
On Reading *Best's Aggregates and Averages*¹ with One Eye Open

by Emilio Venezian*

INTRODUCTION

Reading an edition of *Best's Aggregates and Averages (A&A)* for the first time, one is hit by the same impression as when reading a telephone directory: "great cast of characters but no plot." On reading it for a second time, this time with the mind's eye wide open, however, the characters recede into the background and booby-traps, plots, and subplots emerge. It is unfortunate that many people never go through that second reading; the plots and subplots are important and sometimes crucial to the ways in which the data may properly be used. This paper presents some of the plots and subplots that come with an open-minded reading of the books in examining whether (or how) the data can be used to test hypotheses or provide insight into what is going on in the market. This should be of interest both to researchers who wish to use the data in their empirical endeavors and to people who are trying to evaluate what is in the literature.

The intricacies sometimes become obvious in the reading, especially if the meaning and intent of footnotes is considered carefully. Sometimes institutional knowledge is necessary. And at times a critical examination of the data is called for. I suppose that *caveat lector* is a warning that every user of *A&A* data should keep in mind and every referee of empirical papers based on the *A&A* information should revere. But apparently most users do not heed the warning. For the reader of empirical papers based on data from *A&A*, *caveat lector* is much too mild. *Vae lectoris* would be more appropriate. They both may be translated as "let the reader beware." The first, as in the familiar *caveat emptor*, enjoins the reader or buyer to watch out for pitfalls. The second is best known for the Latin *vae victis*, which is a warning that the vanquished (or in this case the reader) is doomed.

*Department of Finance and Economics, Rutgers Business School, Newark and New Brunswick.

English does not have synonyms of “beware” that connote the same range of meanings.

TRAPS AND PLOTS

The Summary and Change Traps

Sometimes it saves a lot of time and effort to collect data from the periodic recaps published in *A&A* rather than going back to the original editions. That is acceptable if you understand the risks and adhere to your obligations. The primary obligation is, of course, to describe exactly how you got the data.² This is a tedious occupation and the resulting text is generally frowned upon by editors, but it is necessary. The reasons for meticulous detail in this aspect of the work are many, but they simplify to academic honesty.

Suppose I wrote a paper in which I used a fancy regression model and the underlying data was “premiums written and underwriting profit or loss for all classes of insurance written by stock insurers for the years 1942 through 1970 taken from *Best’s Aggregates and Averages*. The results reject the model at the one percent level.” As a believer in the model you might be curious. You might try to repeat what I said I did, and you might get a different answer. What is going on?

One very simple way to explain the differences is that one of us fell into the summary trap and took the data for 1942–1970 from page 135 of the 1971 edition of *A&A*. Had that person (or the graduate assistant who actually did the searching and data entry) read the footnotes, they would have seen the following: “Prior to 1951 figure included only business written by casualty companies. Figures for all years include Livestock and Miscellaneous Unsegregated and Reinsurance Unsegregated Lines. Aircraft (all perils) is included for 1971 only. Previously Aircraft was included in Allied Lines.” Dismissing or ignoring the footnote results in the use of a peculiar time series. Welcome to the change trap.

The other of us might have been diligent in going to the original editions and fallen into the change trap in a different way. Starting with the 1952 edition, the reports for stock companies are given in a single section that covers both fire companies and casualty companies. Before that, there is one section for “stock fire companies” and another for “stock casualty companies.” The second appears after the section for “mutual fire companies.” So the change trap might lead the researcher and assistant to take the data for fire companies and forget to add on the data for casualty companies.

So we have two sets of data for the years 1942 to 1950 that are quite different but whose collection could be described briefly by the same sentence. Being specific about just how the data were obtained allows people to know what traps you might have fallen into or—even more valuably—what traps to avoid.

A warning is in order. To be specific is no substitute for being careful, and being careful may be less important than being lucky. If you were putting together data on accident and health coverages, you would find in the 1951 edition of *A&A* two different headings: "Accident and Health" and "Group Accident and Health." In the 1961 edition in the tables of "Cumulative by line Underwriting Experience" you would find "All Accident and Health Except Group" and "Group Accident and Health" in the section on stock insurers, but the headings on the section for mutual insurers read "All Accident and Health" and "Group Accident and Health." In the 1971 edition the two groups are again described the same way in the stock and mutual sections, this time as "Group Accident and Health" and "Other Accident and Health." By the 1981 edition, you would find "Group Accident and Health" and "Other Accident and Health includes Credit Accident and Health."

If Accident and Health is not your piece of cake, try Homeowners Multiple Peril. In the "Cumulative" pages it appears just that way in the 1971 edition. In the 1981 edition it appears as "Homeowners Multiple Peril (includes Farmowners)." In the 1996 edition the headings "Farmowners Multiple Peril" and "Homeowners Multiple Peril" appear separately. The construction of a series for these coverages is clearly not a simple task. Institutional knowledge adds to the complexity. "Marshal's fees" paid by insurance companies are based on their fire premium and their HMP premiums. The factor applied to HMP premiums is based on aggregate reports from statistical agencies. Some companies with deviating rates may, in particular years and states, save substantial fees by reporting the coverages under HMP policies separately as fire and other liability rather than under the multiple-peril policy. Unfortunately, we do not know to what extent this technique is used and hence cannot determine whether the changes in the data reflect real changes in the market or merely cost-saving ploys.

The "summary trap" has another component. Sometimes numbers are revised. For example, the 1985 edition shows written premiums in fire insurance for mutual companies in 1980 as \$566.812 million; the 1981 edition has the number as \$569.230 million. For allied lines, the corresponding numbers are \$322.053 and \$323.262. While the differences are generally small, they can be annoying, especially when you are trying to verify the

accuracy of your own data entry and you have not documented the procedure carefully.³

Implications

The use of the data requires a great deal of care and thought. We must never assume that because the data are in the same place this year as last year, they actually mean the same thing. We have to be aware of the nuances in the words, titles, and footnotes and must be ready to pursue any hints that something may have changed.

In some situations, reconciliation is impossible. For example, where are Credit Accident and Health data reported before 1981? If Credit Accident and Health before 1981 is part of "Unsegregated Miscellaneous Lines" and not reported upon as a separate line, it may not be possible to recover an accurate, consistent series for Other Accident and Health. In such situations, we need to perform the analysis in such a way that the reporting change is not ignored; the introduction of a dummy variable may be appropriate.

THE AGGREGATION AFFAIR

Aggregation issues should not be considered a trap, though many researchers seem to ignore them. The A.M. Best Company Inc. has been very careful in giving titles to their publications to avoid implications that aggregated numbers represent consolidated industry totals. They have until recently avoided any wording that might convey the impression that the numbers somehow represent the industry. That is why they refer to "aggregates" and "averages." The numbers do not represent the industry. They are simply the addition of all the numbers provided by the individual companies included in a particular year.

Subplot 1—Surplus Inflation

Suppose stock company A contributed one million dollars to establish company B as a wholly owned subsidiary. That one million dollars would appear as an asset in the books of company A (as an investment in an affiliate for years in which this rubric is used) and also on the books of company B (as paid-in capital). When the aggregate is computed, two million dollars in assets are recorded. Since neither the contribution of the capital nor its receipt creates a liability, the aggregation has artificially added one million dollars to the "aggregated statutory surplus." If the transfer had been a loan, then company A would show a reduction in cash and a receivable, both of one million, and company B would show the asset

and a payable, both of one million. The aggregate assets would go up by two million and the aggregate liabilities would go up by two million, in both cases showing no change in "aggregated surplus" though both assets and liabilities would be distorted.

For most other balance sheet items, such as receivables under reinsurance agreements, accrued interest and dividends, and unearned premium reserves, asset entries would be offset by liability entries so that the "aggregated statutory surplus" would not be affected even though the aggregated assets and aggregated liabilities would be.⁵

On the income and expense side, the aggregations may result in inflating the direct premiums if there is substantial reinsurance among members of a group, but should not distort the net premiums. If transfer prices are artificial, other problems may arise. Net premium should aggregate to the same number that would be arrived at by consolidation. So should net losses incurred and underwriting expenses.

