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Tournament incentives and reserve management

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Abstract

This paper examines the impact of internal tournament incentives on reserve management within the property-liability insurance industry. We find a positive relationship between internal tournament incentives and reserve errors, suggesting that a larger tournament prize is associated with more conservative loss-reserve management. In contrast to the literature on non-financial firms, we do not observe a positive association between tournament incentives and risk-taking behavior or performance. The overall evidence indicates that vice presidents participating in internal tournaments prioritize strong financial health over performance. Moreover, the positive effect of tournament incentives on conservative reserve management is more pronounced for insurers with more volatile returns and a higher ratio of claim loss reserves to total liabilities. This effect attenuates for larger insurers, those underwriting long-tail lines, and those operating in less competitive environments. Our findings also suggest that the Sarbanes–Oxley Act significantly influences executives' reserve behavior. Finally, we show that stronger board monitoring is associated with more conservative reserve practices in internal tournaments.

1 | INTRODUCTION

This study examines the impact of internal tournament incentives on reserve management in the property-liability (P-L) insurance industry. Tournament incentive theory, introduced by Lazear and Rosen (1981), suggests that a compensation scheme based on a worker's ordinal rank is an optimal scheme when direct monitoring of performance is too costly. Internal tournaments indicate that vice presidents (VPs) and senior executives compete for promotion to the CEO position. Prior literature documents how internal tournament incentives influence corporate finance decisions. For example, Kale et al. (2009) show that internal tournament incentives positively affect firm performance.[1] Theoretically, Goel and Thakor (2008) demonstrate that executives are incentivized to increase firm risk in a tournament setting to increase their chances of promotion. Kini and Williams (2012) find empirical evidence that internal tournaments lead to increased risk-taking among VPs at nonfinancial as well as financial firms, but not at insurance firms.[2]

Many studies investigate reserve management and how firm executives use their discretion to manage earnings in the insurance industry. For example, Eckles and Halek (2010) show that managerial compensation packages that include bonuses and stock options are inclined to increase reserve errors, which is consistent with a tendency to inflate their compensation. They also find that managers who hold restricted stocks tend to underestimate their loss reserves. Similarly, Eckles et al. (2011) find that managers with a compensation structure with greater bonuses and restricted stocks are more inclined to manipulate earnings. Although reserve management-related issues have been examined extensively in the insurance industry, none of the existing literature has investigated the relationship between tournament incentives and reserve management. This article aims to fill this gap.

Applying the insights from nonfinancial firms to the P-L industry, on the one hand, one might expect that VPs try to increase their perceived probability of promotion to CEO through less conservative reserve behavior in the short run by underestimating loss reserves, which would result in higher earnings. In this case, one would expect a negative relationship between internal tournament incentives and reserve estimates. On the other hand, we argue the reverse may hold: executives might overstate reserves to signal strong financial health, which is critically important to stakeholders such as stockholders, policyholders, and regulators. Because financial stability reduces insolvency risk—a major regulatory concern—overestimating reserves may increase promotion chances.

We focus on the relationship between tournament incentives in the insurance industry and reserve management for several reasons. First, the literature suggests that tournament incentives influence earnings management, which is linked to firm performance. We use loss-reserve errors as a proxy for earnings management. Compared to accounting-based measures

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[1]Tournament incentives are measured as the difference in compensation between a CEO and the next layer of senior executives.

[2]Coles et al. (2017) find a positive relation between CEO labor market tournament incentives and the firm risk level and performance, controlling for tournament incentives among VPs to become CEO. The extant literature has mostly focused on the inter-tournament because some argue senior executives below the rank of the CEO may not have significant power in determining firm investment and financial policies. More recently, however, other studies (e.g., Chava & Purnanandam, 2010; Géczy et al., 2007; Jiang et al., 2010) show that senior executive incentives can also influence financial policies.

(e.g., accruals) commonly used in nonfinancial firm studies, reserve management offers a more reliable proxy (e.g., Beaver et al., 2003; Han et al., 2018). Insurers are required to disclose both the originally estimated and revised loss reserves for unpaid claims annually. This regulation allows us to compare the original reserve estimates with their revised estimates in later years to obtain an objective measure of earnings management. Second, loss reserves are subject to managerial discretion. Senior executives, such as VPs, may adjust reserves to enhance their promotion prospects to the CEO position. Reserve management is the most common form of financial performance manipulation in the insurance industry, as managers have substantial discretion over estimating loss reserves—the largest liability item on a property–liability insurer's balance sheet (e.g., Hsu et al., 2019). Third, insolvency is more critical to insurance policyholders than customers in nonfinancial industries because insurers sell promises, not products or services, at the time of the transaction. Moreover, unlike most other investments (e.g., stocks and bonds), insurance is necessary for most individuals. The consequence of an insurance firm's insolvency can be severe for policyholders, as they could suffer millions of dollars in losses without guarantee funds, even if they pay only hundreds of dollars in insurance premiums.[3] Finally, the insurance industry is highly regulated, allowing us to examine whether regulation moderates the relationship between internal tournament incentives and reserve management.

Our sample consists of all publicly traded P-L insurers from 1993 to 2017. We measure internal tournament incentives as the gap between a CEO's total compensation and the median total compensation of vice presidents, as in Kale et al. (2009). Following Kazenski et al. (1992), we calculate reserve errors as the difference between initially reported and subsequently revised loss reserves.

Our main findings are as follows. We find a positive relationship between internal tournament incentives and reserve errors, suggesting that a larger pay gap as a tournament prize incentivizes VPs to overestimate loss reserves. In other words, a higher tournament prize is associated with more conservative loss-reserve management. We also examine the relationship between tournament incentives, performance, and risk-taking because performance and risk-taking behavior are related. We find no evidence of a positive relationship between tournament incentives and either risk-taking or performance. This evidence contrasts with findings in noninsurance firms, where such incentives are positively associated with both. Overall, our results indicate that VPs in the insurance industry prioritize financial strength over performance. Moreover, we find that the positive impact of internal tournament incentives on reserve errors is more pronounced for insurers with more volatile returns and a higher ratio of claim loss reserves to total liability. However, this effect is weaker for larger insurers, those underwriting long-tail products, and those facing less competition. Our findings also indicate that the Sarbanes–Oxley Act (SOX) significantly influences the relationship between tournament incentives and reserve management. Finally, we find that, as board independence increases, VPs competing in promotion-based tournaments are more likely to adopt conservative reserve strategies.

Our research contributes to the existing literature in several ways. Importantly, this paper is the first to examine the effects of tournament incentives on reserve management in the P-L insurance industry. Moreover, our findings on risk taking (as evidenced via reserve

[3]Most insurance products for consumers are protected by state guarantee funds. This is more evidence that insolvency risk is critical to insurance companies.

management) contrast with that of risk taking in nonfinancial industries (as evidenced via earnings management). Specifically, our results show that P-L insurance managers in tournaments are more likely to reserve more, implying lower risk taking, whereas the evidence for nonfinancial firms shows that the relationship between tournament incentives and risk taking is positive.

Additionally, we use a single industry as our sample, which can reduce concern about a spurious relation caused by unobserved heterogeneity (Eckles et al., 2011). Kini and Williams (2012) find a positive relationship between tournament incentives and risk-taking for financial institutions, while we do not see a significant relationship. The data used by Kini and Williams (2012) include multiple industries—commercial banks, savings institutions, credit unions, stock brokerage firms, portfolio management, insurance carriers, agents, brokers, and service, as well as real estate agents and managers. However, the characteristics of these institutions are not homogenous.

Finally, recent studies have shown that senior executive incentives can also influence financial policies (e.g., Chava & Purnanandam, 2010; Cheng et al., 2016; Géczy et al., 2007; Jiang et al., 2010). We add to this literature by showing that senior executives who face option-like features in intra-organizational promotion tournaments affect reserve management. More importantly, interviews of VPs at some insurance companies and executives at actuarial consulting firms indicate that VPs in all areas (e.g., actuary, finance, marketing, and operations) participate in the decision-making on reserve estimates. For instance, marketing VPs have input on reserving, especially for new policies where the risk profile of new policyholders is not known. Vice presidents in operations also influence reserving, as efficient claims settlement and processing can reduce outstanding liabilities and lead to lower reserve estimates. In other words, we show that the VP tournament setting is valid for the insurance companies.

The remainder of this paper is organized as follows. Section 2 overviews tournament incentives and decision-making in reserve management, risk-taking, and performance. The data, sample, variable definitions, and empirical methodology are described in Section 3. Section 4 presents the descriptive statistics and main empirical results regarding firm risk and performance, and Section 5 concludes the paper.

2 | LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

This section outlines the reserve estimation decision-making process and develops hypotheses concerning the relationship between internal tournament incentives and reserve management.

2.1 | Reserve management decision making

Given our focus on internal tournament incentives and reserve management, it is essential to understand how vice presidents (VPs) influence reserve estimates. Based on interviews with executives and VPs at several insurance companies, we found that reserve estimates are not made solely by one individual, such as the VP of actuarial services or finance. Instead, the estimates are typically discussed among a group of VPs from various departments, including accounting, finance, marketing, and operations, before a final recommendation is presented to the CEO. For instance, a marketing VP may raise concerns about overestimated reserves leading to higher premiums, which could reduce competitiveness. In summary, reserve estimates represent a collective decision, reflecting input from multiple senior executives, before submission to the CEO for approval.

