The International Journal of Business and Finance Research
Vol. 11, No. 1, 2017, pp. 1-12
ISSN: 1931-0269 (print)
ISSN: 2157-0698 (online)

IBFR
www.theIBFR.com

DO PROPERTY-LIABILITY INSURERS CATER THEIR LOSS RESERVE TO INVESTOR SENTIMENT?

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ABSTRACT

We investigate the relation between investor sentiment and property-liability insurers' loss reserves. We use the Michigan Consumer Confidence Index as a proxy for sentiment, we show that during high sentiment periods, property-liability insurers intend to under-estimate loss reserves. In contrast, during periods of low sentiment, property-liability insurers intend to over-estimate loss reserves. We interpret this finding as evidence that insurers cater to investors' optimism (pessimism), driven by investor sentiment, via loss reserve claims. Further analysis indicates that insurers with loss or small profit are more sensitive to investor sentiment, in terms of adjusting loss reserves while insurers with higher earnings are less sensitive to investor sentiment in terms of adjusting loss reserves, consistent with catering theory. The findings of insurers cater their loss reserves to investor sentiment show the need for increased attention from boards of directors, auditors and regulators to earnings reported on the financial statements, especially during periods of high investor sentiment when insurers are more likely to understate loss reserves and accordingly to report optimistic earnings.

JEL: G2, L1

KEYWORDS: Insurers, Loss Reserve, Investor Sentiment

INTRODUCTION

Investor sentiment, defined as optimism or pessimism about market in general is an important part in the literature of behavioral finance (Baker and Wurgler, 2006, 2007). Previous research suggests that managers tend to make financing and investment decisions that cater to investor sentiment. For example, Baker, et al. (2003) propose a catering theory of investment and suggest that managers make investment decisions according to stock price movements. Baker and Wurgler (2004a, 2004b) develop a catering theory of dividends, finding that managers cater to investors demand for dividends when make dividend payments decisions. More recently, Rajgopal, et al. (2007) present a catering theory of earning management and find that earnings management is partially driven by the prevailing investor demand for earnings surprises. Baker, et al. (2009) proposes a catering theory of nominal stock prices and predicts that managers cater to investors valuations.

Despite the bulk of existing studies on catering theory to investor sentiment, the research in the insurance industry is rare. Our study seeks to fill this gap in the literature by examining the relation between investor sentiment and the loss reserve for a sample of property-liability (P&L) insurers. We exam the catering theory of loss reserve errors in insurance industry is due to the following reasons. First, loss reserves are collectively the largest liability on a P&L insurance company's balance sheet. They could significantly affect the reported earnings and financial strength of an insurance company. Second, loss reserves are required to be disclosed regularly in Schedule P of the NAIC's Annual Statement, which allows us to develop a relatively reliable measure of management's exercise of discretion over earnings.

Third, insurers are generally experts in risk management and follow a philosophy of prudence. Whether they actively respond to market activities would be an issue of interest to both regulators and the public. Fourth, catering theories have important implications on corporate governance and financial policy choices, which allegedly played an important role in the recent financial crisis of 2007 to 2009. Although less involved in than banks, insurers, especially those active in risk taking, are not free of criticism. For this reason, we are interested in examining catering theory as it relates to P&L insurers. Finally, examining a single industry-insurance industry, and hence a homogeneous sample of firms, avoids the potentially confounding effects that industry-specific factors could have on research results.

In this article, we test two hypothesis of catering theory. We first test whether P&L insurers cater their loss reserves to investor sentiment. In the formulation of our hypothesis, we discuss the catering theory supported by the opportunistic view and the managerial sentiment view that could explain the association between investor sentiment and loss reserve claims. The opportunistic views and managerial sentiment view suggest that the cost-benefit trade-off of loss reserve manipulation will vary with investor sentiment. Prior research on social cognition suggests that pessimistic individuals exercise greater scrutiny and are less likely to take information at face value, compared with optimistic individuals (Taylor, 1991, Bless, et al., 1996). We therefore contend that during optimistic (pessimistic) periods, investors will evaluate loss reserve accruals less (more) rigorously and that this reduced (heightened) investor scrutiny will result in managers facing lower (higher) loss reserve related costs. This suggests that managers' likelihood to manipulate loss reserves will increase with investor sentiment.