The magnitude of the effect on surplus can be estimated. In 1970, *A&A* reported for the first time the holdings in affiliates. For the industry as a whole⁵ this amounted to \$4.5 billion. The aggregated statutory surplus at the time was \$18.2 billion. Unfortunately, we have no information on how much of the \$4.5 billion represented investments in property and liability companies and how much was in other enterprises. If the whole amount is deducted, the surplus would shrink to \$13.7 billion. The aggregate statutory surplus could be as much as 33 percent higher than the estimated actual surplus. A step up in precision occurs in 1984, when for the first time *A&A* reported "consolidated" results.⁶ In that year the "consolidated" industry holdings in affiliates amounted to \$13.3 billion, whereas the "aggregate" holding in affiliates was \$28.4 billion. The best interpretation is that approximately half of the investments in affiliates is in companies outside the property and liability business.⁷ The "aggregate"⁸ statutory surplus for 1984 was \$78.9 billion⁹; the "consolidated" value as given in the 1985 edition of *A&A* was \$63.8 billion. The difference is exactly that between 28.4 and 13.3 billion. Thus the surplus by aggregation was nearly 24 percent higher than the consolidated value.

The issue of obtaining a reasonably valid measure of actual surplus has received very little attention. It is worth some discussion. If you had ever tried to compute the surplus of the property and liability insurance business you would know that there are some eight different reporting patterns between 1942 and 1999. Over part of the interval we have no information to help us with this. Over some of the period all you can get is bonds, common stock, and preferred stock of other insurance companies. Then for one or two years we have only the sum of bank stocks and insurance stocks. Then there is a period in which holdings in affiliates are

given separately, but it is *all* affiliates, not just property and casualty affiliates. Only in the more recent years, by comparing the “aggregate totals” with the “consolidated totals,” do we have a glimmer of what fraction of affiliated investments might be in property and liability companies and what in other types of companies, such as life insurers, radio stations, industrial security companies, and so on. Even with all these factors taken into account, we have not even gotten to first base. We are not yet close the real surplus; that requires taking into account the equity in the unearned premium reserve, the discounting of the loss reserves, and making allowance for non-admitted assets.¹⁰

Subplot 2—Consolidation Changes

Starting in 1984, *A&A* includes progressively more data on a “consolidated” basis.¹¹ I have paid relatively little attention to the issues raised by consolidation.¹² It is certain that these “consolidated” tables are essentially aggregates of the consolidated reports of groups and of unaffiliated companies. The consolidation rules actually consolidate only affiliates within the property and liability business, which is useful since we now have a way of adjusting the industry’s surplus for inter-affiliate holdings.

There are major differences between the consolidated and aggregated data for, say, mutuals. This should be expected, given the way the aggregates have been structured. In the aggregates, State Farm Fire is part of the stock company group. Under consolidation it would be consolidated under its parent, State Farm Mutual Auto. The same would happen with the stock subsidiaries of Metropolitan and Prudential.¹³ Thus, use of consolidated results by industry segment in time series analysis that also includes aggregated data could lead to catastrophic misinterpretation.¹⁴ I hope that the A.M. Best Company Inc. will not decide to reclassify companies in their aggregates section to conform to their classification in the consolidated section. Doing so would destroy the one long-term series of comparable results. Warts and all, the available data is better than none.

Implications

The main implication of this affair is that the surplus reported by *A&A* should be used with great care. If we need a consistent series, we need to stick to numbers derived from the aggregated values and avoid mixing aggregated values with consolidated values. We also need to be specific about whether we are using “surplus” as a regulatory concept or as an economic concept. In the former case we need to modify the numbers obtained from *A&A* by deducting estimates of the inter-company holdings. In the second case we need to follow that up by estimating other corrections, such as the equity in the unearned premium reserve, and

modifying our result accordingly. Safety and prudence suggest that repeating the analysis with the three different versions of surplus is sound practice.

It is also important to realize that other consolidation issues need to be faced when testing models of insurer behavior. It seems paradoxical but we need to define what we mean by an insurer. Is a company that has zero net premiums written an insurer or is it not? Such companies do exist. They have positive direct premiums written but manage to reinsure every dollar of premium they write. One view is that these are little more than insurance intermediaries. Another is that they are indeed insurance companies because they are the payers of first instance and must stand the risk in the event that the reinsurers become bankrupt. In the first case, their surplus should not be counted as part of the consolidated industry total; in the second case, it should. Data from the NAIC database indicate that for the period 1993 to 2000, insurers with zero net written premiums had between 4.4 percent and 23.8 percent of the admitted assets of non-life insurance companies.¹⁵ The magnitude and variability of this fraction suggests that careful thought should be devoted to whether the underlying model requires that the balance-sheet information for these zero-net-written premium companies be included in the industry totals or not.

THE TAX AFFAIR

Over the years the reporting of financial data by insurance companies has become increasingly stylized and uniform, largely because of the efforts of the NAIC. Best's may also have exerted a healthy influence because of the prestige of its ratings. But in earlier years uniformity was something to be wished and striven for rather than something accomplished. Before 1945 there was no uniformity in the reporting of income taxes. Some companies included taxes as part of expenses and others reported them separately. For reasons that are probably sound and useful but long since forgotten, Best's *A&A* adopted the practice of calculating the underwriting profit and the underwriting profit margin before income taxes. That meant that before 1945 we do not really know the underwriting profit margin, or, put differently, profit margins reported before 1945 are not comparable to those reported after that year. The information for some companies "after expenses" was automatically "after taxes."

A typical footnote about these matters reads:

The above aggregates through 1944 are based on the reported statutory underwriting results with some companies including federal income taxes as an expense of operation and others excluding such

taxes. For 1942¹⁶ and 1943 we estimate the statutory profit before federal income taxes at \$115,000,000 for each year and at about \$70,000,000 and \$65,000,000 respectively after federal income taxes. For 1944 the corresponding figures were \$100,000,000 and \$60,000,000. Beginning with 1945 underwriting experience is recorded before federal taxes and underwriting results are on a case basis for reserves.¹⁷

That sounds clear enough, but remember it is appended to the same table for which the “all classes” panels have the warning of the “summary trap.” Taken in context this appears to apply only to the results of casualty companies. We have no estimate of what the effect of taxes was on the underwriting profit reported for fire companies.

Implications

Rather immediately, this suggests that if it is necessary to include data from years before 1945 to get the level of significance that justifies publication, then the model probably does not hold water. The significance may arise mostly from numbers that have identified biases. By the same token, studies that fail to show significance when these years are included might actually be compromised by the biased data points.

There is a more serious implication that does not appear to be generally appreciated. Taxes do exist and they pervade the data. Using the data to test models that ignore taxes is useless. When faced with such a paper the reader should start asking a series of questions. If the data are viewed as supporting the model, do they also support the view that taxes do not exist? Is the fit merely a consequence of compensating errors, with the effect of taxes compensating for other inadequacies in the model? If the model were tested against data from an economy with no taxes, with consequent changes in behavior,¹⁸ would the results support the model? Or could it be that out of the whole body of data all the elements that might reject the composite hypothesis have conveniently been forgotten?

THE ACCIDENT AND HEALTH AFFAIR

Is accident and health insurance part of “Property and Liability” insurance? It is certainly true that some insurance companies sell accident and health products. But health insurance companies also sell these coverages. And life insurance companies are also active in the field. While there appears to be no compendium of companies selling these coverages, some interesting data can be useful to put things in perspective.

In the 1970s approximately 80 percent of the health coverages in Massachusetts were sold by the Blue Cross/Blue Shield company. The national accounts of insurance companies doing business in New York State indicate that companies classified by that state as "life" companies sold accident and health premiums that, countrywide, were about 10 times the accident and health premiums sold by companies classified as "property and casualty" insurers; the "Blues" are not included in these reports.

One view is that accident and health coverages may be part of property and liability insurance, but that property and liability insurers are, by and large, a small part of the market. In that view, when analyzing the property and liability business we would take the position that the property and liability companies "also write accident and health insurance." Another is that these coverages are definitely part of property and liability insurance, and we might want to include in our assessment of the business all the accident and health coverages that are being written. An analogy would be that property and liability companies also buy and sell bonds, as contrasted with the view that buying and selling bonds is part of the business of property and liability insurance. From this perspective we would not feel compelled to include all companies that buy and sell bonds as part of the business of property and liability insurance. From the second point of view the inclusion of all companies that buy and sell bonds would be important.