2.2 | Tournament incentives and reserve management

We first review tournament theory and its empirical evidence to develop our hypothesis. In the tournament literature, Lazear and Rosen (1981) suggest that compensation based on relative performance is optimal when individual output is difficult and costly to monitor. Tournament prizes can incentivize all workers at a firm, regardless of their level, including CEOs and next-level executives (or VPs). VPs can be viewed as being in a contest to assume the CEO position, and they are evaluated based on their relative performance. In a tournament setting, as the tournament prize increases, contestants are expected to increase their effort levels to win the tournament.[4] On average, firm performance and value increase as contestants increase their efforts. Empirical evidence from industrial firms supports this notion. For example, Kale et al. (2009) find a positive link between firm performance (e.g., ROA) and the pay gap between CEO and VPs.

Because earnings management can affect firm performance, we next review the literature related to earnings management at nonfinancial firms. Many studies investigate executive compensation and earnings management. For example, Aboody and Kasznik (2000) find that CEOs attempt to influence their stock option compensation by making voluntary disclosures. Healy et al. (1987), Sloan (1993), Guidry et al. (1999), and Balsam (1998) review the management of bonus schemes through the manipulation of discretionary accruals. Burns and Kedia (2006) find a significantly positive relation between CEO delta (the sensitivity of the CEO's option portfolio to the stock price) and the tendency to misreport. Similarly, Armstrong et al. (2013) explore a positive relationship between executives' portfolio vega and the proclivity to misreport. Gao and Shrieves (2002), Baker et al. (2003), Francis et al. (2004), and Bergstresser and Philippon (2006) illustrate an association between the magnitude of discretionary accruals and an option-like compensation scheme. Finally, Jiang et al. (2010) document that CFO equity incentives play a greater role than CEO incentives in earnings management, as the magnitude of accruals is more sensitive to CFO equity incentives than to those of the CEO. In summary, the literature suggests managers are willing to engage in earnings management for compensation.

Reserve management in the insurance industry is similar to earnings management in nonfinancial industries because reserve management has a significant impact on insurer earnings. Like earnings management in nonfinancial industries, reserve management has been examined extensively in the insurance literature. For example, Eckles and Halek

[4]Coles et al. (2017) examine the relationship between industry tournament incentives and firm performance. They use a contest approach, in which the tournament prize is the pay gap between the highest-paid CEO and the aspiring CEO, and so the tournament has two players. In their approach, the aspiring CEO wins the prize if he/she can take the position of the highest-paid CEO; otherwise, the highest-paid CEO continues to win the tournament prize. It should be noted that the industry tournament is not the focus of our paper.

(2010) demonstrate that managerial bonus schemes influence reserve behavior, and Eckles et al. (2011) illustrate that strong governance can moderate this effect.[5]

Drawing from the literature on nonfinancial industries, one might expect tournament incentives to result in under-reserving, consistent with higher earnings and greater risk-taking. Under-reserving for insurers is associated with increased risk. Therefore, to obtain a CEO position, managers in tournaments in the P-L insurance industry are more likely to underestimate reserves for higher earnings.[6]

Conversely, we argue that managers in tournaments are more likely to overestimate reserves than underestimate reserves in the P-L industry. The reason is that the underestimation of reserves can increase the insolvency risk. The insolvency of an insurer can have a severely negative impact on stockholders and other stakeholders, such as policyholders. Insolvency is more critical to insurance policyholders than customers in nonfinancial industries because insurers sell promises, not products or services. Moreover, unlike most other investments (e.g., stocks and bonds), insurance products or services are necessary for most people. The consequence of insolvency at an insurance firm can be severe for policyholders because they might suffer millions of dollars in losses without guarantee funds, even if they paid only hundreds of dollars in insurance premiums.[7] Therefore, VPs in the insurance industry are more likely to overestimate reserves to protect their firm's financial health.

In addition, regulators can detect these types of reserve (earnings) manipulation. The fact that the P-L industry is heavily regulated might also motivate VPs to be more conservative and lead them to overestimate reserves to avoid insolvency risk and unwanted regulatory attention. Highly profitable financial conditions with underestimated reserves might trigger suspicions from regulators about the reliability of financial statements. Moreover, regulators are more sensitive about underestimation than overestimation of reserves because under-reserving behavior causes financial distress for insurers. Although the appointment of CEOs is at the discretion of the board of directors, the board cannot ignore the possibility of insolvency, which is monitored by regulators. In other words, unwanted attention from regulators negatively impacts the board's decisions to hire CEOs.

Managers of insurers, thus, cannot focus solely on pleasing their shareholders by under-reserving; instead, they should focus on financial health. The financial health of publicly traded insurers is intensely monitored not only by regulators but also by investors, rating agencies, and boards of directors. If managers underestimate reserves to obtain higher earnings in the short run but harm the financial health of the insurers, the managers can lose their reputational capital or even their jobs. Managers who are conservative in reserves are more likely to win tournaments because conservatism might be consistent with the objective of the board, which is good financial health rather than good performance.

[5]The literature also examines the relationship between tournament incentives and other issues. For example, previous studies find a positive relationship between tournament incentives and sabotage (Harbring & Irlenbusch, 2011), dishonest reporting of performance (Conrads et al., 2014), and corporate fraud (Haß et al., 2015).

[6]The reasons for reserve management examined in the literature include tax minimization (Grace, 1990), income smoothing (Beaver et al., 2003; Grace, 1990; Weiss, 1985), financial weakness (Gaver & Paterson, 2004; Grace & Leverty, 2012; Petroni, 1992), market value maximization (Beaver & McNichols, 1998; Petroni et al., 2000), and price regulation (Grace & Leverty, 2010, 2012; Nelson, 2000).

[7]Most insurance products for consumers are protected by state guarantee funds. This is more evidence that insolvency risk is critical to insurance companies.

The board of directors has responsibilities to other stakeholders as well as shareholders.[8] The board of directors may prefer overestimating (than underestimating) the reserves to protect their reputational capital due to the risk of insolvency. In addition, overestimated reserves enjoy tax-shield benefits. VPs might be aware of these inclinations by the board and, thus, prefer a conservative reserve policy. In summary, internal tournament incentives can induce VPs to over-reserve to increase their probability of promotion because the financial health of the insurers is vital to their stakeholders.

Overall, based on these two conflicting arguments, we propose that there is a relationship between internal tournament incentives and reserve management behavior, but the sign of the relationship in the P-L insurance industry cannot be determined a priori.

2.3 | Tournament incentives and risk-taking

The literature suggests that tournament incentives can alter executive risk preferences. Because winning a promotion-based tournament yields an option-like payoff, executives are incentivized to pursue strategies with high upside potential. This convexity in compensation structures—akin to financial options—encourages risk-taking (Guay, 1999; Kini & Williams, 2012). Goel and Thakor (2008) develop a theoretical model showing that executives are more likely to take on greater risk in the presence of tournaments, thereby improving their chances of winning. In a tournament for CEO promotion, when all executives exert the same effort or generate similar output, their promotion probabilities are equal. However, riskier strategies can produce outlier performance, potentially distinguishing an executive in the competition. Because boards often cannot observe whether high output is due to ability or risk-taking, they may mistakenly attribute success to managerial skill. Empirical evidence supports this theory. Kini and Williams (2012) find that senior executives are induced to increase firm risk through an intra-organizational tournament to become the firm's CEO.[9] Moreover, Coles et al. (2017) document a positive relationship between industry-wide tournament incentives and firm risk, as well as the riskiness of firm investment and financial policies.

Although the literature shows a positive relationship between tournament incentives and firm risk in nonfinancial industries, we argue that this relationship may not be positive for the P-L insurance industry. Two unique features of this sector may mitigate the typical risk-taking incentives induced by tournaments. First, the insurers sell promises, not physical goods or services. The negative consequence of insolvency is much higher for policyholders than for customers of nonfinancial companies because customers do not obtain products after a transaction with insurers.[10] Second, the insurance industry operates

[8]Recently, the Business Roundtable released a statement "signed by 181 CEOs who commit to lead their companies for the benefit of all stakeholders—customers, employees, suppliers, communities, and shareholders." Although the statement was not from the board of directors, it reflected the current trend in corporate governance. See https://www.businessroundtable.org/business-roundtable-redefines-the-purpose-of-a-corporation-to-promote-an-economy-that-serves-all-americans.

[9]They further show that larger tournament incentives induce senior executives to pursue more intensive R&D, higher leverage and firm focus, and lower capital expenditure. Here, VP promotion does not have to be realized to motivate them to strive for higher effort or to choose riskier policies, because VPs are still compared with their peer group by their and other firms' boards when their performance is evaluated.

[10]Customers of durable goods might also care about the firms' insolvency risk because of warranties and the need for parts in the future.

in a highly regulated environment. Internal tournament incentives might incentivize VPs toward more conservative and less risky financial activities in P-L insurers because regulators' main concern is the solvency of insurers. Also, any deterioration in the financial health of an insurance firm can undermine its VPs' reputation. Therefore, from a conservative perspective, the relationship between tournament incentives and risk-taking is expected to be negative.[11] Given these two conflicting arguments, a relationship between internal tournament incentives and risk-taking behavior is expected, but the direction of this relationship in the P-L insurance industry is ultimately an empirical question. We summarize these two views, that is, risk-taking (under-reserving) and conservative (over-reserving), in Figure 1.

