© *The Journal of Risk and Insurance*, 2011, Vol. 78, No. 3, 761-790
DOI: 10.1111/j.1539-6975.2011.01417.x

EARNINGS SMOOTHING, EXECUTIVE COMPENSATION, AND CORPORATE GOVERNANCE: EVIDENCE FROM THE PROPERTY-LIABILITY INSURANCE INDUSTRY

David L. Eckles
Martin Halek
Enya He
David W. Sommer
Rongrong Zhang

ABSTRACT

Unlike studies that estimate managerial bias, we utilize a direct measure of managerial bias in the U.S. insurance industry to investigate the effects of executive compensation and corporate governance on firms' earnings management behaviors. We find managers receiving larger bonuses and stock awards tend to make reserving decisions that serve to decrease firm earnings. Moreover, we examine the monitoring effect of corporate board structures in mitigating managers' reserve manipulation practices. We find managers are more likely to manipulate reserves in the presence of particular board structures. Similar results are not found when we employ traditional estimated measures of managerial bias.

INTRODUCTION

Earnings management has long been a topic of interest to academic researchers, stakeholders, industry practitioners, and regulators. Despite the ample evidence of earnings manipulation and the importance of corporate governance in curtailing such manipulation, little research has examined the collective impact of executive compensation and board structure on earnings management. In this study, we extend

David L. Eckles is at the Department of Insurance, Legal Studies, and Real Estate, Terry College of Business, University of Georgia. He can be contacted via e-mail: deckles@uga.edu. Martin Halek is at the Wisconsin School of Business, Department of Actuarial Science, Risk Management, and Insurance, University of Wisconsin-Madison. He can be contacted via e-mail: mhalek@bus.wisc.edu. Enya He is at the Department of Finance, Insurance, Real Estate and Law, College of Business, University of North Texas. She can be contacted via e-mail: enyahe@unt.edu. David W. Sommer is the Charles E. Cheever Chair of Risk Management at the Bill Greehey School of Business, St. Mary's University. He can be contacted via e-mail: dsommer@stmarytx.edu. Rongrong Zhang is at the Department of Finance & Quantitative Analysis, College of Business Administration, Georgia Southern University. The author can be contacted via e-mail: rzhang@georgiasouthern.edu.

previous literature by investigating the combined effect of executive compensation and board structure on firms' earnings management behavior. We jointly consider that (1) managers use discretionary accounting components to affect earnings for compensation enhancement and (2) firms structure boards to exert more control over managers, thereby potentially mitigating some of these effects.

Consistent with the prior literature utilizing estimated abnormal accruals, our results show a direct link between the incentive component of executive compensation and earnings management. Specifically, we observe that managers who derive larger proportions of their compensation from bonus payments and restricted stock are more likely to engage in earnings management. We further see that corporate governance through board monitoring plays an important role in curbing managers' manipulation of earnings, with different corporate governance structures being associated with varying degrees of manipulation by managers. We find these results using observed outcomes of managerial decision making (i.e., insurer loss reserve errors) instead of estimated measures of earnings management typically used in the accounting and finance literature. Moreover, our results are not found when we employ estimated measures of managerial bias. Our research contributes to the literature in several other important ways. First, this study augments the earnings management literature in general. It is well known that insurance companies are subject to much heavier regulation than almost all other industries. Hence, our study serves as a stronger test for earnings management than prior studies examining other industrial firms not subject to the same level of regulatory scrutiny as insurance companies.

Second, this research expands the current limited understanding of corporate governance in the insurance industry specifically. Despite the abundant evidence of loss reserve manipulation among property–liability insurers (Petroni, 1992; Beaver, McNichols, and Nelson, 2003; Gaver and Paterson, 2000, 2004) and the link between executive compensation and earnings management (Healy, 1985; Holthausen, Larcker, and Sloan, 1995; Eckles and Halek, 2010), no prior research in the insurance literature has investigated how insurers' loss reserve practices are affected by the joint impact of executive compensation incentives and board structure. Further, this is the first article that uses reserve errors to observe the initial impact of the Sarbanes–Oxley Act (SOX) on corporate governance in the insurance industry.

Third, our article significantly adds to the narrow, yet growing literature regarding the interaction among executive compensation, board structure, and earnings management. Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009) are the only two studies we know of that examine the joint effect of corporate governance and executive compensation on earnings management. Yet, both Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009) proxy earnings management by abnormal accruals, which are estimated indirectly using a regression model. Inferences drawn from their empirical evidence are thus limited, "due to the difficulty of measuring the level of accruals absent managerial bias, since accruals are the expected future cash receipts and payments resulting from all current and past transactions, and researchers cannot directly measure managerial expectations" (Petroni, 1992, pp. 485–486). We significantly advance Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009) by utilizing a more accurate proxy of managerial bias, insurer loss reserve errors, which are disclosed in accounting results filed with state regulatory authorities and available through the

National Association of Insurance Commissioners' Database (the NAIC Database). Specifically, statutory reporting requires insurers to estimate losses and to ultimately report the observed, realized values of the estimated losses. Hence, managerial manipulation is directly captured by the differences between the estimated losses and the actual realized losses reported by management, both of which are disclosed in annually filed regulatory reports.[1]

Moreover, neither Cornett, Marcus, and Tehranian (2008) nor Cornett, McNutt, and Tehranian (2009) include insurance holding companies. Cornett, Marcus, and Tehranian (2008) study a sample of industrial firms in the Standard & Poor's (S&P) index from 1994 to 2003, whereas Cornett, McNutt, and Tehranian (2009) focus on the 100 largest bank holding companies in the United States from 1994 to 2002. According to Gillan, Hartzell, and Starks (2003), industry factors account for most of the explainable variation in overall governance structure and appear to dominate time effects and firm factors. Therefore, the results from Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009) may not apply to the insurance industry. We contribute to understanding the relation between executive compensation, board structure, and earnings management by pioneering an investigation of the U.S. property–liability insurance industry.

Finally, by focusing solely on the U.S. property–liability insurance industry, we better control for the differential effects of regulation and political pressure, which allows us to assess more directly the influence of executive compensation and board structure on earnings management. The corporate governance literature is known for being fraught with difficult to overcome endogeneity problems. The likelihood that our results are due to the spurious correlation caused by unobserved heterogeneity is significantly reduced because our sample firms come from a single industry, and are thus more homogeneous (Blackwell, Brickley, and Weisbach, 1994; He and Sommer, 2010). Compared to Cornett, Marcus, and Tehranian (2008), our article is less prone to endogeneity, particularly the problem of omitted variables.

The remainder of the article is organized as follows. The "Literature Review" section examines the extant literature. The "Hypotheses Development and Model Framework" section develops the research hypotheses and the economic models. The "Data and Descriptive Statistics" section provides details on the sample data and analysis methodology. The "Regression Results" section presents the empirical results, and the final section concludes.

LITERATURE REVIEW

Prior research has documented the manipulation of insurance accounting results for various reasons, including avoiding regulatory scrutiny (Grace, 1990; Petroni, 1992), smoothing tax liabilities (Grace, 1990; Petroni, 1992; Petroni and Shackelford, 1999), and increasing the compensation of executives (Healy, 1985; Holthausen, Larcker,

[1] We recognize that the error, that is, the difference between the initial estimated losses and the realized losses, is not entirely managerial manipulation. It could also include unintended estimation errors. As such, we utilize firm-level fixed effects in the empirical testing to help control for these unintended estimation errors. In addition, if the errors are only random errors and are not subject to managerial manipulation, it should bias against us finding significant results in our tests.

and Sloan, 1995; Eckles and Halek, 2010).[2] There also exists a literature investigating the oversight capacity that corporate governance mechanisms have in mitigating executives' manipulation of earnings (see Klein, 2002; Xie, Davidson, and DaDalt, 2003; Peasnell, Pope, and Young, 2005). Despite evidence of earnings manipulation and the impact of corporate governance in curtailing such manipulation, little research has jointly examined the influence of executive compensation and board structure on earnings management. To our knowledge, Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009) are the only papers to investigate earnings manipulation with respect to *both* corporate governance oversight and managerial compensation incentives.

Our article examines the joint hypothesis that managers use discretionary accounting components to affect firm performance and that a firm's board structure can potentially mitigate some earnings management incentives. We provide a brief review of these two research areas.

The first strand of research focuses on managers' motives to manipulate earnings. Some incentives are operational decisions that benefit the business entity, whereas others directly benefit managers at the expense of business owners. Dechow and Skinner (2000) categorize capital market based incentives for earnings management into two streams: (1) incentives provided by stock market participants (e.g., analysts and money managers) for managers to meet relatively simple earnings benchmarks (see Burgstahler, 1997; Burgstahler and Dichev, 1997; Degeorge, Patel, and Zeckhauser, 1999; Myers, Myers, and Skinner, 2007) and (2) incentives for managers to improve the terms of equity offerings by engaging in earnings management at the time of seasoned equity offers (see Rangan, 1998; Teoh, Welch, and Wong, 1998a). While these incentives are more likely operational decisions, managers' incentives to manipulate earnings can also be self-serving. In particular, the growth of stock-based compensation has significantly affected managerial motives for earnings management, as "managers have become increasingly sensitive to the level of their firms' stock price and their relation to key accounting numbers such as earnings" (Dechow and Skinner, 2000, p. 237).

Despite widespread belief among practitioners and regulators that earnings management is pervasive and problematic, academic research has not convincingly proved this to be the case, as indicated by Dechow and Skinner (2000). McNichols (2000) suggests that "much of the controversy over interpretation of the literature's findings is due to the extensive use of aggregate accruals models to characterize discretionary behavior" (p. 314). She further indicates that "future contributions to the earnings

[2] A strand of literature explores similar issues within the banking industry. Previous research examines how banks use loan loss provisions and gains and losses from securities to manage bank earnings and capital levels, finding mixed results. For example, Beatty, Chamberlain, and Magliolo (1995) find no relation between earnings and loan loss provisions. By contrast, Collins, Shackelford, and Wahlen (1995) find a positive relation between earnings and loan loss provisions. Collins, Shackelford, and Wahlen (1995), Beaver and Engel (1996), and Ahmed, Takeda, and Thomas (1999) document a negative relation between discretionary accruals and capital, whereas Beatty, Chamberlain, and Magliolo (1995) show a positive relation between these two items.

management literature will come from papers that model the behavior of specific accruals with and without manipulation" (p. 338).

Studies in both the accounting and insurance literatures have considered the effects of managerial compensation packages on earnings manipulation. In the accounting literature, Healy (1985), Gaver, Gaver, and Austin (1995), and Holthausen, Larcker, and Sloan (1995) link the bonus component of executive compensation with earnings management through accruals.[3] In the insurance literature, Eckles and Halek (2010) find evidence that incentive-based components of executive compensation are positively associated with earnings manipulations. Similarly, Browne, Ma, and Wang (2009) show significant correlation between insurer reserve errors and the options granted to executives. However, neither study considers the role of board structure in mitigating the impact of the executive compensation packages on earnings management.