In our second hypothesis, we test how insurers respond their loss reserves to investor sentiment differently, in terms of various earning levels. Previous papers discuss income-smoothing problem for insurers (Grace, 1990; Grace and Leverty, 2012; Beaver, et al., 2003). For example, Beaver, et al. (2003) examines the relation between P&L insurers' loss reserves and the distribution of their reported earnings. They document that P&L insurers manage loss reserves across the entire distribution of earnings. They further find that small profit insurers report the most income-increasing reserve accruals and insurers with the highest earnings report the most income-decreasing reserve accruals. Accordingly, we propose that the strategic adjustment in loss reserves of insurers with loss or small profits should be more sensitive to investor sentiment and so tend to under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. In contrast, insurers with higher profits are relatively less sensitive.

To test our first hypothesis, we regress loss reserve error on investor sentiment proxied by the Michigan Consumer Confidence Index. We find a negative and significant relation between the level of investor sentiment and loss reserve error, indicating that, during high sentiment periods, P&L insurers intend to under-estimate loss reserves. In contrast, during periods of low sentiment, P&L insurers intend to over-estimate loss reserves. We interpret this finding as evidence that insurers cater to investors' optimism (pessimism), driven by investor sentiment, via loss reserve claims. To test our second hypothesis, we incorporate the interaction item of an insurer's earning and investor sentiment and find that, insurers with loss or small profits are more sensitive to investor sentiment and so tend to under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. In contrast, insurers with higher profits are relatively less sensitive.

Taken together, our results demonstrate that P&L insurers react strategically to sentiment via the loss reserve. The findings of insurers cater their loss reserves to investor sentiment show the need for increased attention from boards of directors, auditors and regulators to earnings reported on the financial statements, especially during periods of high investor sentiment when insurers are more likely to understate loss reserves and accordingly to report optimistic earnings.The outline of the paper is as follows. Section 2 provides a background analysis on loss reserves and investor sentiments. Section 3 develops our hypotheses. Section 4 describes the data and research methodology. Section 5 presents our empirical findings. Section 6 concludes.

LITERATURE REVIEW

Loss Reserves

Under SAP accounting, which insurers are required to follow, loss reserves are insurers' estimated liability for unpaid claims on all losses that occurred prior to the balance sheet date. Loss reserves are collectively the largest liability on a P&L insurer's balance sheet. Gaver and Perterson (2004) report that loss reserves account for 53% of total liabilities. Thus, loss reserves could significantly affect the reported earnings and financial strength of an insurance company. However, estimation of loss reserves is highly subjective and difficult, because not all claims for current period losses are filed by the balance sheet date. Even for claims filed in the current period, the ultimate cash settlement could be quite different in amount or delayed for several years. The accounting matching principle requires insurers to match claim losses with related premium revenues in order to report profitability during a special time interval. Although the premiums are recognized in the year incurred, the majority claims will remain outstanding for several years. To estimate the amount an individual claim will ultimately cost, typically an insurer's actuaries generate predictions about future loss payments and expenses and make a range of recommendations to management, who then chooses the actual loss reserve levels to be reported. Therefore, a failure to correctly account for all current and future expected claims information may cause estimated loss reserve error. It is also possible that management exercises their discretion and misestimate loss reserves intentionally.

Previous literature studies loss reserve error mainly from four aspects: taxes, income smoothing, financial weakness and price regulation. For example, Grace (1990), Petroni (1992), Penalva (1998), and Nelson (2000) find that when taxable income increases, insurers overestimate future claims in an intention to postpone the tax payments until future claim costs are realized in some future periods. Weiss (1985), Grace (1990) and Beaver, et al. (2003) provide evidence that P&L insurers use reserve estimation practices to stabilize reported earnings. That is, when having unexpected high (low) earnings, an insurer will overestimate (underestimate) its reserves. Petroni (1992), Beaver, et al. (2003), and Gaver and Paterson (2004) prove that financially troubled insurers underestimate their reserves to conceal financial distress and evade regulatory intervention. Grace and Leverty (2010) reveal that insurers subject to more stringent rate regulation tend to over-reserve. The above literature mainly focuses on the potential problems of an insurer itself. Managers over- (or under-) estimate reserves, based on their own company's financial situations, and so maintain stability. In this study, we regard investor sentiment as a market view outside the company and extend the prior research by addressing the impact of investor sentiment on P&L insurers' loss reserve estimation.