3 | DATA AND METHODOLOGY

3.1 | Data and sample description

Our sample comprises all publicly traded P-L insurance firms. The sample comprises 36 firms from 1993 to 2017, yielding 369 firm-year observations.[12] The relatively small sample size is consistent with prior research on publicly traded insurers (e.g., Eckles & Halek, 2010; Han et al., 2018; Huang et al., 2011; Ma & Wang, 2014; Miller, 2011).

Compensation data is from the ExecuComp database, which provides data on executive salaries, option grants, stock awards, bonuses, and total compensation at public firms. Insurance firm-specific data, including dependent variables, reserve errors, and firm characteristics, are obtained from the annual statutory statements filed with the National Association of Insurance Commissioners (NAIC). We get stock returns and firm characteristics from the Center for Research in Security Prices (CRSP) and Compustat, respectively. Lastly, board co-option data is collected from Lalitha Naveen's website (Coles et al., 2014).

3.2 | Variable definition and methodology

3.2.1 | Methodology

We use both the ordinary least squares (OLS) regression model and the two-stage least squares (2SLS) method to investigate the effect of internal tournament incentives on reserve errors. The main specification is as follows:

$$
\begin{aligned}
(Res\ error/Asset)_{i,t+1} = {} & \alpha_i + \beta_1 \ln(Firmgap)_{i,t} + \beta_2 \ln(CEO\ delta)_{i,t} + \beta_3 \ln(CEO\ vega)_{i,t} \\
& + \beta_4 Firm\ characteristics_{i,t} + \gamma Other\ control\ variables_{i,t} + \varepsilon_{i,t},
\end{aligned}
$$

where i (t) represents a firm (fiscal year).

[11]Reserve management is not the only channel through which an insurance firm can affect the firm's risk level.

[12]We stop at 2017 because reserve error variables, which are the dependent variables, account the following 5 years of reserve estimates. Therefore, our initial panel data include P-L insurance firm observations between 1993 and 2022 from this perspective.

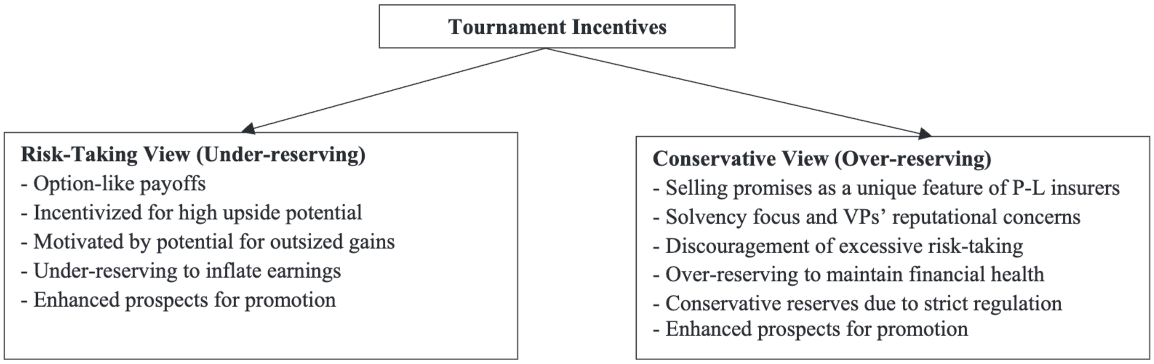

FIGURE 1 Summary diagram depicting two conflicting hypotheses on tournament incentives and reserve error.

3.2.2 | Dependent variables: Reserve errors

Loss reserves are estimated from unpaid claims on losses that occurred before the balance-sheet date. Insurance firms must disclose loss-reserve estimates and any revisions made in these estimates each year. The revisions indicate the overestimation or underestimation of previously reported estimates of loss reserves. Insurers have to report and compile revisions over the previous 10-year estimates of loss reserves through Schedule P in their annual filings.

Schedule P includes loss estimates for the year incurred and revised estimates for the following years. Therefore, the estimated losses during the incident year and the subsequent adjustments in the estimate are disclosed. Incurred losses include both losses paid and losses estimated by an insurer. Following Kazenski et al. (1992), we compute reserve errors as the difference between total incurred losses at year t and a revised estimate of incurred losses at year $t+5$ for firm i. It is calculated as follows:

$$Res\ error_{i,t} = Incurred\ Losses_{i,t} - Incurred\ Losses_{i,t+5.}$$

We use *Res error/Assets* as our dependent variable in our empirical tests, which is defined as *Res error* scaled by total net admitted assets/1000.

3.2.3 | Main variable of interest: Tournament incentives

Our main variable of interest is tournament incentives. Following Kale et al. (2009), we measure internal tournament incentives *ln(Firmgap)* as the natural logarithm of the pay difference between a firm's CEO and the median of next-level firm's executives (VPs). We use the TDC1 variable (total compensation), which consists of salary, option grants, restricted stock grants, bonuses, long-term incentive plan payouts,[13] and other annual payments. Specifically, *ln(Firmgap)* is calculated as follows:

$$ln(Firmgap) = \ln(\text{Total compensation of CEO} - \text{Median compensation of VPs}).$$

[13]This presents the amount paid out to the high-level manager under the company's long-term incentive plan, which quantifies firm performance over more than a year (Albanesi et al., 2015).

3.2.4 | Control variables

The control variables in all the models include compensation incentives (CEO delta and CEO vega), firm characteristics, and other control variables. CEO delta is the sensitivity of CEO wealth to a $1000 change in the stock price, whereas CEO vega is the sensitivity of CEO wealth to a 0.01 unit change in annual stock price volatility. We follow Coles et al. (2006, 2013) and use Black and Scholes's model modified by Merton (1973) to account for dividends. Using the estimates in Bettis et al. (2005), we model the sensitivity of the holding period of stock options to volatility.[14] Further, we control for firm characteristics of insurers. See Appendix A for detailed information about the firm characteristics and other control variables.

3.2.5 | Instrumental variables

We acknowledge that our baseline results may be subject to endogeneity concerns. A primary issue is potential omitted variable bias, where unobserved factors (e.g., firm strategy, management quality, corporate governance) might jointly determine both tournament incentive use and reserve management. Reverse causality is also a concern, where reserve management might influence tournament incentives through the compensation package. We use the instrumental variable (IV) method to address the endogeneity issue. The IVs for our main independent variable $ln(Firmgap)_t$ are lagged internal tournament incentives, $ln(Firmgap)_{t-1}$ (Chen et al., 2016), and the natural logarithm of the number of VPs in a firm-year observation, $ln(NoofVP)_t$ (Kale et al., 2009; Kini & Williams, 2012).[15] $Firmgap_{t-1}$ is not likely to be affected by reserve errors 2 years later because we regress reserve errors on 1-year-lagged independent variables, including $ln(Firmgap)_t$. Also, we use the lagged values of all independent variables, including $ln(Firmgap)_t$. In 2SLS regressions, we regress $ln(Firmgap)_t$ on $ln(Firmgap)_{t-1}$ in the first stage. Therefore, there is a 2-year difference between the reserve error and the instrumented $ln(Firmgap)_t$. $ln(NoofVP)_t$ is not likely to have a direct effect on reserve errors. As the number of VPs increases, the probability of promotion declines, which implies a higher pay gap.

3.2.6 | Risk-taking variables

Following previous studies on risk-taking (Ho et al., 2013), we use the standard deviation of the firm's loss ratio over the next 5-year rolling periods, $Std_5(Loss\ ratio)$, as a measure of underwriting risk, where the loss ratio is the ratio of loss incurred divided by premiums earned. The standard deviation of the return on investment (ROI) over the next 5-year rolling periods, $Std_5(ROI)$, is used to measure investment risk, where ROI is the ratio of the

[14] We benefit from the SAS code provided by Coles et al. (2013) to compute the CEO delta and CEO vega.

[15] In their analyses, Kale et al. (2009) and Kini and Williams (2012) use *CFOisVP*, which can be defined as a dummy variable that equals 1 if there is a CFO in a firm-year observation, and 0 otherwise, as an instrument for *ln(Firmgap)*. However, as CFOs are directly involved in reserve management, we think that this variable is not exogenous, so we did not use it as an instrument.

TABLE 1 Summary statistics.

Variable	*N*	Mean	Std. Dev.	10th Pctl	Median	90th Pctl
Compensation and board variables						
Firmgap ($000)	369	3390.257	3097.251	556.878	2345.099	7918.989
CEO delta ($000)	369	733.495	1279.089	41.503	252.837	1965.509
CEO vega ($000)	369	118.004	179.428	3.499	46.808	359.376
NoofVP	369	4.900	1.179	4.000	5.000	6.000
Board Co-option	236	0.243	0.254	0.000	0.136	0.682
Indgap ($000)	369	40,106.725	42,431.894	14,647.153	26,638.520	79,159.988
Firm variables						
Res error/Assets	369	0.025	0.070	−0.047	0.023	0.097
ln(Total Asset)	369	22.307	1261	21.017	22.215	24.392
ROA	369	0.035	0.044	−0.002	0.035	0.078
Leverage	369	0.696	0.082	0.611	0.702	0.786
Returns vol	369	0.066	0.153	0.011	0.027	0.124
Tobin's Q	369	1.084	0.174	0.928	1.045	1.292
Long tail	369	0.645	0.290	0.000	0.721	0.956
Weak	369	0.054	0.227	0.000	0.000	0.000
Reinsurance ratio	369	0.207	0.223	0.021	0.110	0.608
Product HHI	369	0.396	0.322	0.120	0.263	1.000
Geographic HHI	369	0.135	0.181	0.043	0.066	0.326
Length	369	0.494	0.172	0.264	0.516	0.656
Malpractice ratio	369	0.145	0.258	0.000	0.048	0.389
Tax shield	369	0.036	0.044	−0.001	0.036	0.078
Tax rate	369	0.881	0.325	0.000	1.000	1.000
Std_5*(Loss ratio)*	356	0.111	0.195	0.019	0.046	0.238
Std5(ROI)	356	0.010	0.010	0.003	0.007	0.020
Std5(ROA)	356	0.021	0.024	0.007	0.015	0.039
ROE	354	0.104	0.193	0.000	0.109	0.254
Sales growth	354	0.322	4.925	−0.072	0.045	0.176

Note: This table presents summary statistics for publicly traded property liability insurance firms from 1993 to 2017. All variables are defined in Appendix A.

net investment gain divided by investment assets. We use the standard deviation of the return on assets (ROA) over the next 5-year rolling periods, $Std_5(ROA)$, as a measure of total risk, where ROA is the ratio of net income divided by net admitted assets. Finally, we use *Returns vol*, the variance in daily stock returns within a year, as a proxy for market risk-taking behavior.