Subplot 1—The Life Company Decision

Until 1951 the A.M. Best Company leaned toward the second view. It did not adopt it to the extent of including all the business of companies that wrote accident and health coverages, but *Best's Aggregates and Averages* included a number of life insurance companies¹⁹ as writers of accident and health coverages. So far as one can tell, these companies were included in both the aggregated income statements and the aggregated balance sheets since the numbers of companies in these two reports are usually, though not invariably, the same. In 1951 Best changed its mind²⁰ and thereafter included only the premiums being written by companies it considered to be property and liability companies.

By an unfortunate coincidence, up to 1951 *A&A* had listed (under at least one coverage) every company included in the edition. The first edition that eliminated the accident and health coverage of life insurance companies also limited the listing to companies writing at least \$250,000 of net premium in any given line. Smaller companies are represented by a single line giving their aggregate experience. That precludes a detailed analysis of the effect of this change from the information generally available.

The effect of this decision can be estimated, however,²¹ but only roughly; I will deal only with the data on stock insurers.²¹ In 1950 the list of companies that wrote at least one accident and health coverage included some 249 company names.²² Of these 102 had "Life" but not "Life and Casualty" as part of the name (I will refer to these as the "Life" companies). Counting only those companies that had premiums of over \$250,000 in group accident and health we come up with 22 companies. The group premiums of these companies amounted to \$172.3 million—a little more than 50 percent of the total premiums. Taking these premiums out of the total leaves \$163.5 million. The following year, after the "Life" companies were excluded, the total group accident and health premiums in *A&A* were \$173.0 million. The non-group coverages are segmented so the procedure has to be modified. I considered as "large" any company that had more than \$250,000 in aggregate premium in the non-group coverages. That identified a total of 52 "Life" companies with an aggregate non-group premium of \$131.7 million. The other companies had a non-group premium of \$280.6 million, compared to a premium of \$150.1 million in 1951. To put this in perspective, the \$304 million in accident and health premiums that are clearly related to "Life" companies is almost six percent of the total premium written in 1950 by stock insurers listed in the *A&A*.

Unfortunately, there is no way of knowing from the *A&A* how the assets and liabilities of these "Life" companies were treated in the reports or of the impact that this might have had on the results. It is nonetheless possible to support the hypothesis that the assets of these life companies are not included in the *A&A*. I reach that tentative conclusion by obtaining from *Best's Life and Health Insurance Reports* for 1951 the assets as of December 31, 1950, of the "Life" companies. These amounted to \$6,657 million, compared to assets of \$4,425 million for the stock casualty insurers listed in the 1951 *Property and Casualty* edition of *A&A*.

The numbers for mutual companies also are interesting. Of the 47 companies engaged in group accident and health, eight were "large life" companies by the criterion given above and they accounted for 64 percent of the premiums written in that line. If we include John Hancock Mutual, Prudential Insurance, and Massachusetts Mutual (which do not have "Life" in the names as listed in the *A&A*), that becomes 11 companies and 88 percent of the premium. For the "other accident and health," seven "large life companies" are involved and they represent only 13 percent of the premium. Repeating the exercise of checking the assets of these companies in *Best's Life and Health Insurance Reports* for 1951, we find that if we count only the "Life" companies, the total assets are \$17,413 million, and if we include the three mentioned above, that rises to \$30,693 million, compared to an aggregate of \$1,473 billion for the mutual casualty insurers

Table 1. Earned Premiums of The Travelers²⁴ (in millions of dollars)

	Year		
	1961	1962	1963
Group A&H	321.7	349.0	0.0
Other A&H	33.7	37.4	0.0
Workers comp.	97.6	105.9	85.5
Non-auto B.I.	40.1	33.1	16.1
Auto B.I.	73.8	20.3	1.1
Stat. surplus	256.5	284.3	297.6
Vol. reserve	167.6	163.8	171.4

listed in the 1951 *Property and Casualty* edition of *A&A*.²³ This finding reinforces the conclusion that while the accident and health premiums of life companies are included prior to 1951, the assets are not.

Subplot 2—Travelers Insurance Decides

A decision taken in 1962 by The Travelers Insurance Company also had major impact on the sales of accident and health coverages reported in the *A&A*. Travelers simply shifted all its accident and health coverages to its life affiliate. Since Best had decided earlier to exclude the accident and health business of life companies, those premiums were no longer included. The magnitude of this can be gauged by the fact that subsequent editions of *A&A* include footnotes such as: "Starting with 1963, accident and health business of The Travelers Insurance Company excluded." While that footnote might lead the unwary reader to believe that Best made the decision to exclude that business, the facts are different. The impact may be the same.

In 1961, Travelers had net premiums of \$33.7 million in non-group accident and health, \$321.7 million in group accident and health, \$97.6 million in workers compensation, \$40.1 million in non-automobile bodily injury liability, and \$73.8 billion in auto bodily injury liability. Its statutory surplus was \$256 million, and a voluntary reserve of \$168 million was carried in addition. The corresponding numbers for 1961, 1962, and 1963 are given in Table 1 for comparison.

The decision by Travelers' to shift its accident and health business to a life affiliate had the effect of reducing the premiums written by stock

property and liability companies listed in *A&A* by about 3.5 percent. It also appears to have reduced substantially the writings in automobile bodily injury liability. It does not appear to have shifted any surplus away from the business. Because Travelers Insurance remained in the property and liability business, however, the whole assets and surplus of the company continued to be included in *A&A*.

As an epilogue, in 1971 Travelers resumed writing accident and health insurance in its property and liability subsidiaries; the majority of the writing continued to be in its life insurance company. Most groups that had both property and liability and life operations appear to have kept the lion's share of the accident and health premiums in the life subsidiary from long before 1963.

Implications

The changes that went along with the accident and health affair have implications for empirical research. One is that anyone studying the expenses of property and liability insurers should studiously avoid this period. The reason for that is simple. Group accident and health over this period that was eliminated later was about 7 percent of all premiums reported in *A&A*. Although that sounds small, the underwriting expenses of group accident and health insurance were about 10 percent of premiums and the loss adjustment expenses were negligible. In contrast, for all the lines combined the underwriting expense ratio was about 25 percent of premiums and the loss adjustment expenses were between 15 and 20 percent of the losses incurred.

Also of concern is the effect that the inclusion of the premium of life companies and exclusion of their assets might have.²⁵ If their assets were not included, then the computed premium-to-surplus ratio would overstate by roughly 10 percent for the stock companies and by a substantial margin for mutual companies.

I view this as a very good reason to stay away from the period over which this plot was developing. Starting after 1963 is probably a good idea. Starting after 1950 is practically mandatory unless the study calls for the use of data by line of insurance and does not require balance-sheet items. The additional six years that would be added by going back to 1945 may represent a substantial extension of the number of points but the price being paid in terms of homogeneity is potentially large.

Indecision by Other Insurers

In the case of Travelers we saw a large clean break.²⁶ For other companies the situation is much more complicated. Many stock P&L companies had life insurance affiliates. Among these are Aetna Casualty, Allstate,

Hansecó, Hartford, and INA. The percentage of the A&H premium that goes to the P&L affiliates varies from year to year. The variations are substantial and do not have a definite trend. The decisions may well depend on factors such as premium taxes or income taxes.

Implications

The apparently capricious allocation of accident and health coverages to P&L and life affiliates suggests that studies based on regression models of aggregate or consolidated premiums on other variables should begin by investigating whether the allocations are explained by these variables. If the allocations are correlated with these variables, then care must be taken to ensure that the regression results are interpreted with due care so that real effects rather than merely the consequence of these allocations are being identified.

THE MARKETING AFFAIR

People seem to forget that the A.M. Best Company Inc. is a profit-seeking entity. Presumably it cares about profit just as we believe the companies in our models care about profit. If we keep one part of our mind on that thought we ought to consider the agency problems involved in using them as our data collection agents.

Subplot 1—The Numbers Game

One consequence of this line of thinking is that when data collection and analysis had high marginal costs, Best might well have relied on insurers to provide the data rather than to spend a great deal of effort to collect data from all companies. That may be one reason why, in the mid-1960s, the number of property and casualty insurers included in the *A&A* represented only about 40 percent of the domestic licensed companies. That percentage has risen; in the last five years or so it has been about 75 percent. But now one can probably obtain all the information in machine-readable form from companies that want to be rated and to buy it from the NAIC²⁷ for companies that do not want to be rated.

