

Earnings Management before Mergers and Acquisitions: Evidence from the U.S. Property-Liability Insurance Industry

1. Introduction

Research on mergers and acquisitions (M&As) shows that in stock for stock mergers, acquiring firms tend to manipulate their accounting reports and overstate their earnings before the merger announcements in order to reduce the cost of acquiring target firms (e.g., Erickson and Wang, 1999; and Louis 2004). However, little prior research, to our knowledge, has empirically examined whether target firms manage their earnings to increase the premium paid by the acquirers. This lack of research is likely due to three factors: first, it is unclear whether target firms can anticipate the acquisition with enough time to manage their earnings; second, even if earnings management does take place among target firms before being acquired, it is difficult to capture such manipulation; finally, in the case of private target firms, it is usually very difficult to obtain financial data for target firms.

The U.S. property-liability insurance industry provides an excellent opportunity to investigate this issue. First, the NAIC Insurance Holding Company System Regulatory Act, which has been adopted by most states, requires acquirers to file the merger and acquisition proposal with their domiciled states and all other related states' departments of insurance before making a public announcement of the intended merger or acquisition.¹ The state regulators will then review each particular case before they decide whether to approve or deny the application. In most cases,

¹ NAIC Model Laws and Regulations Guidelines, Volume III, Insurance Holding Company System Regulatory Act, Section 3. A. Filing requirements, "...The person shall file a pre-acquisition notification with the commissioner containing the information set forth in section 3.1 C(1) sixty (60) days prior to the proposed effective date of the acquisition".

acquisition in the insurance industry is done on friendly terms, with hostile takeovers being very rare. It is quite common that negotiation between acquirers and targets has been underway for some time (i.e., ranging from several months to well over a year) before the filing is made with the related department of insurance. Such regulatory requirements make it more likely for the target firms to anticipate the transaction and the lengthy negotiation may create enough time for target firms to manage up the earnings if they choose to do so. Second, the stringent filing and disclosure requirements for insurers' accounting information allow for an accurate proxy for managerial bias. Both the expected and realized claim losses are disclosed in regulatory reports, the difference of which represents the managerial bias (Petroni 1992). As such, the discretionary accounting accrual adjustments by management in the insurance industry can be mostly captured by the adjustment of the firm's claim loss reserves (Petroni 1992; Grace and Leverty, 2012). Third, due to regulatory requirements and data collected by A. M. Best Company and NAIC, comprehensive financial information is available for both public and private insurance companies.

In this study, we take advantage of the opportunity and investigate whether managers of target firms manage up pre-acquisition earnings through loss reserve management. This research is important in three ways. First, it adds to the literature of earnings management by exploring an additional motive for earnings management; namely, target firms' desire to drive up the sale price. Second, it contributes to the literature on mergers and acquisitions, particularly the literature on acquisition of private target firms (Chang 1998; Faccio, McConnell, and Stolin 2006), by examining a potentially important factor affecting the premium paid by the acquirers. Lastly, it expands the loss reserve literature by exploring firms' loss reserving practices in an event-driven setting. Prior research has discussed various roles of loss reserves in smoothing income, minimizing taxes, reducing regulatory costs or justifying premium levels (e.g. Weiss 1985; Grace

1990; Petroni 1992; Gaver and Paterson, 1999; Nelson 2000; Gaver and Paterson, 2004; Grace and Leverty, 2012), but none of them focuses on external event-induced changes in reserve estimation. It is hoped that, by disentangling external event-induced loss reserve manipulation from the other reasons for reserve adjustment, this research may reconcile the differences between findings in Grace and Leverty (2012) and those reported in prior studies.²

Mergers and acquisitions provide a great opportunity to examine loss reserve management in a different setting. The potential upside gain from under-reserving is significant if it can lead to a higher acquisition price for the firm. Moreover, the cost of under-reserving is lower for the owners of firms subject to a potential merger and acquisition bid, as the ownership will change hands if the deal goes through and the current owners are less concerned about the long term impact of under-reserving on firms' profitability and stability. Therefore, earnings management through reserve management may be more prevalent among target insurance companies than among insurers in general.

We test two alternative hypotheses in the paper.

One hypothesis is that target firms manage up their earnings through loss reserve prior to mergers and acquisitions. As discussed previously, if target firms anticipate or know of a potential merger or acquisition and manage up their earnings to induce higher premiums paid by acquirers, one would expect to observe (more) under-reserving by target firms before the acquisition relative to firms not involved in takeover activities. This is referred to as the *under-reserving* hypothesis.