TABLE 2 Tournament incentives and reserve management (OLS).

Dep var =	$(Res\ error/Assets)_{t+1}$
$ln(Firmgap)_t$	0.011***
	(2.802)
$ln(CEO\ delta)_t$	0.002
	(0.563)
$ln(CEO\ vega)_t$	−0.004**
	(−2.081)
$ln(Total\ Asset)_t$	−0.019
	(−1.128)
ROA_t	41.740***
	(3.570)
$Leverage_t$	0.310***
	(3.120)
$Returns\ vol_t$	−0.076***
	(−3.301)
$Tobin's\ Q_t$	0.053
	(1.486)
$Long\ tail_t$	0.114**
	(2.356)
$Weak_t$	0.023
	(1.683)
$Reinsurance\ ratio_t$	−0.093*
	(−1.706)
$Product\ HHI_t$	0.187***
	(4.916)
$Geographic\ HHI_t$	0.220***
	(2.994)
$Length_t$	0.093*
	(1.768)
$Malpractice\ ratio_t$	−0.113**
	(−2.284)
$Tax\ shield_t$	−41.564***
	(−3.547)
$Tax\ rate_t$	0.019**
	(2.174)

TABLE 2 (Continued)

Dep var =	***(Res error/Assets)$_{t+1}$***
Year-fixed effect	Yes
Firm-fixed effect	Yes
Observations	368
Adj. R-squared	0.718

Note: The table reports OLS regression models of reserve error on internal tournament incentives. The dependent variable *Res error/Assets* is a measure of reserve error. The main independent variable *ln(Firmgap)* is the natural logarithm of the pay difference between a firm's CEO and the median of next-level firm's executives (VPs). All variables are defined in Appendix A. *T*-statistics (in parentheses) are computed using robust standard errors corrected for clustering of observations at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

3.2.7 | Performance variables

We also examine the effects of internal tournament incentives on the performance of P-L insurance firms. ROA, return on equity (ROE), sales growth, and Tobin's Q are used as proxies for firm performance.

4 | DESCRIPTIVE STATISTICS AND RESULTS

4.1 | Descriptive statistics

Table 1 shows the descriptive statistics. The mean (median) of internal tournament incentives (main variable of interest), *Firmgap*, is $3.39 million ($2.35 million). For CEO pay sensitivity, the mean (median) of *CEO delta* and *CEO vega* is $0.73 million ($0.25 million) and $0.12 million ($0.05 million), respectively. The average number of VPs, *NoofVP*, is 5. Moreover, on average, 24% of board members are co-opted. The mean (median) of industry tournament incentives *Indgap* is $40.11 million ($26.64 million).

The mean (median) of *Res error/Assets* is 0.025 (0.023). The results suggest that insurance firms in our sample overestimate total loss reserves. The other dependent variables are risk-taking and performance. The risk-taking variables used are Std_5*(Loss ratio)*, Std_5*(ROI)*, and Std_5*(ROA)*, whose means (medians) are 0.111 (0.046), 0.010 (0.007), and 0.021 (0.015), respectively. Also, the performance variables used are ROA, ROE, Sales growth, and Tobin's Q, whose means (medians) are 0.035(0.035), 0.104 (0.109), 0.322 (0.045), and 1.084 (1.045), respectively. For firm characteristics, the means (medians) of *Leverage, Weak, Reinsurance ratio, Product HHI, Geographic HHI, Length*, and *Tax shield* are similar to those reported by Han et al. (2018).

4.2 | Empirical results: Tournament incentives and reserve management

This section examines the relationship between reserve management and internal tournament incentives using OLS and 2SLS regressions. The standard errors are clustered by firm. The

TABLE 3 Tournament incentives and reserve management (2SLS).

Dep var =	(1) 1st stage $ln(Firmgap)_t$	(2) 2nd stage $(Res\ error/Assets)_{t+1}$
Predicted ln(Firmgap)$_t$		0.040***
		(2.780)
ln(Firmgap)$_{t-1}$	0.301***	
	(3.182)	
ln(NoofVP)$_t$	−0.353*	
	(−2.013)	
ln(CEO delta)$_t$	0.032	−0.005*
	(0.697)	(−1.712)
ln(CEO vega)$_t$	0.005	−0.003
	(0.246)	(−1.384)
ln(Total Asset)$_t$	−0.363	0.008
	(−1.345)	(0.434)
ROA$_t$	288.985*	37.009**
	(1.846)	(2.547)
Leverage$_t$	−0.470	0.273**
	(−0.367)	(2.037)
Returns vol$_t$	−0.067	−0.037**
	(−0.201)	(−2.070)
Tobin's Q$_t$	0.097	0.022
	(0.313)	(0.875)
Long tail$_t$	0.831	0.064
	(1.485)	(1.121)
Weak$_t$	−0.014	0.029**
	(−0.077)	(2.062)
Reinsurance ratio$_t$	−0.851	−0.040
	(−0.932)	(−0.638)
Product HHI$_t$	−0.706	0.237***
	(−1.077)	(4.079)
Geographic HHI$_t$	−0.831	0.278***
	(−0.663)	(3.349)
Length$_t$	1.311***	0.029
	(2.797)	(0.563)

TABLE 3 (Continued)

Dep var =	(1) 1st stage $ln(Firmgap)_t$	(2) 2nd stage $(Res\ error/Assets)_{t+1}$
$Malpractice\ ratio_t$	−0.170	−0.093
	(−0.176)	(−1.458)
$Tax\ shield_t$	−286.920*	−36.907**
	(−1.826)	(−2.531)
$Tax\ rate_t$	−0.036	0.018*
	(−0.264)	(1.853)
Firm-fixed effect	Yes	Yes
Year-fixed effect	Yes	Yes
Observations	347	347
Adj R-squared	0.721	0.222
First-Stage *F*-stat		22.48
Cragg-Donald Wald *F*-stat		28.41
Hansen-J Stat (*p*-value)		0.718

Note: The table reports 2SLS regression models of reserve error on internal tournament incentives. The dependent variable *Res error/Assets* is a measure of reserve error. The main independent variable *ln(Firmgap)* is the natural logarithm of the pay difference between a firm's CEO and the median of next-level firm's executives (VPs). The IVs used are lagged *ln(Firmgap)* and the natural logarithm of the number of VPs in a firm-year observation, *ln(NoofVP)*. All variables are defined in Appendix A. *T*-statistics (in parentheses) are computed using robust standard errors corrected for clustering of observations at the firm level. Sign ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

regressions include both firm- and year-fixed effects to capture firm- and year-specific features that are not captured by the main independent and control variables.

Table 2 reports the results from the regression using *Res error/Assets* as the dependent variable. We find significantly positive coefficients on *ln(Firmgap)* at 1%, implying that firms are likely to reserve more when tournament incentives are higher.

To address endogeneity issues, we employ the 2SLS regression approach. The IVs used for the endogenous variable *ln(Firmgap)* are *ln(NoofVP)* and 1-year lagged *ln(Firmgap)*. Furthermore, we use the lag of all control variables. Table 3 shows the result of 2SLS estimation. Column (1) shows the results of the first-stage of 2SLS, and Column (2) shows the second-stage result. In the first stage, the coefficients on the two instruments are significant at the conventional levels. The *F*-statistic is 22.48, and the Cragg–Donald Wald *F*-statistic (Cragg & Donald, 1993) is 28.41, indicating that the instruments are relevant. Since we have two IVs for one endogenous variable, the Hansen-J *p*-value of 71.8% suggests there is no overidentification. As seen in the second-stage result (column 2), the coefficient on predicted *ln(Firmgap)* is significantly positive at the 1% level.

The findings of OLS in Table 2 and 2SLS in Table 3 suggest that a tournament among VPs induces them to reserve more. The results are also economically significant. For example, in Table 2, when the firm pay gap increases by one standard deviation around its mean, the

TABLE 4 Firm characteristics interaction effects.