One element balancing the effort might well be a reputation effect. It would not be easy to sell rating services if one rated only a handful of companies, and having only a few companies included in *Aggregates and Averages* might not give the market great confidence in the product. We saw that in 1951 roughly 100 life insurance companies were eliminated from the stock casualty segment. We might have expected the number of companies included in the *A&A* to drop. But in the 1951 edition (reporting the

business of 1950, when the life companies were included), the stock section had 646 companies, and in the following edition the corresponding number was 664. In 1950, 97 mutual companies were listed as being in the group accident and health business in 1951 the number had decreased to 30, yet the total number of mutual companies included in *A&A* decreased by only one from 363 to 362.²⁸

The numbers game has at least one sub-subplot. While we might expect that in any given year the number of companies included in the balance sheet and income statement aggregates will be the same, that is not always the case. The disparities occur more frequently for mutual companies than for stock companies, but they are there for both. From 1941 to 2001 the number of stock companies in the two reports differed in two years: 1944 and 1945. For mutuals the numbers differed in 24 years from 1941 to 1965 (both inclusive), except for 1952. For reciprocals, and Lloyds the details are available only since 1951, and the numbers agree in every year.

Subplot 2—The Prestige Game

It may be that the addition and deletion of companies has only a little to do with bankruptcies and new formations and a lot to do with public relations. There is another side to this coin as well. After all, insurance companies also are likely to be profit-seeking or at least value-seeking. If A.M. Best relied on receiving the data from companies, then certainly a company that feared a down-rating might have considered delays in submitting the data to Best. Since publications have deadlines, companies not submitting their data on time would not be included. If such relations exist, then a whole discipline that cannot talk ten minutes without appealing to self-selection has been using data that result from a self-selection process without ever considering the possibility.

To determine whether companies might play such games, I regressed the percent change in the number of companies in *A&A* on the underwriting profit margin before dividends to policy holders, the change in the value of stocks, and the income from other assets. The change in value of stocks was measured either by a change in the S&P index or by that change multiplied by the percent of assets that was invested in stocks. For the other variable I used either the interest rate on 30-day Treasury bills or that times the percent of assets not in stocks. I used data for the period from 1952 to 2001. For stock insurers the two regressions gave very similar results. The one with the more “sophisticated” variables gave a somewhat higher *r*-squared: 0.365. The results are in Table 2. Note that all coefficients are highly significant and have the expected sign.

Table 2. Results of Regressing the Percent Change in the Number of Stock Insurers Included in A&A on Underwriting and Financial Variables

Variable name	Estimated coefficient	Standard error	T-Ratio with 46 DF	P-value
UPBD	0.23650	0.06397	3.697	0.001
S&P*%Stock	0.12478	0.05579	2.237	0.030
R*(1-%Stock)	0.90698	0.19850	4.568	0.000
CONSTANT	-0.01167	0.00781	-1.495	0.142

For mutual companies, neither regression gave strong results. In both, the interest rate was significant at the 10 (but not the 5) percent level and had the expected positive coefficient. The other coefficients for the variables were not significantly different from zero.

Thus it appears that at least stock companies may be playing the prestige game. The failure of mutual companies to participate may be due simply to the fact that they typically pay out substantial policyholder dividends and can adjust those to “dress” their books.

Subplot 3—The Merry-Go-Round

The regression presented above may be interesting but it is far from conclusive. It could just be that conditions during the year precipitate or retard bankruptcy and deter or encourage new entry.²⁹ Some authors appear to believe that this is the major effect. Short of having access to complete listings of the companies included in each year, it is not possible to prove conclusively that this is not an important element. One can, however, show that it is not the only element.

Beginning in 1984, A&A gives both beginning of year and end of year balance sheets for the companies reporting in a given year.³⁰ So we have, for example, the December 1987 aggregated balance sheet of the 1427 stock companies that were used in the 1988 edition and the aggregated balance sheet on the same date of the 1482 stock companies included in the 1989 edition. We might well expect that with an increase of 55 companies, every asset account and every liability account would have increased. If there had been a decrease in the number of companies, we would similarly expect a decrease in all the accounts. In the unusual event that the numbers were the same, we might expect no change in the accounts, realizing that some might have dropped out and been replaced by the same number of new companies.

The exact asset and liability items differ in the various editions³¹ as changes took place. I examined some ten items for the years 1984 through 2000. If all ten moved in the same direction as the number of included companies, that could be chance, the result of having a very large increase or decrease of the number of companies, or an indication that indeed there were only additions or only deletions. On the other hand, if not all these balance-sheet items move in the same direction as the change in number, it is definite proof that mixed moves—that is, both additions and deletions—had taken place. For stock companies, 3 of the 17 comparisons showed mixed moves; for mutual companies it was four of 17; for reciprocals it was three of 17³²; and for Lloyds it was seven of 17. These numbers conclusively show that movement occurred in both directions. If they do not appear impressive to you, consider that in this period the number of companies in the *A&A* increased from 1773 to 2412. The average of the absolute value of the changes from year to year was 45.8 for stocks, 17.4 for mutuals, and 2.9 for both reciprocals and Lloyds. The large numbers for stocks and mutuals make it unlikely that one would observe mixed movements; if the number of companies increases by 30 net, how likely is it that the aggregate cash surplus, total assets, or the unearned premium reserves would decrease even if several companies exited?

If the increases were all new entrants, the unearned premium reserve, unpaid loss reserve, and reserve for unpaid loss adjustment expenses would not increase when there is an addition. That is a result of the fact that if the company added was in its first year of business, its reserves would have been zero at the beginning of the year. I found no instance in which all three were unchanged.³³

All this is statistical evidence of a merry-go-round. There is also direct evidence. In a study of the effects of scale on the costs of automobile insurers, my coauthor and I collected from the *A&A* data on the largest writers³⁴ in any of the segments of auto insurance for their operations in the years 1989 through 1999. Several insurers had one-year “holes” in the middle of their data. An inquiry about a sample of them with A.M. Best elicited the information that the reports were received late and hence the companies had been left out of the compilation. So yes, for whatever reasons, there is a merry-go-round.

Implications

The marketing affair has a number of implications. The primary one is that one cannot view the data in *A&A* as representing anything like a continuous “market” for property and liability even if one avoids the poisonous years involved in the accident and health affair. A company that is a major writer in commercial automobile insurance might disappear for

a year or two and be replaced by one that writes virtually no commercial automobile. This extends, though in milder form, the problems discussed in the accident and health affair. In particular, attempts to relate aggregate premiums in a given year to losses and premiums in earlier years may yield interesting results but results that are impossible to interpret because we know little about the effect of the changing panel of insurers included in the data.³⁵

A second implication is that the numbers of companies included do matter. There is nothing like proportionality—the largest companies have been there all along and typically stay there unless they become insolvent. The new entrants tend to be smaller than companies already included. But an increase in aggregate premium from year t to year $t+1$ could be merely a result of an increase in the number of companies included or, at the other extreme, might underestimate the change in aggregate expenditures on insurance because the number of companies included has decreased. The study of models that involve both the income and balance-sheet information is particularly sticky because of the years in which mismatches in the numbers of insurers in the two sets of information exist.

The use of stock companies alone as representing the market is difficult to defend. During the period from 1951 to 2001, the stock companies lost market share—not dramatically in aggregate, but steadily. In automobile insurance between 1951 and 1970, their share declined by 10 percentage points or so.³⁶ From 1971 to 2001 it decreased by nearly 6 percent. Before 1972, stocks had virtually 100 percent of the medical professional liability premium; by 1981 it had decreased to just over 54 percent. If stock companies are in competition with mutual and reciprocals,³⁷ they cannot be viewed as “the market” in any sense

Given this set of circumstances it is a great deal safer to engage in analyses that involve ratios such as the underwriting profit margin and the premium-to-surplus ratio than in analyses that involve profits and surplus. Even the ratio analysis can be a problem, however, since the data suggest that self-selection may be in play.

THE TREE IN THE FOREST AFFAIR

If a tree falls in the forest and nobody hears it or sees it, has it really fallen? Well, it has, but we tend to assume that things we do not know about do not exist. This is where institutional knowledge helps and where one has to start reading not just with an open mind but with an aggressively inquisitive one too.

How many papers have you read that are based on a model in which the insurance company springs from nothing the first day of the year, receives a great deal of premium income on that day, and then lies dormant until the end of the year, at which point it pays all the losses and ceases to exist? There are many. But how many of the authors or their readers realize that the data against which these models are being “tested” do not conform with that picture at all?