Alternatively, target firms' incentives for earnings manipulation through loss reserves may

² Studies such as Petroni (1992), Gaver and Paterson (2004), and Beaver, McNichols and Nelson (2003) have indicated that property-liability insurance companies achieve specific financial reporting goals through reserve management. By contrast, Grace and Leverty (2012) conclude that original estimated reserves are in fact most likely

be partially or totally offset by the fact that most acquirers involved in insurance M&As are other insurance companies.³ As transactions between insurance companies involve much less information asymmetry than transactions between insurance and non-insurance companies, the probability of target firms' loss reserve manipulation being detected by the acquirer is much higher when the latter party is also in the insurance business. Or, in some cases, an acquirer and a target firm may enter an agreement under which the target's reserve development after the acquisition is linked to the transaction value. Specifically, if an unbearable adverse reserve development after acquisition occurs, the target firm will have to return part of the takeover premiums to acquirers. In either of these cases, one probably will not find any evidence on earnings management through under-reserving. This is referred to as the *information symmetry* hypothesis.

In this project, we test these competing hypotheses using the data of the U.S. property-liability insurance companies that include 228 target firms acquired during the period of 1994 and 2005 and with reserve error information available. Our preliminary results indicate that target firms significantly under-estimate their loss reserves compared to those non-target firms in both the year of merger and acquisition and the year before merger and acquisition, even after we control for other incentives that might induce the firms to under-reserve, such as tax reduction or income smoothing. Overall, the results support the earnings management hypothesis: target firms under-reserve for their losses to boost up the earnings prior to acquisition.

The remainder of the paper proceeds as follows. Section 2 provides a brief literature review on earnings management and loss reserve, background on merger and acquisition regulation in the U.S. insurance industry, and further discussion of the hypotheses tested in this paper. Section 3

unbiased forecasts of the sum of the eventual cash payments.

³ Of 140 target firms in our sample, over 80% of them (i.e. 115 target firms) are acquired by other insurance

discusses the data, the sample selection process, the measurement of loss reserve error and the research methodology. Section 4 presents the empirical results and section 5 concludes.

2. Literature review and hypothesis development

2.1. Incentive and impact of earnings management

Earnings management has been an important issue for regulators, investors and researchers. As reviewed in Healy and Wahlen (1999), ample empirical evidence exists in the literature showing the incentives and impacts of earnings management. For an industrial firm listed on stock exchanges, managers of the firm have incentives to use discretionary earnings management prior to some firm-specific events to influence short-term stock price. For example, managers may choose to “understate” earnings prior to management buyouts (Perry and Williams 1994) and “overstate” earnings prior to seasoned equity offerings (Teoh, Welch, and Wong 1998b), initial public offerings (Teoh, Welch, and Wong 1998a; Teoh, Wong, and Rao 1998) and stock-financed acquisitions (Ericason and Wang 1998). Other incentives for managers to manipulate earnings include increasing management compensation (Watts and Zimmerman 1978; Bergstresser and Philippon 2006), or avoiding high regulation costs (Petroni, 1992; Gaver and Paterson 2004), which may be particularly important for financial service industries such as banking and insurance.

The magnitude and frequency of earnings management among industrial firms has been dramatic. For example, for firms making initial public offerings, median unexpected accruals in the offer year account for 4 to 5 percent of total assets (Teoh, Wong, and Rao 1998). Teoh, Wong, and Rao (1998) find that of all the firms making IPOs in their study, nearly 62 percent have

companies.

abnormally high unexpected accruals compared to a matched sample of firms not making IPOs. For seasoned equity offerings, the annual growth in the issuers' asset-scaled net income significantly exceeds that of the matched non-issuers by a median of 1.69% in the issue year (Teoh, Welch, and Wong 1998a). In stock-for-stock acquisitions, acquirers are associated with unexpected accruals as high as two percent of total assets in the quarter of a stock acquisition (Erickson and Wang 1998).

Existing literature has shown that earnings management is not easy to detect by the market, and earnings management prior to equity issues does in fact affect stock prices. Firms with positive current abnormal accruals in the year of a seasoned equity offering have significant subsequent stock underperformance (Teoh, Welch, and Wong 1998a) and earnings after IPOs exhibit a similar pattern (Teoh, Welch, and Wong 1998b; Teoh, Wong, and Rao 1998).