Dep var =	$(Res\ error/Assets)_{t+1}$
$ln(Firmgap)_t$	0.019
	(0.472)
$ln(CEO\ delta)_t$	−0.009
	(−0.562)
$ln(CEO\ delta)_t \times ln(Firmgap)_t$	0.001
	(0.531)
$ln(CEO\ vega)_t$	−0.007**
	(−2.461)
$ln(CEO\ vega)_t \times ln(Firmgap)_t$	0.001
	(0.770)
$ln(Total\ Asset)_t$	0.017
	(0.816)
$ln(Total\ Asset)_t \times ln(Firmgap)_t$	−0.003**
	(−2.705)
ROA_t	17.345
	(0.656)
$ROA_t \times ln(Firmgap)_t$	3.090
	(1.037)
$Leverage_t$	−0.226
	(−0.980)
$Leverage_t \times ln(Firmgap)_t$	0.068*
	(1.916)
$Returns\ vol_t$	−0.139***
	(−4.064)
$Returns\ vol_t \times ln(Firmgap)_t$	0.020***
	(3.177)
$Tobin's\ Q_t$	−0.153*
	(−1.913)
$Tobin's\ Q_t \times ln(Firmgap)_t$	0.025*
	(1.867)
$Long\ tail_t$	0.720***
	(4.829)
$Long\ tail_t \times ln(Firmgap)_t$	−0.074***
	(−4.069)

TABLE 4 (Continued)

Dep var =	***(Res error/Assets)***$_{t+1}$
$Weak_t$	0.027
	(0.258)
$Weak_t \times ln(Firmgap)_t$	−0.002
	(−0.161)
$Reinsurance\ ratio_t$	0.015
	(0.112)
$Reinsurance\ ratio_t \times ln(Firmgap)_t$	−0.011
	(−0.689)
$Product\ HHI_t$	0.572***
	(4.447)
$Product\ HHI_t \times ln(Firmgap)_t$	−0.053***
	(−3.199)
$Geographic\ HHI_t$	0.306***
	(2.976)
$Geographic\ HHI_t \times ln(Firmgap)_t$	−0.015
	(−0.658)
$Length_t$	−0.726***
	(−3.561)
$Length_t \times ln(Firmgap)_t$	0.108***
	(4.444)
$Malpractice\ ratio_t$	−0.218
	(−1.328)
$Malpractice\ ratio_t \times ln(Firmgap)_t$	0.015
	(0.713)
$Tax\ shield_t$	−17.284
	(−0.642)
$Tax\ shield_t \times ln(Firmgap)_t$	−3.059
	(−1.008)
$Taxrate_t$	0.086
	(1.469)
$Taxrate_t \times ln(Firmgap)_t$	−0.008
	(−1.214)
Year-fixed effect	Yes
Firm-fixed effect	Yes

(Continues)

TABLE 4 (Continued)

Dep var =	$(Res\ error/Assets)_{t+1}$
Observations	368
Adj. R-squared	0.746

Note: The table reports OLS regression models of reserve error on internal tournament incentives and their interactions with various factors. The dependent variable *Res error/Assets* is a measure of reserve error. *ln(Firmgap)* is the natural logarithm of the pay difference between a firm's CEO and the median of next-level firm's executives (VPs). All variables are defined in Appendix A. *T*-statistics (in parentheses) are computed using robust standard errors corrected for clustering of observations at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

standard deviation of loss reserves increases by about 6.7%.[16] The overall evidence implies that VPs focus on strong financial health through conservative reserve behavior to increase their probability of promotion to CEO positions.

Regarding other control variables in Table 2, we find that the coefficients on *ln(CEO vega)* are significantly negative, which suggests that CEOs with higher risk-taking incentives reserve less. The coefficients on *ROA*, *Leverage*, and *Tax rate* are significantly positive, while the coefficient on *Tax shield* is negative.[17] This tax rate result is consistent with the findings of Grace and Leverty (2012), suggesting that insurers with high tax rates have higher reserve errors than insurers with low tax rates. An insurer's estimation of claim costs reduces taxable income and cash outflow in taxes (Grace, 1990). We also find that the coefficients on *Long tail, Product HHI*, and *Geographic HHI* are positive, which is consistent with the findings of Grace and Leverty (2012). The evidence also shows that as *Returns vol* increases, insurance firms tend to reserve less. Overall, the coefficients on controls are generally consistent with the literature.

Table 4 provides the results of the effects of various firm characteristics on the relationship between internal tournament incentives and loss-reserve patterns. We interact our tournament incentive variable *ln(Firmgap)* with each of the controls. Our discussions focus on the coefficients that are statistically significant. We find significantly negative coefficients on *ln(Total Asset)* × *ln(Firmgap)*, suggesting that insurers with higher assets reserve less as tournament incentives increase. VPs might focus more on higher earnings, as larger insurers generally have better financial health due to diversity in product lines and the law of large numbers. The negative coefficient on *Long tail* × *ln(Firmgap)* suggests that insurers that write more long-tail lines reserve less when tournament incentives are high. This evidence implies that VPs focus more on higher earnings instead of higher reserves, possibly because insurers do not need to pay out all of their claims immediately, and the tournament is short-term. We find that the interaction term of *Product HHI* and *ln(Firmgap)* is negative, indicating that insurers with higher tournament incentive VPs reserve less as HHI increases because higher HHI insurers are more dominant due to less competition. As a result, higher HHI insurers have fewer financial health concerns, and conservative reserve behavior is less important. VPs with more tournament incentives try to reserve less to increase earnings and their probability of promotion to CEO positions.

[16]We compute the economic significance using the following method:

$$\frac{[\ln(\text{mean of } Firmgap + 0.5\text{std}) - \ln(\text{mean of } Firmgap - 0.5\text{std})] \times \text{coef on } \ln(Firmgap)}{\text{std}(Res\ error\ /\ Assets)}$$

[17]*Tax rate* and *Tax Shield* are proxies used by the literature as controls for reserve error. Please see the Appendix for definitions. They are not correlated.

TABLE 5 SOX effect.

Dep var =	$(Res\ error/Assets)_{t+1}$
$SOX_t \times ln(Firmgap)_t$	−0.017**
	(−2.341)
$ln(Firmgap)_t$	0.024***
	(3.482)
$ln(CEO\ delta)_t$	0.002
	(0.686)
$ln(CEO\ vega)_t$	−0.004**
	(−2.062)
$ln(Total\ Asset)_t$	−0.025
	(−1.526)
ROA_t	39.479***
	(3.376)
$Leverage_t$	0.300***
	(2.942)
$Returns\ vol_t$	−0.080***
	(−3.300)
$Tobin's\ Q_t$	0.040
	(1.094)
$Long\ tail_t$	0.137***
	(2.876)
$Weak_t$	0.024*
	(1.752)
$Reinsurance\ ratio_t$	−0.106*
	(−1.951)
$Product\ HHI_t$	0.179***
	(4.944)
$Geographic\ HHI_t$	0.209***
	(3.151)
$Length_t$	0.100*
	(1.947)
$Malpractice\ ratio_t$	−0.120**
	(−2.553)
$Tax\ shield_t$	−39.286***
	(−3.354)

(Continues)

TABLE 5 (Continued)

Dep var =	***(Res error/Assets)$_{t+1}$***
Tax rate$_t$	0.020**
	(2.391)
Year-fixed effect	Yes
Firm-fixed effect	Yes
Observations	368
Adj. R-squared	0.723

Note: The table reports OLS regression models of reserve error on internal tournament incentives and their interactions with SOX dummy. The dependent variable *Res error/Assets* is a measure of reserve error. *ln(Firmgap)* is the natural logarithm of the pay difference between a firm's CEO and the median of next-level firm's executives (VPs). *SOX* dummy is set equal to one if a fiscal year is after 2002. All variables are defined in Appendix A. *T*-statistics (in parentheses) are computed using robust standard errors corrected for clustering of observations at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

The significantly positive coefficient on *Returns vol* × *ln(Firmgap)* suggests that when stock volatility is high, VPs in insurers with higher tournament incentives are likely to reserve more than those with lower tournament incentives, because VPs with higher tournament incentives are more concerned about financial health during uncertain business conditions. The result for *Length* × *ln(Firmgap)* shows that a higher percentage of claim loss reserve over total liabilities increases the positive impact of internal tournament incentives on reserve errors. *Length* measures the lag between the time a loss is incurred and its final claim settlement (Gaver & Paterson, 2001). One possible reason is that VPs in insurers with more tournament incentives reserve more for rapid final settlement because they are more concerned with short-run conservatism in reserve estimates, as the tournament is short-term.

Table 5 shows the impact of the SOX on the association between internal tournament incentives and reserve error. We add a dummy variable *SOX*, which equals 1 in the post-SOX period and 0 otherwise, and its interaction with *ln(Firmgap)* to the model.[18] We observe a significantly negative coefficient on *SOX* × *ln(Firmgap)*. One possible reason is that as SOX imposes more strict regulation on publicly traded insurers, VPs with more tournament incentives reserve less because stakeholders are better protected after the implementation of SOX (e.g., He et al., 2008).

We also examine whether corporate governance affects the relationship between tournament incentives and reserve management. Coles et al. (2014) assert that board co-option, which is the share of the board consisting of directors appointed after a CEO assumed office, has greater explanatory power of monitoring effectiveness than the conventional measure of board independence because not all independent directors are effective monitors. They argue that co-opted directors, regardless of whether they are named independently, are more prone to align their actions with the benefits of the CEO if the CEO participated in their initial placement. Following Coles et al. (2014), we use *Board Co-option* as a measure of board dependence, which

[18]We do not include *SOX* as control as the year fixed effects subsume the variations in SOX dummy.

TABLE 6 The impact of board co-option.