Studies in the corporate governance literature show that board structure affects the probability and/or magnitude of earnings management. For example, Xie, Davidson, and DaDalt (2003) and Peasnell, Pope, and Young (2005) show that the management of earnings through abnormal accruals is somewhat mitigated by more independent boards. But none of these studies consider the impact of executive compensation on earnings management, and more importantly whether such an impact is mitigated by the firms' board structure.

Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009) are the only papers we know of that consider both managerial compensation and board structure within the context of accounting manipulation. Our article builds upon Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009) in two important ways. First, our direct measure of managerial bias allows for a more accurate proxy for managerial discretion than estimated aggregate accruals models.[4] Second, we consider multiple detailed, incentive-based executive compensation components rather than one proxy for compensation structure.[5]

HYPOTHESES DEVELOPMENT AND MODEL FRAMEWORK

Healy (1985), Gaver, Gaver, and Austin (1995), and Holthausen, Larcker, and Sloan (1995) all indicate some level of manipulation of reported earnings by managers through the use of discretionary accounting practices. Loss reserve estimation by insurance executives is one such discretionary practice. *Ceteris paribus*, we postulate that insurance executives who derive a larger portion of their total compensation

[3] For an early summary of theories surrounding CEO compensation incentives, see Murphy (1999).

[4] Cornett, McNutt, and Tehranian (2009) themselves recognize the shortcomings of using regression residuals as a proxy for managerial discretion. In Footnote 11 on page 419, they indicate that it "should be noted that the model residuals contain all misspecifications and all models are at best approximations."

[5] Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009) consider the sensitivity of CEO wealth to firm performance. Cornett, Marcus, and Tehranian (2008) proxy pay-for-performance sensitivity (PPS) with the percentage of total CEO annual compensation composed of grants of new stock options; similarly, Cornett, McNutt, and Tehranian (2009) proxy PPS with the ratio of CEO option holdings to total CEO compensation.

from incentive-based components will have larger reserve estimation errors in the direction that optimizes their compensation. Further, recent corporate governance literature documents that managers of firms with particular strong (weak) governance mechanisms are less (more) likely to manipulate earnings.[6]

In this section, we examine how various executive compensation components and several corporate governance characteristics relate to executives' discretionary accounting practices in insurance firms. The compensation components examined include bonuses, restricted stock held, stock options exercised, and stock options awarded. Prior research indicates that each component does not necessarily induce the manager to act in a consistent manner. We therefore investigate each compensation element and discuss whether it should induce earnings-decreasing behavior (e.g., restricted stock awards), earnings-increasing behavior (e.g., exercising options), and either earnings-decreasing or earnings-increasing behavior (e.g., structured bonus plans).

Executive Compensation and Reserve Errors

Several observable compensation items can be characterized as long-term incentive schemes. Awarding stock options and restricted stock is intended to align the long-term incentives of the executive and company. The "value" of these securities is not obtained during the year in which they are awarded but rather are ultimately realized in the future, contingent on the overall value of the firm. Stock options are commonly granted with an exercise price set equal to the price of the stock on the award date (Aboody and Kasznik, 2000). Additionally, restricted stock grants are made at the current stock price. Therefore, as Aboody and Kasznik (2000) argue, executives prefer lower current stock prices to reduce the strike price of the option and to potentially increase the number of shares awarded.[7] Hence, these compensation variables should provide motivation for managers to make earnings-decreasing decisions (i.e., relatively over-reserve for losses) in the current year. Over-reserving creates the temporary perception that the insurer has incurred larger losses, therefore reducing current stock prices.[8] This leads to our first testable hypothesis:

---

[6] Klein (2006) finds that earnings management is positively related to CEO's sitting on the board's compensation committee and negatively related to the CEO's equity holdings and the independence of the board's audit committee, consistent with the notion that more independent boards may be more effective in monitoring the corporate financial accounting process. Cornett, Marcus, and Tehranian (2008) show that compensation via stock options encourages earnings management whereas board independence and institutional monitoring discourage such earnings manipulations.

[7] This is similar to the "spring-loading" effect noted by Yermack (1997).

[8] We are agnostic as to whether or not earnings manipulation does actually affect stock and stock option prices, and we do not purport to test these issues. There is significant debate as to whether or not managers can actually "fool" the market through earnings manipulation. On one hand, there is strong empirical evidence that the market does not see through data manipulation by management. For example, Teoh, Welch, and Wong (1998a, 1998b) and Rangan (1998) show that management manipulates accruals prior to initial public offering and seasoned equity offerings, leading to overvaluation of new issues. Also, Balsam, Chen, and Sankaraguruswamy (2003) find evidence suggesting that firms manage earnings prior to stock option grants, whereas McAnally, Srivastava, and Weaver (2007) show that stock option grants encourage missing earnings targets. However, when the incentive to manage earnings

H1: *Firms whose managers have larger proportions of stock options awarded and restricted stock awarded as compensation components relative to their total compensation in period t are more likely to make earnings-decreasing decisions in period t.*

In addition to long-term compensation components, we observe incentive-based compensation elements that are realized or exercised during the current year, such as bonuses and exercised stock options. The earnings management incentives created by these compensation components are not as straightforward as some other components. Specifically, Healy (1985), Gaver, Gaver, and Austin (1995), and Holthausen, Larcker, and Sloan (1995) indicate managers may have incentives to make both earnings-increasing and earnings-decreasing decisions based on the structure of a bonus plan. The payoff schemes of the bonuses investigated by Healy (1985), Gaver, Gaver, and Austin (1995), and Holthausen, Larcker, and Sloan (1995) resemble a generic "call spread," with upper and lower thresholds setting bounds on the potential bonus.[9] The manager's incentives then were determined by where the firm's earnings were relative to the thresholds.[10]

We examine bonus plans similar to the plans studied by Holthausen, Larcker, and Sloan (1995) and Healy (1985).[11] Unfortunately, our data do not provide sufficient detail regarding the structure of the executive bonus plans in order for us to make absolute predictions on the effects these plans may have on loss reserving practices.[12] As

is more transparent to the market, investors seem to penetrate such data manipulation by insiders and no abnormal stock returns are detected as in the case of employee stock option reissuance (see Coles, Hertzel, and Kalpathy, 2006).

[9] That is, the payoff of the bonus is flat (presumably zero) until the first strike price (bonus threshold) is reached. The payoff then increases (though not necessarily in a linear fashion) until the second strike price (the upper bound of the bonus) is reached, at which point the payoff of the bonus again flattens.

[10] A manager was shown to have an incentive to implement earnings-decreasing practices if the earnings were above an established upper bound (Healy, 1985; Gaver, Gaver, and Austin, 1995; Holthausen, Larcker, and Sloan, 1995) or if the earnings were well below the threshold where the manager would receive some performance-based compensation (Healy, 1985). Alternatively, managers were shown to implement earnings-increasing policies if the firm's earnings were in the range where increased earnings would lead to increased compensation (Healy, 1985; Gaver, Gaver, and Austin, 1995; Holthausen, Larcker, and Sloan, 1995).

[11] The executives in our sample are also given bonuses termed "long-term incentive plans," which are essentially bonuses paid in 1 year based upon performance in multiple prior years. We remove these bonuses from consideration, since prior research has found them to be insignificant with respect to reserving practices (Eckles and Halek, 2010) and since they make up a very small proportion of the executive compensation packages for our executives (around 4 percent of total compensation).

[12] Although we do not have specifics on the thresholds and upper bounds of all of the compensation packages, we do observe the plan details for a subset of the firms in the data. The bonus schemes reported in the 10-Ks of these firms are exactly the same as the schemes studied in Healy (1985), Gaver, Gaver, and Austin (1995), and Holthausen, Larcker, and Sloan (1995). In these bonus schemes, there exists a lower and upper bound of earnings between which managers are rewarded a bonus, and outside of which the bonus is either not paid or capped. Although we are unable to obtain the specifics of every insurer's bonus scheme, for every year, we are confident that this common bonus scheme is generally employed by our sample of insurers.

described above, managers may have incentives to make either earnings-decreasing or earnings-increasing decisions with respect to loss reserves, depending on where the firm's performance falls relative to the structure of the bonus plan. For example, as discussed above, managers would have an incentive to make earnings-increasing decisions if operating between the bonus threshold and upper limit of the bonus, should such a limit exist. We therefore test the following hypothesis:

H2: Firms whose managers derive a larger portion of total compensation from bonus plans in period t have more incentive to manipulate earnings in period t.

Options exercised by executives are by definition "in the money" and are therefore in the range where Healy (1985), Gaver, Gaver, and Austin (1995), and Holthausen, Larcker, and Sloan (1995) suggest earnings-increasing discretionary behavior occurs. Moreover, these generic options are presumably straight call options with no upper bound, which provide only incentives for earnings-increasing discretionary behavior. Thus, we expect managers of insurers to make earnings-increasing reserve errors, that is, under-reserve, when exercising call options. This leads to the first part of our *anticipation hypothesis* and our third testable hypothesis, H3, formally stated as:

H3: Firms whose managers derive a larger portion of total compensation from the exercising of options in period t have more incentive to make earnings-increasing reserving decisions in period t.

The value of restricted stock held presents additional incentives for executives. This component represents restricted stock currently owned by executives that may be sold or held at their discretion, so long as the restricted stock conditions have been satisfied. The incentives of executives to manipulate earnings will be determined by their holding period preferences. Executives who prefer to continue holding the restricted stock will be more inclined to undertake earnings-decreasing decisions in the current period so as to shift positive results to future periods when the restricted stock will be sold. Conversely, executives who prefer to liquidate in the short run are expected to make earnings-increasing decisions in the current period in order to maximize the current value of the firm, and thus the value of their restricted stock.[13] Our hypothesis related to restricted stock is formally stated as:

H4: Firms whose managers derive a larger portion of total compensation from restricted stock liquidation have more incentive to manipulate earnings.

Board Structure and Reserve Errors

To examine how board characteristics affect insurers' reserve practices, we focus on three key aspects of corporate boards: the size of the board, the fraction of independent directors, and whether the CEO is also the chairman of the board (i.e., CEO duality).

[13] While the restricted stock held may be viewed as more of a wealth variable as opposed to a direct compensation variable, these holdings still provide an incentive for managers to manipulate reserves. The same is true for options that are awarded and may eventually be exercised.

Lipton and Lorsch (1992) argue that the larger the board, the more difficult for all members to express their views in the limited time available at board meetings. Hence, smaller boards are more effective in monitoring. For our study, we hypothesize that smaller boards are better suited for monitoring insurer executives, because the insurance firms in our sample engage in complicated underwriting business. Hence, the smaller the board size, the greater its ability to monitor, and the smaller the subsequent absolute reserve errors. However, this association may be either negative or positive. That is, for executives who over-(under-) reserve to maximize personal benefits, we expect smaller boards will constrain the over-(under-) reserving practice.