Despite ample research in the area of earnings management, prior work on earnings management behavior related to mergers and acquisitions event is very limited. The two exceptions are Erickson and Wang (1998) and Louis (2004). Erickson and Wang (1998) document evidence of earnings management among acquirers prior to their stock-for-stock acquisitions, but they found no such evidence for the target firms. Their explanation is that target firms are usually unaware of the potential acquisition before an announcement and therefore have insufficient time to manipulate their earnings before the transaction. Consistent with Erickson and Wang (1998), Louis (2004) find strong evidence suggesting that acquiring firms overstate their earnings in the quarter preceding a stock swap announcement. The paper argues that the post-merger underperformance of acquiring firms can be partially attributable to reversal of the price effects of such behavior.

In this paper, we extend the work by Erickson and Wang (1998) and Louis (2004) by examining the earnings management behavior of target firms in the U.S. property-liability insurance industry. The U.S. property-liability insurance industry presents a great opportunity for research in this area due to several advantages: data on firms' financial information is available for both public and private firms; the disclosure of discretionary accruals (i.e. loss reserve) makes it easier to capture the managerial discretion; and the special filing requirement of M&A imposed on acquirers gives target firms enough time ahead of the transaction to manage their earnings. We discuss these in detail below.

2.2. Merger and acquisition regulation of the U.S. insurance industry

In the case of merger and acquisitions among publicly traded industrial companies, target firms usually have no or little information before the M&A proposal is announced publicly. Even in cases where information might be leaked out beforehand, such leakage is dated back to one month (i.e. 21 trading days) at most (Schwert 1996). As such, target firms usually do not have enough time to manage their earnings before the M&A transaction. On the contrary, mergers and acquisitions involving insurance companies are in very different situations due to the regulatory environment of the insurance industry. First of all, the NAIC model law on Insurance Holding Companies, which has been adopted by the majority of states, stipulates that when mergers or acquisitions are being considered, acquirers are required to file for approval on documents that includes all the details of the transaction (Called Form A filings). For a transaction to be valid, approvals must be obtained in multiple states where the involved parties have operations.⁴ As a

⁴ For example, the California Insurance code states "No person shall make a tender offer for, or a request or invitation for tenders of, or enter into an agreement to exchange securities for or acquire in the open market, any voting security, or any security convertible into a voting security, of a domestic insurer or of any other person controlling a domestic insurer, if the other person is not substantially engaged either directly or through its affiliates in any businesses other than that of insurance, if, as a result of the consummation thereof, the person would, directly or indirectly, acquire

result, a complete document about the potential M&A must be filed with all related state regulators before any news goes to the public. In addition, hostile takeovers are very rare in the insurance industry. Instead, acquirers often start negotiation and communication with targets prior to the filing of M&A with relevant state regulators. Both the filing requirement and the nature of M&A in the insurance industry make the M&A process distinctively different from that involving general industry firms. Therefore, it is not uncommon that well before a transaction is known to the public, the targets have already known the information about the potential deal. Besides, the negotiation process between acquirers and targets are usually lengthy, often ranging from several months to well over a year, which gives targets plenty of time to react and manage their earnings if they choose to do so.

2.3. Literature on loss reserving in the property-liability insurance industry

The nature of insurance accounting and insurance operation creates the opportunity for earnings management through loss reserves. Insurers pay claims to customers for the incurred losses. However, on average, only a small portion of claims are paid out immediately, while the remaining is paid out over several years. The unpaid portion of the incurred losses, which requires an estimation of the losses that will be paid eventually, constitutes the “loss reserve”. Loss reserve represents one of the largest parts of an insurance firm’s liabilities, and under-reserving can inflate reported net income and surplus significantly.

Previous studies on loss reserves have shown that property-liability insurers manage loss

control of the insurer, and no person shall enter into an agreement to merge with or otherwise to acquire control of a domestic insurer, unless, at the time copies of the offer, purchase, request, or invitation are first published, sent, or given to security holders or the agreement or transaction is entered into, as the case may be, the person has filed with the commissioner, and has sent to the insurer, a statement containing the following information, and any additional information as the commissioner may by rule or regulation prescribe as necessary or appropriate in the public interest or for the protection of policyholders or shareholders....” (CA Codes (ins:1215-1215.16))

