

Understanding Insurance, Part III

The Impact of Survivor Bias on Financial Comparisons

COSMO: Hey, George, I found a surefire way to make a buck in mutual funds!

GEORGE: Oh, yeah? Clue me in.

COSMO: I found multiple funds to choose from with double-digit returns over the past three or five years. Matter of fact, I really didn't see many bad choices at all.

GEORGE: Amazing! I wish I'd invested in some of those funds. I lost a bundle on my original investment in a mutual fund, and that one closed up last year.

COSMO: Hold on a second. Let me see if I can find your fund in my research report. What's the ticker symbol?

GEORGE: I think it was ILOST.

COSMO: Nope, can't find it.

GEORGE: Interesting. Looks like the publications you researched show only mutual funds that have survived through the publication date.

COSMO: Aha! That makes sense now. I was wondering how all the funds together could be better than the industry average.

Does this scenario sound familiar? Have you ever tried using outdated contact information to hire building contractors to work on your house? How many contractors did you reach? Probably not the ones who moved, changed their company's name, or even went out of business.

Have you ever tried to research the historical performance of insurance companies over a five-year period? Did the market leaders stay consistent over time? How did you treat the companies that went insolvent? In life's daily endeavors, the lesson learned is: Beware of survivor bias, where an author's study might end up with prime real estate on Lake Wobegon.

It's often difficult to understand some of the intricacies of analyzing property/casualty insurance financial data over a multi-year period. Before accepting a conclusion presented in someone else's analysis or reaching your own conclusion regarding trends in surplus, rates of return, or loss payments, you should be comfortable with the underlying data:

- Is anything missing?
- Is anything included that doesn't seem to belong there?
- Is the analysis period long enough for the line under review (e.g., three years, five years, and 10 years)?

- Is it appropriate to use the data without noting special circumstances or catastrophic impacts?
- Is it appropriate for getting to the questions one wants to ask?

In the November/December 2005 issue of *Contingencies* we discussed whether it's appropriate to compare written premiums and paid losses. In the April/May 2006 issue we examined the importance of understanding the components of insurance premium: rates and exposure. In this article, we take a closer look at the importance of understanding survivor bias when performing financial analysis.

What's Missing?

Survivor bias is a challenging problem in any industry, but especially when reviewing insurance company financial statements. Each year, consulting firms, rating agencies, magazines, and regulatory bodies produce studies showing the financial trends in the balance sheet, cash flow, and income statements of insurers. The studies usually display the aggregate industry results, along with individual insurance company rankings (e.g., top 10, top 25, market leaders representing 75 percent of market share, etc.). The rankings are determined using market-share measures such as written premium, earned premium, statutory surplus, or invested assets.

Although financial research often provides valuable insights into trends in investment strategies, returns on investment, surplus, reserves, loss ratios, loss payments, pre-

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miums, expenses, etc., what may be missing from the analysis may be just as important.

For Example, the Top Five

It's not uncommon for reports to be prepared focusing on the market leaders in an individual state. For example, legislation might require an insurance department to perform annual financial analysis on indi-

vidual insurance companies that represent greater than 70 percent of the earned premium for a specific line of business.

Table 1 displays an example of the combined ratio results over a three-year period for the top five companies and for the industry in total. Imagine the different headlines that could be produced from Table 1 (see Figure 1).

From the above example, we see how much the story can change just by cutting the data and choosing which companies make it into our analysis (i.e., survive).

Insolvency

Table 2 displays an example of how insurance company insolvencies can affect studies performed by researchers.

TABLE 1. Combined Ratio Analysis

Premium Rank	2002		2003		2004	
	Earned Premium	Combined Ratio	Earned Premium	Combined Ratio	Earned Premium	Combined Ratio
1	14,000,000	100%	16,000,000	92%	15,000,000	84%
2	12,000,000	100%	10,000,000	92%	15,000,000	84%
3	10,000,000	100%	10,000,000	92%	8,000,000	84%
4	8,000,000	100%	9,000,000	92%	8,000,000	84%
5	6,000,000	100%	5,000,000	92%	4,000,000	84%
6-20	20,000,000	100%	20,000,000	120%	20,000,000	140%
Industry	70,000,000	100%	70,000,000	100%	70,000,000	100%
Top 5	50,000,000	100%	50,000,000	92%	50,000,000	84%
Top 5 Market Share		71%		71%		71%

