

**A PRACTICAL METHOD OF FORECASTING A LIFE INSURANCE
COMPANY'S GROSS OPERATING EARNINGS
FOR THE CURRENT YEAR**

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GEORGE RYRIE:

May I suggest that while the title of this paper and the development of the various points necessarily tend to emphasize the subject of surplus forecasting, the related subject of reserve checking deserves more than passing mention. There is no doubt that in a period of rapid growth, increasing expenses and strong competition, the subject of probable surplus earnings is very important to the management group of a company, particularly if the net level premium valuation standard is employed. Nevertheless, the actuary's responsibility for the adequacy of valuation is always present. For many small and medium-sized companies for various reasons not organized to develop more or less mechanical reserve valuation checks, the approach inherent in the surplus forecasting process is strongly recommended. May I also add that in my opinion it is most forceful in requiring a broad knowledge of developments in many different areas of the company activity, since it soon becomes evident that such knowledge is vital to the architect of any adequate reserve checking process. In addition, it is a most intriguing task and certainly rewarding in a personal sense—particularly if and when your reserve check stirs up some point of significance.

Mr. Walker touches rather lightly on the subject of certain tools available—in particular, tabular costs and net premiums or loadings. It would be rather unfortunate if the lack of such tools tended to discourage some from embarking on this very interesting problem of forecasting. We do not have these factors available in North American Life, nor do we attempt to estimate them separately, but we do prepare surplus forecasts and derive much assistance from them.

Referring to Ordinary assurances and in regard to tabular mortality costs, it seemed to us that any company such as ours, employing as many as five different mortality tables in its premium and reserve calculations, would merely produce some quite meaningless figures if it attempted to develop tabular cost. We also felt that any statement of surplus earnings by source which purported to identify substantial earnings from mor-

tality savings might lead to misunderstanding in some areas. In actual practice our method of estimating mortality loss employs a net cost per thousand at risk developed from the experience of previous years and applied to the estimated risk for the period covered by the forecast.

It is possible, even with five mortality tables and two or three rates of interest, to approximate closely to tabular net premiums without the labor of an actual calculation over your entire business. However, without tabular mortality cost, such a figure is not of much practical use. In any case, a suggestion of profit from loadings is also open to possible misunderstanding as in the case of so-called "profits from mortality."

As Mr. Walker points out, the methods of calculation and the amount of refinement will vary greatly within the group of companies following the process of attempting to forecast surplus earnings.

Because of our views in regard to tabular cost and loading profit and also influenced by our development of the estimation process for reserve checking, we concluded that there was some virtue in attempting to develop an approximation to the factor of $P - d$, *i.e.*, net premiums less the tabular cost or, in other words, the amount of current premium required for allocation to policy reserve. The results of dealing with this factor over the past ten years certainly give adequate confirmation of the comment made on several occasions by Mr. Walker to the effect that many of these factors show a remarkable stability over a period of years and trends developed can be used with considerable confidence. In illustration, may I quote that in our case, over the period of the last ten years, the factor of $P - d$ applied to ordinary premiums has gradually moved from 58.5% to 58.0%.

As a result of adapting the forecasting process to assist in checking the actuarial reserve calculations, we distribute business transactions other than expenses into the six major lines of ordinary assurances, deferred annuities, vested annuities, group life assurances, group annuities, and supplementary contracts. Many of our methods of approximating the factors required to estimate reserve movement are similar to those mentioned by Mr. Walker. Because expenses are not allocated during the year between lines of business, we have not as yet developed our forecast process to produce line-of-business profits.

In Mr. Walker's paper as well as in others on this subject, there appear references to seasonal fluctuations in business, uneven distribution of policy issue dates, and other items which, even after the insertion of part of the year's actual experience, still require particular judgment in forecasting for the remainder of the year's operation. In our considerations of this problem we reached the conclusion that the effect of many of

these influences would be smoothed out if we were to move from the forecast type of statement prepared at the beginning of the year to a series of twelve months' running statements to include the last current month for which actual figures were available. These 12 months' running statements necessarily involve the use of many of the assumptions employed in developing our beginning of the year forecast but, because of the inclusion of 12 consecutive months of facts, the estimate of surplus on a 12 months basis tends to run in a much more regular manner. We feel that the likelihood of arriving at the forecast surplus target can better be judged by interested parties than to require dependence on a single adjusted forecast for the complete current year.

In practice, after preparing in early February our initial statement of surplus earnings for the year on a forecast basis, we prepare a series of statements of estimated surplus earnings for the 12 months ending June, July, etc., until the year-end. This statement takes the following form:

- a) Gross Investment Revenue (excluding Capital Transactions)
- b) Investment Expenses (including direct and allocated)
- c) Net Investment Income
- d) Required Interest (addition of requirements for six lines of business plus deposits plus pension fund)
- e) Surplus from Interest (*A*)
- f) Gross Premium Revenue
- g) Policy Requirements (reserve increase arising from premiums *ex* required interest plus surrenders and maturity values, reserves on death claims, annuity payments, less surrender charges)
- h) Policy Income (net of *f* and *g*)
- i) Mortality Net (Incurred Death Claims less Reserves)
- j) In Force Expense (all expenses *other* than acquisition and investment expenses)
- k) Taxes
- l) Policy Outgo (total *i*, *j*, *k*)
- m) Surplus from Business in Force (*B*)
- n) Surplus before Acquisition Expenses (*A* + *B*)
- o) Acquisition Expenses Assumed in Premiums (a rather arbitrary standard of a constant per thousand plus a percentage of first year premiums)
- p) Excess of Acquisition Expense over Assumed Standard
- q) Acquisition Expenses (direct plus allocated) (*C*)
- r) Net Surplus Earnings (*A* plus *B* minus *C*).