reserves for many reasons. Earlier studies suggest that insurers use loss reserve to smooth underwriting results, stabilize reported income, and reduce tax bills (Smith 1980; Weiss 1985 and Grace 1990; Gaver and Paterson 1999). More recent studies indicate that discretionary reserve management has also been used to avoid regulatory attention or action (Petroni 1992; Petroni et al, 2000; Gaver and Paterson 2004) or to meet a target earning threshold (Beaver et al, 2003). Grace and Leverty (2012) provide a comprehensive analysis on loss reserve by simultaneously investigating the extant theories of loss reserve manipulation. Overall, they find that “the principal motivation for loss reserving errors is not related to solvency manipulation or profit maximization motives, but rather seems that original estimated reserves are most likely unbiased forecasts of the sum of the eventual cash payments.” Despite the large amount of evidence documented in previous literature on loss reserve practices, no prior research has examined the issue in the context of mergers and acquisitions. It is hoped that this paper will help fill this void in the insurance literature by examining the loss reserve practices of target insurers before the mergers and acquisitions.

2.4. Hypotheses Development

As discussed previously, the regulatory environment and the nature of M&As in the insurance industry may give target insurers ample time to boost up their book earnings through loss reserve management. Moreover, as most individual insurance companies are not publicly traded, the prices acquirers are willing to pay for these companies are largely dependent on the book earnings of the target companies. Therefore, target insurers are believed to have strong incentive to manage up their earnings, if they can, in order to increase their net income and surplus to get a higher premium payment. If that is the case, one would expect target firms to under-reserve before M&A. We call this the *under-reserving hypothesis*.

Target insurers' incentive and ability to manage their earnings might be limited or offset by the risk that such management is detected by the other party. It is relatively easier to practice earnings management (through under-reserving) when the other party, the acquirer, is less informed or is unsophisticated. However, most insurance-related M&A activities occur between insurance companies, and the information asymmetry between acquirers and target firms is therefore likely to be relatively low, since managers of the acquirers are also informed users of insurance accounting information and are likely familiar with many of the earnings management tactics the target firms may apply. Low information asymmetry between the acquirers and the targets increases the probability that target firms' earnings manipulation behavior will be detected. Therefore, the targets may choose not to manage their earnings through loss reserve prior to the acquisition, considering the potential hefty cost of being detected.⁵ If that is the case, one may not find evidence of under-reserving by target firms prior to M&A. We call this hypothesis the *information symmetry hypothesis*.

3. Data and Sample Selection

3.1 Data Source

Because our reserve error estimation requires five years of loss development data, the merger and acquisition sample we study is limited to the period of 1994-2005, with year 2005 being the latest year of merger and acquisition under investigation. Our M&A data for period 1994-1996 comes from Conning & Company and the data for period 1997-2005 comes from SNL DataSource.⁶ The financial data required to conduct the analysis are from the regulatory annual statement database maintained by

⁵ The adverse impact of being detected could range from losing favorable negotiation status to cancellation of the proposed transaction.

⁶ The SNL DataSource is provided by SNL Financial Corporation, <http://www.snl.com>. Conning & Company and SNL conduct M&A data collection for both private and publicly traded insurers.

the National Association of Insurance Commissioners (NAIC), and in our study, data from 1993-2010 NAIC Databases are used in the analysis.

3.2. Sample Selection

The vast majority of M&A activities in the property-liability insurance industry involve insurance groups buying and selling individual insurance companies. Thus, it seems appropriate to examine the loss reserve estimation by target companies with individual company data. Moreover, the annual statements insurers filed with NAIC are also at the individual company level regardless of the company's group affiliations.

We apply the following procedure to select the sample of target firms:

- (1) Start with all M&A deals from 1993 to 2005 reported in either Conning & Company or SNL Data Source;
- (2) Eliminate M&A deals that are pending, terminated, or non-binding, as well as acquisitions of a minority interest;
- (3) Eliminate M&A deals where the targets are foreign companies;
- (4) Eliminate M&A deals where the targets could not be verified in Best's Insurance Reports and the NAIC annual statement files;
- (5) Eliminate M&A deals where the targets is a title company, Lloyds' association, captive, or a state fund worker's compensation program, or where the targets are acquired as shell companies;⁷
- (6) Eliminate M&A deals where the target merged fully into the acquirer so that financial data of the target are no longer available after the merger.
- (7) Eliminate M&A deals that represented the internal restructuring of an existing insurance

⁷ These types of companies are not representative of the mainstream property-liability insurance industry.

