Conservatism and Asymmetric Timeliness of Loss Reserve Management in Property-Liability Insurance Industry

Juan Zhang

Department of Risk, Insurance, and Healthcare Management
Fox School of Business
Temple University

juan.zhang@temple.edu

Abstract

The meaning of "conservatism" in accounting is different from that in insurance, the latter usually meaning over-reserving, but the former meaning that loss reserves reflect bad news more quickly than good news. The purpose of this paper is to study whether the accounting conservatism exists in the property-liability (P&L) insurance industry, and whether firm factors (organizational form and firm size) affect insurers' degree of conservatism. There are additional benefits of studying conservatism in the insurance industry: (1) loss reserves reported by P&L insurers are a material accrual and provide an observable and material measure of managerial discretion; (2) the statutory financial reporting required for most insurers enables me to study a sample of both public and private firms; (3) focusing on one industry can avoid industry-level confounding factors and provide additional insights. I use a sample of single P&L insurers from 2000 to 2009. I find that conservatism exists in the P&L insurance industry, i.e. insurers adjust the loss reserves by a larger magnitude to bad news than to good news. Besides, conservatism is more significant for large insurers than for small insurers. However, I do not find significant difference between stock insurers and mutual insurers in terms of conservatism.

Key Words: Conservatism, Loss Reserve Error, Asymmetric Timeliness, Premanaged Net Income

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1. Introduction

In insurance, conservatism usually means the managers' tendency to overestimate loss reserves in order to prepare for future claims better. However, in accounting, the meaning of conservatism is different. It means that the loss reserves reflect bad news more quickly than good news. In essence, it captures managers' tendency to "require a higher degree of verification for recognizing good news than bad news in financial statements" (Basu, 1997). In this paper, I aim to study the accounting conservatism in the property-liability (P&L) insurance industry because studying in the insurance industry brings additional benefits.

First, in the P&L insurance industry there is an observable and material measure for managerial discretion – loss reserve error. Insurers are required to charge claim losses to operations in the period they incurred and the related premiums are recognized. Although some claims are reported and settled in the year they incurred, the majority will remain unsettled for several years and hence create substantial case reserves or incurred but not reported (IBNR) reserves. The uncertainty surrounding the unsettled claims provides the managers opportunities to exercise their managerial discretion in estimating the loss reserves.

In addition to the original loss reserves, insurers are also required to report the revised loss reserves for 10-year period as they gradually obtain more information about the original unsettled claims. The difference between the original loss reserves and the revised loss reserves is called the loss reserve error. Since the loss reserves are the largest liability on an insurer's balance sheet and harder to estimate than other costs due to associated huge uncertainty, it is a material accrual to insurers and provides an important measure of managerial discretion in this paper.

Second, insurance companies are required to submit statutory financial reports to state insurance commissioners following the statutory accounting principles (SAP), which enables me to study a sample of both publicly traded firms and private firms. Third, a more focused industrial

setting can avoid industry-level confounding factors and provide more insights regarding the conservatism principle.

Hence, the purpose of this paper is to study whether conservatism exists in P&L insurance industry. This is shown through the asymmetric timeliness of recognizing bad news and good news in loss reserves. Besides, the paper also tests whether firm factors (organizational form and firm size) affect insurers' degree of conservatism.

I propose and test three hypotheses in this paper. For Hypothesis 1, I propose that conservatism exists in the financial reporting of P&L insurance companies. Insurers reflect bad news more quickly in the loss reserves than good news. Regarding the effect of organizational form on conservatism, Hypothesis 2 assumes that conservatism is more significant for stock insurers than for mutual insurers because managers of stock insurers are able to exercise more discretion in business management than those of mutual insurers (Mayers and Smith, 1988). Regarding the effect of firm size on conservatism, Hypothesis 3 assumes that conservatism is more significant for large insurers than for small insurers. Since large firms tend to have less concentrated managerial ownership than small firms, the agency problems tend to be more severe in large firms because of less alignment of managers and shareholders. Therefore, large firms demand more conservatism because it is a mechanism to address agency problems.

Regarding the econometric methodology, I adopt the asymmetric timeliness model in Basu (1997). The dependent variable is *Total error*, which is the total loss reserve error for all accident years. Since the sample includes both public and private firms, I use an accounting-based measure to proxy for the news. It is the premanaged net income (*PNI*), which is calculated as reported net income less total loss reserve error. A dummy variable, *D*, is used to identify bad news. *D* is equal to 1 if $PNI < 0$. The *Total error* is regressed on *PNI*, *D*, and their interaction term. If the marginal effect of *PNI* for bad news has a greater magnitude than that for good news, then conservatism

exists. I use three types of *PNI* (current *PNI*, lagged *PNI*, and *PNI* change) and conduct three types of regression models accordingly. Firm fixed effects and year fixed effects are included to control for unobservable firm- and year-specific effects.

I use a sample of affiliated and unaffiliated single P&L insurers domiciled in the U.S. from 2000 to 2009. Only stock and mutual insurers are included. The data come from the National Association of Insurance Commissioners (NAIC) Annual Reports. I exclude the firms with negative assets, negative net premiums written, and extreme loss reserve errors.

Through empirical analysis, I find evidence supporting the H1 and H3 but no evidence supporting the H2. When using the current *PNI* as the proxy for news, I find that insurers are as 1.08 times sensitive to bad news as to good news in estimating the original loss reserves, which suggests that P&L insurers adopt conservative principal in reporting the loss reserves, supporting H1. In addition, large insurers are more conservative than small insurers since large insurers are 1.02 times as sensitive to bad news as to good news while small insurers are only 0.66 times. This supports H3 that. However, I do not find significant evidence supporting H2.

Two explanations can account for the existence and prevalence of conservatism – *reducing information asymmetry* and *reducing shareholder litigation cost*. Conservatism plays an efficient role in constraining managerial opportunism and reducing the information asymmetry between managers and other claimholders. Managers' choices to adopt conservatism in financial reporting can be considered as "the managers' voluntary attempts to bond against exploiting their asymmetrically informed position relative to other claimholders" (Basu, 1997). The shareholder litigation cost is another source for conservatism. Investors can sue the managers and the auditors for investment losses due to fraudulent financial reporting. Liu (2010) finds that litigation concerns can motivate managers to be conservative in preparing financial statements because when losses are recognized in a timelier manner than gains, managers are less likely to be blamed for

investment losses caused by manipulating accounting numbers.

The remainder of the paper is constructed as follow. Section 2 introduces the literature of conservatism, including its definitions, measures, and explanations. Section 3 gives the definition and formula of loss reserve error. Section 4 shows three hypotheses. Section 5 provides the econometric models and the estimation methods. Section 6 shows the data, the empirical results, and the robustness tests. At last, Section 7 concludes.

2. Conservatism Literature Review

2.1. Definitions and Measures of Conservatism

In the absence of a unified definition of conservatism, various definitions and measures of conservatism are studied by the extant literature, including asymmetric timeliness, market-to-book (MTB) ratio, and accruals-cash flows correlation. Basu (1997) makes an important contribution to the understanding of conservatism. He defines conservatism as "capturing accountants' tendency to require a higher degree of verification for recognizing good news than bad news in financial statements." He studies the conservatism by measuring the asymmetric timeliness of earnings. Under his interpretation, earnings are expected to "reflect bad news more quickly than good news" in a conservative accounting system.