Dep var =	*(Res error/Assets)*$_{t+1}$
Board Co-option × ln(Firmgap)$_t$	−0.028**
	(−2.192)
Board Co-option	0.227**
	(2.320)
ln(Firmgap)$_t$	0.020***
	(3.699)
ln(CEO delta)$_t$	0.003
	(0.881)
ln(CEO vega)$_t$	−0.005**
	(−2.484)
ln(Total Asset)$_t$	−0.008
	(−0.397)
ROA$_t$	34.549**
	(2.208)
Leverage$_t$	0.278***
	(2.948)
Returns vol$_t$	−0.055
	(−0.630)
Tobin's Q$_t$	0.078***
	(3.047)
Long tail$_t$	0.135
	(1.453)
Weak$_t$	−0.013
	(−0.828)
Reinsurance ratio$_t$	0.224***
	(3.060)
Product HHI$_t$	0.180***
	(3.772)
Geographic HHI$_t$	0.113*
	(1.821)
Length$_t$	0.132**
	(2.123)
Malpractice ratio$_t$	−0.192***
	(−2.789)

(Continues)

TABLE 6 (Continued)

Dep var =	$(Res\ error/Assets)_{t+1}$
Tax shield$_t$	−34.258**
	(−2.191)
Tax rate$_t$	0.024**
	(2.399)
Year-fixed effect	Yes
Firm-fixed effect	Yes
Observations	235
Adj. R-squared	0.798

Note: The table reports OLS regression models of reserve error on internal tournament incentives and their interactions with board co-option. The dependent variable *Res error/Assets* is a measure of reserve error. *ln(Firmgap)* is the natural logarithm of the pay difference between a firm's CEO and the median of next-level firm's executives (VPs). *Board Co-option* is the fraction of independent directors appointed after the CEO assumes office. All variables are defined in Appendix A. *T*-statistics (in parentheses) are computed using robust standard errors corrected for clustering of observations at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

is the ratio of the number of independent directors appointed after the CEO assumes office. We argue that the board's independence weakens as *Board Co-option* increases.

Table 6 shows that the coefficient on the interaction term between *Board Co-option* and *ln (Firmgap)* is significantly negative, implying that as board independence increases, the positive impact of internal tournament incentives on reserve errors is strengthened. In other words, insurers with higher tournament incentives reserve more to focus on financial health than those with fewer incentives as board independence increases, possibly because independent monitoring is more concerned about ensuring sufficient reserves to support financial health and stability. This finding aligns with Ho et al. (2013) evidence, which suggests that the percentage of independent directors is associated with low total risk in property-liability insurers.

4.3 | Empirical results: Tournament incentives and risk-taking behavior and performance

The literature on tournaments focuses on the relationship between tournament incentives and risk-taking (performance). We next examine the effects of internal tournament incentives on risk-taking behavior and performance of P-L insurance firms so that we can compare the evidence on P-L insurers with that of nonfinancial firms. Following previous related studies, we use Std_5*(Loss ratio)* as underwriting risk, Std_5*(ROI)* as investment risk, Std_5*(ROA)* as total risk, and *Returns vol* as firm's overall risk as the variables for risk-taking.[19] Table 7 presents the results regarding the relationship between internal tournament incentives and firm risk-taking behavior. In contrast to the literature on nonfinancial firms, we do not find any significant

[19] Std_5 stands for the standard deviation of Loss ratio, ROI, and ROA, respectively, over next 5-year rolling periods. For detailed definitions, see Appendix A.

TABLE 7 The effect of tournament incentives on firm risk.

Dep var =	Underwriting risk $Std_5(Loss\ ratio)$	Investment risk $Std_5(ROI)$	Total risk $Std_5(ROA)$	Return volatility $Returns\ vol_{t+1}$
$ln(Firmgap)_t$	0.012	−0.000	0.001	0.003
	(1.047)	(−0.164)	(1.044)	(0.412)
$ln(CEO\ delta)_t$	0.011	0.001	0.001	−0.016*
	(1.048)	(1.087)	(0.980)	(−1.763)
$ln(CEO\ vega)_t$	−0.001	−0.000	−0.000*	−0.003
	(−0.201)	(−0.797)	(−1.846)	(−1.574)
$ln(Total\ Asset)_t$	0.124**	0.002	0.015**	0.003
	(2.287)	(0.359)	(2.476)	(0.113)
ROA_t	−22.347	−6.592**	−8.306*	9.999
	(−0.585)	(−2.616)	(−1.796)	(0.433)
$Leverage_t$	−0.254	−0.004	−0.055	0.168
	(−0.807)	(−0.146)	(−1.358)	(0.973)
$Returns\ vol_t$	−0.099	−0.005	0.007	0.316***
	(−1.189)	(−0.670)	(0.404)	(4.428)
$Tobin's\ Q_t$	−0.161**	−0.006	−0.014	−0.255*
	(−2.125)	(−0.725)	(−1.636)	(−2.043)
$Long\ tail_t$	−0.296***	−0.015*	−0.039**	−0.017
	(−3.514)	(−1.765)	(−2.744)	(−0.201)
$Weak_t$	0.073	0.003	0.014***	0.007
	(1.440)	(1.366)	(3.772)	(0.090)
$Reinsurance\ ratio_t$	−0.279*	−0.015*	−0.008	−0.011
	(−1.970)	(−1.783)	(−0.569)	(−0.085)
$Product\ HHI_t$	0.048	−0.007	−0.029***	−0.093
	(0.436)	(−0.786)	(−3.772)	(−1.153)
$Geographic\ HHI_t$	0.176	0.008	0.016	0.016
	(1.340)	(0.783)	(1.150)	(0.224)
$Length_t$	−0.090	0.003	−0.033**	−0.066
	(−0.878)	(0.342)	(−2.669)	(−0.529)
$Malpractice\ ratio_t$	0.539***	0.028**	0.037***	0.097
	(3.405)	(2.182)	(2.769)	(0.972)
$Tax\ shield_t$	20.916	6.599**	8.154*	−10.593
	(0.546)	(2.592)	(1.746)	(−0.464)
$Tax\ rate_t$	−0.031	−0.002*	−0.005	0.022
	(−1.363)	(−1.840)	(−1.413)	(0.958)

(Continues)

TABLE 7 (Continued)

Dep var =	Underwriting risk *Std₅(Loss ratio)*	Investment risk *Std₅(ROI)*	Total risk *Std₅(ROA)*	Return volatility *Returns vol*$_{t+1}$
Year-fixed effect	Yes	Yes	Yes	Yes
Firm-fixed effect	Yes	Yes	Yes	Yes
Observations	355	355	355	355
Adj. R-squared	0.730	0.513	0.737	0.630

Note: The table reports OLS regression models of firm risk on internal tournament incentives Std_5*(Loss ratio)* is the standard deviation of the firm's loss ratio over the next five-year rolling periods, where the loss ratio is the ratio of loss incurred divided by premiums earned. Std_5*(ROI)* is the standard deviation of return on investment (ROI) over the next five-year rolling periods, where ROI is measured by the ratio of net investment gain divided by investment assets. Std_5*(ROA)* is the standard deviation of return on assets (ROA) over the next five-year rolling periods, where ROA is calculated as the ratio of net income divided by net admitted assets. *Returns vol* is measured as the variance of one year of daily stock returns. All variables are defined in Appendix A. *T*-statistics (in parentheses) are computed using robust standard errors corrected for clustering of observations at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

relation between tournament incentives and any of the risk-taking measures in P-L insurance firms. This evidence shows that VPs induced by promotion-based tournaments focus on the strong financial health of insurers instead of high risk.

In addition, we examine the impact of internal tournament incentives on firm performance and report the results in Table 8, in which we use *ROA, ROE*, *Sales growth*, and *Tobin's Q* as measures of firm performance. We do not find a significant relationship between internal tournament incentives and firm performance measures. These results are different from those in the literature on nonfinancial firms. These results support the main evidence that managers in tournaments focus on the strong financial health of insurers instead of performance.

One might find it puzzling that tournaments are associated with reserves, but not performance, as reserves are strongly related to performance. One possible explanation is that many factors impact performance, such as underwriting strategy, claim efficiency, and investment returns. The impact of these factors on performance (profits) is likely more critical than reserve management. In other words, reserve management is only one of many factors that impact performance. More importantly, other performance measures, such as Sales growth and Tobin's Q, are not likely to be highly associated with reserve management.

5 | ROBUSTNESS CHECKS AND ADDITIONAL TESTS

In this section, we perform robustness tests on the positive relationship between tournament incentives and loss reserves. First, we control for an additional variable, industry tournament incentives, in our analysis. Industry tournament incentives are related to the competition among CEOs in their industry to become the CEO of the leading firm within the same industry. We control for this variable because VPs can also compete with CEOs of other firms in the same industry to become CEOs. Coles et al. (2017) find a positive relationship between industry tournament incentives and firm performance (the riskiness of the firm and its financial policies). We calculate industry tournament incentives, *Indgap*, as the pay gap between the CEO of a focal firm and the highest-paid CEO's total compensation in the sample. Table 9 demonstrates

TABLE 8 The effect of internal tournament incentives on firm performance.