With respect to board independence, numerous empirical studies suggest that independent boards provide effective monitoring. For publicly traded firms, the increased monitoring by outside directors can somewhat offset the entrenchment effects resulting from the ownership and control separation.[14] In particular, He and Sommer (2010) document that among property–liability insurance companies, those with greater separation of ownership and control use more outside directors. Hence, we predict a significant relation between the fraction of outside directors on the board and magnitude of the reserve error.[15] Again, the association could be either negative or positive.

The extant literature suggests that CEO duality results in higher agency costs.[16] Hence, we predict that when CEOs hold dual positions, they tend to increase reserve errors, however, the direction of the reserve depends on how they derive their compensation. When over-reserving increases executive payoffs, all else equal, we expect firms with CEO duality will over-reserve even more. On the other hand, when under-reserving provides larger executive benefits, all else equal, we expect firms with CEO duality will further under-reserve. In summary, our board governance hypothesis is stated as:

H5: *Reserving behavior will be affected by board size, board independence, and whether the CEO also holds the position of chairman of the board.*

[14] Though we do not study mutual insurers, Mayers, Shivdasani, and Smith (1997) find that mutual insurers employ more outside directors than stock insurers since other external mechanisms, such as the threat of a takeover, are relatively ineffective in mitigating agency problems.

[15] Though some researchers raise doubts about whether more independent boards are better (e.g., Linck, Netter, and Yang, 2008; Coles, Daniel, and Naveen, 2008), other researchers show that board composition does matter in a variety of contexts. For example, Weisbach (1988) shows a stronger association between firm performance and the probability of CEO turnover for companies with outsider-dominated boards whereas Brickley, Coles, and Terry (1994) find that the average stock market reaction to announcements of poison pills is positive for firms with outsider-dominated boards (and vice versa) and conclude that outside directors serve the interests of shareholders better than inside directors.

[16] In 80 percent of the U.S. companies, the CEO is also the chair of the board (Brickley, Coles, and Jarrell, 1997). Empirical research on the effect of CEO duality on firm performance is mixed. For example, Baliga, Moyer, and Rao (1996) find the market is indifferent to changes in a firm's CEO duality status and little evidence of operating performance changes around duality status changes. They find some weak evidence that duality status affects long-term performance. In contrast, Bhagat and Bolton (2008) show that CEO–chair duality is negatively related to firm performance.

To test H1, H2, H3, H4, and H5, we employ the following model:

$$\begin{aligned} RE_{i,t} = {} & \beta_0 + \beta_1 LNASSETS_{i,t} + \beta_2 NETINCOME_{i,t} + \beta_3 LONGTAIL_{i,t} \\ & + \beta_4 BONUS_{i,t} + \beta_5 RSTKAW_{i,t} + \beta_6 RSTKHELD_{i,t} + \beta_7 STKOPAW_{i,t} \\ & + \beta_8 STKOPEX_{i,t} + \beta_9 BOARDSIZE_{i,t} + \beta_{10} OUTBOARD_{i,t} \\ & + \beta_{11} CEODUAL_{i,t} + \nu_i + \varepsilon_{i,t}, \end{aligned} \tag{1}$$

where i represents the individual insurers, t represents the year (1992–2004), and $RE_{i,t}$ represents the reserve estimation error associated with reserves reported for firm i in year t. By definition, a positive (negative) $RE_{i,t}$ represents under-reserving (over-reserving) in year t.[17] *LNASSETS* is the natural log of firm assets, *NETINCOME* is the net income of the firm, *LONGTAIL* is the proportion of business written in long-tailed lines, *BONUS* is the percent of total executive compensation received in the form of a bonus, *RSTKAW* is the percent of total executive compensation received in restricted stock awarded, *RSTKHELD* is the ratio of the value of restricted stock held to total executive compensation, *STKOPAW* is the percent of total executive compensation received in options awarded, *STKOPEX* is the ratio of the value of exercised options to total executive compensation, *BOARDSIZE* is equal to the natural log of the number of directors on the board, *OUTBOARD* is the proportion of the board that is made up of independent (nonexecutive) directors, *CEODUAL* is a indicator variable that is set to one if the CEO also holds the position as the chairman of the board and zero otherwise, ν_i is the company specific error, and $\varepsilon_{i,t}$ is the random error.[18]

A negative (positive) coefficient of an independent variable in (1) indicates that an increase in that variable is associated with over-reserving/earnings-decreasing (under-reserving/earnings-increasing) behavior. For example, if a long-term incentive compensation variable is found to have a negative coefficient, it implies that the larger the proportional compensation in this long-term component, the greater the over-reserving/earnings-decreasing behavior.[19] H1 predicts the coefficients of *RSTKAW*

[17] The loss reserve estimation error in year t is the developed loss reserve in year $t + n$ for losses incurred in year t and earlier less the original loss reserve estimate in year t for losses incurred in year t and earlier. We utilize a 5-year development period ($n = 5$). This follows the loss reserve estimation error methodology utilized by Petroni (1992) and Gaver and Paterson (2004). In order to control for variation in insurer size and to reflect the loss reserve estimation error as a percentage, this difference is scaled by two alternative factors: (1) total admitted assets and (2) the 5-year developed reserve.

[18] We also use the G-index from Gompers, Ishii, and Metrick (2003) as an alternative measure of corporate governance strength. The results from model 1 are similar when substituting the G-index for the corporate governance variables given in model 1. However, since the G-index (G-index components) is (are) not constructed (reported) for every year in the IRRC data set, using the G-index severely limits the number of observations we are able to use (more than half of our observations are lost). Additionally, the G-index may have other flaws such as double counting, employing an arbitrary functional form, and so on. As such, we are hesitant to draw any conclusions from models utilizing this index.

[19] Note that it does not matter where the initial reserves are set. If the compensation component induces earnings-increasing (earnings-decreasing) behavior, the loss reserves will be set lower (higher) *relative* to where they would have otherwise been set.

and *STKOPAW* to be negative. Finding any significance on the coefficients of *BONUS* is consistent with managers impacting reserving practices in response to these compensation items (H2). H3 predicts the coefficient of STKOPEX to be positive. Any significance of the coefficient on *RSTKHELD* is indicative of a relation between the reserve errors and the restricted stock held H4. In testing the board structure hypothesis, we expect the coefficients on *BOARDSIZE*, *OUTBOARD*, and *CEODUAL* to be significantly different from zero, though H5 does not predict the sign for any of these coefficients.[20]

We include proxies for insurer size (*LNASSETS*) and business mix (*LONGTAIL*), as prior research has shown them to affect reserve estimation error (e.g., business mix is significant in Aiuppa and Trieschmann, 1987, and Petroni, 1992; size is also significant in Aiuppa and Trieschmann, 1987, but not in Petroni, 1992, or Weiss, 1985). *NETINCOME* is used to proxy an insurer's tax liability since related literature suggests that an insurer may manipulate loss reserves in an effort to minimize tax liability; hence, we would expect to see insurers reserve more (i.e., make income-decreasing decisions) for firms with higher levels of net income. A negative coefficient on *NETINCOME* would reflect such over-reserving. Finally, according to Grace and Leverty (forthcoming), it is possible that these control variables used are not significantly related to reserve errors. Our article can therefore be considered as a further test of the recent results reported by Grace and Leverty.

The Joint Effects of Board Governance and Executive Compensation

Although we expect to find a relation between the reserve errors and the board governance variables, it is possible that the relation among reserve errors, executive compensation, and board structure is sufficiently complex that differing incentives muddle the observed relation. The extant literature on corporate governance generally finds that firms with more effective board monitoring have lower agency costs. Since the board of directors has direct influence on executive compensation mechanisms, we posit that the associations between various compensation components and insurers' reserve errors should vary for firms with certain board structures. In other words, a chosen dimension of board structure should mitigate the impact of incentive compensation on reserve manipulation. This leads to our final hypothesis, which tests how the interactions between board governance and executive compensation mechanisms jointly affect reserve errors, formally stated as:

H6: Firms with certain board structures will have weaker associations between their compensation components and reserve errors, whereas firms with ineffective board structures will have stronger associations between their compensation components and reserve errors.

[20] As noted in the hypothesis development of board structure, board variables may lead to either under- or over-reserving behavior. Our model does not allow us to test these nonmonotonic predictions at the same time as we test monotonic relationships of other independent variables. Thus, we are only expecting a significant coefficient on the board variables. However, in our results discussion, we provide two robustness checks that verify our results are not obscured by these differing effects.

To test H6, we first use the following model:

$$\begin{aligned} RE_{i,t} = {} & \beta_0 + \beta_1 LNASSETS_{i,t} + \beta_2 NETINCOME_{i,t} + \beta_3 LONGTAIL_{i,t} \\ & + \beta_4 BONUS_{i,t} + \beta_5 RSTKAW_{i,t} + \beta_6 RSTKHELD_{i,t} + \beta_7 STKOPAW_{i,t} \\ & + \beta_8 STKOPEX_{i,t} + r_1 BOARDSTRUCT_{i,t} + r_2 BONUS_{i,t} * BOARDSTRUCT_{i,t} \\ & + r_3 RSTKAW_{i,t} * BOARDSTRUCT_{i,t} + r_4 RSTKHELD_{i,t} * BOARDSTRUCT_{i,t} \\ & + r_5 STKOPAW_{i,t} * BOARDSTRUCT_{i,t} \\ & + r_6 STKOPEX_{i,t} * BOARDSTRUCT_{i,t} + \nu_i + \varepsilon_{i,t}, \end{aligned} \tag{2}$$

where variables from model (1) remain the same. The indicator variable *BOARDSTRUCT* measures the strength of the board and is interacted with the compensation variables. *BOARDSTRUCT* equals one for firms with a particular board structure and zero otherwise. In constructing *BOARDSTRUCT*, we analyze three factors: (1) the relative size of the board, (2) the relative independence of the board, and (3) whether the CEO is also chairman of the board. We define a firm to have a board that is "large," potentially affecting effective oversight, if the board is larger than the median board size of our sample. Further, we define a firm's board to be "less independent" if it has fewer than the median percent of outside board members. Finally, we define a board to be "not separated" if the CEO also holds the position of chairman of the board (i.e., if *CEODUAL* equals one). If the firm meets at least two of these three criteria (large, less independent, or not separated) the firm is considered to have a board structure where *BOARDSTRUCT* is equal to one. We hypothesize that the sum of $(\beta + r)_j$ will be different from β_j for at least one of the j compensation component variables ($j = 1,\ldots,6$). However, the sign on r_j is undetermined. If executives reserve more, then r is hypothesized to be negative for firms with boards with these characteristics. If executives reserve less, then r is hypothesized to be positive for firms with boards with these characteristics.