Basu's primary research design tests how current-year accounting income reflects differently in terms of timeliness to positive and negative stock returns over the fiscal year (proxies for good and bad news). The econometric regression model for his basic hypothesis is as follow:

$$E_{it}/P_{it-1} = \alpha_0 + \alpha_1 DR_{it} + \beta_0 R_{it} + \beta_1 R_{it} * DR_{it} + \varepsilon_{it} \quad (1)$$

where E_{it} = earnings per share for firm *i* in fiscal year *t*,

P_{it-1} = the stock price per share at the beginning of the fiscal year *t*,

R_{it} = the stock returns on firm *i*,[1] and

[1] Three types of annual returns are used in Basu (1997) with earnings adjusted accordingly: (1) inter-announcement

DR_{it} = an indicator variable that is set equal to one if R_{it} is negative and is set equal to zero otherwise.

In the above regression, β_0 measures the response of earnings to positive returns (proxy for good news) and $(\beta_0 + \beta_1)$ measures the response of earnings to negative returns (proxy for bad news). Conservatism implies that $\beta_0 + \beta_1 > \beta_0$, that is, the interaction slope coefficient $\beta_1 > 0$. Basu (1997) defines β_1 to measure "the difference in sensitivity of earnings to negative and positive returns" and finds it is significantly different from zero in a pooled cross-sectional regression.

Feltham and Ohlson (1996) developed the MTB measure. They argue that on average, the market value of operating assets exceeds (equals) their book value for conservative (unbiased) accounting because the valuation function of market value under conservative accounting requires additional adjustment for the understatement of operating assets. Thus, the MTB ratio greater than 1 indicates the conservative accounting system. Some studies question the validity of Basu's asymmetric timeliness measure (Givoly, Hayn, and Natarajan, 2007; Dietrich, Muller, and Riedl, 2007). An important basis for that is the observed negative correlation between Basu's measure and the MTB ratio (Givoly, Hayn, and Natarajan, 2007; Roychowdhury and Watts, 2007).

Ball and Shivakumar (2005) propose a model to use "the positive but asymmetric relation between accruals and contemporaneous cash flows" as the measure of conservatism for a sample of private firms in the United Kingdom. They develop an alternative model in addition to Basu's (1997) model because private firms do not have market returns available. They argue that "the positive correlation between accruals and cash flows arises because cash flows from an individual

period return which is the return from 9 months before fiscal year end to 3 months after fiscal year end, (2) market adjusted inter-announcement period return which is the inter-announcement period return less the corresponding Center for Research in Security Prices (CRSP) equal-weighted market return, and (3) fiscal year return which is the stock return cumulated over the firm's fiscal year, from the beginning of the fiscal year to its end. The corresponding earnings for type (1) and (3) returns is just the earnings per share for the fiscal year. The corresponding earnings for the market-adjusted returns is the earnings-price ratio adjusted by the average earnings-price ratio for the sample firms in the same fiscal year.

durable asset (such as plant and equipment, or an ongoing production process) tend to be correlated over time," and thus "revisions in current period cash flow are positively correlated with current revisions in expected future cash flows." The asymmetric correlation between accruals and cash flows arises "because economic losses are more likely to be recognized on a timely basis, as unrealized (i.e., non-cash) accrued charges against income," whereas "economic gains are more likely to be recognized when realized, and hence accounted for on a cash basis."

In Ball and Shivakumar's (2005) research design which is shown in equation (2), they adopt the Dechow, Kothari, and Watts's (1998) model to calculate accruals (ACC) which is used as dependent variables. Instead of stock returns, they proxy the news using cash flows from operations (CFO) which is equals earnings before extraordinary items less discretionary accruals. They also include a dummy $DCFO_t$ that equals one if CFO_t is negative and zero otherwise. Under conservatism hypothesis that accrued losses are more likely in periods of negative cash flows, the authors predict a positive incremental coefficient β_3 for negative cash flows.

$$ACC_t = \beta_0 + \beta_1 DCFO_t + \beta_2 CFO_t + \beta_3 DCFO_t \times CFO_t + v_t \quad (2)$$

where ACC_t = accruals

CFO_t = cash flows from operations which is measured as earnings before exceptional and extra-ordinary items less accruals, and

$DCFO_t$ = 1 if CFO_t is negative and 0 otherwise.

This paper adopts Basu's (1997) asymmetric timeliness measure to study the existence of conservatism in P&L insurance industry. More detailedly, it studies whether the bad news is reflected in a timelier manner in loss reserves than the good news. Loss reserve error provides an observable and material measure of managerial bias. Since the sample includes private firms, instead of stock returns, an accounting-based measure is used to proxy the news, which is the premanaged net income. It is equal to the reported net income less the total loss reserve error.

2.2. Conditional and Unconditional Conservatism

Conservatism can be unconditional (or *ex ante* or news independent), meaning that aspects of the accounting process determined at the inception of assets and liabilities yield expected unrecorded goodwill. Conservatism can be conditional (or *ex post* or news dependent), meaning that book values are written down under sufficiently adverse circumstances but not written up under favorable circumstances. The difference between conditional and unconditional conservatism is "central to understanding the role of conservatism in efficient contracting with the firm" (Ball and Shivakumar, 2005).

Basu (2005) demonstrate that "the key distinction between unconditional conservatism and conditional conservatism is that the former only utilizes information known at the inception of the asset's life; whereas the latter one utilizes, and hence reveals, information when it is received in future periods." If the information of future cash flows is not used, then conservatism cannot play a role in contracting because it does not provide new information that could generate contracting responses. Ball and Shivakumar (2005) argue that only conditional conservatism is likely to improve contracting efficiency because it employs new information. Unconditional conservatism is likely a response to regulatory or tax incentives.

Beaver and Ryan (2005) document that the literature on unconditional conservatism emphasize more on "the difficulty of valuing certain types of economic assets and liabilities and determining their effects on future income." However, the literature on conditional conservatism emphasize more on "improving contracting efficiency given managers' incentives to report upward-biased accounting numbers." In this paper, I only study the conditional conservatism.

2.3. Incentives for Conservatism

Watts (2003) documents four explanations for conservatism: contracting, shareholder litigation, taxation, and accounting regulation. The empirical evidence suggests that the

contracting and shareholder litigation explanations are most important ones while the effects of taxation and regulation are weaker.

Reducing Information Asymmetry

Separation of ownership and control gives rise to agency problems between managers and owners of the firm. Financial reporting conservatism is one potential mechanism to address these agency problems (Lafond and Roychowdhury, 2008). Basu (1997) mainly attributes the existence and pervasive influence of conservatism to the costly contracting explanations. Managers often possess valuable private knowledge about firm operations and risk managements which shareholders and outsiders do not have access to. Hence, if managerial compensation is dependent on firm performance, then managers have incentives to withhold any information that would adversely affect their compensation from financial reports. The asymmetric information makes the contracting costly because it produces agency costs. Basu argues that "the emergence of the conservatism principle and the preparation of audited financial statements can be ascribed to managerial attempts to bond against exploiting their asymmetrically informed position relative to other claimholders."

LaFond and Watts (2008) provide similar explanations from the aspect of the information role of conservatism. They argue that "information asymmetry between firm insiders and outside equity investors generates conservatism in financial statements." Managers with asymmetric information have incentives and ability to manipulate accounting numbers especially when their compensations are performance-dependent. Conservatism can constrain managerial opportunistic behaviors and thereby reduce information asymmetry and the deadweight losses that information asymmetry generates.