Subplot 1—Does the Trunk Fall?

Not many of us were around when three-year prepaid policies were in vogue in homeowners multiple peril. If we were, we were probably not aware of insurance. Yet those of us who study the market should have some awareness of it. That need not come through an apprenticeship program, though one would hope that the educational system might pass on the information. But if you have ever had the curiosity to divide one number by another—or maybe just to compare two numbers—you might have stumbled upon it.

On December 31, 1961, the unearned premium reserve of stock companies for homeowners multiple peril insurance was \$702.7 million. The premiums written for the year were \$701.4 million. Our one open eye should catch that. Since we are well indoctrinated to expect that the unearned premium reserve should be very nearly one-half of the premiums written, we should be surprised. Granted that this was the first year the HMP was listed as a separate coverage, but is it likely that most policies were written after midnight on the last day of the year? Because that would have to be the case if we envision only annual policies. If they were all written at midnight of December 31, the unearned premium reserve would equal the written premium, but we see an unearned premium reserve that exceeds the premiums written. Of course part of the answer is that more policies were probably written in the last half of the year than in the first half, but the other part is that some policies were prepaid policies for more than one year.

The problem goes well beyond HMP, and it may or may not be due to the existence of multiple-year policies. Take the boiler and machinery coverage. The ratio of unearned premium reserve to net written premium for boiler and machinery insurance from 1951 to 1984³⁸ is shown in Figure 1. The two points for mutuals in 1983 and 1984 are so different that one might think that the data collector must have made a bad mistake. Yet, the numbers are exactly as reported in the 1984 and 1985 editions of *A&A*. If you have been reading this with attention you might expect that you have been caught in the change trap one more time. Checking the bottom of the page for footnotes, you would find only an innocuous one to the effect that

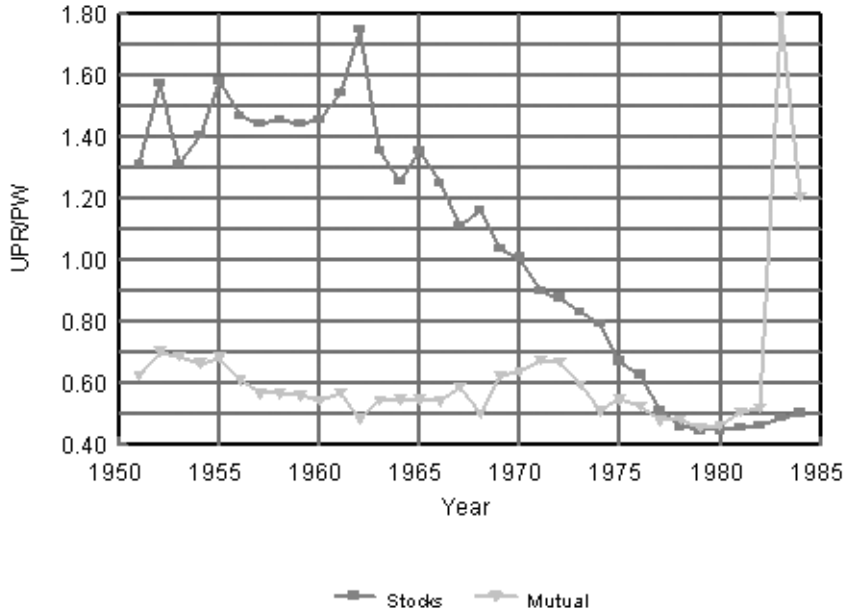


Fig. 1. The ratio of unearned premium reserve to premium written for Boiler and Machinery coverage.

the last three zeros have been omitted. But if the force is with you, you might turn to the next page, where you would find the following footnote:

Beginning with the 1983 data year, business written by Factory Mutuals was included in the appropriate lines of business in the above table—namely Fire and Boiler and Machinery. Total net premium written (in thousands) by Factory Mutuals in 1983 was \$230,902 (Fire \$102,279 and Boiler and Machinery \$58,730).

Welcome to the change trap.³⁹ What would have happened if you tried to interpret the data before you were introduced to the trap? How should we interpret it once we know the trap is there? We might have been able to learn more about this problem had other changes not intervened. The business of Factory Mutuals was not broken down by line, and in 1985 A&A discontinued the column on unearned premium reserves.

Apart from the effects of the sudden change in the definition of “mutual,” the notable feature of this graph is that for stock companies the ratio reaches as much as 1.8 and does not decline below 1.0 until 1971. For mutuals on the other hand, it was at levels we might feel comfortable with; assuming annual policies, the figures imply that the average sale occurred

somewhere between mid-May and mid-August.⁴⁰ If all the policies had been three-year prepaid policies, then the ratio would be expected to be around 1.5.

We can justify the number this way: suppose I wrote one three-year policy around mid-year every year at a price P per year. Then in any given year the premium written would be $3P$. The unearned premium reserve would be $2.5P$ for the policy I wrote this year $1.5P$ for the one I wrote last year and $0.5P$ for the one I wrote two years ago. The total UPR would be $4.5P$ or 1.5 times the premiums written. If the policies were written very late in the year the ratio could go up to 2. But going from 1.45 one year to 1.75 the following year, would require that many policyholders with anniversaries early in the year stop buying policies and be replaced by equivalent numbers buying very late.

What might account for the numbers for stock companies and for the even more extreme numbers for factory mutuals?⁴¹ I cannot tell with any degree of certainty. My inquiries from old hands in the brokerage business indicate that while multiple-year policies did exist, they were seldom prepaid. If the policies are not prepaid, then each year the premium written should be P , one from each policy, and if the policies are written at mid-year each should contribute $0.5P$ to the unearned premium reserve. So the ratio of the UPR at year end to the premiums written would be 0.5, just as for annual policies. It is very unlikely that companies would account for three-year policies with annual payments as though they were prepaid. If they did so all monies not paid within 90 days of the policy's inception would become non-admitted assets and the companies would suffer unnecessarily from a depletion of statutory surplus.

Just to show the power of the change trap and to suggest that the features we have been discussing may be particular to how companies do and report business, Figure 2 shows the data for fire coverage—the other coverage in which factory mutuals are involved. The effect of the reporting change is clearly visible. Somehow, factory mutuals in the early 1980s were still operating in such a way that the ratio was much higher than for stocks mutuals or reciprocals.⁴² Beyond that, the figure shows that for this coverage also, the ratio in the 1950s is consistent with the hypothesis that a substantial fraction of policies were three-year prepaid policies. The ratio decreased gradually and by the late 1970s was consistent with the hypothesis that the market consisted mostly of annual policies—except of course for the factory mutual component.

Subplot 2—Do the Leaves Change Color?

We have little information about the seasonality of sales. Accordingly, we do not worry about its possible effects. That may be misguided. Figure

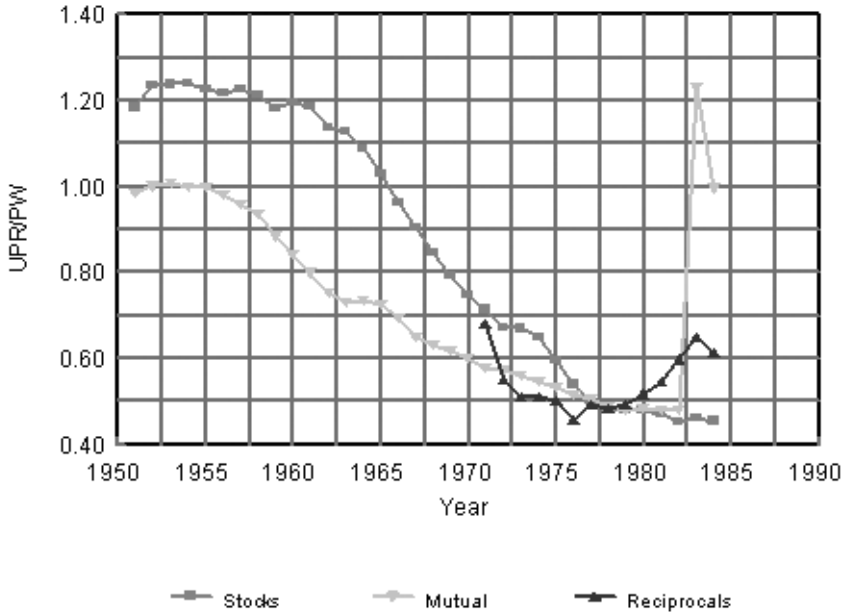


Fig. 2. The ratio of unearned premium reserve to premium written for Fire coverage.