DATA AND DESCRIPTIVE STATISTICS

Since Ke, Petroni, and Safieddine (1999) show that more widely held insurance firms are more likely to base their CEO compensation packages on objective accounting measures, we limit our study to publicly held insurance companies.[21] Data for our research come from the Form 10-K that publicly traded companies file with the U.S. Securities and Exchange Commission, annual statutory statements filed with the National Association of Insurance Commissioners (NAIC) from 1992 to 2009, Compustat North America's Executive Compensation (ExecuComp) data available from 1992 to 2004, and the Investor Responsibility Research Center (IRRC), Inc.'s database. The Form 10-K and ExecuComp provide detailed compensation data on insurance executives, the IRRC database provides our corporate governance variables, whereas annual NAIC financial statements provide necessary insurer accounting information. We analyze stock property–liability insurers between 1992 and 2004.[22]

[21] Another reason for limiting the sample to publicly traded insurance companies is that information on executive compensation is not publicly available for privately owned insurance companies.

[22] We are limited to using data years 2004 and earlier because of the 5-year loss reserve development, which is required in calculating the reserve errors.

Our data include a period of time where significant changes to the regulatory and economic environment of insurers occurred. In particular, Regulation Fair Disclosure (Reg FD) was introduced by the Securities and Exchange Commission in the latter part of 2000 and, garnering more media attention, SOX was enacted in the middle of 2002. SOX and, to a lesser extent, Reg FD were hailed as creating necessary changes in the accountability and disclosure of public financial statements. Additionally, the stock market decline that began in the early part of 2001 adversely affected insurer performance and balance sheets.

Due to these potentially confounding affects, we separate our data into two periods of analysis: 1992–2000 and 2001–2004. The period of 1992–2000 provides a test of the effect of board structure and executive compensation on insurer reserve errors during a time of relatively low regulatory scrutiny and stable economic environment. Due to the length and homogeneity of this period, 1992–2000 serves as our central time frame for analysis. The period of 2001–2004 provides a preliminary examination on the effectiveness of the regulatory scrutiny of SOX. If SOX does not affect the behavior of publicly traded insurers, we should see consistent results across the two periods. Conversely, if SOX influences change in the behavior of insurers, we should see distinct differences in our results between periods. Caution must be taken, however, as our data only include 4 years in which to test these changes in regulatory scrutiny.[23] While we discuss these early results, it is important to note that these are truly preliminary. Further investigation should be conducted at a time when data are more readily available.

Our initial sample of over 1,700 executive-year compensation observations reduces to 213 and 98 insurer-year observations for 5-year loss reserve error estimations for the 1992–2000 period and the 2001–2004 period, respectively.[24] The reasons for these reductions are as follows. First, ExecuComp reports individual annual compensation figures for executive officers whereas the NAIC reports firm specific as well as consolidated information for insurers that are often composed of multiple insurance companies.[25] Since executive officers work for an entire insurance group (i.e., the publicly traded entity) and the corporate governance variables reported by the IRRC are at the group level, we utilize consolidated data for each insurance group based on the aggregation of individual insurers within each group.[26] We also cannot make distinctions between which executive(s) were the driving force behind the reserving practices. However, we can rationally assume the executives of each insurance

[23] Due to the 5-year loss development requirement, loss reserve errors for year 2005 may not be calculated until the 2010 NAIC annual statements are available. As of this writing, these statements are not yet available.

[24] Compensation for 1 year for one executive is defined to be one executive-year compensation observation. Accounting information for 1 year for one insurer is defined to be one insurer-year observation.

[25] For example, in 1992 the Allstate Insurance Group consisted of 11 individual insurance companies. The NAIC reports financial information for each of these 11 companies as well as consolidated information for the entire group.

[26] Some insurer groups do not provide consolidated data for their group to the NAIC and in some cases insurer groups report multiple consolidations for the same group. Hence, we manually create consolidated data for each insurer group. Our resulting aggregated insurer group data are consistent with those insurers who do report consolidated financial information to the NAIC.

group as a team were influential in the reserving practices of their respective group as they ultimately agreed to report these reserve amounts. Therefore, we aggregate and average compensation data for the executives of each insurance group whose compensation data are available.

Second, our calculation of 5-year loss reserve estimation errors for insurers does not allow us to use data beyond the year 2004.[27] Our methodology is consistent with Petroni (1992) and Gaver and Paterson (2004) where loss reserve estimation error is defined as the 5-year developed reserve reported in year $t + 5$ less the original reserve which was reported 5 years prior (i.e., year t).

Finally, we limit our initial sample to publicly held property–casualty insurance companies that are domiciled in the United States.[28] Mutual insurers are excluded from our sample, which also contributes to the relatively low number of insurer groups, for two reasons. Mutual insurers do not have stock or stock options to offer their executives. Further, incentive compensation data from mutual insurers (as for other privately held stock insurers) is self-reported to the NAIC and therefore incomplete. The exclusion of mutual insurers should not be of significant concern since their executive compensation packages are not completely comparable with those of stock insurers, and including mutuals with stocks could lead to biased results.[29] Moreover, Ke, Petroni, and Safieddine (1999) show that widely held insurance firms are more likely to base their executive compensation packages on objective accounting measures.

The aggregation of executives' compensation data, the utilization of consolidated publicly held stock insurer data and the data limitations created by our 5-year loss reserve error calculation methodology combine to yield a sample of 213 and 98 insurer-year observations for our two sample periods based on 54 publicly traded property–casualty insurers.[30]

[27] For example, the 1997 developed loss reserve data are needed to calculate 1992 loss reserve errors and the 2005 developed loss reserve data are needed to calculate 2000 loss reserve errors. Since 2009 is the last year for which we have access to, we are unable to calculate reserve errors beyond 2004.

[28] Life and health insurers are excluded as managers of these insurers have much less discretion in establishing reserves because a larger portion of their reserves are based upon well-established and well-publicized actuarial tables (see Petroni, 1992). Also, the reserve development for life insurers is not reported to the NAIC, making the observation of loss reserve errors more difficult.

[29] Analysis of loss reserve estimation error and executive compensation structure may be done on both mutual and stock firms, but in separate models, with separate hypotheses. Here, we attempt to analyze only the stock portion of the industry and leave the analysis of mutual insurers to future studies that contain more complete executive compensation data for mutual insurers as well as privately held stock insurers.

[30] The resulting sample reflects a relatively large portion of the U.S. property–casualty industry and reflects an even larger relative portion of property–casualty stock insurers, which is the only organizational form of interest to us. For example, in 1999 stock insurers accounted for about 67 percent of the entire property–casualty industry's net premiums written. Net premiums written by our sample of insurers represent approximately 59 percent of all stock insurers, or 39 percent of the entire industry's net premiums written in 1999. These percentages are consistent throughout the years of our sample data.

Panel A of Table 1 displays descriptive statistics for our sample of 213 insurer-year observations for the 1992–2000 period. Following previous insurance literature, we scale the 5-year loss reserve error by both admitted assets (RE_1) and by the 5-year developed loss reserve (RE_2).[31,32] We use both scalars to be consistent with the extant literature, to control for variation in insurer size, and to provide further evidence if the scaling factor is important in studies of reserving errors.

The average magnitudes of RE_1 and RE_2 are 1.86 percent and −5.33 percent, respectively. The majority of the sample under-reserve losses as the median error measures are 0.27 percent and 1.44 percent for RE_1 and RE_2, respectively.[33] RE_1 and RE_2 have similar standard deviation measures relative to their respective means. For RE_1, the largest 5-year over-reserving error is 13.07 percent whereas the largest 5-year under-reserving error is 84.24 percent. When measuring the reserve error relative to the developed reserve, the largest over-reserving and under-reserving errors are 241 percent and 72.10 percent, respectively.

The average value of total admitted assets is just under $10 billion and the average value of net income is approximately $374 million. These numbers reflect the bias toward large insurers in our sample. The smallest insurer in the sample has assets valued at $10 million. The variable *LONGTAIL* proxies an insurer's product mix where a higher value reflects more concentration in longer-tailed lines of business.[34,35] In our sample, this ratio has an average of 51 percent, with a median value

[31] The prior literature has generally used one or both of these scalars and rarely found any differences in results between the two scalars. Petroni (1992) and Beaver, McNichols, and Nelson (2003) use RE_1 but report that their results are not sensitive to the choice of the scaling variable. Gaver and Paterson (2004) primarily use RE_2. Grace and Leverty (forthcoming) primarily use RE_1 but do find their results to be sensitive to the scaling variable.

[32] RE_1 is technically scaled by admitted assets, which are themselves scaled by 1,000.

[33] The size and direction of the RE_1 loss reserve errors of our sample are consistent with those estimated by Petroni (1992) when she scaled by admitted assets. Her sample considered property–casualty insurers from 1979 to 1983 and found mean and median loss reserve estimation errors of 2.1 percent and −0.2 percent, respectively. Similarly, our sample RE_2 loss reserve errors are consistent with those estimated by Gaver and Paterson (2004) when they scaled by developed reserves. They examined property–casualty insurers from 1988 to 1993 and found an average overstatement of reserves by 2.75 percent. However, in the latter years of their sample, over-reserving averaged 5.70 percent in 1992 and 6.04 percent in 1993.

[34] *LONGTAIL* is computed as the ratio of the sum of an insurer's net premiums written in the following lines of business to its aggregate net premiums written: farm multiperil, homeowners' multiperil, commercial multiperil, medical malpractice, workers' compensation, products liability, automobile liability, and "other" liability. Our definition of long tail lines is consistent with other research (see Berger et al., 2000; Grace and Leverty, forthcoming; Hoyt and McCullough, 2010). We estimate our models using alternative long tail lines specifications, including one that removes farmowners' multiperil, homeowners' multiperil, workers' compensation, and automobile liability, and we also use a measure similar to Petroni and Beasley (1996). Our results are robust to these alternative definitions of long tail lines.