Conservatism is also hypothesized to play an important role in debt contracting. Debtholders and other creditors also demand timely information about bad news because their

claims payoffs are more sensitive to a decrease than an increase in firm value (Smith and Warner, 1979). Nikolaev (2010) studies whether the use of covenants in debt financing can make the accounting system more conservative. When a company faces financial distress, the covenant policies take effect and transfer part of decision-making and control rights from shareholders to bondholders, thereby limiting managers' abilities to expropriate bondholder's wealth. Using Basu's asymmetric timeliness measure of conservatism, Nikolaev finds that firms with more extensive use of covenants in their public debt contracts exhibit timelier recognition of economic losses in accounting earnings, i.e. more conservative financial reporting.

Reducing Shareholder Litigation Costs

Shareholder litigation is another source for conservatism in recent years. Investors can sue the managers and the auditors for investment losses due to fraudulent financial reporting. Watts (2003) argues that litigation cost is asymmetric because overstating the firm's net assets is more likely to generate litigation costs for firm than underestimating net assets. The asymmetric litigation costs create incentives for managers to adopt a conservative accounting system. Liu (2010) argues that litigation concerns motivate managers and auditors to be conservative in preparing financial statements because when losses are recognized in a timelier manner than gains, managers and auditors are less likely to be blamed for investment losses caused by manipulating accounting numbers. In other words, conservatism "shields managers and auditors from allegations that they overstated earnings and net assets."

In a more litigious environment, both managers and auditors could be more sensitive to expected litigation costs because shareholders are more likely to be protected by the legal system against managers' opportunism. The litigation costs increase with the level of information asymmetry, and thereby conservatism plays a more important role in a more litigious environment. Liu and Elayan (2015) hypothesize and find that the association between information asymmetry

and conservatism is positively related to the level of litigiousness.

Tax Shield Effect and Regulation Incentive

Watts (2003) argue that "the links between taxation and reporting can also generate conservatism in financial reporting." Since losses have tax-shield benefits, when losses are recognized in a timelier manner than gains, managers of profitable firms can defer the tax payments by "delaying the recognition of revenues and accelerating the recognition of expense." This increases the value of firm. Watts also argue that the asymmetric political costs also motivate financial reporting standard setters and regulators to favor conservative reporting because conservatism shield standard setters and regulators from criticism for firm's overstatement of net assets. Taxation and regulation mainly explain the unconditional conservatism. They have weaker explanation power than the contracting and litigation explanations.

Relation between Conservatism and Earnings Management

Both conservatism and earnings management are about managerial discretion in financial reporting. They coexist in financial reporting but represent for different incentives. Conservatism is *systematically* recognizing bad news more quickly and completely than good news. In a principal-agent setting, conservative accounting system could be either required by the principal or voluntarily adopted by the agent in order to reduce agency costs and/or to increase the firm and equity value. It can also improve the debt efficiency by complementing the covenants. However, earnings management represent another set of managers' incentives, where managers may manipulate earnings to avoid losses, inflate their compensations, exaggerate firm performance after the turnover, etc. More importantly, managers do not manage earnings in a systematic way. What they do depends on the firm's performance, their compensation structure, and other factors. Hence, earnings management is quite different from conservatism, and the conservatism should be studied in a setting without earnings management.

3. Loss Reserve Error

Loss reserves represent the liability for unpaid claims and unpaid loss adjustment expenses incurred as of a given valuation date. The reserves should include estimates of potential losses for all reported but unpaid claims and all incurred but not reported (IBNR) claims. Because of the uncertainty surrounding the losses estimation of unsettled claims, the loss reserve estimation requires considerable managerial discretion. With the passage of time, more information becomes available regarding those unsettled claims and how original loss reserves are revised. Insurers are required to disclose the year-by-year revisions for an original loss reserve for 10 years. These revisions are recorded in Schedule P of the NAIC Annual Statement.

A loss reserve error for accident year *t* is defined as the revised loss reserves in development year *t+5* minus the original loss reserves stated in development year *t*. I use the total loss reserve error (*Total error*) as the dependent variable, which accumulates the loss reserves of all accident years prior to the evaluation date. I use 5-year period because Petroni (1992) documents that most claims are likely to have been paid and settled within 5-year period.

The *Total error* is defined as:

$$\text{Total Error}_{i,t} = \left(\begin{matrix}\text{Revised Incurred}\\ \text{Losses}\end{matrix}_{i,t+5} - \begin{matrix}\text{Original Incurred}\\ \text{Losses}\end{matrix}_{i,t}\right)/\text{Total Assets}_{i,t} \qquad (3)$$

A positive loss reserve error indicates under-reserving and a negative loss reserve error indicates over-reserving. I scale the loss reserve error by the total admitted assets to reduce the heteroskedasticity problem and improve cross-sectional comparability (Petroni, 1992; Grace, 1990; Beaver, McNichols, and Nelson, 2003; Gaver and Paterson, 2004, Grace and Leverty, 2012).[2] An alternative loss reserve error, the loss reserve error for current accident year (*AY error*), is used in the robustness test as the dependent variable.

[2] Grave and Leverty (2012) scale reserve errors by the total assets. I also analyze the sensitivity of empirical results to scaling variable in the robustness tests session.

4. Hypotheses Development

4.1. Existence of Conservatism

Conservatism means that bad news is more quickly reflected in loss reserves than good news. Under conservative principle, managers and actuaries require a higher degree of verification for the recognition of good news than bad news in financial statements. As a result, if an insurance company reports conservatively, then its loss reserves will be adjusted to bad news in a timelier manner than to good news. This is the asymmetric timeliness of loss reserves to bad news and good news. Hence, Hypothesis 1 is:

> ***Hypothesis 1:*** Managers of P&L insurance companies reflect bad news in the loss reserves more quickly than good news, i.e. conservatism exists in P&L insurance companies.

4.2. Impact of Firm Factors

Several firm factors may affect the main financial decisions of insurers, such as firm size, organizational form, group affiliation, financial healthy, etc. In this paper, I explore the effects of two factors on the decision of conservative reporting.

Organizational Form

There are two main forms of organization in the insurance industry: stock firms and mutual firms. In stock firms, the shareholders bring capital and receive the residual value. In mutual firms, customers provide capital, bear risk, and own the residual value of the firm. A mutual insurer is collectively owned by its policyholders, whereas in a stock firm two distinct groups perform the ownership and customer functions. Ownership rights in these two types of firms are not equal (Viswanathan and Cummins, 2003). Managers in these two types of firms also have different freedom to exercise discretion. These differences lead to the conservatism more significant in stock organizations than in mutual organizations.

Greene and Johnson's (1980) survey demonstrates that "the group of mutual insurers officers does not feel as free to conduct their business as their legal immunity from policyholder

powers might suggest." On the contrary, more stock insurer officers than mutual officers believe that they can exercise greater discretion, even though they may receive more constrains from the shareholders.