- group or where the target was inactive, in run-off, retired after the acquisition, or when the target was involved in another transaction within two years before or after the recorded transaction;
- (8) Eliminate target companies that do not have fully functioning insurance underwriting operations (i.e. companies reinsuring 100% of their business and thus reporting non-positive net premiums written);
 - (9) Eliminate target companies whose loss reserve information or other required financial information is not available in the NAIC Database.

Going through this procedure, we finally obtain 228 target firms during the period of 1994 to 2005.⁸ The sample distribution of target firms is reported in **Table 1**. The number of target firms has varied over the years while it reaches its peak in 1998 when 42 target companies are in the sample. The yearly distribution of target firms is similar to that of the original list of target firms.

[Insert Table 1 Here]

For statistical comparison, we compose a control sample of insurers that are not involved in any M&A activities during our sample period. A pool of all qualified control firm candidates is determined as follows. First, a firm is considered qualified if its loss reserve and other financial data are available in the NAIC databases. Then we make sure a control firm does not fall into any of the following categories: target firms, acquiring firms, or firms affiliated with any target firm or any acquiring firm during the sample period.⁹ Our sample of target and control firms consist of 11,420 observations during the twelve-year sample period.

⁸ The loss reserve error is disclosed five years after. In other words, to obtain data on loss reserve error for firms acquired in 2005, we need to have access to NAIC 2010 statements.

3.3. Measures of Loss Reserve Error

We use a five-year development period to estimate reserve bias, which is consistent with many prior studies (e.g., Petroni 1992; Gaver and Paterson 2004). For each insurer-year, we subtract the original loss reserve from the 5-year developed reserve. This is the unscaled reserve error. We then divide the unscaled reserve error by a firm's total assets to control for variation in insurer size.¹⁰ Thus, for each insurer in our sample, the loss reserve errors are defined as follows:

Asset-Scaled Loss Reserve Error of Year t =

Unscaled Loss Reserve Error divided by Insurer's Total Assets in Year t

Where:

Unscaled Loss Reserve Error of Year t =

Five-Year Developed Loss Reserve Reported in Year t+5 – Initial Loss Reserve Reported in Year t

The loss reserve error is positive if the company initially under-reserved and vice versa.

3.4. Methodology

The empirical testing includes two parts. We first perform a univariate comparison of loss reserve error between target and control firms for both the year of M&A and one-year before M&A. While such univariate analysis provides the initial evidence, prior studies have shown that insurers have other incentives to manipulate loss reserves, such as reduction of tax, or smoothing of earnings, and etc.; as such, we control such factors in our multivariate analysis. The control

⁹ Note that even if a target firm is not in our sample, the firm itself and its affiliates are still excluded from the control sample.

¹⁰ Our use of firm's total assets to scale the errors is consistent with many previous studies (e.g., Petroni, 1992, Beaver et al., 2003, and Grace and Leverty. 2012). While other scalars (e.g., surplus) can also be found in some studies, their use is not as prevalent as that of total assets. Moreover, prior researchers such as Petroni (1992) and Gaver and Paterson (2004) have indicated that results are not sensitive to the choice of scaling variable.

variables in the regression include firm size, line of business Herfindahl index, geographical Herfindahl index, fraction of business from long tail lines, indicator variable for financially weak insurers, indicator variable for negative net income in one year prior to merger and acquisition, and an indicator variable for tax incentives. We also control for year effects by including eleven year indicators with year 1994 being the omitted category. In summary, we employ the following regression model in testing our hypotheses:

Scaled Loss Reserve Error = $f(\textit{Target}, \textit{Size}, \textit{Neginc}, \textit{Tax}, \textit{Weak}, \textit{Lineh}, \textit{Geoh}, \textit{Ltail}, \textit{year indicators})$

Where

- Target* = 1 if target firms, 0 if control firms;
- Size* = Logarithm value of total admitted assets;
- Neginc* = 1 if negative net income in one year prior to merger and acquisition, 0 otherwise;
- Tax* = indicator variable for tax incentives;
- Weak* = indicator variable for financially weak insurers;
- Lineh* = Herfindahl index of product lines;
- Geoh* = Herfindahl index across states;
- Ltail* = Percentage of net premiums written on long-tail lines;

Among them, the target indicator variable is our key independent variable. The detailed definitions of all the variables and their expected signs are reported in **Table 2**.