[35] Since our concentration variable is the net premium written in long tail lines to the total net premiums written, negative values (if an insurer was a net cedant of long tail lines) or positive values (if an insurer was a net cedant of short tail lines) could potentially occur. We do observe four such observations (one negative and three greater than one [one of which is probably simply a rounding error in the insurer's data reporting process]). We have not

TABLE 1
Descriptive Statistics

	Mean	Median	Std. Dev.	Min.	Max.
Panel A: Descriptive Statistics: 1992–2000 Period					
Insurer accounting variables					
Five-year reserve error scaled by admitted assets (000) (RE_1)	0.0186	0.0027	0.0922	−0.1307	0.8424
Five-year reserve error scaled by developed reserve (RE_2)	−0.0533	0.0144	0.4121	−2.4127	0.7210
Admitted assets (000,000,000)	9.9583	3.5478	16.5205	0.0106	85.6788
Developed reserve (000,000)	4.0814	0.9449	6.8658	0.0027	34.7270
Net income (000,000)	374.1296	155.2486	631.0755	−303.1295	4123.8250
Concentration in longer-tailed lines of business (*LONGTAIL*)	0.5138	0.6579	0.3246	−0.0114	1.0001
Compensation variables					
Average total compensation (*TOTALCOMP*) (000,000)	2.1157	1.4510	2.1564	0.2597	13.3574
Average bonus awarded as a percent of average total compensation (*BONUS*)	0.1938	0.1918	0.1252	0.0000	0.7235
Average value of restricted stock awarded as a percent of average total compensation (*RSTKAW*)	0.0591	0.0000	0.1124	0.0000	0.8268
Average value of restricted stock held as a percent of average total compensation (*RSTKHELD*)	0.2815	0.0000	0.5869	0.0000	5.1662
Average value of stock options awarded as a percent of average total compensation (*STKOPAW*)	0.3131	0.3041	0.2118	0.0000	0.8730
Average value of stock options exercised as a percent of average total compensation (*STKOPEX*)	0.4245	0.0614	2.0348	0.0000	28.9805
Board variables					
Board size	11.1596	11.0000	3.0519	5.0000	23.0000
Percent of outside directors on board (*OUTBOARD*)	0.6648	0.7273	0.2159	0.0833	0.9286
Indicator for CEO holding position of chairman (*CEODUAL*)	0.6667	1	0.4725	0	1
Indicator for board structure (*BOARDSTRUCT*)	0.5915	1	0.4927	0	1

(*Continued*)

TABLE 1
Continued

	Mean	Median	Std. Dev.	Min.	Max.
Panel B: Descriptive Statistics: 2001–2004 Period					
Insurer accounting variables					
Five-year reserve error scaled by admitted assets (000) (RE_1)	0.0329	0.0150	0.1365	−0.2629	0.7350
Five-year reserve error scaled by developed reserve (RE_2)	0.0176	0.0467	0.2929	−1.4516	1.0000
Admitted assets (000,000,000)	9.3283	5.0376	11.8281	0.7010	56.3825
Developed reserve (000,000)	4.3652	1.5461	7.4013	0.0013	41.1403
Net income (000,000)	376.8380	176.2162	688.1730	−177.1058	4,793.8880
Concentration in longer-tailed lines of business (*LONGTAIL*)	0.5057	0.6474	0.3498	0.0000	1.0835
Compensation variables					
Average total compensation (*TOTALCOMP*) (000,000)	3.4392	2.2492	3.4347	0.3823	17.7769
Average bonus awarded as a percent of average total compensation (*BONUS*)	0.2194	0.2111	0.1171	0.0000	0.4564
Average value of restricted stock awarded as a percent of average total compensation (*RSTKAW*)	0.0883	0.0000	0.1259	0.0000	0.5710
Average value of restricted stock held as a percent of average total compensation (*RSTKHELD*)	0.4788	0.0000	1.0735	0.0000	6.1401
Average value of stock options awarded as a percent of average total compensation (*STKOPAW*)	0.3535	0.3639	0.2111	0.0000	0.7548
Average value of stock options exercised as a percent of average total compensation (*STKOPEX*)	0.3499	0.2132	0.4373	0.0000	1.9299
Board variables					
Board size	11.4592	11.0000	2.9116	6.0000	20.0000
Percent of outside directors on board (*OUTBOARD*)	0.6919	0.6833	0.1590	0.2667	0.9231
Indicator for CEO holding position of chairman (*CEODUAL*)	0.7857	1	0.4124	0	1
Indicator for board structure (*BOARDSTRUCT*)	0.6122	1	0.4897	0	1

Notes: In Panel A, observations = 213. The sample consists of cross-sectional data from 1992 through 2000. In Panel B, observations = 98. The sample consists of cross-sectional data from 2001 through 2004.

of almost 66 percent. The compensation component variables (*BONUS, RSTKAW, RSTKHELD, STKOPAW,* and *STKOPEX*) are all ratios relative to the annual average total compensation (*TOTALCOMP*) of all the executives of an insurer.[36] Executives' mean *TOTALCOMP* for our sample is $2.12 million with a median value of $1.45 million. *TOTALCOMP* for executives ranged from roughly $0.26 million to $13.36 million. The mean and median values of annual bonuses earned by executives (*BONUS*) relative to their *TOTALCOMP* are both approximately 20 percent. Proportions relative to *TOTALCOMP* for the value of restricted stock awarded in a year, *RSTKAW,* and for the value of restricted stock held, *RSTKHELD,* average 5.9 percent and 28.2 percent, respectively. The mean value of *STKOPAW* (the value of stock options awarded during the year relative to *TOTALCOMP*) is 31.3 percent, with a median value of 30.4 percent, indicating that the majority of executives receive some level of compensation in options awarded.[37] Finally, on average, executives exercised options equal to approximately 42.5 percent of their *TOTALCOMP* (*STKOPEX*). Board size ranged from 5 to 23 members for our sample. The average board size of our sample firms was 11 members. Further, the average percentage of outside directors on each board was approximately two-thirds, while two-thirds of all the boards had the CEO hold the position of chairman of the board. Finally, approximately 59 percent of the firms are classified as having the combination of board components where *BOARDSTRUCT* equals one. Panel B of Table 1 displays analogous descriptive statistics for our sample of 98 insurer-year observations for the 2001–2004 period.

REGRESSION RESULTS

Sample Period Results for 1992–2000

For all regressions, we use firm-level fixed-effects models to account for unobservable cross-sectional differences that affect reserve error. Panel A of Table 2 shows the results for Equation (1). The models were estimated using both measures of reserve error discussed above.[38] These results support the findings in Eckles and Halek (2010). As predicted, the coefficient on *RSTKAW* is significant and negative in both specifications, supporting H1. This result is consistent with the notion of executives making earnings-decreasing decisions when granted restricted stock. We also find support for H2 with the negative and significant coefficient on *BONUS*. This result is consistent for the two specifications of reserve error and suggests that bonus payments received by executives are affecting their reserving behavior. Although we do not observe the exact

altered the data, however conducting the analysis with the concentration variable truncated at 0 and 1 does not change our results.

[36] Annual total compensation is comprised of the following: salary, bonuses, total value of restricted stock awarded, total value of stock options awarded (using Black–Scholes), long-term incentive payouts, and other perquisites such as signing bonuses, 401(k) contributions, debt forgiveness, severance payments, insurance premiums, and payment for unused vacation.

[37] The magnitude of awarded options relative to bonus compensation in our sample suggests that both options and bonuses are commonly used to motivate executive behavior, and should both be included when examining executive compensation incentives for publicly traded property–casualty insurers.

[38] Since some of the compensation components are partially a function of the reserve errors, potential endogeneity in our models may exist. Both the Wu–Hausman *F*-test and the Durbin-Wu-Hausman chi-square test strongly reject any endogeneity concerns for all models.

TABLE 2
Fixed Effects Estimation of Equation (1)

Dependent Variable Independent Variables	Predicted Sign	Five-Year Reserve Error (RE_1) Coefficient	Standard Error[a] (p-Value)	Five-Year Reserve Error (RE_2) Coefficient	Standard Error[a] (p-Value)
Panel A: Results from Firm-Level Fixed-Effects Estimation of Equation (1): 1992–2000 Period					
Intercept		0.4463	0.5591 (*0.426*)	1.0467	0.9721 (*0.283*)
Bonus (*BONUS*)	+/−	−0.2711**	0.1311 (*0.040*)	−0.6275***	0.1570 (*<0.001*)
Restricted stock awarded (*RSTKAW*)	−	−0.2520**	0.0987 (*0.012*)	−0.6486**	0.2732 (*0.019*)
Restricted stock held (*RSTKHELD*)	+/−	0.0179	0.0169 (*0.290*)	0.2378**	0.0986 (*0.017*)
Stock options awarded (*STKOPAW*)	−	−0.0523	0.0676 (*0.440*)	0.0113	0.1392 (*0.935*)
Stock options exercised (*STKOPEX*)	+	0.0017**	0.0007 (*0.012*)	0.0031	0.0037 (*0.395*)
Board size (*BOARDSIZE*)	+/−	0.0769	0.0579 (*0.186*)	0.1964	0.2233 (*0.381*)
Percent outside directors on board (*OUTBOARD*)	+/−	0.0352	0.0688 (*0.610*)	0.2627	0.2335 (*0.262*)
CEO holds position of chairman (*CEODUAL*)	+/−	0.0085	0.0264 (*0.749*)	−0.0094	0.1081 (*0.931*)
Natural log of assets (*LNASSETS*)	+/−	−0.0133	0.0195 (*0.497*)	−0.0535	0.0346 (*0.124*)
Concentration in longer-tailed lines (*LONGTAIL*)	+/−	−0.5347*	0.3204 (*0.097*)	−0.9309**	0.3937 (*0.019*)
Net income (*NETINCOME*)	+/−	$1.27e^{-11}$	$1.72e^{-11}$ (*0.426*)	$5.00e^{-12}$	$4.24e^{-11}$ (*0.906*)
F-statistic		3.96***	n/a	4.50***	n/a
Adj. R^2		39.78%	n/a	70.54%	n/a
Number of observations		213		213	

(*Continued*)

bonus structures, the results here are consistent with executives that have exhausted compensation from their bonus plans.[39,40,41] *STKOPEX* is positive and significant

[39] In an attempt to distinguish between the differing incentives of bonuses, we also estimate the model adding interaction terms of the bonus variable with three insurer performance-related indicator variables ("good," "average," and "poor"). As expected, we find negative and significant (at the 1 percent level) coefficients when interacting the bonus variable with the "good" and "poor" indicator variables. The results on the "average" interaction were not as significant. This result is consistent with the incentives at the lower and upper bounds of the bonuses affecting managerial behavior.