Mayers and Smith (1988) argue that managers of stock firms could exercise higher managerial discretion because shareholders can employ various monitoring mechanisms to control the costs of managerial opportunism, whereas mutual owners do not employ those mechanisms. A key means which stock owners use while mutual owners do not is manager's turnover. For stock firms, the board has the authority to monitor the manager and shareholders can vote for replacing the existing manager. The threat of an outside takeover can be a significant factor in improving the power of monitoring and reducing managerial opportunism. In a mutual, however, the turnover threat is weaker because the mutual owners would have to remove existing management through a proxy fight and the costs of turnover could outweigh the gains. Therefore, since mutual insurance companies have higher costs for monitoring and controlling management than stock insurance companies, mutuals are usually concentrated on business lines where managerial discretion is rarely needed comparing to stocks.

Conservatism is documented to be an efficient mechanism to constrain managers' opportunistic behaviors (Basu, 1997; Watts, 2003; Kwon, Newman, and Suh, 2001; Ball and Shivakumar, 2005). Thus, I assume that financial reporting conservatism should be more significant for stock insurance companies than for mutual companies because managers in stock insurance companies are able to exercise more discretion in business management than those in mutual insurance companies.

Another reason is because of the shareholder litigation cost. In a mutual firm policyholders pay very low attention to management. Greene and Johnson (1980) survey about 60 of the largest life insurers on policyholder attendance at their annual meetings. For mutual insurers, the

policyholder attendance rate is between 0.001 percent to 0.2 percent, whereas for stock insurers, shareholder attendance ranges from 0.7 percent to 44.9 percent. Thus, stockholder owners seem more likely to attend annual meetings and communicate with the firm than mutual policyholders. Policyholders of mutual insurance companies prefer to consider them as consumers rather than owners of the mutual insurance company. It is unlikely for mutual policyholders to sue managers and auditors for recouping losses. Hence, litigation risk is very low in mutual insurance companies. Since litigation risk is an important source of conservatism, conservatism is expected to be less significant in mutual firms than in stock firms. Thus, Hypothesis 2 is:

> ***Hypothesis 2:*** The financial reporting conservatism is more significant for stock P&L insurance companies than for mutual P&L insurance companies.

Firm Size

Agency problems are different in large and small insurance companies. Generally speaking, managerial ownership of large insurance companies is lower than that of small insurance companies. Since large insurance companies need more capitalization during their growth, their ownership structure is more likely to be diversified. They hire an outside manager who manage the firm on behalf of all owners and get a low proportion of ownership for compensation. Compared to large firms, manager of small firms is more likely to be the owner with a large proportion of ownership. Ownership and control of small firms are not separated as completely as of large firms.

Lafond and Roychowdhury (2008) argue that accounting conservatism is negatively related to managerial ownership when conservatism is defined as "the imposition of stricter verification standards for recording good news as gains than for recording bad news as losses." The degree of alignment between managers and shareholders should be positively related to managerial ownership. The agency problems are more severe when the managerial ownership is smaller and the managers and shareholders are less aligned, and a more conservative reporting standard is

expected in this situation. Hence, Hypothesis 3 is:

> ***Hypothesis 3:*** The financial reporting conservatism is more significant for large P&L insurance companies than for small P&L insurance companies.

5. Econometric Methodology

5.1. Premanaged Net Income

I use the econometric model in Basu (1997) to estimate the asymmetric timeliness of loss reserves. One limitation of Basu's model is that it cannot be applied to private firms since stock returns, which is the proxy for news in Basu's paper, are not available for private firms. Hence, I use the premanaged net income (*PNI*) to proxy for news. *PNI* is defined as the reported net income less the total loss reserve error. The way to back out the loss reserve error from reported net income is as follow.

For an insurer's balance sheet in year *t*:

$$\text{Net Income}_t = \begin{matrix}\text{Net Underwriting}\\ \text{Gain}\end{matrix}_t + \begin{matrix}\text{Net Investment}\\ \text{Gain}\end{matrix}_t + \begin{matrix}\text{Total Other}\\ \text{Income}\end{matrix}_t \quad (4)$$

$$\text{Net Underwriting Gain}_t = \text{Premiums Earned}_t - \text{Incurred Losses}_t - \text{Expenses}_t \quad (5)$$

Equation (4) and (5) show that loss reserve error is already incorporated in reported net income because the losses incurred in Equation (5) already include the loss reserve error, as shown in Equation (6).

$$\begin{matrix}\text{Original}\\ \text{Incurred Losses}\end{matrix}_t = \begin{matrix}\text{Revised}\\ \text{Incurred Losses}\end{matrix}_{t+5} - \text{Loss Reserve Error}_t \quad (6)$$

Rewriting Equation (6):

$$\begin{matrix}\text{Revised}\\ \text{Incurred Losses}\end{matrix}_{t+5} = \begin{matrix}\text{Original}\\ \text{Incurred Losses}\end{matrix}_t + \text{Loss Reserve Error}_t \quad (7)$$

Hence, *PNI* is calculated as the reported net income minus loss reserve error, as shown in Equation (8):

$$\begin{matrix}\text{Premanaged Net}\\ \text{Income}\end{matrix}_t = \left[\text{Premiums Earned}_t - \begin{matrix}\text{Revised}\\ \text{Incurred Losses}\end{matrix}_{t+5} - \text{Expenses}_t\right] +$$

$$\text{Net Investment Gain}_{t} + \text{Total Other Income}_{t} =$$

$$\text{Reported Net Income}_{t} - \text{Loss Reserve Error}_{t} \quad (8)$$

5.2. Asymmetric Timeliness Model

I use an asymmetric timeliness mode to test the existence of conservatism. The dependent variable is the total loss reserve error, *Total error*. As for independent variable, three types of *PNI* are used: current *PNI*, lagged *PNI*, and the change of *PNI*. Accordingly, three separate regression models are conducted for each of them, respectively.

Managers and owners could use any of the three types of *PNI* for decision-making. Usually managers generate predictions regarding whether the firm is facing adverse or favorable circumstances based on the current year's *PNI*. However, there may be not enough time for managers to response in this period. They may make a response in the next period. Besides, in order to make a response, managers may need to gather other information to make rational decisions. In this case, they may rely on the lagged *PNI* or the change of *PNI* to make a decision.

The Hypothesis 1 is tested by Equation (9a) through (9c) where *PNI*, lagged *PNI*, and *PNI* change are the proxy for news, respectively. Firm fixed effects and year fixed effects are included in the regression models to control for time-specific and firm-specific unobservable effects.

$$Total\ Error_{it} = \alpha_0 + \alpha_1 D_{it} + \beta_0 PNI_{it} + \beta_1 PNI_{it} * D_t + \alpha_2 Stock_{it} + Year_t + c_i + \varepsilon_{it} \quad (9a)$$

$$Total\ Error_{it} = \alpha_0 + \alpha_1 D_{it-1} + \beta_0 PNI_{it-1} + \beta_1 PNI_{it-1} * D_{t-1} + \alpha_2 Stock_{it} + Year_t + \quad c_i + \varepsilon_{it} \quad (9b)$$

$$Total\ Error_{it} = \alpha_0 + \alpha_1 \Delta D_{it} + \beta_0 \Delta PNI_{it} + \beta_1 \Delta PNI_{it} * \Delta D_t + \alpha_2 Stock_{it} + Year_t + c_i + \varepsilon_{it} \quad (9c)$$

where i, t = firm i and year t,

$Total\ Error_{it}$ = total loss reserve error scaled by total admitted assets,

PNI_{it} = premanaged net income for current year scaled by total admitted assets, proxying for news in Model (9a),

D_{it} = dummy variable equal to 1 if $PNI_{it} < 0$ and 0 otherwise, identifying the bad news in model (9a),

PNI_{it-1} = lagged premanaged net income scaled by previous year's total admitted assets, proxying for news in model (9b),

D_{it-1} = dummy variable equal to 1 if $PNI_{it-1} < 0$ and 0 otherwise, identifying the bad news in model (9b),

ΔPNI_{it} = $PNI_{it} - PNI_{it-1}$, the year change of premanaged net income, scaled by total admitted assets, proxying for news in model (9c),

ΔD_{it} = dummy variable equal to 1 if $\Delta PNI_{it} < 0$ and 0 otherwise, identifying the bad news in model (9c),

$Stock_{it}$ = dummy variable equal to 1 if the insurer *i* is a stock firm and 0 if the insurer *i* is a mutual firm,

$Year_t$ = a common year effect to control for time fixed effects, such as the exogenous economic factors,

c_i = firm fixed effects to control for omitted unobservable firm-specific effects, and

ε_{it} = random error term.