[Insert Table 2 Here]

4. Empirical Results

4.1. Descriptive Statistics

Descriptive statistics of the independent variables are presented in Table 3. Both mean and median statistics are reported for the target firms and control firms.

[Insert Table 3 Here]

4.2. Univariate Comparison of Loss Reserve Errors

Univariate analysis of loss reserve errors between target firms and control firms is contained in Table 4, which lists the mean and median value of scaled loss reserve errors¹¹ for the target and non-target firms for the year of M&A and the year prior to M&A. We analyze both year t and year t-1 to capture the full time period in which M&A-related reserve manipulation is mostly likely to occur. As stated earlier, negotiations between buyers and targets are often ongoing for months before a formal notification is made to the NAIC or announced to the public. Therefore the impending M&A, if it is going to impact loss reserving, is quite likely to begin doing so in year t-1. For both years, it is found that target firms under-reserve, and control firms over-reserve, and the difference in errors is statistically significant at the 1% level. These univariate results are consistent with the notion that target firms try to boost up their earnings through under-reserving before M&A.

[Insert Table 4 Here]

4.3. Regression Results

Previous studies have documented various incentives for insurers to under-reserve. Univariate results alone are not enough to test our hypotheses. To control for other incentives for loss reserve manipulation, we also employ a multivariate analysis. We present regression results for both the year of merger or acquisition and the year prior.

Table 5 reports the Pearson correlation coefficients among all variables involved in the regression. No serious correlation is detected among the independent variables, reducing the

potential concern about multicollinearity.

[Insert Table 5 Here]

Regression results are reported in Table 6 and Table 7. Table 6 shows results based on reserve errors in the year of M&A (year t), and Table 7 shows results based on the year prior (year t-1). The key variable, target firm indicator, is positive and significant in both regressions, with significance at the 10% level for year t and the 5% level for year t-1. These results are consistent with the under-reserving hypothesis that target firms have an incentive to under-reserve (or over-reserve less) relative to non-target firms. Results on the control variables are consistent in both the year t and year t-1 regressions. The results indicate that larger firms tend to have lower values for scaled reserve errors. Stock firms tend to have higher positive reserve errors than mutual insurers. Firms with negative net income in the prior year are associated with greater positive reserve errors, consistent with the notion that such firms have incentive to under-reserve to boost up earnings. Consistent with the tax-reduction hypothesis explored in prior studies, the coefficient on the tax incentive indicator (=1 if an insurer pay taxes or received a refund of prior taxes in year t and 0 otherwise) is negative and significant, indicating that firms reserve more in order to reduce their tax burden. Consistent with the findings reported by Petroni (1992), the coefficient on our weak insurer indicator is positive and significant, indicating that weak firms who are potentially targets of regulatory scrutiny under-reserve in order to avoid regulatory attention. More long-tail line business is associated with over-reserving, as are geographic concentration and line of business concentration.

[Insert Table 6 Here]

¹¹ For all empirical analysis, reserve errors are scaled by total admitted assets.

[Insert Table 7 Here]

5. Conclusion

The regulatory requirements on M&A filing and the lengthy negotiation process involved in insurance M&A transactions provide a great opportunity to examine earnings management through under-reserving by target firms in the US insurance industry. Competing hypotheses are provided with regard to the loss reserve practices of target firms prior to M&As. The under-reserving hypothesis predicts that target firms, aiming at higher acquisition premiums, would intentionally under-reserve to boost up pre-acquisition earnings. Alternatively, the information symmetry hypothesis argues that the incentive and ability of target firms to manage their earnings might be offset by the acquirer's ability to detect such manipulation, and as such, one may not necessarily observe evidence of under-reserving by target firms prior to the acquisition.

Employing a sample of 228 target firms and over 11,000 control firms during the period of 1994 and 2005, we empirically test these competing hypotheses in the US property-liability insurance industry. Consistent with the under-reserving hypothesis, we find that the loss reserve pattern is significantly different between target and control (i.e. non-target) companies. In particular, our results show that target firms are associated with more under-reserving in the year of M&A and the year prior to M&A, even after controlling for other incentives for under-reserving documented in the literature (i.e., tax, regulatory concerns, etc.).