3 shows the ratio of UPR to premiums written for automobile coverages. So far as I have been able to determine, multiple-year policies have never been offered in these coverages, though six-month policies are not unknown. Some states do require that policies be purchased on January 1st.

The patterns in Figure 3 bear discussion. The apparently erratic point for automobile physical damage of stock companies in 1960 is indeed correct—it matches the value for auto collision and auto, fire, theft, and comprehensive for 1960 in the 1961 edition of *A&A*. All the curves seem to exhibit downward trends. A very notable feature is that the ratios for liability policies and physical damage policies are different; they are quite different for stock insurers.

The differences between liability and physical damage policies are difficult to explain. The two coverages are so often purchased in a single policy one would expect virtually the same ratio for the two. One possibility is that people insured through residual market mechanisms purchase policies at different times from people in the voluntary market. The differences would then result from the fact that residual market coverage for physical damage is usually much more restricted. The difference between stock and mutual insurers could then be attributed to greater participation

by the former in states that have large residual markets. Another possibility is that private passenger and commercial automobile policies have different mixes of property damage and liability in them and are sold at different times. Unfortunately, the *A&A* did not report details of these coverages separately until after they stopped reporting the unearned premium reserve.⁴³

The most ready explanations for the downward trends are a progressively increasing fraction of six-month policies, a progressive trend to paying for policies on a quarterly rather than annual basis, or an actual trend in the time at which people purchase policies. The effect is not small; if all the change were due to shift in purchasing patterns, then for automobile physical damage coverages purchased from stock insurers it would amount to almost three months over the period. This would be troublesome from the point of view of empirical research. The emergence of losses almost certainly has seasonal components. Combined with a shift in purchasing patterns the seasonal components would create a trend in the expected loss ratio even if no trend were present in the underlying data. That means that to compare one year's loss ratio or profit margin with that of another year we would have to correct for the effect of changes in the purchasing pattern.

Subplot 3—Does It Matter When It Fell?

A question of some importance is the time elapsed between the time a loss is incurred and the time it is paid. Schedules *P* and *Q* of the annual statement provide information on this but they first became available in the *A&A* in the early 1980s. The standard procedure now being used to discount losses is to compute the pattern of delays from claim to payment from these schedules and apply the results to earlier periods going back to the 1940s or 1930s. The justification for this procedure is that data were not available before the 1980s. That assumes that the average time has remained the same over that whole span—an assumption that is not likely to be valid given the increase in importance of liability coverages relative to property coverages.

Fortunately, an alternative is at hand. The ratio of the reserves for unpaid losses and unpaid loss adjustment expenses at the end of the year to the losses and loss adjustment expenses incurred during the year is a measure of the average time elapsed from the time a claim is incurred to the time it is paid.⁴⁴ Figure 4 shows a graph of this ratio for stock insurers over time.

From 1951 to 1992 the ratio trebled. More recently it has been falling rapidly but it is still at over twice the 1951 level.

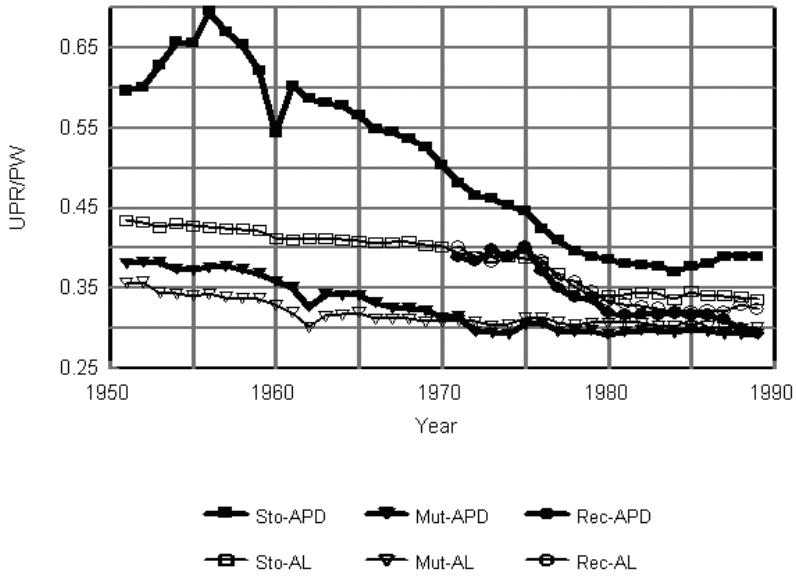


Fig. 3. The ratio of unearned premium reserve to premium written for automobile coverages.

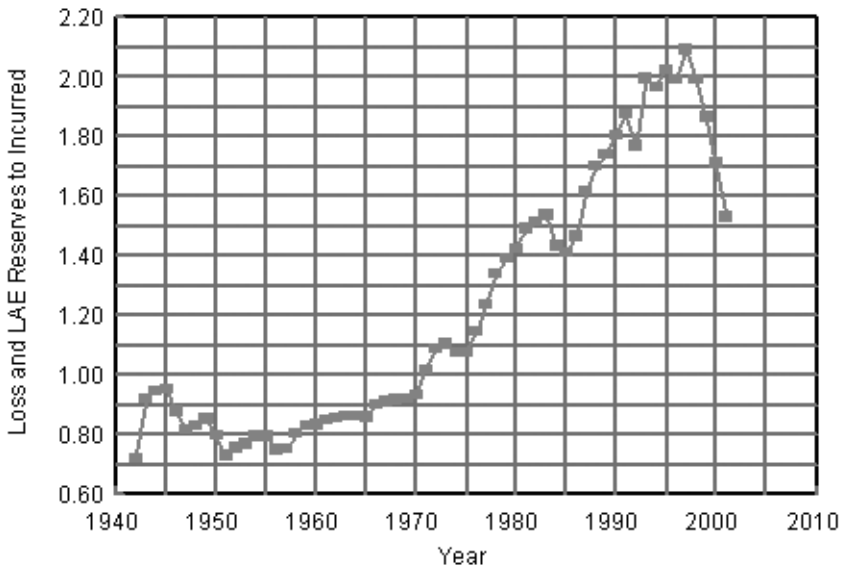


Fig. 4. Ratio of the reserves for losses and loss adjustment expenses to incurred losses and loss adjustment expenses for stock insurers.

Implications

When faced with a model in which all policies are written at the beginning of a period and the losses are all paid at the end, the reader needs to take a line of defense similar to that suggested earlier. The line of questions in this case includes the following. If the data from *A&A* in any way validate the features of the model you claim you tested, do they also validate the other features—namely, that all policies are written at the beginning of the period and losses paid at the end? If not, all we can know is that the composite model was not rejected by the data. And if we know some parts of the model are not true, how can we be sure the third part would not be rejected by relevant data?

The other major implications are for the discounting of loss to obtain their present value at the time the policy was sold. The first piece of the problem is that by assuming annual policies and then using data in which a substantial volume of multiple-year policies is present, we are introducing substantial distortion. The second is that by assuming that current patterns of loss payment applied in the past, we are almost certainly introducing a major distortion.

There are simple though perhaps inelegant ways of dealing with the problem. Assuming that policies are purchased uniformly over the year and there are not strong seasonal effects on claim events, the ratio of the unearned premium reserve to premiums written gives a measure of average time from policy inception to the average claim event. The ratio of total loss reserves to total loss obligations incurred gives a measure of the average time from the loss event to the payment. The sum of these two quantities is an estimate of the average time from policy inception to payment of the related losses. We could just discount for that period of time and forget the niceties of estimating the distribution. This is not elegant, but would take care of effects over a factor of three that is ignored in applying the recent data to old losses. Figure 5 shows how this might affect the results. For this figure I have used simply the 30-day Treasury bill rate, not worrying about the time structure of interest rates. For the “Modified Winter” curve I used the distribution inferred by Winter (1994); for the “Naïve” curve I raised one plus the current rate to the negative power of the average time from inception to payment, as described above. The “Exponential” curve was derived by assuming that the payout occurs over 120 months following an exponential distribution of the same mean, as inferred from the data. It should be kept in mind that the variable in which we are usually interested is not the discounted value of the losses but the difference between the premium income and the discounted value of the losses; a small change in the discount factor can lead to a large change in the estimated profit.