Dep var =	(1) ROA_{t+1}	(2) ROE_{t+1}	(3) Sales $growth_{t+1}$	(4) Tobin's Q_{t+1}
$ln(Firmgap)_t$	0.002	0.007	−0.005	−0.006
	(0.643)	(0.447)	(−0.666)	(−0.785)
$ln(CEO\ delta)_t$	0.002	0.013	−0.006	−0.007*
	(1.060)	(1.481)	(−0.721)	(−1.799)
$ln(CEO\ vega)_t$	−0.000	−0.001	0.000	−0.000
	(−0.172)	(−0.246)	(0.087)	(−0.184)
$ln(Total\ Asset)_t$	0.002	−0.047	−0.074	−0.101***
	(0.221)	(−1.060)	(−1.556)	(−2.935)
ROA_t	1.691	11.130	85.929**	24.591
	(0.133)	(0.228)	(2.704)	(1.245)
$Leverage_t$	0.059	0.663*	0.090	0.176*
	(0.738)	(1.991)	(0.386)	(1.901)
Returns vol_t	−0.044**	−0.163*	−0.229	0.169***
	(−2.406)	(−1.805)	(−1.314)	(3.237)
Tobin's Q_t	0.050***	0.221**	0.097	0.708***
	(3.137)	(2.324)	(0.877)	(10.690)
Long $tail_t$	0.045*	0.206	−0.008	0.149
	(1.849)	(1.685)	(−0.067)	(1.154)
$Weak_t$	−0.002	−0.020	0.012	0.038
	(−0.150)	(−0.240)	(0.378)	(1.377)
Reinsurance $ratio_t$	−0.005	0.027	−0.029	−0.087
	(−0.302)	(0.290)	(−0.280)	(−0.909)
Product HHI_t	0.055**	0.229**	−0.094	−0.018
	(2.730)	(2.517)	(−0.703)	(−0.242)
Geographic HHI_t	0.008	0.041	−0.188	−0.098
	(0.341)	(0.434)	(−1.602)	(−1.274)
$Length_t$	0.011	0.028	−0.091	0.048
	(0.382)	(0.350)	(−0.895)	(0.629)
Malpractice $ratio_t$	−0.066**	−0.303**	0.223	−0.056
	(−2.750)	(−2.694)	(1.533)	(−0.794)
Tax $shield_t$	−1.143	−8.302	−86.807**	−24.386
	(−0.090)	(−0.169)	(−2.749)	(−1.227)
Tax $rate_t$	0.005	0.016	0.022	0.005
	(0.704)	(0.573)	(1.110)	(0.446)

(Continues)

TABLE 8 (Continued)

Dep var =	(1) ROA_{t+1}	(2) ROE_{t+1}	(3) *Sales growth*$_{t+1}$	(4) *Tobin's* Q_{t+1}
Year-fixed effect	Yes	Yes	Yes	Yes
Firm-fixed effect	Yes	Yes	Yes	Yes
Observations	353	353	353	353
Adj. R-squared	0.670	0.605	0.234	0.843

Note: The table reports OLS regression models of firm performance on internal tournament incentives. *ROA* is the net income divided by net admitted assets. *ROE* is the net income divided by equity. *Sales Growth* is the percentage change in sales compared to the previous year's sales. *Tobin's Q* is the ratio of the sum of the market value of equity and the book value of debt to total assets. All variables are defined in Appendix A. *T*-statistics (in parentheses) are computed using robust standard errors corrected for clustering of observations at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

TABLE 9 Robustness - Controlling for industry tournament incentives.

Dep var =	(1) OLS *(Res error/Assets)*$_{t+1}$	(2) 2SLS *(Res error/Assets)*$_{t+1}$
ln(Firmgap)$_t$	0.011**	
	(2.292)	
Predicted ln(Firmgap)$_t$		0.040***
		(2.790)
ln(Indgap)$_t$	0.001	−0.001
	(0.042)	(−0.311)
Controls	Yes	Yes
Year-fixed effect	Yes	Yes
Firm-fixed effect	Yes	Yes
Observations	366	345
Adj. R-squared	0.717	0.223
First-Stage *F*-stat		24.02
Cragg–Donald Wald *F*-stat		29.45
Hansen-J Stat (*p*-value)		0.664

Note: The table reports OLS and 2SLS regression models of reserve error on internal tournament incentives, controlling for CEO industry tournament incentives. The dependent variable *Res error/Assets* is a measure of reserve error. The main independent variable *ln(Firmgap)* is the natural logarithm of the pay difference between a firm's CEO and the median of next-level firm's executives (VPs). *ln(Indgap)* is the natural logarithm of the pay gap between the highest-paid CEO's total compensation within the industry and the CEO's total compensation. In the first-stage of 2SLS, the IVs used are lagged *ln (Firmgap)* and the natural logarithm of the number of VPs in a firm-year observation, *ln(NoofVP)*. The controls are from Table 2. All variables are defined in Appendix A. *T*-statistics (in parentheses) are computed using robust standard errors corrected for clustering of observations at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

TABLE 10 Robustness - Testing the significance of the coefficients with bootstrapping.

Dep var =	(1) OLS $(Res\ error/Assets)_{t+1}$	(2) 2SLS $(Res\ error/Assets)_{t+1}$
$ln(Firmgap)_t$	0.011***	
	(0.005)	
Predicted $ln(Firmgap)_t$		0.040***
		(0.003)
$ln(CEO\ delta)_t$	0.001	−0.005
	(0.321)	(0.947)
$ln(CEO\ vega)_t$	−0.004	−0.003
	(0.957)	(0.888)
$ln(Total\ Asset)_t$	−0.019	0.007
	(0.865)	(0.353)
ROA_t	41.739***	37.215**
	(0.002)	(0.014)
$Leverage_t$	0.312***	0.273**
	(0.005)	(0.032)
$Returns\ vol_t$	−0.077***	−0.037**
	(−3.324)	(−2.037)
$Tobin's\ Q_t$	0.053*	0.022
	(0.087)	(0.205)
$Long\ tail_t$	0.112**	0.066
	(0.026)	(0.138)
$Weak_t$	0.023*	0.029**
	(0.068)	(0.034)
$Reinsurance\ ratio_t$	−0.092	−0.042
	(0.924)	(0.729)
$Product\ HHI_t$	−0.092***	−0.042***
	(0.000)	(0.000)
$Geographic\ HHI_t$	0.221***	0.279***
	(0.006)	(0.002)
$Length_t$	0.092*	0.030**
	(0.064)	(0.303)
$Malpractice\ ratio_t$	−0.114	−0.094
	(0.975)	(0.903)

(Continues)

TABLE 10 (Continued)

Dep var =	(1) OLS *(Res error/Assets)*$_{t+1}$	(2) 2SLS *(Res error/Assets)*$_{t+1}$
Tax shield$_t$	−41.383	−37.467
	(0.999)	(0.990)
Tax rate$_t$	0.019**	0.018**
	(0.022)	(0.044)
Year-fixed effect	Yes	Yes
Firm-fixed effect	Yes	Yes

Note: This table reports the results of the bootstrapping method. The dependent variable *Res error/Assets* is a measure of reserve error. The main independent variable *ln(Firmgap)* is the natural logarithm of the pay difference between a firm's CEO and the median of the next-level firm's executives (VPs). The IVs used in 2SLS regressions are lagged *ln(Firmgap)* and the natural logarithm of the number of VPs in a firm-year observation, *ln(NoofVP)*. All variables are defined in Appendix A. We simulate the coefficients of the OLS (2SLS) regressions 1000 times based on the normal distribution, and the probability of the coefficients refers to how many times *t*-stats of coefficients found by bootstrapping exceed the *t*-stat of a coefficient found by OLS (2SLS). The coefficients are found by adjusting the coefficients found in OLS (2SLS) by subtracting the mean of bootstrapped coefficients, i.e., biased-corrected coefficients. *p* values are shown in parentheses below the coefficients and illustrate the percentage of *t*-stats of coefficients found by bootstrapping exceeding the *t*-stat found by the original OLS (2SLS) model out of 1000 times. Sign ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

the OLS and 2SLS regression results when we control for industry tournament incentives. Our main results remain consistent even after controlling for the CEO labor market tournament.

Second, given that we examine publicly traded P-L insurance firms, we have only 369 observations, constituting a relatively small sample. Following the literature (e.g., Zhang & Nielson, 2015), we test the statistical significance of the coefficients in the regressions by bootstrapping to address concerns about small sample size. Table 10 shows the results. We simulate the coefficients of the OLS and 2SLS regressions 1000 times based on the normality assumption for the regression residuals, where the dependent variable is *Res error/Assets*. In Column (1), we perform an auxiliary OLS regression by regressing the dependent variable on all exogenous variables and *ln(Firmgap)*, except for the variable being tested. In Column (2), we employed a similar approach using *Predicted ln(Firmgap)* in 2SLS. We obtain the regression residuals (ε_{it}) with the distribution of $N\left(\mu_{\varepsilon}, \sigma_{\varepsilon}^2\right)$ based on the assumption. We generate auxiliary residuals (ε_{it}^*) based on this distribution in each round of bootstrapping and construct the auxiliary dependent variable (y^*) by using auxiliary coefficients and auxiliary residuals. Then, we estimate the regression of the auxiliary dependent variable (y^*) on all the independent variables tested. We repeat this procedure 1,000 times. Hence, we obtain 1,000 bootstrapped coefficients ($\tilde{\beta}$) and *t*-statistics ($\tilde{t}$) for the variable tested.