[40] RE_1 is the insurer reserve error as a percent of assets, whereas RE_2 is the insurer reserve error as a percent of developed reserves. Additionally, the compensation variables are all

TABLE 2
Continued

Dependent Variable Independent Variables	Predicted Sign	Five-Year Reserve Error (RE_1) Coefficient	Standard Error[a] (p-Value)	Five-Year Reserve Error (RE_2) Coefficient	Standard Error[a] (p-Value)
Panel B: Results from Firm-Level Fixed-Effects Estimation of Equation (1): 2001–2004 Period					
Intercept		1.4524	1.0536 (*0.173*)	0.9360	2.0858 (*0.655*)
Bonus (*BONUS*)	+/−	−0.0054	0.1899 (*0.977*)	−0.7417*	0.3870 (*0.060*)
Restricted stock awarded (*RSTKAW*)	−	−0.0220	0.1614 (*0.838*)	0.1175	0.3541 (*0.741*)
Restricted stock held (*RSTKHELD*)	+/−	−0.0636***	0.0161 (*<0.001*)	−0.0423*	0.0243 (*0.086*)
Stock options awarded (*STKOPAW*)	−	−0.0138	0.0931 (*0.883*)	−0.0784	0.2463 (*0.751*)
Stock options exercised (*STKOPEX*)	+	−0.0089	0.0176 (*0.613*)	−0.0012	0.0538 (*0.982*)
Board size (*BOARDSIZE*)	+/−	−0.2125*	0.1239 (*0.091*)	−0.3214	0.3791 (*0.400*)
Percent outside directors on board (*OUTBOARD*)	+/−	0.0423	0.1510 (*0.780*)	0.6756	0.4776 (*0.162*)
CEO holds position of chairman (*CEODUAL*)	+/−	0.0829*	0.0449 (*0.069*)	0.2231	0.1481 (*0.137*)
Natural log of assets (*LNASSETS*)	+/-	−0.0470	0.0449 (*0.298*)	−0.0352	0.0959 (*0.715*)
Concentration in longer-tailed lines (*LONGTAIL*)	+/−	0.1571	0.1188 (*0.191*)	0.3996	0.3541 (*0.264*)
Net income (*NETINCOME*)	+/−	$1.43e^{-6}$	$1.24e^{-5}$ (*0.908*)	$-5.01e^{-6}$	$3.47e^{-5}$ (*0.885*)
F-statistic		3.05***	n/a	1.25	n/a
Adj. R^2		57.41%	n/a	38.35%	n/a
Number of observations		98		98	

*, **, and *** indicate significance at 10%, 5%, and 1%, respectively.
[a]White's standard errors.

calculated as a percent of total compensation. Therefore, for the compensation variables, the coefficient estimates in our models represent the associated change in the reserve error (as a percent of assets and developed reserve) for a 1 percent change in the compensation component. For example, the economic significance is quite similar for the two variables, *BONUS* and *RSTKAW*. For a change of 1 percent (i.e., from 20 percent to 21 percent) in the proportion of compensation from bonuses or restricted stock awarded, the reserve error as a percent of assets decreases by approximately 0.25 percent. When considering RE_2, a 1 percent change in *BONUS* or *RSTKAW* reduces the reserve error as a percent of developed reserve by approximately 0.63 percent.

in the model using RE_1, providing some evidence that executives exercising options are making earnings-increasing reserving decisions, supporting H3. We also find some support for restricted stockholdings affecting managerial incentives (H4), as the coefficient on *RSTKHELD* is positive and significant in the model using RE_2.

The coefficients of all three measures of board structure, *BOARDSIZE*, *OUTBOARD*, and *CEODUAL*, are not significant. Thus, we do not find direct evidence in support of certain board structures mitigating the incentives of managers to manipulate earnings (*H5*).[42] This result suggests that the individual components of the board structure do not have a direct significant impact on reserve errors.[43] However, the board structure when interacted with compensation components could affect reserve errors. We next conduct empirical tests for these predictions described in Equation (2).

To test the interactions between the board structure and compensation variables, we again use a firm-level fixed-effects model to estimate Equation (2) specifications for the period 1992–2000. Panel A of Table 3 shows the results of the fixed-effects specification whereas Panel A of Table 4 reports the results of the joint coefficients tests between executive compensation coefficients and their respective level of board structure coefficients (*BOARDSTRUCT* interaction coefficients). Although we do not observe a direct correlation between corporate board variables and reserve errors in the previous model (i.e., Equation (1)), here we find some evidence that corporate board structure indirectly affects loss reserve practices through its impact on the compensation/loss reserve relation. As shown in Panel A of Table 3, the coefficient

[41] As a robustness check, we rank the firms in quartiles based on admitted assets and separate them into two groups: (1) firms in the top quartile and (2) all other firms. Fixed-effects estimations using these two groups show some slight changes to the significance of the individual coefficients we report; however, joint tests on our most significant variables (*BONUS* and *RSTKAW*) show that the coefficients are not statistically different for all but one case. The only difference observed is in *RSTKAW* for the model specification with RE_1. In this model, the coefficient on *RSTKAW* for the large firms was insignificant whereas the coefficient for the remaining sample was negative and significant. We also observe that the size of the board is significant in both specifications for large firms.

[42] We also estimate Equation (1) using only *BOARDSTRUCT* in place of the three separate board structure variables. Here, the significance of the coefficients on the compensation variables do not change and the *BOARDSTRUCT* variable coefficient is also not significant.

[43] To verify that our board variable results were not being obscured by the board structure minimizing the reserve error, we conducted two separate analyses. First, we split our sample into firms that had negative and positive errors prior to testing our models. In these specifications, board variables are never significant for the 1992–2000 period. For the 2001–2004 period, we find the coefficient of CEODUAL to be positive and significant when using RE_1, but only for firms with negative errors. We find no significance in any models for the other board variables, including board size. Second, per a suggestion by a reviewer, we estimated our models with the absolute value of the reserve error as the dependent variable (with interaction terms for our independent variables denoting firms with negative or positive reserve errors). Again, the coefficients of the board variables were insignificant for the 1992–2000 period. Further, we find a result consistent with CEODUAL for the 2001–2004 period. In particular, only firms with negative errors show a significant coefficient on duality (this time the sign is negative, again suggesting these firms are minimizing their errors). Hence, we do not feel that our lack of significance on the board variables is due to differing reserving incentives of insurers who under- and over-reserve.

TABLE 3
Fixed Effects Estimation of Equation (2)

Dependent Variable / Independent Variables	Predicted Sign	Five-Year Reserve Error (RE_1) Coefficient	Standard Error[a] (p-Value)	Five-Year Reserve Error (RE_2) Coefficient	Standard Error[a] (p-Value)
Panel A: Results From Firm-Level Fixed-Effects Estimation of Equation (2): 1992–2000 Period					
Intercept		0.3623	0.5187	1.4078	0.9242
			(*0.486*)		(*0.130*)
Bonus	+/−	−0.1027	0.0889	−0.3878*	0.2212
(*BONUS*)			(*0.250*)		(*0.082*)
Restricted stock awarded	−	0.0524	0.1001	−0.9162*	0.4885
(*RSTKAW*)			(*0.602*)		(*0.063*)
Restricted stock held	+/−	−0.0003	0.0102	0.2903***	0.0953
(*RSTKHELD*)			(*0.977*)		(*0.003*)
Stock options awarded	−	0.0271	0.0620	0.2034	0.1653
(*STKOPAW*)			(*0.663*)		(*0.221*)
Stock options exercised	+	−0.0022	0.0088	0.0108	0.0959
(*STKOPEX*)			(*0.804*)		(*0.910*)
Board structure	+/−	0.1071*	0.0585	0.3233**	0.1560
(*BOARDSTRUCT*)			(*0.069*)		(*0.040*)
BONUS × *BOARDSTRUCT*	+/−	−0.3196**	0.1587	−0.4691	0.3315
			(*0.046*)		(*0.159*)
RSTKAW × *BOARDSTRUCT*	−	−0.4307**	0.1765	0.3534	0.4779
			(*0.016*)		(*0.461*)
RSTKHELD × *BOARDSTRUCT*	+/−	0.0876	0.0691	−0.1802	0.1371
			(*0.207*)		(*0.191*)
STKOPAW × *BOARDSTRUCT*	−	−0.1172	0.0719	−0.3344	0.2435
			(*0.105*)		(*0.172*)
STKOPEX × *BOARDSTRUCT*	+	0.0033	0.0089	−0.0083	0.0961
			(*0.709*)		(*0.932*)
Natural log of assets	+/−	−0.0058	0.0181	−0.0478	0.0340
(*LNASSETS*)			(*0.750*)		(*0.162*)
Concentration in longer-tailed lines	+/−	−0.4149	0.2657	−0.9561**	0.4114
(*LONGTAIL*)			(*0.121*)		(*0.022*)
Net income	+/−	$8.65e^{-12}$	$1.5e^{-11}$	$-4.66e^{-12}$	$4.82e^{-11}$
(*NETINCOME*)			(*0.568*)		(*0.902*)
F-statistic		5.00***	n/a	4.07***	n/a
Adj. R^2		43.43%	n/a	70.85%	n/a
Number of observations		213		213	

(*Continued*)

on *BONUS* is significant (at the 10 percent level) and negative in the model using RE_2, and the coefficient on *BONUS* interacted with *BOARDSTRUCT* is significant and negative in the model using RE_1. Panel A of Table 4 indicates that the combined effect of *BONUS* on loss reserve error is negative and significant after controlling for board structure.

TABLE 3
Continued

Dependent Variable Independent Variables	Predicted Sign	Five-Year Reserve Error (RE_1) Coefficient	Standard Error[a] (p-Value)	Five-Year Reserve Error (RE_2) Coefficient	Standard Error[a] (p-Value)
Panel B: Results From Firm-Level Fixed-Effects Estimation of Equation (2): 2001–2004 Period					
Intercept		1.1327	0.7827 (*0.153*)	0.9642	1.9541 (*0.624*)
Bonus (*BONUS*)	+/−	−0.3559**	0.1454 (*0.017*)	−1.2434***	0.3234 (*<0.001*)
Restricted stock awarded (*RSTKAW*)	−	−0.1948	0.1907 (*0.311*)	−0.2550	0.2733 (*0.355*)
Restricted stock held (*RSTKHELD*)	+/−	−0.0673***	0.0163 (*<0.001*)	−0.0368*	0.0205 (*0.078*)
Stock options awarded (*STKOPAW*)	−	−0.1030	0.1145 (*0.372*)	−0.2054	0.2598 (*0.432*)
Stock options exercised (*STKOPEX*)	+	−0.0027	0.0606 (*0.965*)	−0.0188	0.0716 (*0.794*)
Board structure (*BOARDSTRUCT*)	+/−	−0.1913**	0.0915 (*0.041*)	−0.3754	0.2462 (*0.133*)
BONUS × *BOARDSTRUCT*	+/−	0.7236**	0.3036 (*0.020*)	1.2953**	0.6027 (*0.036*)
RSTKAW × *BOARDSTRUCT*	−	0.3857	0.2800 (*0.174*)	1.1932	0.9007 (*0.190*)
RSTKHELD × *BOARDSTRUCT*	+/−	−0.0072	0.0697 (*0.918*)	−0.0536	0.2291 (*0.816*)
STKOPAW × *BOARDSTRUCT*	−	0.2312*	0.1275 (*0.075*)	0.4278	0.3428 (*0.217*)
STKOPEX × *BOARDSTRUCT*	+	0.0051	0.0628 (*0.935*)	0.0334	0.0982 (*0.735*)
Natural log of assets (*LNASSETS*)	+/−	−0.0477	0.0358 (*0.188*)	−0.0379	0.0879 (*0.668*)
Concentration in longer-tailed lines (*LONGTAIL*)	+/−	0.1565	0.0983 (*0.117*)	0.4032	0.3165 (*0.208*)
Net income (*NETINCOME*)	+/−	$-7.12e^{-6}$	$1.66e^{-5}$ (*0.670*)	$-2.755e^{-5}$	$4.7e^{-5}$ (*0.565*)
F-statistic		3.30***	n/a	2.10**	n/a
Adj. R^2		60.99%	n/a	37.81%	n/a
Number of observations		98		98	

*, **, and *** indicate significance at 10%, 5%, and 1%, respectively.
[a]White's standard errors.