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Table 1: Sample distribution of 228 target firms by year

Year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
# of Targets	20	11	12	29	42	31	24	11	13	10	8	17

Table 2: Definitions of variables

Dependent Variable		
Name	Definitions	Expected Sign
Scaled reserve error	Unscaled reserve error divided by a firm's assets, where unscaled error is defined as the difference between Five-Year Developed Loss Reserve Reported in Year t+5 and Original Loss Reserve Reported in Year t	
Independent Variables		
Target	Indicator = 1 if a firm is an acquisition target, and 0 if it is a control firm	+
Neginc	Indicator = 1 if net income in prior year <0, and 0 otherwise	+
Tax	Indicator=1 if an insurer pays taxes or received a refund of prior taxes in year t ; 0 otherwise	-
Firm size	Equal to Logarithm of total assets	+/-
Lineh	Diversification across business lines	+/-
Geoh	Diversification across geographical areas	+/-
Ltail	Fraction of business from long tail lines, such as workers comp, Medical malpractice, product liability, auto liability, etc.	+
Stock	Indicator = 1 if a firm is a stock company, 0 otherwise	-
Weak	Indicator = 1 if the firm has at least 4 IRIS ratios unacceptable by NAIC, 0 otherwise	+

Table 3: Descriptive statistics of independent variables in our sample during 1995-2005

Variables	Target Firms		Control Firms	
	Mean	Median	Mean	Median
Number of Observations	228		11,182	
Firm Size				
Total Assets (in \$ million)	406	93	306	30
Direct Premiums Written (in \$ million)	145	58	118	15
Net Premiums Written (in \$ million)	118	34	112	11
Business Mix and Diversification				
Fraction of Business from Long Tail Lines	0.68	0.73	0.66	0.75
Line of business Herfindahl	0.45	0.40	0.58	0.51
Geographic Herfindahl	0.44	0.32	0.70	0.97
Organizational Forms				
Mutual	0.08	0	0.31	0
Group-affiliated	0.86	1	0.46	0
Variables Related to Under-/Over-reserve Motivation				
Negative net income	0.21	0	0.21	0
Paid taxes or received a tax refund	0.54	1	0.68	1
Weak firms (based on IRIS ratios)	0.20	0	0.07	0

Table 4: Comparison of loss reserve errors between target firms and non-target firms

Year	Target Firms		Control Firms		<i>p</i> -values from Kruskal-Wallis Test
	Mean	Median	Mean	Median	
1-year prior to M&A	0.00738	0	-0.0193	-0.0143	<.0001
Year of M&A	0.00235	0	-0.0191	-0.0146	<.0001

Table 5: Correlation Table of Dependent and Independent Variables

Definitions of variables are as follows: Unscaled reserve error in year t is the difference between five-year developed reserve reported in year $t+5$ and initial reserve reported in year t . Scaled reserve error $_t$ = unscaled reserve error $_t$ /total assets $_t$, where unscaled reserve error in year t is the difference between five-year developed reserve reported in year $t+5$ and initial reserve reported in year t .

Target is an indicator variable, which equals 1 if it is a target firm and 0 otherwise. Size is the natural log of total assets. Neginc is an indicator variable, which equals 1 if the firm's net income is negative in the year prior to the acquisition year. Tax is an indicator variable, which equals 1 if an insurer pay taxes or received a refund of prior taxes in year t and 0 otherwise. Weak is an indicator variable, which equals 1 if the firm has more than one non-reserve IRIS ratio unacceptable by NAIC, 0 otherwise. Lineh is the line of business Herfindahl index. Geoh is the geographic Herfindahl index. Ltail is the fraction of business from long tail lines. Long tail lines are defined as the following lines: homeowners, farmowners, private passenger auto liability, other Liability, products Liability (if reported separately), commercial multiple peril, ocean marine, medical malpractice, workers compensation, commercial auto liability, aircraft, boiler and machinery, international, and reinsurance.

	target	Size	stock indicator	tax	weak	neginc_pri	% of longtail lines	Geographic Herfindahl	LOB Herfindahl
Reserve error/asset	0.0351	-0.00358	0.0545	-0.10539	0.14774	0.07922	-0.06054	-0.05816	-0.11114
error/asset	0.0002	0.7018	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001
target	1	0.07779	0.09952	-0.04177	0.06974	0.0008	0.00978	-0.09969	-0.05885
size		1	<.0001	<.0001	<.0001	0.9315	0.296	<.0001	<.0001
stock			1	0.09576	0.21019	-0.05028	-0.10963	0.17513	-0.44399
tax				1	<.0001	<.0001	<.0001	<.0001	<.0001
weak					1	-0.04946	-0.15125	-0.15228	0.12647
neginc_pri						1	<.0001	<.0001	<.0001
% of long tail business							1	0.06236	-0.05125
Geographic Herfindahl								1	0.06954
									<.0001

Table 6: OLS Estimation of (Reserve Error/Total Assets)_t

Dependent variable = unscaled reserve error/total admitted assets in the year of M&A
 Unscaled reserve error is the difference between the five-year developed reserve reported in year t+5 and initial loss reserves reported in year t.