Combined ratio = (Loss and LAE Ratio + Expense Ratio)/Earned Premium

FIGURE 1. Headlines

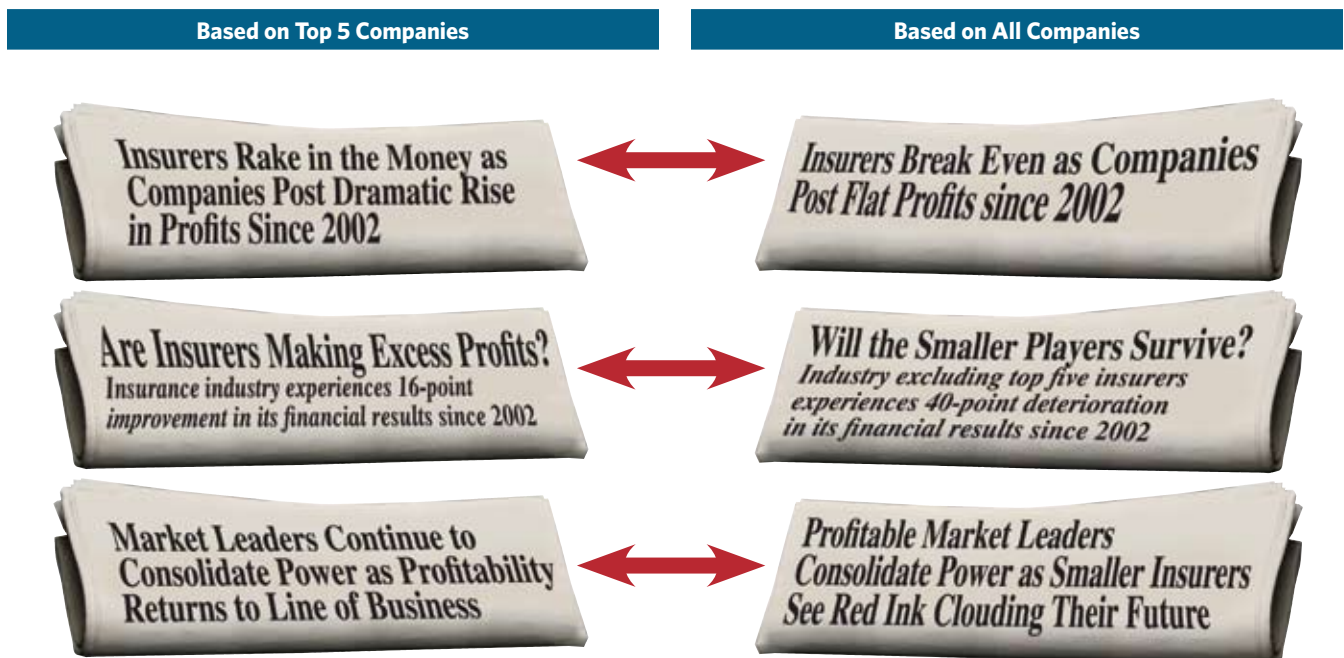


TABLE 2. Loss Ratio Analysis—Insolvency

Company	2003			2004		
	Earned Premium	Incurred Losses	Loss Ratio	Earned Premium	Incurred Losses	Loss Ratio
Strength Ins Co	27,000,000	27,000,000	100%	30,000,000	30,000,000	100%
Strong Ins Co	27,000,000	27,000,000	100%	30,000,000	30,000,000	100%
Stable Ins Co	27,000,000	27,000,000	100%	30,000,000	30,000,000	100%
Solid Mutual	27,000,000	27,000,000	100%	30,000,000	30,000,000	100%
Weak Ins Co	15,000,000	37,500,000	250%	No Annual Statement Filed		
Industry	123,000,000	145,500,000	118%	120,000,000	120,000,000	100%
Weak Ins Co Annual Statement Data if Filed:				5,000,000	50,000,000	1,000%
Restated Industry:				125,000,000	170,000,000	136%

If we compare 2003 industry loss ratio results to industry results in 2004, insurance companies appear to have significantly reduced their loss ratio (118 percent to 100 percent) while charging less premium (\$123 million to \$120 million). On a dollar basis, industry-incurred losses dropped by an amazing \$25.5 million, from \$145.5 million to \$120.0 million. Could this mean that the four remaining insurance companies implemented a revolutionary new risk management program that reduced the industry's indemnity

payments by 17.5 percent in one year?

If we compare industry loss ratio results in 2003 to the restated industry results in 2004, it looks as if insurance companies have experienced a dramatic increase in their loss ratio (118 percent to 136 percent) even though the industry charged slightly more premium (\$123 million to \$125 million). With the inclusion of Weak Insurance Co's 1,000 percent loss ratio, we see a 36-point swing in the conclusion.

This brings us back to the researcher's comfort with the underlying data and

the five questions we asked originally. In response to the question "Is anything missing?" for example, it's obvious that different conclusions and inferences can be drawn depending on whether Weak Insurance Co. is included or excluded. In addition, other issues need to be addressed, such as the appropriateness of the one-year comparison period, understanding what happened to Weak Insurance Co's policyholders (e.g., leave the insurance market to self-insure or form captive insurance companies, insure

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with other competitors, etc.). Did a major catastrophe affect Weak Insurance Co., or did Weak Insurance Co. experience significant adverse development in older accident years (e.g., asbestos)?

The Flip Side

There is a flip side to the above illustrations. Survivor bias results in generalizing the successes of the observed sample to a larger population. Similar limitations occur if the sample is biased toward failures.

Extreme outcomes grab attention. The catastrophic hurricane season of 2005 produced plenty of speculation about the impact on the insurance industry. Certainly some companies endured severe losses, and some insolvencies may be attributed to these or other catastrophic events. But one should be wary of generalizations that suggest all insurance costs will spiral upward.

Simplifying observations can help make an issue more understandable, but oversimplification can lead to invalid conclusions.

Conclusion

The proper matching of insurance revenues with insurance expense from one year to the next must consider the entire population of insurance companies. If the mix of companies changes, a researcher could end up producing a financial analysis that provides conclusions as valuable as the following statement taken by a sharp actuary at the end of a NASCAR race: "Amazing! One hundred percent of the race cars that crossed the finish line started the race!"

Armed with a knowledge of the reasons for the changing mix of companies (e.g., insolvent company stopped reporting data, acquisition, new market leader focusing on different coverages, etc.), authors

and users of financial studies can ask more informed questions about the underlying data contained in the reports in order to make more informed decisions regarding the conclusions. And when readers need more information, we hope they'll reach out and ask an actuary about the shocking conclusions and catchy ratios that may appear too good to be true *or too bad to be true*.

The actuarial resources are there. For public officials, their insurance departments are filled with qualified actuaries ready and able to provide a detailed review of each new study. The American Academy of Actuaries (www.actuary.org) and the Casualty Actuarial Society (www.casact.org) are filled with volunteer actuaries and committees focusing on the important issues of the day. Pick up the phone, and we believe our profession will answer the call.

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