A similar result is found for *RSTKAW*. In Panel A of Table 3, the coefficient on *RSTKAW* is significant (at the 10 percent level) and negative in the model using RE_2, and the coefficient on *RSTKAW* interacted with *BOARDSTRUCT* is significant and negative in the model using RE_1. In Panel A of Table 4, the combined effect of *RSTKAW* on loss reserve error is negative and significant after controlling for board structure. Overall,

TABLE 4
Test of Joint Coefficients of Equation (2)

Dependent Variable Null Hypotheses	Five-Year Reserve Error (RE_1) Coefficient (p-Value)	Five-Year Reserve Error (RE_2) Coefficient (p-Value)
Panel A: Test of Joint Coefficients From Firm-Level Fixed-Effects Estimation of Equation (2): 1992–2000 Period		
$BONUS + BONUS \times BOARDSTRUCT = 0$	−0.4223**	−0.8569***
$(\beta_4 + r_2 = 0)$	(*0.0252*)	(*0.0006*)
$RSTKAW + RSTKAW \times BOARDSTRUCT = 0$	−0.3783***	−0.5628**
$(\beta_5 + r_3 = 0)$	(*0.0090*)	(*0.0431*)
$RSTKHELD + RSTKHELD \times BOARDSTRUCT = 0$	0.0873	0.1101
$(\beta_6 + r_4 = 0)$	(*0.2303*)	(*0.3409*)
$STKOPAW + STKOPAW \times BOARDSTRUCT = 0$	−0.0901	−0.1310
$(\beta_7 + r_5 = 0)$	(*0.2440*)	(*0.4931*)
$STKOPEX + STKOPEX \times BOARDSTRUCT = 0$	0.0011	0.0026
$(\beta_8 + r_6 = 0)$	(*0.1175*)	(*0.4402*)
Panel B: Test of Joint Coefficients From Firm-Level Fixed-Effects Estimation of Equation (2): 2001–2004 Period		
$BONUS + BONUS \times BOARDSTRUCT = 0$	0.3677	0.0518
$(\beta_4 + r_2 = 0)$	(*0.1614*)	(*0.9306*)
$RSTKAW + RSTKAW \times BOARDSTRUCT = 0$	0.1909	0.9386
$(\beta_5 + r_3 = 0)$	(*0.4165*)	(*0.3009*)
$RSTKHELD + RSTKHELD \times BOARDSTRUCT = 0$	−0.0746	−0.0904
$(\beta_6 + r_4 = 0)$	(*0.2868*)	(*0.6955*)
$STKOPAW + STKOPAW \times BOARDSTRUCT = 0$	0.1282	0.2224
$(\beta_7 + r_5 = 0)$	(*0.2451*)	(*0.5291*)
$STKOPEX + STKOPEX \times BOARDSTRUCT = 0$	0.0024	0.0146
$(\beta_8 + r_6 = 0)$	(*0.8881*)	(*0.8207*)

Note: This table reports the results of the linear test that the sum of the referenced coefficients from Equation (2) is different from zero.
** and *** indicate significance at 5% and 1%, respectively.

Panel A of Table 4 suggests that the impact of bonus schemes and restricted stock awarded on reserve errors is significant and negative. Taken together, these results provide evidence that bonus and restricted stock awards affect managerial incentives (consistent with the results from Equation (1)) and some evidence that certain board structures create more opportunity for executives to manipulate reserves in an effort to maximize their compensation from bonus and restricted stock awarded.

Sample Period Results for 2001–2004

Because our sample data cover a period of relatively lax regulatory scrutiny (i.e., pre-SOX) and a period of increased regulatory scrutiny (i.e., post-SOX), we have a natural experiment on the effect of increased regulation on managerial behavior. We temper the results discussed below with an important caveat: our data include only 4 years

into a period of potential increased regulatory oversight, resulting in a necessarily small sample size.[44] We believe our results are merely a starting point in research on the effects of increased regulatory scrutiny on insurer reserving practices. Using our methodology, a full analysis cannot be sufficiently completed until enough time has passed.

Results based on the 2001–2004 period are reported in Panel B of Tables 2, 3, and 4. The primary result from our post-2000 sample is that compensation components no longer have as strong a significant association with reserve errors. Panel B of Table 2 shows *RSTKHELD* (restricted stock held) to be significant across both models (at the 1 and 10 percent levels for the models using RE_1 and RE_2, respectively) and *BONUS* to be significant (at the 10 percent level) in one model. In the 1992–2000 period, both *RSTKHELD* and *BONUS* were significant (at least the 5 percent level) for both models. Further, although Panel B of Table 3 shows several significant compensation coefficients, Panel B of Table 4 shows no joint significance of the compensation coefficients. With the aforementioned caveat in mind, the post-SOX results provide limited evidence that increased regulatory scrutiny has altered managerial behavior with respect to using reserving practices to maximize compensation.

Accrual Quality Measures

An innovation of this article is the use of insurer loss reserve errors as an accrual quality measure to test the relation between firm earnings, managerial compensation, and corporate governance. As discussed above, several papers in the accounting and finance literatures use estimated accrual quality to test similar relation. For comparison, we estimated two alternative accrual quality measures commonly used in the accounting and finance literature (see Francis et al., 2005). The first measure generates accrual quality based on an augmented version of the modified-Jones approach used in Cornett, Marcus, and Tehranian (2008) (Francis et al., 2005, point out several criticisms to the modified-Jones approach.). We refer to this as AQ_1. The second approach uses a time series estimation of the standard deviation of the original accrual quality measure. We refer to this as AQ_2. Table 5, Panels A and B, displays the correlation matrix between these two accrual measures, AQ_1 and AQ_2, and our measures, RE_1 and RE_2, for both sample periods.

The common measures used in the finance and accounting literature appear to be dissimilar to those used in the insurance literature. Panel A of Table 5 reflects the correlation matrix for the 1992–2000 period. Here, the accrual quality measure (similar to the one used in Cornett, Marcus, and Tehranian, 2008) (AQ_1) is slightly negatively correlated with only one of our measures (RE_2). However, the alternative measure of accrual quality used in the finance and accounting literature (AQ_2) is slightly positively correlated with both of our measures. For the 2001–2004 period, Panel B of Table 5 shows AQ_1 is slightly negatively correlated with our RE_1 measure whereas AQ_2 is not significantly correlated with either of our measures. Further, we reestimated all of our models for both sample periods using AQ_1 and AQ_2 as the dependent variable.

[44] Panel B of Table 1 reports the summary statistics for the post-2000 sample. The insurer characteristics are fairly similar to the pre-2001 sample, although the reserving errors have significantly changed in the latter time period.

TABLE 5
Correlations Between Accrual Quality Measures

	RE_1	RE_2	AQ_1	AQ_2
Panel A: Correlations Between Accrual Quality Measures: 1992–2000 Period				
RE_1	1			
RE_2	0.5400***	1		
AQ_1	−0.0688	−0.2831***	1	
AQ_2	0.2929***	0.2288**	0.0183	1
Panel B: Correlations Between Accrual Quality Measures: 2001–2004 Period				
RE_1	1			
RE_2	0.8025***	1		
AQ_1	−0.3015**	−0.0552	1	
AQ_2	−0.1495	−0.0213	−0.2828**	1

** and *** indicates significance at 5% and 1%, respectively.

We find that (1) our models are generally not significant (none are significant at the 1 percent level) and (2) show virtually no relation between executive compensation, corporate governance, and accrual quality. For insurers, then, the traditional finance and accounting accrual measures do not reveal any relation between executive compensation and accrual quality.

CONCLUSION

This article examines the relations between the compensation of insurance company executives, the board structure of insurance firms, and the reserving practices of insurance firms. Executives' incentives to manipulate accounting results to maximize personal benefits are well documented in the earnings management literature. Our article adds to this strand of literature in two significant ways. First, most of the earnings management studies must estimate the managed earnings component since it is generally unobservable in accounting statements. We utilize a more accurate proxy of managerial discretion by taking advantage of insurance company data that report the developed reserve and actual reserve, the difference of which captures the *actual* accounting discretion exercised by insurers' managers. We further note that using standard measures of managerial discretion employed in the finance and accounting literature does *not* reveal the results we observe. Hence, our approach may provide researchers an opportunity to better capture earnings management relative to standard accruals models. Second, our study merges two related literatures, managerial compensation and corporate governance, by investigating the separate impact of managerial compensation and board structure as well their joint effect on managers' loss reserving practices. Our results suggest that the design of executive compensation is associated with earnings management behavior and the presence of certain board structures exacerbates such association. Our results are consistent, though not exactly identical to, Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009). Like Cornett, Marcus, and Tehranian (2008) and Cornett, McNutt, and Tehranian (2009), we find that certain managerial incentives are more likely to

lead to earnings management. However, we do not observe the board structure to be as strong of a mitigating influence.

The misalignment of interests between executives and shareholders has long been a focus of corporate governance literature. Incentive-based compensation was developed in part to align the interest of managers with that of shareholders. However, these mechanisms are not costless, as incentive-based compensation also encourages managers to use discretion over accounting practices to maximize their own utility. Despite heavy regulation in the insurance industry, insurer managers have still been able to exercise sizable discretion over accounting numbers where these actions are encouraged by incentive-based compensation, coupled with insufficient monitoring from the board. Specifically, we find evidence of bonus plans, restricted stock awards, exercised stock options, and restricted stockholdings affecting earnings management. Though we do not find a direct effect of corporate governance strategies (e.g., larger vs. smaller boards) on these managerial incentive-based mechanisms, we do find an indirect effect. Particularly, we note that certain board structures allow for further opportunistic reserve manipulation by managers.

Recent regulations, most notably SOX, have attempted to improve corporate governance by mandating increased accuracy and transparency in firms' financial reporting, and holding executives accountable for any such shortcomings. By examining the pre- and post-SOX period in our data, we note that these regulatory strategies may be resulting in their desired effect. While we find relations between insurer reserving practices and managerial compensation packages *before* the period of SOX, we find much smaller associations *after* the enactment of SOX, although this is a notably shorter period.

Finally, we do not claim to provide a complete test of the efficacy of the current regulatory environment. However, our results do offer some preliminary/early indication that recent regulatory changes brought to accounting practices, reporting requirements, and corporate boards do appear to have reduced the relation between incentive-based managerial compensation components and insurer loss reserve errors. Future research in this area may further explore the effectiveness of regulatory changes. Going forward, regulators of private firms (e.g., nonpublicly traded insurers) may also utilize similar provisions in order to minimize potential problems brought on by incentive-based compensation packages.