The coefficients illustrated are bias-corrected coefficients, which are obtained by subtracting the average of the bootstrapped coefficients ($\hat{\beta} - Avg(\tilde{\beta})$) from the coefficient found in the original OLS (2SLS) regression model. The probabilities (*p*-value) illustrated below the coefficients in Table 10 show the percentage of hitting or exceeding the *t*-statistics generated in the original OLS (2SLS) regression model by the bootstrapped *t*-statistics ($\tilde{t}$) in 1000 rounds. We

TABLE 11 Robustness – Alternate measure of reserve error.

Dep var =	(1) OLS (Weiss error/Assets)$_{t+1}$	(2) 2SLS 1st stage ln(Firmgap)$_t$	(3) 2nd stage (Weiss error/Assets)$_{t+1}$
ln(Firmgap)$_t$	0.012**		
	(2.384)		
Predicted ln(Firmgap)$_t$			0.031**
			(2.078)
ln(Firmgap)$_{t-1}$		0.301***	
		(3.182)	
ln(NoofVP)$_t$		−0.353*	
		(−2.013)	
ln(CEO delta)$_t$	0.000	0.032	−0.004
	(0.140)	(0.697)	(−1.596)
ln(CEO vega)$_t$	−0.006***	0.005	−0.003**
	(−3.175)	(0.246)	(−1.998)
ln(Total Asset)$_t$	−0.040**	−0.363	−0.004
	(−2.657)	(−1.345)	(−0.293)
ROA$_t$	17.396	288.985*	14.798
	(1.410)	(1.846)	(1.019)
Leverage$_t$	0.319***	−0.470	0.267**
	(3.686)	(−0.367)	(2.238)
Returns vol$_t$	−0.062***	−0.067	−0.010
	(−2.823)	(−0.201)	(−0.575)
Tobin's Q$_t$	0.041	0.097	0.010
	(1.334)	(0.313)	(0.524)
Long tail$_t$	−0.001	0.831	0.025
	(−0.024)	(1.485)	(0.490)
Weak$_t$	0.018	−0.014	0.022
	(1.213)	(−0.077)	(1.455)
Reinsurance ratio$_t$	−0.004	−0.851	0.053
	(−0.067)	(−0.932)	(0.972)
Product HHI$_t$	0.089**	−0.706	0.146**
	(2.317)	(−1.077)	(2.546)
Geographic HHI$_t$	0.059	−0.831	0.126
	(0.760)	(−0.663)	(1.537)

(Continues)

TABLE 11 (Continued)

Dep var =	(1) OLS *(Weiss error/Assets)*$_{t+1}$	(2) 2SLS 1st stage *ln(Firmgap)*$_t$	(3) 2nd stage *(Weiss error/Assets)*$_{t+1}$
Length$_t$	0.196***	1.311***	0.122***
	(4.445)	(2.797)	(3.442)
Malpractice ratio$_t$	0.023	−0.170	0.020
	(0.476)	(−0.176)	(0.295)
Tax shield$_t$	−17.189	−286.920*	−14.622
	(−1.391)	(−1.826)	(−1.005)
Tax rate$_t$	0.005	−0.036	0.008
	(0.632)	(−0.264)	(1.052)
Year-fixed effect	Yes	Yes	Yes
Firm-fixed effect	Yes	Yes	Yes
Observations	368	347	347
Adj. R-squared	0.869	0.721	0.118
First-Stage *F*-stat			22.48
Cragg–Donald Wald *F*-stat			28.48
Hansen-J Stat (*p*-value)			0.923

Note: The table reports OLS and 2SLS regression models of reserve error on internal tournament incentives using *Weiss error/Assets* as a measure of reserve error. The main independent variable *ln(Firmgap)* is the natural logarithm of the pay difference between a firm's CEO and the median of next-level firm's executives (VPs). All variables are defined in Appendix A. *T*-statistics (in parentheses) are computed using robust standard errors corrected for clustering of observations at the firm level. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

find significantly positive coefficients on *ln(Firmgap)* and *Predicted ln(Firmgap)* in all the regressions. These results suggest that our main regression results are robust to the bootstrapping approach.

Third, we demonstrate the robustness of our main results using an alternative measure of reserve error following Weiss error (Weiss, 1985), which is the difference between total incurred losses at year t and developed losses paid at year $t+5$ for firm i.[20] Weiss error is calculated as follows:

$$Weiss\ error_{i,t} = Incurred\ Losses_{i,t} - Developed\ Losses\ Paid_{i,t+5}.$$

As the incurred losses include both developed losses paid (losses actually paid) and estimated losses, Weiss errors are expected to be greater than KFS errors. The mean (median) of

[20]Developed losses paid refers to the total loss amount paid by an insurer since its origination.

Weiss error/Assets in our sample is 0.124 (0.113). Table 11 shows the results from OLS and 2SLS using this measure as the dependent variable. The table shows that the coefficient on *ln (Firmgap)* in OLS and the coefficient on predicted *ln(Firmgap)* in 2SLS are significantly positive at the 5% level. This result suggests that our baseline results are robust to using an alternative measure of reserve error.

6 | CONCLUSION

This study explores how internal tournament incentives affect reserve management, risk-taking behavior, and performance at publicly traded property-liability insurance firms. We find a significantly positive relationship between internal tournament incentives and reserve errors, indicating that executives vying for promotion are more likely to adopt conservative reserve practices. Additionally, in contrast to the extant literature on noninsurance firms, which posits a positive relationship between internal tournament incentives and risk-taking (performance), our findings reveal no such positive relationship. Taken together, the evidence suggests that vice presidents prioritize maintaining the insurer's financial stability over enhancing firm performance. One possible reason is that financial health is crucial for insurers and their stakeholders, such as stockholders, policyholders, and regulators. Although the board has the authority to promote a VP to become CEO, it cannot ignore the welfare of stakeholders.

Further, we show that the impact of internal tournament incentives on conservative reserve management is more pronounced for insurers with more volatile returns and a higher proportion of claim loss reserves relative to total liability. Conversely, the positive effect attenuates for larger insurers, those underwriting higher long-tail lines, and those facing lower competition. Additionally, we find that the SOX mitigates the positive relationship between industry tournament incentives and reserve errors. One possible reason is that while strict rules motivate VPs to support conservative policies, they might choose more aggressive reserve policies because consumers are better protected since the implementation of the SOX. We also find that insurers with more independent board members are likely to engage in more conservative reserve behavior in internal tournaments. Overall, our analysis indicates that tournament incentives are important motives for reserve management.

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APPENDIX A: Data sources and definitions

Variable	Definition	Source
Compensation and board variables		
Firmgap	The pay gap between the CEO's total compensation and the median VP total compensation.	ExecuComp
CEO delta	(Shares owned at the beginning of the year + Average delta of prior option grants × No. of options)/Number of shares outstanding.	ExecuComp
CEO vega	The dollar change in the CEO's wealth for a 0.01 change in the standard deviation of stock returns.	ExecuComp
NoofVP	Number of vice presidents (VP).	ExecuComp
Board Co-option	Co-option is the ratio of the number of independent directors appointed after the CEO assumes office, who are considered to be "co-opted," to the total number of board members. This variable is the tenure-weighted.	Coles et al. (2014)
Indgap	The pay gap between the highest-paid CEO's total compensation within the industry and the CEO's total compensation.	ExecuComp
Firm variables		
Res error/Assets	Reserve error measure computed as the difference between cumulative incurred losses at year t and year $t + 5$ scaled by (total net admitted assets/1000).	NAIC
Total Asset	Total net admitted assets.	NAIC
ROA	Net income divided by total net admitted assets.	NAIC
Leverage	1 minus the surplus-to-asset ratio.	NAIC
Returns vol	Return volatility is the variance of 1 year of daily stock returns in a year, multiplied by 100.	CRSP
Tobin's Q	The ratio of the sum of the market value of equity and the book value of debt to total assets.	Compustat
Long tail	The premiums of long-tail lines are divided by total net premiums written.	NAIC
Weak	A dummy variable = 1 if an insurer has four or more than four unusual IRIS (Insurance Regulatory Information System) ratios, and 0 otherwise.	NAIC
Reinsurance ratio	The ratio of reinsurance ceded divided by the sum of direct premiums written plus reinsurance assumed.	NAIC
Product HHI	Sum of the squares of the value of net premiums written in line i divided by the insurer's total net premiums written.	NAIC
Geographic HHI	Sum of the squares of the value of direct premiums written in state i divided by the insurer's total direct premiums written.	NAIC

Variable	Definition	Source
Length	Percentage of claim loss reserve over total liabilities.	NAIC
Malpractice ratio	Percentage of net premiums written from malpractice insurance.	NAIC
Tax shield	Sum of net income and estimated reserve scaled by total assets.	NAIC
Tax rate	A dummy variable = 1, which takes a value of one if the insurer either paid taxes or received a refund of prior taxes in the given year, and 0 otherwise.	NAIC
Std_5*(Loss ratio)*	The standard deviation of the firm's loss ratio over next 5-year rolling periods, where the loss ratio is the ratio of loss incurred divided by premiums earned.	NAIC
Std5(ROI)	The standard deviation of return on investment (ROI) over next 5-year rolling periods, where ROI is measured by the ratio of net investment gain divided by investment assets.	NAIC
Std5(ROA)	The standard deviation of return on assets (ROA) over next 5-year rolling periods, where ROA is calculated as the ratio of net income divided by net admitted assets.	NAIC
ROE	Net income divided by equity.	NAIC
Sales growth	The percentage change in sales compared to the previous year's sales.	Compustat