For internal distribution and study, such a compact statement can easily be set forth for the previous 4 or 5 calendar years together with as many of the 12 months' running estimates of the current year as are deemed necessary to indicate the progress toward target.

A. EDWARD ARCHIBALD:

This is a subject in which I have long been interested, but I will limit my discussion to three comments.

First, the thing to do about this problem is to get started, and that is particularly true for a smaller company. Naturally, since the author is connected with a company no longer small, this paper was presented from the point of view of a company in the medium to large range. For the smaller company there are many short-cuts that make the job much less formidable than it has appeared even in this clear presentation.

My second comment has to do with the advantage of small figures. The author cites the advantage, for instance, of dealing with profits directly rather than with assets, liabilities, etc.—of dealing with small items where \$10,000 shows up like a sore thumb. There are many ways we can arrange the statement to arrive at small numbers in our results. One example is forecasting the financial results from new business within the year. The detail, of course, will depend on the method of operation of the company. However, for even a small company, first year premiums and commissions are large items, but the difference between first year premiums and charges which vary with volume (reserve charges, commissions, etc.) is usually quite small—often close to zero.

My third comment, and most important, is on nomenclature. As actuaries, don't we have a responsibility to be very careful of our use of common words with special meanings? In this excellent paper I was disappointed to see these terms: "Mortality Gain," which, without a lot of explanation, is not a gain; "Interest Required," which is not required; "Gain from Interest," which is not a gain. Unfortunately, these terms are still used by some accountants, auditors, publishers, and others outside our profession; their use by actuaries seems to put them in good standing. These are terms that plagued us in the depression years, and until they were finally eliminated from the Convention Form Statement. I had hoped that by now they would have been dead and buried.

(AUTHOR'S REVIEW OF DISCUSSION)

J. BARRETT WALKER:

Mr. Ryrie quite properly emphasizes the subsidiary value obtained through the reserve checking procedures which are inherent in the

process of forecasting earnings. Not only does the adjusted forecast itself serve as an over-all check on the calculation of earnings that emerges from the Statement Department, but also a rough initial analysis of the increase in reserve for the current year can be made in suitable subdivisions coincidentally with the Statement Department's year-end calculations in order to isolate the origin of any substantial errors arising in either the valuation or accounting routines.

In the former method of checking, the adjusted forecast should be sufficiently close to the earnings produced by the actual year-end calculation, so that an approximate reconciliation can be carried out by considering mortality and other fluctuations arising during the last month or two and capable of substantially influencing the final result.

In the latter method of checking, it is the practice in the Canada Life to prepare gain and loss work-sheets well in advance of the year-end to enable figures for reserves, income and disbursements to be entered as they become available to the Statement Department, thus obtaining an immediate check on the accuracy of statement figures. Admittedly, this preliminary analysis is not perfectly accurate, since it may fall a little short of a balanced analysis because of the speed with which it must be carried out and since loading factors, tabular costs and average required interest rates must be estimated from trends over previous years. Nevertheless, we have found that it serves a very useful purpose. The whole analysis, of course, must be reworked later in January, using accurate factors, and must further be balanced to the Report figure if it is to serve its purpose as a base for use in forecasting the following year's surplus earnings as described in the paper.

I am not quite sure of the implication to be taken from Mr. Ryrie's remark to the effect that the use of several different mortality tables produces meaningless results when tabular costs are calculated. The divisions by source are meaningless even if only one mortality table is employed, unless the mortality table is in close agreement with current experienced mortality and unless modified reserves are held. Nor would the fact that there might be several different tables in use destroy the *trends* displayed by the various sources of profit, unless there was a sudden change in the reserve basis of a large block of business or a change in the reserve basis for new business. In either case some adjustment would have to be made either by test or by judgment during the year of change-over.

The method of forecasting surplus described by Mr. Ryrie is an interesting variation of the same general approach that I have used, although it is my feeling that the single adjusted forecast carried out with the

proper degree of refinement tends to isolate abnormal fluctuations and indicate trends more surely than could be expected from an analysis of successive 12-month statements. Moreover, any method which combines the so-called "gains" in a different grouping seems to me to be as much subject to misinterpretation as a method which displays them in their normal divisions.

I am in sympathy with Mr. Archibald's attitude regarding the various "gains" and "losses" and his objection to terminology. However, it is difficult to suggest alternatives that would be as compact and as meaningful as these well-worn terms themselves—at least that would be as meaningful to the actuary. There is also the fact that they actually are the gains and losses which emerge from a valuation of liabilities under the assumptions used for Annual Statement purposes and which, in total, constitute the Statement Surplus.

I should like to thank both Mr. Ryrie and Mr. Archibald for their thoughtful well-considered discussions of my paper. The points which they have raised are well worth further careful study and consideration.

I should also like to express my thanks to Mr. Ellis, of our Company, for the very thorough and constructive criticisms which he supplied during the early stages of drafting the paper.