The Breusch-Pagan Lagrange multiplier tests are conducted to test whether random-/fixed-effects are existed. The results show that the null hypothesis of no firm-specific or year-specific effects is rejected (p-value<0.001), suggesting that fixed-/random-effects models are more efficient than a pooled cross-sectional model. Hausman tests are conducted to test whether a random effects model is more appropriate than a fixed effects model. However, the *chi-square* values are negative, which indicates that the model fitted on these data fails to meet the asymptotic assumptions of the Hausman test. Generally speaking, the fixed effects method is more robust than the random effects model.

The Hypothesis 2 is tested by interacting all explanatory variables with the stock dummy and the mutual dummy separately.

$$Total\ Error_{it} = \alpha_0 + Stock_{it} * (\alpha_{S1} D_{it} + \beta_{S0} PNI_{it} + \beta_{S1} PNI_{it} * D_t) + Mutual_{it}$$
$$* (\alpha_{M1} D_{it} + \beta_{M0} PNI_{it} + \beta_{M1} PNI_{it} * D_t) + Year_t + c_i + \varepsilon_{it}$$

The coefficients β_{S0} and β_{S1} are the marginal effects of the stock firms, and the coefficients β_{M0} and β_{M1} are the marginal effects of the mutual firms. In this way, I can compare the stock and the mutual firms' coefficients directly by the Wald test.

The Hypothesis 3 is tested by interacting the large firm dummy and small firm dummy variables with all other explanatory variables separately. An insurer is defined as a large firm if the insurer's total admitted asset is greater than the sample's median. Similarly, the large firms' coefficients are β_{L0} and β_{L1} while the small firms' coefficients are β_{S0} and β_{S1}.

$$Total\ Error_{it} = \alpha_0 + Large_{it} * (\alpha_{L1} D_{it} + \beta_{L0} PNI_{it} + \beta_{L1} PNI_{it} * D_t) + Small_{it}$$
$$* (\alpha_{S1} D_{it} + \beta_{S0} PNI_{it} + \beta_{S1} PNI_{it} * D_t) + Year_t + c_i + \varepsilon_{it}$$

5.3. Sensitivity Ratio

In the regression models, β_0 is the adjustment of the original loss reserves associated with one-unit change of PNI when D = 0. It measures the insurer's response to good news. The sum($\beta_0 + \beta_1$) is the adjustment of the original loss reserves associated with one-unit change of PNI when D = 1. It measures the insurer's response to bad news. Hence, the interaction slope coefficient β_1 measures the difference in the *sensitivity* of insurer's response to good or bad news.

The sign of the coefficients β_0 and $\beta_1$represents the directions of adjusting the original loss reserves. According to the definition of the loss reserve error, a positive coefficient means underestimating the original loss reserves more and a negative coefficient means overestimating the original loss reserves more. However, I do not distinguish the sign of the coefficients. I only look at their magnitudes because it is possible for an insurer to adjust the original loss reserves in either way. Only the magnitudes of the adjustment show how sensitive an insurer is in response to good news or bad news.

A sensitivity ration can be constructed as $|(\beta_0 + \beta_1)/\beta_0|$. It represents how many times an insurer is more sensitive to bad news than to good news. A conservative financial reporting implies $|(\beta_0 + \beta_1)/\beta_0| > 1$, i.e. the magnitude of the adjustment of the original loss reserves by an insurer to bad news is larger than that to good news. $|(\beta_0 + \beta_1)/\beta_0| > 1$ can serve as a rule of determining the existence of conservatism.

6. Data and Empirical Results

6.1. Data and Descriptive Statistics

I use a sample of affiliated and unaffiliated single P&L insurers domiciled in the U.S insurance industry. The sample spans from 2000 to 2009. Since one-year lagged PNI and 5-year leading revised loss reserves are used, the data of PNI extend to 1999 and the data of loss reserves extend from 1998 to 2014. All data come from 1998-2014 NAIC Property-Casualty Annual Statement Database. The sample is screened based on the following criteria:

(1) Excluding insurers with negative total admitted assets,

(2) Excluding insurers with negative net premiums written,[3]

(3) Excluding insurers who have missing RBC ratios, and

(4) Excluding insurers with extreme loss reserve errors from the sample.[4]

Before screening, the sample includes 2,537 firms and 21,333 firm-year observations. After screening, the final sample includes 1,993 firms and 14,917 firm-year observations. The descriptive statistics of all variables are shown in Table 1. The *Total error* (loss reserve error for all accident years) has a mean of 7.65 million, which is much larger than that of *AY error* (loss reserve error for current accident year) -6.26 million. The mean values show that P&L insurers on average underestimate the total loss reserves but overestimate the loss reserves of current accident

[3] To exclude insurers who cede all premiums to other insurers because they do not have reserves.
[4] The extreme loss reserve error is defined as the original loss reserves estimate differs from the revised estimate by greater than 50 percent in absolute value. Insurers with extreme total errors are excluded.

year. The median of *Total error* and AY error is -0.45 and -0.44 million, respectively, which indicates that most insurers overestimate loss reserves. The distribution of loss reserve error is heavily right-skewed. The standard deviation of *Total error* is as 4.4 times large as that of *AY error*, which suggests that *Total error* is more volatile than *AY error*.

The value of *PNI* (premanaged net income) varies from -5.37 billion to 7.77 billion. *PNI* has a mean of 13.38 million and a median of 1.86 million. Its distribution is also right-skewed. The mean of dummy variable *D* is 0.295, which means that 29.5% observations of the sample face adverse circumstances. If judged by Δ*PNI*, the proportion of observations facing bad news is 44.8%. Among the sample, 78.8% observations are stock firms and the remaining 21.2% are mutual firms. The average admitted assets is 0.75 billion. The average RBC ratio is 13.94.

6.2. Empirical Results

The empirical results of Hypothesis 1 are shown in Table 2. Column 1 shows the results of Model 9a where PNI_{it} and D_{it} are regressors. Column 2 shows the results of Model 9b where PNI_{it-1} and D_{it-1} are regressors. Column 3 shows the results of Model 9c where ΔPNI_{it} and ΔD_{it} are regressors. The dependent variable of the three regressions is the total loss reserve error. The results of Breusch-Pagan LM tests show that the random-/fixed-effects methods are more appropriate than the pooled cross-sectional models. Hence, all regressions incorporate firm fixed effects and year fixed effects to control for firm specific and year specific unobservable effects.