Year indicators are included but not reported here to save space.

Group clustering: yes

Variables	Coefficient Estimate	Robust Standard Error*
Intercept	0.0377***	[0.0126]
Target firm indicator	0.0092*	[0.0050]
Stock indicator	0.0036*	[0.0021]
Negative income indicator	0.0033**	[0.0015]
Tax incentive indicator	-0.0076***	[0.0012]
Weak insurer indicator	0.0181***	[0.0024]
Firm size	-0.0017***	[0.0006]
Line of business Herfindahl	-0.0249***	[0.0051]
Geographic Herfindahl	-0.0151***	[0.0039]
% of business from long tail lines	-0.0017***	[0.0006]
No. of observations	11420	
Adjusted R-squared	0.06	
Significance of model (Prob > F)	0.0001	

Definitions of explanatory variables, all measured in year t, the year of merger and acquisition, except for neginc which is measured in year t-1: Target is an indicator variable, which equals 1 if it is a target firm in year t and 0 otherwise

Size is the natural log of total assets

Neginc is an indicator variable, which equals 1 if the firm's net income is negative in the year prior to the acquisition year

Tax is an indicator variable, which equals 1 if an insurer pay taxes or received a refund of prior taxes in year t and 0 otherwise

Weak is an indicator variable, which equals 1 if the firm has more than one non-reserve IRIS ratio unacceptable by NAIC, 0 otherwise

Lineh is the line of business Herfindahl index

Geoh is the geographic Herfindahl index

Ltail is the fraction of business from long tail lines. Long tail lines are defined as the following lines: homeowners, farmowners, private passenger auto liability, other Liability, products Liability (if reported separately), commercial multiple peril, ocean marine, medical malpractice, workers compensation, commercial auto liability, aircraft, boiler and machinery, international, and reinsurance.

Table 7: OLS Estimation of (Reserve Error/Total Assets)t-1

Dependent variable = (unscaled reserve error/total admitted assets) in the year prior to M&A, where unscaled reserve error is the difference between the five-year developed reserve reported in year t+4 and initial loss reserves reported in year t-1.

Year indicators are included but not reported here to save space.

Group clustering: yes

Variables	Coefficient Estimate	Robust Standard Error*
Intercept	0.0385***	[0.0141]
Target firm indicator	0.0139**	[0.0061]
Stock indicator	0.0053**	[0.0024]
Negative income indicator	0.0037**	[0.0018]
Tax incentive indicator	-0.0079***	[0.0014]
Weak insurer indicator	0.0218***	[0.0029]
Firm size	-0.0018***	[0.0006]
Line of business Herfindahl	-0.0273***	[0.0052]
Geographic Herfindahl	-0.0152***	[0.0044]
% of business from long tail lines	-0.0140***	[0.0034]
No. of observations	10,159	
Adjusted R-squared	0.06	
Significance of model (Prob > F)	<.001	

Definitions of explanatory variables, all measured in year t-1, the year prior to merger and acquisition, except for neginc which is measured in year t-2, two years prior to merger and acquisition:

Target is an indicator variable, which equals 1 if it is a target firm in year t and 0 otherwise

Size is the natural log of total assets

Neginc is an indicator variable, which equals 1 if the firm's net income is negative in the year prior to the acquisition year

Tax is an indicator variable, which equals 1 if an insurer pay taxes or received a refund of prior taxes in year t and 0 otherwise

Weak is an indicator variable, which equals 1 if the firm has more than one non-reserve IRIS ratio unacceptable by NAIC, 0 otherwise

Lineh is the line of business Herfindahl index

Geoh is the geographic Herfindahl index

Ltail is the fraction of business from long tail lines. Long tail lines are defined as the following lines: homeowners, farmowners, private passenger auto liability, other Liability, products Liability (if reported separately), commercial multiple peril, ocean marine, medical malpractice, workers compensation, commercial auto liability, aircraft, boiler and machinery, international, and reinsurance.