Investor Sentiment

The behavioral finance literature defines investor sentiment as "a belief about future cash flows and investment risks that is not justified by the facts at hand" (Baker et. al. 2007). In the spirit of Shiller (2000), investor sentiment arises from a mix of rational and irrational cognitive and emotional bias and affects investors' expectations about firms' future performance. Therefore, investor sentiment can cause the deviation of stock prices away from the fundamental values as the standard model suggests. During low sentiment periods, it is more likely for market participants to be pessimistic and underestimate firm values. In contrast, market participants would be more optimistic during high sentiment periods and so overestimate firm values. Shleifer and Vishny (1997) emphasize that it is costly and risky to bet against sentimental investors. As a result, rational market participants would not aggressively force prices back to fundamental values. Part of prior research investigates the association of investor sentiment and different corporate decisions such as capital investment, dividend policy, acquisition and stock splits, and finds significant correlations (e.g. Shleifer and Vishny, 2003, Baker and Wurgler, 2000, Baker, et al., 2003). Some other part of the literature examines how managers respond to investor sentiment via strategic

corporate disclosure. For example, Bergman and Roychowdhury (2008) find that "managers increase their forecasts to walk up current estimates of future earnings over long horizons" during low-sentiment periods. Brown, et al. (2012) find that investors tend to evaluate managers' pro forma disclosures less rigorously and so managers are more likely to disclose adjusted earnings metric during high-sentiment periods. Following Bergman and Roychowdhury (2008), we use the Michigan Consumer Confidence Index as a proxy of investor sentiment. For robustness test, Conference Board's Consumer Confidence Index is also investigated as a proxy. The results are similar with Michigan Consumer Confidence Index. We will not report the results in this paper.

HYPOTHESES DEVELOPMENT

A catering theory has been proposed in several areas such as dividend policy, nominal share prices and earnings management. For example, Baker, et al. (2003) propose a catering theory of investment and suggest that managers make investment decisions according to stock price movements. Baker and Wurgler (2004a, 2004b) propose a catering theory of dividends. Specifically, Baker and Wurgler (2004a) indicate that "Managers rationally cater to investor demand". That is, when dividend-paying companies are traded at higher prices, managers tend to pay dividends. When nonpaying companies are preferred, managers do not pay. They conclude that investor sentiment could be a reasonable and important interpretation of the dividend decision. Baker and Wurgler (2004b) empirically show that investor sentiment changes about dividend-paying companies relative to nonpaying companies may be captured by changes in a company's dividend policy.

More recently, Rajgopal, et al. (2007) examine the relationship between earnings management and investor demand for earnings surprises. They find that, if investors react more optimistically to positive earnings surprises, then managers cater by inflating earnings in periods. Otherwise, if investors react more pessimistically to earnings news, managers may report deflated earnings. They also conclude that investor sentiment is part of a reason for earning optimism leading to earnings catering. Baker, et al. (2009) propose a catering theory of nominal stock prices. It predicts that managers respond by supply lower-price shares if investors put high valuations on low-price companies. In addition, if investors put high valuations on high-price companies, then managers respond by supply higher-price share.

Despite the bulk of existing studies on catering theory to investor sentiment, the research in the insurance industry is rare. Our study seeks to fill this gap in the literature by examining the relation between investor sentiment and the loss reserve for a sample of P&L insurers. We first test whether P&L insurers cater their loss reserves to investor sentiment and discuss four aspects to formulate our first hypotheses. First, managers may care more about current firm value, instead of long run value. Rajgopal, et al. (2007) suggest that, without the assumption of investor rationality, managers care more about current prices/values of firms. There are several reasons. Managers may not be able to stay in their companies for a long period. In short run, they may hope to maximize the current value of firm. In addition, usually managerial compensation and promotion opportunities are closely correlated with current prices. Second, the cost for managers to adjust downward loss reserve levels during high sentiment period may be relatively low. Research in social cognition finds that, when investors hold pessimistic beliefs, they process information more systematically and strictly. With optimistic belief, investors may be easier to accept information reported by companies (Taylor, 1991, Bless, et al., 1996). Therefore, investors evaluate companies' information with less scrutiny during high sentiment period.