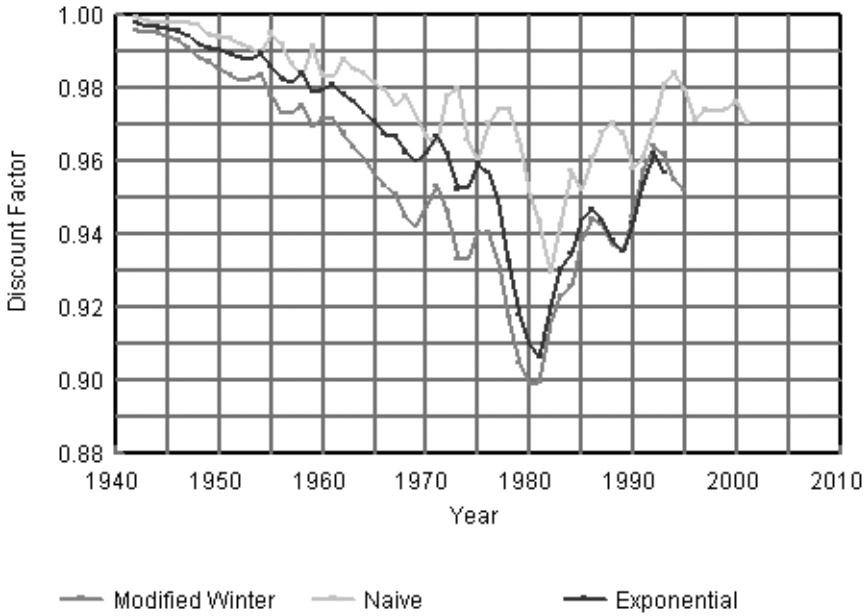


Fig. 5. Comparison of the factor for discounting losses and loss adjustment expenses proposed here with that of Winter (1994).

Note that for the 1990s we can presumably develop accurate predictions from Schedules *P* and *Q*.

Another important implication arises from the fact that the relation between a dollar of premium and the funds generated from it varies substantially across time, across lines, and across companies.⁴⁵ This can be verified further by looking at the ratios at one time for companies with different business focus. As an example, for the year that ended on December 31, 1980, the ratio of reserves to premiums earned for some groups of companies were those given in Table 3. It seems clear that the ratios differ across groups and from stock to mutual insurers, though not always in a systematic way. It seems probable that individual companies with each group also differ from each other. This provides no support to the assumption that the amount of funds generated by a dollar of premium at a given time does not depend on the company.

Another implication of this plot is that we need to determine the reasons behind the variation in the ratio of unearned premium reserves to premiums written. If a substantial portion of the shift is due to changing seasonal patterns of purchases, then we need to develop methods for taking

**Table 3. Ratios of Reserves to Premiums Earned
for Various Company Groups**

Group	Ratio	
	Stock	Mutual
Multiple line deviating	1.18	1.29
Fire and allied standard	0.76	1.03
Fire and Allied deviating	0.86	0.92
Auto deviating	1.06	0.88
Medical malpractice	3.66	4.29

those shifts into account when comparing reported loss or profit patterns over time. Appendix A describes a story that might account for some of the features but I have been unable to find corroboration for it.

DISCUSSION

The *A&A* are the backbone of empirical analysis in insurance. They represent the only body of data that has some continuity over some five decades. We have no alternatives for investigating the long-term trends in the business. Nonetheless we must not get into the habit of assuming homogeneity where there is none or of ignoring lack of homogeneity simply because a referee would like three more points in a regression.

To understand the issues, we must study the body. The cast of characters—the companies that constitute the object of study—are not as important as what underlies their being included or excluded. The changes that have taken place in the presentation of the *A&A* are worth studying. Familiarity with the changes allows us to avoid pitfalls, but every project requires a fresh look because every project requires some new element of data that we have not investigated in detail before.

I do not pretend that this is an exhaustive survey; it merely illustrates the point that good empirical research requires intimate knowledge of the data being used. The change trap is forever with us. Medical malpractice was first separated out from other liability in 1975. As I found out, the factory mutuals were treated as a line of insurance in the mutual section until 1982. After that their data were separated into the lines and added to what had been data for just the mutual companies.⁴⁶ Other changes have

taken place. Starting in 1986 the surety data included financial guarantee coverages; starting in 1991 the "Other Liability" line includes product liability.⁴⁷ Care must be exercised at every stage.

Understanding the data leads to different ways of thinking. If we want to use the data to test models, we must be careful in making the model represent reality as closely as possible. If one part of the model is unrealistic, we cannot then claim that the model is valid merely because it was not rejected by the data. This is a difficult task, not just because it requires a great deal more effort but because dealing with realistic conditions makes the models "inelegant" and reduces the probability of publication. But it is a necessary effort if the profession is to retain any integrity.

Probing into the nature of the data is worthwhile. It leads to new insights and new opportunities. When I started writing this piece I knew that there were problems with the inclusion and exclusion of life insurance companies over the years but had no appreciation of the magnitude. I thought the exclusion of Travelers was a decision taken by A.M. Best rather than by Travelers. I suspected that the discounting methods in use were flawed but had no idea of how the effects could be measured or where an alternative could be found. I believed that some of the time series analyses that had been performed were flawed because they failed to take into account the entrances and exits from the included list of companies, but had no evidence that I was right; now I have evidence that I was right but also have evidence that I was wrong. I was right, for example, in choosing the data from New York to study fluctuations in underwriting margins, since the group of companies writing in New York is more stable than that of companies included in *A&A*. But I was wrong when I used *A&A* in not thinking about the potential effects of self-selection. I simply had not thought of that as a possibility until I gained some confidence in the fact that entry and exit are not determined by Best alone.

At one point in the development of this paper it occurred to me that I ought to ask the question, "Is Best good enough?" I now feel the more relevant question is, "Are we good enough to compensate for the necessary problems in the *A&A*?"

NOTES

¹I will use "Best's Aggregates and Averages" to refer to the whole series of reports published by the A.M. Best Company Inc., now located in Oldwick, NJ. The series has annual editions. The 1971 edition as an example, reports on the operations for the year ending December 31, 1970. I have used editions covering the operating years 1940 through 2001.

²It is also for the most part a thankless one. Editors do not want to publish the stuff. Reviewers view it as useless—after all, they know everything. Often the honest compromise is to prepare

a detailed statement and insert a footnote in the paper to the effect that the exact procedure for obtaining the data is available from the corresponding author.

³This annoyance can be minimized by making sure you never look at editions that have overlapping data. Unfortunately, that maximizes the likelihood of falling into change traps.

⁴Using the word “should” would be more appropriate. I remember fondly discovering that an insurer (mercifully, not property and liability) had engaged in a transaction with an affiliate in the early 1980s in which the affiliate (not in insurance) sold its portfolio of 5 percent mortgages to the other. The buying company put on its books the outstanding balance of the mortgages but paid only the market value. Instant surplus creation. The same tactics have reportedly been used in property and liability insurance in the selling or swapping of workers compensation liabilities. The key is that distortion can occur if the data regarding the transfer process are manipulated.

⁵It is meaningless to talk about consolidation of stock companies separately from consolidation of mutual companies. State Farm Mutual Automobile is a mutual company. Its wholly owned subsidiary State Farm Fire and Casualty is the second-largest stock insurer by the ranking assigned by the A.M. Best Company.

⁶The consolidation subplot will be discussed next.

⁷Some of the unconsolidated amount may be in property and liability companies in which the investment is small enough not to require consolidation.

⁸*A&A* uses “aggregate” for aggregated. This is potentially misleading since “aggregate” could be construed as meaning “in total.” As you may have noticed, I try to use “aggregated” in an attempt to avoid confusion.

⁹My calculation by adding the “aggregate” surplus for stock mutual reciprocal and Lloyds insurers.

¹⁰Non-admitted assets include such worthless items as defaulted bonds agents, balances outstanding more than 90 days (including portions of premiums due under experience-rated and retro-rated plans under adjustment), fully depreciated buildings and “fully depleted” oil wells (a fully depleted oil well is one for which the accumulated depletion allowance equals the initial investment) still in active production. It is not at all clear that their aggregate market value is negligible. An interesting sideline is that there is no such thing as non-admitted liability or non-admitted revenue; the net income from those fully depleted oil wells is part of investment income.