REFERENCES

Aboody, D., and R. Kasznik, 2000, CEO Stock Option Awards and the Timing of Corporate Voluntary Disclosures, *Journal of Accounting and Economics*, 29(1): 73-100.

Ahmed, A. S., C. Takeda, and S. Thomas, 1999, Bank Loan-Loss Provisions: A Reexamination of Capital Management, Earnings Management, and Signaling Effects, *Journal of Accounting and Economics*, 28(1): 1-25.

Aiuppa, T. A., and J. S. Trieschmann, 1987, An Empirical Analysis of the Magnitude and Accuracy of Incurred-but-Not-Reported Reserves, *Journal of Risk and Insurance*, 54(1): 100-118.

Baliga, B. R., R. C. Moyer, and R. S. Rao, 1996, CEO Duality and Firm Performance: What's the Fuss? *Strategic Management Journal*, 17(1): 41-53.

Balsam, S., L. H. Chen, and S. Sankaraguruswamy, 2003, Earnings Management Prior to Stock Option Grants, Working paper.

Beatty, A., S. L. Chamberlain, and J. Magliolo, 1995, Managing Financial Reports of Commercial Banks: The Influence of Taxes, Regulatory Capital, and Earnings, *Journal of Accounting Research*, 33(1): 231-262.

Beaver, W. H., and E. E. Engel, 1996, Discretionary Behavior With Respect to Allowances for Loan Losses and the Behavior of Security Prices, *Journal of Accounting and Economics*, 22(1-3): 177-206.

Beaver, W. H., M. F. McNichols, and K. K. Nelson, 2003, Management of the Loss Reserve Accrual and the Distribution of Earnings in the Property-Casualty Insurance Industry, *Journal of Accounting and Economics*, 35(3): 347-376.

Berger, A. N., J. D. Cummins, M. Weiss, and H. Zi, 2000, Conglomeration versus Strategic Focus: Evidence From the Insurance Industry, *Journal of Financial Intermediation*, 9(4): 323-362.

Bhagat, S., and B. Bolton, 2008, Corporate Governance and Firm Performance, *Journal of Corporate Finance*, 14: 257-273.

Blackwell, D. W., J. A. Brickley, and M. S. Weisbach, 1994, Accounting Information and Internal Performance Evaluation—Evidence From Texas Banks, *Journal of Accounting and Economics*, 17(3): 331-358.

Brickley, J. A., J. L. Coles, and G. Jarrell, 1997, Leadership Structure: Separating the CEO and Chairman of the Board, *Journal of Corporate Finance*, 3(3): 189-220.

Brickley, J. A., J. L. Coles, and R. L. Terry, 1994, Outside Directors and the Adoption of Poison Pills, *Journal of Financial Economics*, 35(3): 371-390.

Browne, M. J., Yu-Luen M., and P. Wang, 2009, Stock-Based Executive Compensation and Reserve Errors in the Property and Casualty Insurance Industry, *Journal of Insurance Regulation*, 27(4): 35-54.

Burgstahler, D., 1997, Earnings, Adaptation, and Equity Value, *Accounting Review*, 72(2): 187-215.

Burgstahler, D., and I. Dichev, 1997, Earnings Management to Avoid Earnings Decreases and Losses, *Journal of Accounting and Economics*, 24(1): 99-126.

Coles, J. L., M. Hertzel, and S. Kalpathy, 2006, Earnings Management Around Employee Stock Option Reissues, *Journal of Accounting and Economics*, 41: 173-200.

Coles, J. L., N. D. Daniel, and L. Naveen, 2008, Boards: Does One Size Fit All? *Journal of Financial Economics*, 87(2): 329-356.

Collins, J. H., D. A. Shackelford, and J. M. Wahlen, 1995, Bank Differences in the Coordination of Regulatory Capital, Earnings, and Taxes, *Journal of Accounting Research*, 33(1): 263-291.

Cornett, M. M., A. Marcus, and H. Tehranian, 2008, Corporate Governance and Pay-for-Performance: The Impact of Earnings Management, *Journal of Financial Economics*, 87(2): 357-373.

Cornett, M. M., J. J. McNutt, and H. Tehranian, 2009, Corporate Governance and Earnings Management at Large U.S. Bank Holding Companies, *Journal of Corporate Finance*, 15(4): 412-430.

Dechow, P. M., and D. J. Skinner, 2000, Earnings Management; Reconciling the Views of Accounting Academics, Practitioners, and Regulators, *Accounting Horizons*, 14(2): 235-250.

Degeorge, F., J. Patel, and R. Zeckhauser, 1999, Earnings Management to Exceed Thresholds, *Journal of Business*, 72(1): 1-33.

Eckles, D. L., and M. Halek, 2010, Insurer Reserve Error and Executive Compensation, *Journal of Risk and Insurance*, 77(2): 329-346.

Francis, J., LaFond Ryan, P. Olsson, and K. Schipper, 2005, The Market Pricing of Accruals Quality, *Journal of Accounting and Economics*, 39(2): 295-327.

Gaver, J. J., K. M. Gaver, and J. R. Austin, 1995, Additional Evidence on Bonus Plans and Income Management, *Journal of Accounting and Economics*, 19(1): 3-28.

Gaver, J. J., and J. S. Paterson, 2000, Earnings Management Under Changing Regulatory Regimes: State Accreditation in the Insurance Industry, *Journal of Accounting and Public Policy*, 19(4-5): 399-420.

Gaver, J. J., and J. S. Paterson, 2004, Do Insurers Manipulate Loss Reserves to Mask Insolvency Problems? *Journal of Accounting and Economics*, 37(3): 393-416.

Gillan, S. L., J. C. Hartzell, and L. T. Starks, 2003, Explaining Corporate Governance: Boards, Bylaws, and Charter Provisions, Weinberg Center for Corporate Governance Working Paper No. 2003–03.

Gompers, P., J. Ishii, and Metrick, 2003, Corporate Governance and Equity Prices, *Quarterly Journal of Economics*, 118(1): 107-155.

Grace, E., 1990, Property-Liability Insurer Reserve Errors: A Theoretical and Empirical Analysis, *Journal of Risk and Insurance*, 57(1): 28-46.

Grace, M. F., and J. T. Leverty, forthcoming, Property-Liability Insurer Reserve Error: Motive, Manipulation, or Mistake, *Journal of Risk and Insurance*.

He, Enya, and David W. Sommer, 2010, Separation of Ownership and Control: Implications for Board Composition, *Journal of Risk and Insurance*, 77(2): 265-295.

Healy, P. M., 1985, The Effect of Bonus Schemes on Accounting Decisions, *Journal of Accounting and Economics*, 7(1-3): 85-107.

Holthausen, R. W., D. F. Larcker, and R. G. Sloan, 1995, Annual Bonus Schemes and the Manipulation of Earnings, *Journal of Accounting and Economics*, 19(1): 29-74.

Hoyt, R. E., and K. A. McCullough, 2010, Managerial Discretion and the Impact of Risk-Based Capital Requirements on Property-Liability Insurer Reserving Practices, *Journal of Insurance Regulation*, 29(1): 207-228.

Ke, B., K. R. Petroni, and A. Safieddine, 1999, Ownership Concentration and Sensitivity of Executive Pay to Accounting Performance Measures: Evidence from Publicly and Privately-Held Insurance Companies, *Journal of Accounting and Economics*, 28(2): 185-209.

Klein, A., 2002, Audit committee, Board of Director Characteristics, and Earnings Management, *Journal of Accounting Economics*, 33(3): 375-400.

Klein, A., 2006, Audit Committee, Board of Director Characteristics, and Earnings Management, NYU Law and Economics Research Paper No. 06–42.

Linck, J. S., J. M. Netter, and T. Yang, 2008, The Determinants of Board Structure, *Journal of Financial Economics*, 87(2): 308-328.

Lipton, M., and Jay W. Lorsch, 1992, A Modest Proposal for Improved Corporate Governance, *Business Lawyer*, 48(1): 59-77.

Mayers, D., A. Shivdasani, and C. W. Smith, Jr., 1997, Board Composition and Corporate Control: Evidence From the Insurance Industry, *Journal of Business*, 70(1): 33-62.

McAnally, M. Lea, A. Srivastava, and C. D. Weaver, 2007, Executive Stock Options, Missed Earnings Targets and Earnings Management, AAA 2007 Financial Accounting & Reporting Section (FARS) Meeting Paper.

McNichols, M. F., 2000, Research Design Issues in Earnings Management Studies, *Journal of Accounting and Public Policy*, 19(4-5): 313-345.

Murphy, K. J., 1999, Executive Compensation, in: Orley Ashenfelter and David Card, eds., *Handbook of Labor Economics*, Vol. 3b (North Holland: Elsevier Science), pp. 2485-2563.

Myers, J. N., L. A. Myers, and D. J. Skinner, 2007, Earnings Momentum and Earnings Management, *Journal of Accounting, Auditing and Finance*, 22(2): 249-284.

Peasnell, K. V., P. F. Pope, and S. Young, 2005, Board Monitoring and Earnings Management: Do Outside Directors Influence Abnormal Accruals? *Journal of Business Finance and Accounting*, 32(7-8): 1311-1346.

Petroni, K. R., 1992, Optimistic Reporting in the Property-Casualty Insurance Industry, *Journal of Accounting and Economics*, 15(4): 485-508.

Petroni, K. R., and M. Beasley, 1996, Errors in Accounting Estimates and Their Relation to Audit Firm Type, *Journal of Accounting Research*, 34(1): 151-171.

Petroni, K. R., and D. A. Shackelford, 1999, Managing Annual Accounting Reports to Avoid State Taxes: An Analysis of Property-Casualty Insurers, *Accounting Review*, 74(3): 371-393.

Rangan, S., 1998, Earnings Management and the Performance of Seasoned Equity Offerings, *Journal of Financial Economics*, 50(1): 101-122.

Teoh, S. H., I. Welch, and T. J. Wong, 1998a, Earnings Management and the Underperformance of Seasoned Equity Offerings, *Journal of Financial Economics*, 50(1): 63-99.

Teoh, S. H., I. Welch, and T. J. Wong, 1998b, Earnings Management and the Long-run Performance of the Initial Public Offerings, *Journal of Finance*, 53: 1935-1074.

Weisbach, M. S., 1988, Outside Directors and CEO Turnover, *Journal of Financial Economics*, 20: 431-460.

Weiss, M., 1985, A Multivariate Analysis of Loss Reserving Estimates in Property-Liability Insurers, *Journal of Risk and Insurance*, 52(2): 199-221.

Xie, B., W. N. Davidson, III, and Peter J. DaDalt, 2003, Earnings Management and Corporate Governance: The Role of the Board and the Audit Committee, *Journal of Corporate Finance*, 9(3): 295-316.

Yermack, D., 1997, Good Timing: CEO Stock Option Awards and Company News Announcements, *Journal of Finance*, 52(2): 449-476.