Third, managers also have their own sentiment, which may be consistent with the whole market's sentiment. Brown, et al. (2012) investigates managerial sentiment view and states that, during high (low) sentiment periods, sentiment-driven managers may perform to reflect their own optimistic (pessimistic) perceptions. Therefore, it is easy for managers to under- (over-) estimate loss reserves to signal their

optimism (pessimism) during high (low) sentiment periods. Fourth, low sentiment periods may be a good time to managers to adjust back their previously under-estimated loss reserves. In some periods (such as high sentiment periods), managers may under-estimate loss reserves. As the development of claim losses, when reporting loss reserve errors, managers need to reverse previously undervalued loss reserves. Bergman and Roychowdhury (2008) state that analysts tend to be pessimistic in low sentiment periods. Managers can meet their forecast easily. Therefore, it is low-sentiment periods that managers can relatively easily reverse under-estimate loss reserves or "save" some extra for future high-sentiment periods. Based on above analyses, we propose our first hypothesis:

H1: During high (low) sentiment period, insurance companies under- (over-) estimate loss reserves.

In our second hypothesis, we test how insurers respond their loss reserves to investor sentiment differently, in terms of various earning levels. Previous papers discussed income-smoothing problem for insurers. For example, Grace (1990) and Grace and Leverty (2012) argue that managers may adjust loss reserve estimate to induce a rate of return in order to make it consistent with their managerial utility and be accountable to regulators. Especially, Beaver, et al. (2003) examine the relation between P&L insurers' loss reserves and the distribution of their reported earnings. They document that P&L insurers manage loss reserves across the entire distribution of earnings. Especially, small profit insurers report the most income-increasing reserve accruals and insurers with the highest earnings report the most income-decreasing reserve accruals. We propose that, insurers with loss or small profits should be more sensitive to investor sentiment and so tend to under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. In contrast, insurers with higher profits are relatively less sensitive. Thus, our second set of hypotheses is as follows.

H2a: insurers with loss or small profit are more sensitive to investor sentiment, in terms of adjusting loss reserves.

H2b: insurers with higher earnings are less sensitive to investor sentiment, in terms of adjusting loss reserves.

DATA AND RESEARCH METHODOLOGY

Loss Reserve Error

In the literature, loss reserve error is most commonly calculated as the difference between insurers' revised estimate of the cumulative claim losses outstanding disclosed in year $t+j$ and the originally reported estimate of cumulative claim loss reserves at the end of year t, e.g., Petroni (1992), Beaver, et al. (2003), Grace and Leverty (2010).

As in Kazenski, et al. (1992) and Petroni (1992), we calculate loss reserve error as follows:

$$Dev_{i,t} = \left(IncurredLosses_{i,t} - IncurredLosses_{i,t+j}\right) / TotalAssets_{i,t} \qquad (1)$$

Where $IncurredLosses_{i,t}$ is the loss reserve for insurer i reported in year t, and $IncurredLosses_{i,t+j}$ is

the revised estimate of the year t loss reserve reported in year $t+j$. In order to reduce problems of heteroscedasticity to allow cross sectional comparability, and more importantly to reflect the errors' importance relative to the financial statements taken as a while, we scale loss reserve errors by total admitted assets in year t. Generally, a positive loss reserve error means an overestimated original reported reserve, while a negative loss reserve error means the underestimated original reported reserve. Following the previous literature (e.g. Petroni, 1992; Beaver, et al., 2003; Gaver and Paterson, 2004; and Grace and

Leverty, 2012), we examine reserve error by comparing with reserves 5 years later. Therefore, *j* is set as five. That is, for a given calendar year, we examine the difference between total losses incurred and revised total losses incurred 5 years later.