¹¹This ties into the change trap. It is easy for the unwary to believe that consolidated data is better than aggregated data and accordingly to use the consolidated data for years after 1983. The problem is that “better” in this case also means “with different biases.” This is not useful in the study of long-term characteristics.

¹²I have tried to locate people at the A.M. Best Company who could answer some basic questions, but have not so far been successful. Of course, they have more pressing business than talking to academics.

¹³Recall that for the period under discussion, these companies were mutual companies rather than stock companies.

¹⁴As an example, for the year 1995 the consolidated tables of mutual companies show premium earned of \$87.7 billion and surplus of \$72.2 billion. The corresponding aggregates show premiums earned of \$65.7 billion and \$68.0 billion, respectively.

¹⁵See Venezian, 2004.

¹⁶The 1972 edition of *A&A* reports that the underwriting profit for 1942 is given as \$80.6 million.

¹⁷*Best's Aggregates and Averages 1972 Edition* A.M. Best Company Inc.

¹⁸Changes can arise in many ways. For example, in the United States, insurers pay federal taxes on the interest dividends and realized capital gains from investments of surplus—closed end mutual funds do not. If the impact of the taxes is placed on the shareholders, would anybody provide the capital? In an economy with no taxes there would be no such problem.

¹⁹ It also appears to have included some companies that were primarily if not exclusively health insurance companies.

²⁰ This could of course be viewed as part of the change trap, but it deserves to stand on its own as a subplot.

²¹ It is puzzling that three of the "Life" companies in this listing had the word "Mutual" in the company name; they appear to have been mutual companies that went into reorganization and emerged as stock companies.

²² It is not always possible to tell without the expenditure of a great deal of effort whether two companies are the same. For example, North American Life, North American Life North (Ill.), and American Life (Minn.) are listed under one or more of the accident and health coverages. It is clear that that represents at least two companies. But is it actually three companies?

²³ The Equitable Life Insurance, John Hancock, Metropolitan, and Prudential, each had assets greater than the aggregate of the 154 mutual casualty companies in *A&A*. Massachusetts Mutual was just below that total.

²⁴ The data are derived from *A.M. Best's Reports* for the corresponding years.

²⁵ I am not arguing that the assets of life companies should have been included. If anything, I would argue that we should remove from the years before 1951 all premiums from life companies if we want to have a consistent and reasonably homogeneous series for either accident and health or all lines combined.

²⁶ The break was not permanent, however. In 1971, Travelers started once more assuming A&H risks in its P&L company, though in much smaller volume than in its life affiliates.

²⁷ It should be kept in mind that the NAIC database does not cover all domestic companies. Companies that do business in a single state are not required to report their data to the NAIC.

²⁸ An alternate hypothesis is that the life companies writing accident and health coverages were not counted even though their accident and health premiums were included.

²⁹ This is unlikely. Potential new entrants are more likely to be swayed by the information they have than by information just becoming available to the companies already operating. Lagged terms in the regression are not significant.

³⁰ This should not be confused with analogous entries in the 1940s. Those in the 1940s gave the balance sheet in the earlier year for companies included in the earlier edition, not for those covered in the current edition.

³¹ As an example, some editions list reserves for unpaid losses separately from reserves for unpaid loss adjustment expenses, whereas others give the sum of the two reserves.

³² Interestingly, two of the three were on years in which the number of included companies did not change.

³³ In two instances, the change is zero in the unearned premium reserve and/or small in the sum of the two other reserves. Both were in the Lloyds segment.

³⁴ We collected data on any company that had been among the top 50 in any one segment of auto business in any one of the years involved. Thus, these typically were not small companies.

³⁵ Even at the company level the results could be interpreted only if the insurer wrote essentially the same mix of business year after year. If the mix of business changed, as it did rather dramatically for the Travelers in the early 1960s, interpretation would depend on whether the changes in business mix were endogenous or exogenous.

³⁶ This is intentionally vague. The data for reciprocals and Lloyds companies by line do not appear until 1971.

³⁷ Lloyds companies are a very small fraction of the market in any line. Reciprocals have about 10 percent of the automobile insurance market and about 20 of the medical professional liability market; they are not negligible as actual or potential competitors.

³⁸ The data end in 1984 because after that year, the *A&A* does not report the unearned premium reserves.

³⁹ Before 1983, the business of the factory mutual companies was treated as though their business were a separate line of coverage in the mutual section.

⁴⁰ The ratio of UPR to PW measures the fraction of the year at which the premium weight average sale occurred. A ratio of 0.7 makes the sale at 8.4 months; one of 0.45 corresponds to 5.4 months.

⁴¹ An analysis of the ratio of UPR to PW for factory mutuals shows that for this small segment, the ratio reached a peak of 3.2 (in 1964). This implies that policies for five years or more were in place.

⁴² See Appendix A for more information on this.

⁴³ In 1986, after the lines were split, stocks had 59.27 percent of private passenger property damage and 59.36 of private passenger liability. The corresponding numbers for commercial coverages were 80.56 and 78.87. The percent of private passenger property damage premiums to all private passenger automobile premiums were 42.5 percent for both stock and mutual insurers; the corresponding values for commercial property damage premiums were 4.5 percent for stock companies and 29.5 percent for mutuals.

⁴⁴ This is analogous to using the ratio of the accounts receivable at year end to sales to estimate the period between sales and cash receipts.

⁴⁵ Differences across companies were shown to exist by Fields and Venezian, 1987.

⁴⁶ Interestingly, the footnote that reports this not always present in subsequent editions. The 1996 edition does not have it.

⁴⁷ The footnote is very terse. It does not expand on where product liability was accounted for before 1991, nor does it state whether the product liability component of commercial multiple-peril policies is included in the statement.

⁴⁸ I have not been able to determine whether IRI involved mutual as well as stock insurers.

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APPENDIX A

Factory Mutuals, the Issue of Multiple Year Policies, and the Peculiar Data for Mutual Insurers in 1984 and 1985—A Story in Need of Corroboration.

Some brokers who were active in the middle of the twentieth century are still in the business. In discussing my findings, two of them told me a story that might account for some of the vagaries in the data. If true, this provides a vivid image of how a very small segment of the insurance business—the factory mutuals—can drive the whole industry into new programs. Here is my synthesis of the story.

In the late 1950s the factory mutuals started offering Highly Protected Risk (HPR) coverage to large corporations as long as they satisfied strict safety conditions with regard to construction, sprinklers, and other factors. They offered high limits and low premiums and began to penetrate the commercial property market, especially that of the largest corporations. In response, some other insurance companies⁴⁸ formed a syndicate, called Industrial Risk Insurers (IRI), to compete with the factory mutuals. One of the ways in which IRI tried to win back the business was to start offering its clients coverages and prices for multi-year periods. The factory mutuals responded with their own multi-year programs. So this is when multi-year prepaid premiums increased in popularity.

So far as I have been able to determine, factory mutuals typically used the prepayment programs rather than installments. I am told that for a 3-year program, the factory mutuals typically required 160 percent of the *total 3-year premium* up front. After the three years were over, they would offer to apply the remaining 60 percent premium balance to the upcoming premium for the next three years should the company choose to renew. IRI, in contrast, apparently offered as options either the prepayment or annual installment plans.

I could not obtain recollections as to the time at which these 3-year and 5-year programs peaked in popularity, but apparently policyholders opted increasingly for the annual installment plans rather than the prepayment as short-term interest rates reached high levels in the late 1970s and early 1980s. At about this time, the factory mutuals are said to have discarded the 3-year prepayment premium model. Thus, one can imagine that the popularity of these multi-year premium prepayments (especially the factory mutual model) was inversely correlated with short-term interest rates.

This information ties a number of points together. It explains the rise of the ratio in the early fifties. It also accounts for a decline in the ratio in

the late 1960s when interest rates started creeping up. It explains why the inclusion of factory mutual premiums by line with those of mutual companies created such aberrations in 1983 and 1984. And it explains something I noticed recently—that the premiums written by factory mutuals appear to have gone down significantly after 1984.

Whether this synthesis of recollections is correct remains an area for research that could change our perception of the validity of many empirical studies of property and liability insurance in the United States.