. Variable definitions

Variable name	Variable explanation
EQUITY_TOT	Ratio of equity-based compensation (the sum of options and restricted stocks) to total compensation
DELTA	Natural logarithm of the change in the value of a CEO's stocks and options to a 1% change in stock price
AC_MN4	Mean of the four highest Accounting Comparability (AC) values for firm i for all J firms in the same two-digit SIC industry-year. Following De Franco et al. (2011), AC is calculated as the absolute difference in the fitted values from the estimated regression equation of firm i's earnings on firm i's return using the parameter estimates from firm i's and j's regression equations, respectively. Given J firms (from j = 1 to J) in the same two-digit SIC industry-year as firm i, AC is computed for all firm i - firm j pairs ($i \neq j$)
AC_MD	Median of AC values for firm i for all J firms in the same two-digit SIC industry-year. Following De Franco et al. (2011), AC is calculated as the absolute difference in the fitted values from the estimated regression equation of firm i's earnings on firm i's return using the parameter estimates from firm i's and j's regression equations, respectively. Given J firms (from j = 1 to J) in the same two-digit SIC industry-year as firm i, AC is computed for all firm i - firm j pairs ($i \neq j$)
LNASSET	Natural logarithm of total assets
MB	Ratio of the market value of equity to the book value of equity (Market-to-Book ratio)
LEV	Total debt divided by total assets
ROA	Operating income before depreciation divided by book value of assets
RETSUM	Aggregated return for 12 months of fiscal year period
STDRET	Standard deviation of returns over 36 months prior to the fiscal year (return volatility)

[16] Although more comparable standards can reduce costs for accounting information users of financial statements and make global capital markets more efficient, some firms might have some difficulties to apply those standards. For instance, Schrödl1 and Klein (2011) argue that the introduction of IFRS is associated with various operational hurdles, which are due to difficulties in implementing and understanding the IFRS due to their complexity. Fang et al. (2017) argue that while comparability enhances the correlation among firms' reported earnings (common informativeness), it reduces firms' own reporting precision (individual informativeness).

[17] The SEC issued a statement laying out the SEC's current position regarding global accounting standards in 2010. The statement makes clear that the SEC continues to believe that a single set of high quality, globally accepted accounting standards would benefit U.S. investors. The SEC also expects the FASB to consider, in developing standards, the extent to which international comparability is necessary or appropriate in the public interest and for the protection of investors

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Appendix A (*continued*)

Variable name	Variable explanation
XRD	R&D expense divided by total assets at the beginning of the fiscal year. It is set to zero if R&D expense is missing in Compustat
AQ	Accrual Quality calculated, using the modification of the Dechow and Dichev (2002) model, as the standard deviation of residuals from firm-specific regressions of total current accruals (TCA) on the current-, lag-, lead-period cash flows from operation (CFO), changes in revenues(REV) and property, plant, and equipment(PPE) over recent 10 years
CEOAGE	CEO age
BSIZE	Natural logarithm of total number of directors on board (Board size)
POUTSIDER	Number of outside directors divided by total number of directors (Board independence)
CEODUALITY	Indicator variable of CEO duality which equals 1 if a CEO is a chairman of the board of directors, and 0 otherwise
CORR_ROA	Median of correlations in ROA firm *i* and all *J* firms in the same two-digit SIC industry over prior 5 years. ROA is computed as income before extraordinary items divided by total assets
CORR_CFO	Median of correlations in CFO firm *i* and all *J* firms in the same two-digit SIC industry over prior 5 years. CFO is computed as cash flow from operating activities divided by total assets
CORR_RET	Median of correlations in RET firm *i* and all *J* firms in the same two-digit SIC industry over prior 5 years. RET is computed as stock return over 12 months prior to the fiscal year
VEGA	Natural logarithm of the change in the value of a CEO's stocks and options to a 1% change in stock return volatility
HIGH_IA	Indicator variable of high information asymmetry which equals 1 if a firm's bid-ask spread over 24 months prior to fiscal year end is greater than industry median of the bid-ask spread, and 0 otherwise
STRONG_CG	Indicator variable of strong corporate governance which equals 1 if outside directors' ownership (ODOWN) at the end of fiscal year is greater than industry median of the outside directors' ownership, and 0 otherwise

Appendix B. Supplementary material

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jaccpubpol.2019.106681.

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