Data

The primary data source is the NAIC Property-Casualty annual statement database from 1990 until 2010. Especially, the primary data source for loss reserve error is the annual statements Schedule P. Schedule P contains each insurer's gradual settlement of claims over time and records all revisions of the loss reserve estimate. Revisions, known as "development", provide an indication of whether the previously reported amount was under- or over-stated. Given a 5-year resolution period, the reserve error sample years are 1990 to 2005. To be included in the sample, firms must have positive reserves, losses incurred, net income and total assets. Each firm must have 16 years data. As a result, our sample includes 1233 companies and 19,728 firm-year observations. To be consistent with the insurance companies' data, we use the annual Michigan Consumer Sentiment Index as our proxy of investor sentiment, SENT. This index is based on a survey of five index questions and calculated from a linear combination of the relative scores for the five questions. The detailed information can be obtained from the website of University of Michigan.

Regressions

To test the relationships between investor sentiment and loss reserve adjustment, we estimate the following model:

$$Dev_{it} = \alpha + \beta * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it} \qquad (2)$$

where Dev_{it} refers to reserve error scaled by total assets, $SENT_{t-1}$ is the Michigan Consumer Confidence Index during year *t-1*. X_{t-1} represents annually control variable, which is the seasonally adjusted growth rate of gross domestic product (GDP) in year *t-1*. GDP data are from the Bureau of Labor Statistics. Z_{it} represents firm characteristic variables, including firms' percentage return on asset (*ROA*), the ratio of net premium earned over total asset (*PremRate*), the natural log of firms' total assets (*Assetlog*), the product line Herfindahl Index (*Herf*) calculated as the sum of the squared percentage of premiums earned in each line of P&L insurers. We regard that there exists some time delay for firms to get data outside firms, such as the Consumer Confidence Index and GDP. Firms should be able to get information on contemporary firm characteristic variables. In order to examine whether the effect of investor sentiments on loss reserve errors depends on insurers' earning distribution, we add an interaction item in our previous model and do the following regression:

$$Dev_{it} = \alpha + \beta * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + b * SENT_{t-1} * ROA_{it} + \varepsilon_{it} \qquad (3)$$

where ROA_{it} is firms' percentage return on asset, included in Z_{it}.
Equation (3) can be also rewritten as:

$$Dev_{it} = \alpha + (\beta + b * ROA_{it}) * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it} \qquad (4)$$

The simple slope, $\beta + b * ROA_{it}$, shows us the regression of loss reserve errors on investor sentiments at particular values of ROA.

RESULTS AND DISCUSSION

Descriptive Statistics

Table 1 summarizes for the descriptive statistics for our sample. All the variables are presented after winsorizing all the variables at the 1st and the 99th percentile to remove the effect of outliers. Consistent with prior research, the average insurer tends to overestimate reserves. The mean (median) loss reserve error is 0.009 (0.012) percent of total assets during the sample period. Since the current data of investor sentiment is in a scale of 100, we divide them by 100, to make it in the same scale with other variables. The mean (median) investor sentiment is 0.92, showing that during the sample period, investors were slightly pessimistic. The seasonally adjusted growth rate of gross domestic product (GDP) has a mean (median) of about 5 percent. In terms of firm characteristics, firms' percentage return on asset (ROA) has a mean (median) of 0.028 percent, meaning the average insurer earns small profit. The mean (median) ratio of net premiums earned over total assets (*PremRate*) is 0.37 (0.36) in the sample. The mean or median total assets (*Assetlog*) are approximately about $85 million, indicating that some particularly large insurers do not skew the size distribution of the sample. The average firm has a product line Herfindahl Index (*Herf*) of 0.46, indicating that the average firm has approximately two lines of business.

Table 1: Descriptive Statistics

Variable	Mean	Median	Std Dev
DevA	0.009	0.012	0.101
SENT	0.921	0.923	0.093
GDP	0.054	0.057	0.012
ROA	0.028	0.028	0.046
PremRate	0.374	0.357	0.219
Herf	0.458	0.363	0.297
Assetlog	18.291	18.268	2.066

This table summarizes for the descriptive statistics for our sample. All the variables are presented after winsorizing all the variables at the 1st and the 99th percentile to remove the effect of outliers. DevA refers to reserve error scaled by total assets. Positive reserve errors are associated with over-reserving and negative reserve errors with under-reserving. The average insurer tends to overestimate reserves. We divide investor sentiment (SENT) by 100 to make it in the same scale with other variables. The mean (median) investor sentiment shows that, during the sample period, investors were slightly pessimistic. GDP represents the seasonally adjusted growth rate of gross domestic product. ROA is firms' percentage return on asset. PremRate is the ratio of net premium earned over total asset. Assetlog means the natural log of firms' total assets. Herf is the product line Herfindahl Index, calculated as the sum of the squared percentage of premiums earned in each line of P&L insurers.