The results in Table 2 show that the coefficient β_0 are statistically significant in all three regression models but the interaction coefficient β_1 is only statistically significant in Model 9a. In Model 9a, for insurers facing favorable circumstance (D = 0) the marginal effect of PNI on total loss reserve error is -0.615, meaning that one-unit change in the current year's PNI is associated with adjusting the original loss reserves by 0.615. For insurers facing unfavorable circumstances (D=1) the marginal effect of PNI on total loss reserve error is -0.663 (0.615+0.048). This means

that when the news is bad one-unit change in the current year's PNI is associated with adjusting the original loss reserves by 0.663. The adjustment of the original loss reserves in response to bad news is larger than that in response to good news.

As I mentioned in Section 5.3, a sensitivity ratio is calculated as $|(\beta_0 + \beta_1)/\beta_0|$ and represents how many times an insurer is more sensitive to bad news than to good news. $|(\beta_0 + \beta_1)/\beta_0| > 1$ indicates the existence of conservatism, i.e. insurers adjust the original loss reserves by a larger magnitude to bad news than to good news. In Table 2, the sensitivity ratio of Model 9a is 1.08, which is greater than 1, supporting the hypothesis that conservatism exists in the P&L insurance industry.

The empirical results of Hypothesis 2 are shown in Table 3. A stock dummy and a mutual dummy are interacted with all other explanatory variables. The coefficients interacted with the stock dummy and the mutual dummy represent the marginal effects of a stock insurer and a mutual insurer, respectively. They are shown in two separate columns. In this way, it is convenient to compare them directly. The Wald tests show whether the coefficients and the sensitivity ratios of stock and mutual insurers are statistically different.

In Table 3, the interaction slope coefficient β_1 is only statistically significant in Model 9a for both stock and mutual insurers. The Wald tests of the coefficients β_0 and β_1 are statistically significant, meaning that the marginal effects of PNI on the adjustment of the original loss reserves are different for stock and mutual insurers. However, In Model 9a, the sensitivity ratios of both stock and mutual firms are smaller than 1, and the Wald test is insignificant. The results of the sensitivity ratio fail to support the Hypothesis 2. Hence, stock and mutual insurers do not have significantly different levels of conservatism.

The empirical results of Hypothesis 3 are shown in Table 4. An insurer is defined as a large firm if its total admitted asset is larger than the sample's median; otherwise, it is defined as a small

firm. The large firm dummy and the small firm dummy are interacted with all other explanatory variables. The coefficients of the large insurers and the small insurers are shown in two separate columns.

In Table 4, the results of β_0 and β_1 are only statistically significant in Model 9a. The Wald test of β_0 is statistically significant while the Wald test of β_1 is insignificant. The sensitivity ratio of large and small insurers is 1.02 and 0.66, respectively. According to the rule of $|(\beta_0 + \beta_1)/\beta_0| > 1$, large insurers are more conservative in financial reporting than small insurers. The Wald test of sensitivity ratio of Model 9a is also statistically significant, indicating that the large insurers exhibit a significantly higher level of conservatism than the small insurers. The results support the Hypothesis 3.

6.3. Robustness Test

A robustness test is conducted for an alternative dependent variable, AY error. This is the loss reserve error for only current accident year. Since *Total error* includes the loss reserve error coming from previous accident years, it incorporates more information than the *AY error*. However, since the claims of previous accident years have been settled for a longer time period, more of their information has been revealed and therefore, managers do not need to exert a lot of discretion in estimating their loss reserves. To the contrary, much of the information associated with current accident year's claims has not been known so the managers need to input their discretion in estimating the current accident year's loss reserves. Consequently, the current accident year's loss reserve error may be more informative and responsive to economic changes than the total loss reserve error. Hence, I conduct the same regressions using the *AY error* as the dependent variable.

The results are shown in Table 5. The slope coefficients β_0 are statistically significant, however, the interaction slope coefficients β_1 are not statistically significant in any model. This

means that in terms of the adjustment of the current accident year's loss reserves, insurers do not response differently to good news and bad news. The current accident year's loss reserves are not reported conservatively.

From the results of Table 5, it seems that *AY error* is responsive to economic changes but not sensitive to good or bad news. One reason may be that the managers only know one-year information when they estimate the current accident year's loss reserves; they may not have enough information to predict future circumstances. When they cannot predict the future, reporting conservatively or liberally can both increase the volatile of loss reserves and harm the firm's performance because loss reserves are a major component of net income. However, the *Total error* incorporates the information of previous accident years. When estimating the loss reserves of previous accident years, managers can have more information and make more reliable prediction on future circumstances. Bases on these predictions, they are able to report the total loss reserves in a conservative way.

7. Conclusion

The meaning of "conservatism" in accounting is different from that in insurance, the latter usually meaning over-reserving, but the former capturing the asymmetric timeliness of adjusting loss reserves to bad news and good news. The purpose of this paper is to study the existence of conservatism in the P&L insurance industry, i.e. whether loss reserves reflect bad news more quickly than good news. Besides, it also tests whether firm factors (organizational form and firm size) affect insurers' degree of conservatism.

Three hypotheses are tested in this paper. Hypothesis 1 assumes that conservatism exists in the financial reporting of P&L insurance companies. Insurers reflect bad news more quickly in the loss reserves than good news. Regarding the effects of organizational form and firm size on conservatism, Hypothesis 2 assumes that conservatism is more significant for stock insurers than

for mutual insurers, and Hypothesis 3 assumes that conservatism is more significant for large insurers than for small insurers.

The asymmetric timeliness model is used to test for the existence of conservatism. The dependent variable is the total loss reserve error, which is the proxy for managerial discretion. The premanaged net income is used to proxy for the news, which is calculated as the reported net income less the total loss reserve error. Firm fixed effects and year fixed effects are included. The sample is the affiliated and unaffiliated single P&L insurers from 2000 to 2009. All data come from NAIC annual reports.

Through empirical analysis, I find evidence supporting the H1 and H3 but no evidence supporting the H2. The results of H1, H2, and H3 are shown in Table 2, Table 3, and Table 4, respectively. When using the current *PNI* as the proxy for news, I find that insurers are as 1.08 times sensitive to bad news as to good news in estimating the original loss reserves, which suggests that P&L insurers adopt conservative principal in reporting the loss reserves, supporting H1. In addition, large insurers are more conservative than small insurers since large insurers are 1.02 times as sensitive to bad news as to good news while small insurers are only 0.66 times. This supports H3 that. However, I do not find significant evidence supporting H2. The robustness test shows that the current accident year's loss reserves are not sensitive to bad news. One possible reason is that managers may not have enough information to predict the future circumstances for current accident year's claims.

One limitation of this paper is that it does not control for other factors that can account for managers' incentives in adjusting loss reserves. Extant literature shows that managers can manage loss reserves in an effort to stabilize earnings (Beaver, McNichols, and Nelson, 2003), increase reported net income income (Eckles and Halek, 2010), avoid regulatory intervention (Gaver and Paterson, 2004), or reduce income tax payments (Grace and Leverty, 2012). Therefore, my next

step of revising this paper is to include those factors into the regressions and investigate whether conservatism still exists after controlling managers' other incentives of managing loss reserves.