Table 2 presents the Pearson (above the diagonal) and Spearman (below the diagonal). The correlations display the associations between the various independent variables. There is no large correlation coefficient between independent variables. Therefore, the inclusion of all the independent variables in the multivariate models is feasible and accurate.

Regression Results

Table 3 reports the results for our first hypothesis. The coefficient on investor sentiment is negative and statistically significant at 1% level, indicating that the inverse relationship between investor sentiment and loss reserve error. Based on our definition of loss reserve error, this result supports our hypothesis. When investors are optimistic (pessimistic), reflected in high (low) investor sentiment, insurers tend to under-estimate (over-estimate) loss reserves.

Table 2: Correlation Matrix

Panel A: Annual Variables					
	SENT	GDP			
SENT		0.461*			
GDP	0.592*				
Panel B: Firm Annual Variables					
	DevA	ROA	PremRate	Herf	Assetlog
DevA		0.139*	-0.045*	0.149*	-0.093*
ROA	0.175*		-0.027*	0.131*	-0.013
PremRate	-0.013	-0.036*		-0.177*	-0.079*
Herf	0.162*	0.143*	-0.154*		-0.342*
Assetlog	-0.079*	-0.023*	-0.056*	-0.386*	

*This table presents the Pearson (above the diagonal) and Spearman (below the diagonal). Reserve error is scaled by total assets. All variables are defined in Table 1. The correlations marked with * are significant at least at the 5% level.*

Table 3: Regression of Loss Reserve Error on Investor Sentiment

Variable	**Coef.**	**T Value**	**P-Value**	
Intercept	0.279	9.510	<.0001	***
SENT	-0.184	-24.630	<.0001	***
GDP	0.736	13.110	<.0001	***
ROA	0.133	9.150	<.0001	***
PremRate	-0.071	-13.600	<.0001	***
Herf	0.033	7.730	<.0001	***
Assetlog	0.001	1.020	0.306	

*Note: Table 3 reports the results for our first hypothesis. The dependent variable is loss reserve error scaled by total assets. All remaining variables are defined in Table 1. *** indicates significance at 1% levels. The coefficient on investor sentiment is negative and statistically significant at 1% level, indicating that the inverse relationship between investor sentiment and loss reserve error. Based on our definition of loss reserve error, this result supports our hypothesis. During high (low) sentiment period, insurance companies under- (over-) estimate loss reserves.*

The coefficient on ROA is positive and statistically significant at the 1% level, meaning that insurers with high earnings report over-estimated loss reserves. This is consistent with Beaver, et al. (2003) who find that highest earning firms report the most income-decreasing reserves. Following Beaver, et al. (2003) and Grace and Leverty (2012), we also investigate whether the effect of investor sentiments on loss reserve errors depends on insurers' earning distribution. Table 4 shows regression results with interaction item, based on equation (3). The interaction item coefficient is statistically significant, meaning that the two simple slopes ($\beta + b * ROA_{it}$) are significantly different from one another for any two different values of ROA. Insurers with different ROA levels may act differently with investor sentiment. The value of the coefficient, 0.414, means that, given one unit change of ROA, the slope of loss reserve errors on investor sentiment is predicted to change by 0.414 units. The regression specification is:

$$Dev_{it} = \alpha + \beta * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + b * SENT_{t-1} * ROA_{it} + \varepsilon_{it},$$

or

$$Dev_{it} = \alpha + \left(\beta + b * ROA_{it}\right) * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it}$$

where ROA_{it} is firms' percentage return on asset, included in Z_{it}.

Table 4: Regression with the Interaction Item

Variable	Coef.	T Value	P-Value	
Intercept	0.291	9.840	<.0001	***
SENT	-0.194	-23.670	<.0001	***
GDP	0.738	13.150	<.0001	***
PremRate	-0.070	-13.520	<.0001	***
Herf	0.033	7.760	<.0001	***
Assetlog	0.001	0.910	0.365	
ROA	-0.249	-1.980	0.048	**
SENT*ROA	0.414	3.050	0.002	***

The regression follows the equation:

$Dev_{it} = \alpha + \beta * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + b * SENT_{t-1} * ROA_{it} + \varepsilon_{it}$, Or

$Dev_{it} = \alpha + (\beta + b * ROA_{it}) * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it}$

where ROA_{it} is firms' percentage return on asset, included in Z_{it}.