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Table 1

Descriptive Statistics for All Variables in Sample: 2000-2009

	Number of Observation	Mean	Median	Standard Deviation	Min	Max
Total Error	14,917	7. 654million	-0.449 million	0.255 billion	-6.125 billion	5.743 billion
AY Error	14,917	-6.262 million	-0.444 million	58.413 million	-1.512 billion	1.219 billion
PNI	14,917	13.38 million	1.857 million	0.301 billion	-5.374 billion	7.770 billion
D	14,917	0.295	0	0.456	0	1
ΔPNI	14,917	6.836 million	0.177 million	0.181 billion	-3.907 billion	6.902 billion
ΔD	14,917	0.448	0	0.497	0	1
Admitted Assets	14,917	0.753 billion	90.100 million	3.702 billion	394,326	104.8 billion
RBC Ratio	14,917	13.94	7.598	37.52	-6.824	2,617
Stock	14,917	0.788	1	0.409	0	1

Note: Total Error is defined as the total loss reserve error for all accident years, measured as ($revised\ loss\ incurred_{t+5}$ - $original\ loss\ incurred_t$) / $asset_t$. AY Error is defined as the loss reserve error for only current accident year. A positive loss reserve error indicates under-reserving and a negative loss reserve error indicates over-reserving. PNI is premanaged net income, defined as the reported net income less the total loss reserve error. D is a dummy variable equal to 1 if PNI<0 and 0 otherwise. ΔPNI is the year change of PNI. ΔD is a dummy variable equal to 1 if ΔPNI <0 and 0 otherwise. Stock is a dummy variable equal to 1 if the insurer is a stock or 0 if the insurer is a mutual. Admitted Assets is the total admitted assets. RBC ratio is the risk-based capital ratio.

Table 2

Empirical Regression Results for Full Sample: 2000-2009

$$Total\ Error_{it} = \alpha_0 + \alpha_1 D_{it} + \beta_0 PNI_{it} + \beta_1 PNI_{it} * D_t + \alpha_2 Stock_{it} + Year_t + c_i + \varepsilon_{it} \quad (9a)$$

$$Total\ Error_{it} = \alpha_0 + \alpha_1 D_{it-1} + \beta_0 PNI_{it-1} + \beta_1 PNI_{it-1} * D_{t-1} + \alpha_2 Stock_{it} + Year_t + c_i + \varepsilon_{it} \quad (9b)$$

$$Total\ Error_{it} = \alpha_0 + \alpha_1 \Delta D_{it} + \beta_0 \Delta PNI_{it} + \beta_1 \Delta PNI_{it} * \Delta D_t + \alpha_2 Stock_{it} + Year_t + c_i + \varepsilon_{it} \quad (9c)$$

	Model (9a) Total Error	**Model (9b)** Total Error	**Model (9c)** Total Error
D	-0.00354**	0.00602***	0.00307**
	(0.00139)	(0.00185)	(0.00145)
PNI (β_0)	-0.615***	-0.342***	-0.294***
	(0.0156)	(0.0156)	(0.0164)
D * PNI (β_1)	-0.0480**	0.00782	0.00159
	(0.0208)	(0.0106)	(0.00606)
Sensitivity Ratio $\lvert(\beta_0 + \beta_1)/\beta_0\rvert$	**1.078**	-	-
Stock	0.00820	0.00825	0.00484
	(0.00551)	(0.00929)	(0.0119)
Constant	0.0144***	0.0243***	0.0122
	(0.00451)	(0.00742)	(0.00939)
N	14,917	14,917	14,917
Adj. R^2	0.710	0.335	0.249
Breusch-Pagan LM test	3218.20***	1421.67***	8107.21***
Hausman test	-90.83	-382.89	-14.67
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Notes: The table shows the results for Hypothesis 1. Standard errors are shown in parentheses. *, **, *** indicate statistical significance at 10%, 5%, 1% confidence level, respectively. The regressions are estimated using fixed effects methods. Year fixed effects are also included in all regressions. Breusch-Pagan LM test shows the statistic under the null hypothesis of no firm-specific or year-specific effects. Hausman test shows the statistic under the null hypothesis that random effects are appropriate. Conservatism implies that sensitivity ratio is greater than 1, i.e. insurers adjust the original loss reserves by a larger magnitude to bad news than to good news.

Total Error is defined as the total loss reserve error for all accident years, measured as ($revised\ loss\ incurred_{t+5}$ - $original\ loss\ incurred_t$) / $asset_t$. A positive loss reserve error indicates under-reserving and a negative loss reserve error indicates over-reserving. PNI is premanaged net income, defined as the reported net income less the total loss reserve error. D is a dummy variable equal to 1 if PNI<0 and 0 otherwise. ΔPNI is the year change of PNI. ΔD is a dummy variable equal to 1 if ΔPNI <0 and 0 otherwise. Stock is a dummy variable equal to 1 if the insurer is a stock or 0 if the insurer is a mutual. Both Total Error and PNI are scaled by total admitted assets.

Table 3

Empirical Regression Results for Stock and Mutual Insurers: 2000-2009

$$Total\ Error_{it} = \alpha_0 + Stock_{it} * (\alpha_{S1} D_{it} + \beta_{S0} PNI_{it} + \beta_{S1} PNI_{it} * D_t) + Mutual_{it} * (\alpha_{M1} D_{it} + \beta_{M0} PNI_{it} + \beta_{M1} PNI_{it} * D_t) + Year_t + c_i + \varepsilon_{it}$$

	Model (9a)			**Model (9b)**			**Model (9c)**		
Dependent var. = Total Error	**Stock Firms**	**Mutual Firms**	Wald test	**Stock Firms**	**Mutual Firms**	Wald test	**Stock Firms**	**Mutual Firms**	Wald test
D	0.0228***	0.0182***		-0.00315	0.00283		-0.000740	-0.00934***	**
	(0.00467)	(0.00486)		(0.0108)	(0.00322)		(0.00310)	(0.00299)	
PNI (β_0)	0.588***	0.322***	***	-0.0197	0.215***	**	-0.462***	-0.0217	***
	(0.0574)	(0.0866)		(0.108)	(0.0412)		(0.122)	(0.0421)	
D * PNI (β_1)	-1.070***	-0.432**	***	-0.147	-0.383***	**	0.798***	-0.0338	***
	(0.0502)	(0.203)		(0.0925)	(0.0698)		(0.199)	(0.0304)	
Sensitivity Ratio $\lvert(\beta_0 + \beta_1)/\beta_0\rvert$	**0.820**	**0.342**		**-**	**0.781**		**0.727**	**-**	
N	14,917			14,917			14,917		
Adj. R^2	0.110			0.016			0.570		
Year fixed effects	Yes			Yes			Yes		
Firm fixed effects	Yes			Yes			Yes		

Notes: The table shows the results for Hypothesis 2. Standard errors are shown in parentheses. *, **, *** indicate statistical significance at 10%, 5%, 1% confidence level, respectively. The regressions are estimated using fixed effects methods. Year fixed effects are also included in all regressions. Wald test shows whether the coefficients (and sensitivity ratios) of mutual insurers and stock insurers are statistically different. Conservatism implies that sensitivity ratio is greater than 1, i.e. insurers adjust the original loss reserves by a larger magnitude to bad news than to good news.