*Note: The dependent variable is loss reserve error scaled by total assets. All remaining variables are defined in Table 1. *** indicates significance at 1% levels. ** indicates significance at 5% levels. The coefficient on the interaction item is statistically significant, meaning that, for any two different values of ROA, the two simple slopes ($\beta + b * ROA_{it}$) are significantly different from one another. It shows that insurers with different ROA level may act differently with investor sentiment. The value of the coefficient, 0.414, means that, given one unit change of ROA, the slope of loss reserve errors on investor sentiment is predicted to change by 0.414 units.*

In order to examine how insurers with different earning levels react to investor sentiment, we follow Jaccard and Turrisi (2003) and list several values of simple slopes with different ROAs, from 10 percentile to 90 percentile in Table 5. The simple slopes of investor sentiment are all negative and the absolute values decrease with the increase of ROA. For example, with 90 percentile ROA, the simple slope of investor sentiment is -0.162, while with 10 percentile ROA, the simple slope is -0.202. It confirms our second hypotheses. If an insurer has a small profit or negative profit, it tends to be more sensitive to investor sentiment and so under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. On the contrary, when an insurer has higher profits, it tend to less sensitive and under- (over-)estimate their loss reserves in lower degree, responding to high (low) investor sentiment.

Table 5: Simple Slope of Investor Sentiment in the Regression with Interaction Item

ROA Percentile	Value of ROA	Simple Slope of Investor Sentiment
90%	0.077	-0.162
80%	0.057	-0.170
70%	0.045	-0.175
60%	0.036	-0.179
50%	0.028	-0.182
40%	0.021	-0.185
30%	0.012	-0.189
20%	0.002	-0.193
10%	-0.020	-0.202

In the equation: $Dev_{it} = \alpha + (\beta + b * ROA_{it}) * SENT_{t-1} + \lambda * X_{t-1} + \gamma * Z_{it} + \varepsilon_{it}$,

$\beta + b * ROA_{it}$ represents the simple slope of investor sentiment.

The simple slopes of investor sentiment are all negative and the absolute values decrease with the increase of ROA. It confirms our second hypotheses. If an insurer has a small profit or negative profit, it tends to be more sensitive to investor sentiment and so under- (over-)estimate their loss reserves in higher degree, responding to high (low) investor sentiment. On the contrary, when an insurer has higher profits, it tend to less sensitive and under- (over-)estimate their loss reserves in lower degree, responding to high (low) investor sentiment.

CONCLUDING COMMENTS

In this paper, we investigate how P&L insurers adjust their loss reserve estimate, based on investor sentiment. We use the Michigan Consumer Confidence Index as a proxy for sentiment and show that during high sentiment periods, P&L insurers intend to under-estimate loss reserves. In contrast, during periods of low sentiment, P&L insurers intend to over-estimate loss reserves. We interpret this finding as evidence that insurers cater to investors' optimism (pessimism), driven by investor sentiment, via loss reserve claims. Further analysis indicates that insurers with loss or small profit are more sensitive to investor sentiment, in terms of adjusting loss reserves while insurers with higher earnings are less sensitive to investor sentiment.

Taken together, our results are consistent with catering theory, demonstrating that P&L insurers react strategically to sentiment via their loss reserves. The catering behavior has important implications for corporate governance and insurance regulation. Our results suggest the need for increased attention from boards of directors, auditors and regulators to earnings reported on the financial statements, especially during periods of high investor sentiment when insurers are more likely to understate loss reserves and accordingly to report optimistic earnings. While our research provides evidence that P&L insurers cater to the investor sentiment, there are several questions that remain, such as whether insurers pursue strategies in other aspects of their business (in addition to loss reserves) in order to cater to the investor market, and whether life-health insurers adopt the strategies of P&L insurers. It is our hope that our study can promote more research in the areas that can improve our understanding of the influence of the investor sentiment on the insurance industry.

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