Total Error is defined as the total loss reserve error for all accident years, measured as ($revised\ loss\ incurred_{t+5}$ - $original\ loss\ incurred_t$) / $asset_t$. A positive loss reserve error indicates under-reserving and a negative loss reserve error indicates over-reserving. PNI is premanaged net income, defined as the reported net income less the total loss reserve error. D is a dummy variable equal to 1 if PNI<0 and 0 otherwise. ΔPNI is the year change of PNI. ΔD is a dummy variable equal to 1 if ΔPNI <0 and 0 otherwise. Stock is a dummy variable equal to 1 if the insurer is a stock. Mutual is a dummy variable equal to 1 if the insurer is a mutual. Both Total Error and PNI are scaled by total admitted assets.

Table 4

Empirical Regression Results for Large and Small Insurers: 2000-2009

$$Total\ Error_{it} = \alpha_0 + Large_{it} * (\alpha_{L1} D_{it} + \beta_{L0} PNI_{it} + \beta_{L1} PNI_{it} * D_t) + Small_{it} * (\alpha_{S1} D_{it} + \beta_{S0} PNI_{it} + \beta_{S1} PNI_{it} * D_t) + Year_t + c_i + \varepsilon_{it}$$

	Model (9a)			**Model (9b)**			**Model (9c)**		
Dependent var. = Total Error	**Large Firms**	**Small Firms**	Wald test	**Large Firms**	**Small Firms**	Wald test	**Large Firms**	**Small Firms**	Wald test
D	0.0200***	0.0219***		0.00608*	-0.0107		-0.00135	-0.00403	
	(0.00320)	(0.00694)		(0.00310)	(0.0171)		(0.00290)	(0.00416)	
PNI (β_0)	0.398***	0.624***	*	0.0577	-0.0429		-0.0101	-0.486***	***
	(0.101)	(0.0834)		(0.0619)	(0.148)		(0.0397)	(0.121)	
D * PNI (β_1)	-0.803***	-1.033***		-0.174	-0.152		-0.0581*	0.823***	***
	(0.221)	(0.0631)		(0.108)	(0.113)		(0.0334)	(0.182)	
Sensitivity Ratio $\lvert(\beta_0 + \beta_1)/\beta_0\rvert$	**1.018**	**0.655**	*	**-**	**-**		**6.752**	**0.693**	
Stock	0.00269	-0.00426		-0.0201**	0.00556		-0.0322***	0.0184*	
	(0.00860)	(0.00522)		(0.00934)	(0.00821)		(0.0123)	(0.00953)	
N	14,917			14,917			14,917		
Adj. R^2	0.712			0.345			0.251		
Year fixed effects	Yes			Yes			Yes		
Firm fixed effects	Yes			Yes			Yes		

Notes: The table shows the results for Hypothesis 3. Standard errors are shown in parentheses. *, **, *** indicate statistical significance at 10%, 5%, 1% confidence level, respectively. The regressions are estimated using fixed effects methods. Year fixed effects are also included in all regressions. Wald test shows whether the coefficients (and sensitivity ratios) of small insurers and large insurers are statistically different. Conservatism implies that sensitivity ratio is greater than 1.

Total Error is defined as the total loss reserve error for all accident years, measured as ($revised\ loss\ incurred_{t+5}$ - $original\ loss\ incurred_t$) / $asset_t$. A positive loss reserve error indicates under-reserving and a negative loss reserve error indicates over-reserving. PNI is premanaged net income, defined as the reported net income less the total loss reserve error. D is a dummy variable equal to 1 if PNI<0 and 0 otherwise. ΔPNI is the year change of PNI. ΔD is a dummy variable equal to 1 if ΔPNI <0 and 0 otherwise. Stock is a dummy variable equal to 1 if the insurer is a stock or 0 if the insurer is a mutual. An insurer is defined as a large firm if its total admitted asset is greater than the sample's median and a small firm otherwise. Both Total Error and PNI are scaled by total admitted assets.

Table 5

Robustness Test for AY Error: 2000-2009

$$AY\ Error_{it} = \alpha_0 + \alpha_1 D_{it} + \beta_0 PNI_{it} + \beta_1 PNI_{it} * D_t + \alpha_2 Stock_{it} + Year_t + c_i + \varepsilon_{it} \quad (9a)$$

$$AY\ Error_{it} = \alpha_0 + \alpha_1 D_{it-1} + \beta_0 PNI_{it-1} + \beta_1 PNI_{it-1} * D_{t-1} + \alpha_2 Stock_{it} + Year_t + c_i + \varepsilon_{it} \quad (9b)$$

$$AY\ Error_{it} = \alpha_0 + \alpha_1 \Delta D_{it} + \beta_0 \Delta PNI_{it} + \beta_1 \Delta PNI_{it} * \Delta D_t + \alpha_2 Stock_{it} + Year_t + c_i + \varepsilon_{it} \quad (9c)$$

	Model (9a)	**Model (9b)**	**Model (9c)**
	AY Error	AY Error	AY Error
D	0.000195	0.000660	0.000667
	(0.000719)	(0.000759)	(0.000531)
PNI (β_0)	-0.190***	-0.0670***	-0.176***
	(0.00688)	(0.00746)	(0.00991)
D * PNI (β_1)	0.0105	0.0187	-0.0157
	(0.0120)	(0.0117)	(0.0150)
Sensitivity Ratio $\lvert(\boldsymbol{\beta_0} + \boldsymbol{\beta_1})/\boldsymbol{\beta_0}\rvert$	-	-	-
Stock	0.00378*	0.00402	0.00340
	(0.00225)	(0.00308)	(0.00281)
Constant	0.00384**	0.00490**	-0.00115
	(0.00186)	(0.00246)	(0.00226)
N	13,712	13,712	13,712
Adj. R^2	0.355	0.159	0.286
Year fixed effects	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes

Notes: The table shows the robustness test results for AY errors. Standard errors are shown in parentheses. *, **, *** indicate statistical significance at 10%, 5%, 1% confidence level, respectively. The regressions are estimated using fixed effects methods. Year fixed effects are also included in all regressions. Conservatism implies that sensitivity ratio is greater than 1, i.e. insurers adjust the original loss reserves by a larger magnitude to bad news than to good news.

AY Error is defined as the loss reserve error for only current accident year. A positive loss reserve error indicates under-reserving and a negative loss reserve error indicates over-reserving. PNI is premanaged net income, defined as the reported net income less the total loss reserve error. D is a dummy variable equal to 1 if PNI<0 and 0 otherwise. ΔPNI is the year change of PNI. ΔD is a dummy variable equal to 1 if ΔPNI <0 and 0 otherwise. Stock is a dummy variable equal to 1 if the insurer is a stock or 0 if the insurer is a mutual. Both AY Error and PNI are scaled by total admitted assets.

Table 6

Definitions of Variables

Variables	Definitions
Total Error	total loss reserve error for all accident years, measured as $(revised\ loss\ incurred_{t+5}$ - $original\ loss\ incurred_t)$ / $asset_t$
AY Error	loss reserve error for only current accident year
PNI	premanaged net income, defined as the reported net income less the total loss reserve error
D	a dummy variable equal to 1 if *PNI*<0 and 0 otherwise
ΔPNI	the year change of PNI
ΔD	a dummy variable equal to 1 if Δ*PNI*<0 and 0 otherwise
Stock	a dummy variable equal to 1 if the insurer is a stock or 0 if the insurer is a mutual
Admitted assets	total admitted assets
RBC Ratio	risk-based capital ratio