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THE PURCHASE ACCOUNTING QUANDARY

by Joe B. Pharr

It is disconcerting news that an AICPA committee has been disbanded without agreeing on a question of importance to many actuaries—how to account for purchase of a life insurance company. It may be helpful to consider here, first, what the extreme possibilities are, and, second, what range of practical approaches might prove acceptable to both the accounting and actuarial professions.

The Extremes

The extreme value of actuarial liabilities on the high side is, of course, the undiscounted sum of future death benefits and cash maturity values; this would produce large future earnings. The extreme on the low side would be arrived at by a gross premium valuation on realistic assumptions; this would yield no gain or loss at all except to the extent that experience turns out differently from the assumptions selected. The earnings by whatever valuation of liabilities is used in practice must fall between these two extremes.

Three Approaches

Valuation methods observed by this author, diverse though they are, fall into three distinct categories. First is the defined valuation premium method in which the valuation premium is customarily defined as the gross premium reduced by a reasonable profit margin expressed as a percentage of premiums. Second is a variant of this employing deliberately conservative assumptions; for this, see Douglas A. Eckley's paper now in page proof form for Vol. XXXIV of the *Transactions*. The third category establishes benefit reserves on current as-

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COMPUTERS IN THE SOCIETY OFFICE

Ed. Note: This article, aimed at acquainting our members with the steps, to the end of 1978, by which computers came into service at our headquarters, is a composite of recollections by two who were Executive Directors at the time. Descriptions of the machines have been furnished by Bernard A. Bartels, then Administrative Officer. The story of 1979 to 1983 will be told in a later article.

Gary N. See (Executive Director 1973-74):

Early consideration of having the Society's membership records computerized was stimulated by favorable—life saving, one might say—experience we had had in using an outside computer to keep track of students' examination records.

Membership growth was creating difficulties in many office activities. Publishing the *Year Book* using the old typesetting process was expensive and slow. The office found itself making more and more mailings, and particularly needed to be able to make selective mailings, e.g. to chief actuaries. Accuracy of our membership records was clearly declining. And assembling topic material for the Program Committee's work was posing problems that a computer could comfortably solve.

Peter W. Plumley (Executive Director 1975-78):

When I arrived on the scene in April 1975, an addressograph system was in use for Society, Academy and Conference mailings, the plates being filed in six or eight categories according to mailing needs. This system entailed modest expense but suffered from several large drawbacks, the most serious being our inability to make address and other changes promptly. Some thought had been given to choice of a specific com-

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SOME THOUGHTS ON DISCOUNTING

by Richard M. Wenner

If you hypothesize a future that has a given set of non-level interest rates and are presented with a stream of cash flow emerging in that context, how would you calculate its present value? This is the nub of a problem that surfaces in determining the adequacy of a reserve in a manner which fully takes into account both the assets and liabilities involved. This can arise in valuing GICs and annuities under New York's version of the dynamic valuation law; that law requires a demonstration of reserve adequacy when the more favorable (higher) valuation interest rate is used.

One approach would be to project along several possible future interest rate paths the cash flow of both the contract liabilities of the book of business in question and the assets that support them. The resultant net cash flows for a given interest rate path can then be converted to a single value through discounting or accumulating.

But how does one discount or accumulate in the case of a non-level interest rate path? Using a single interest rate would produce results of questionable meaning. That technique would implicitly assume that all future reinvestment would occur at that interest rate.

I believe what is needed in this situation is a form of the investment year method, which incorporates an assumed reinvestment strategy for handling cash flow (both positive and negative) emerging in any given year. How would it work?

Accumulation . . . Or Discounting

Consider first what might be called the "progressive accumulation approach". Under this approach the first year's cash

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Thoughts on Discounting

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flow derived from projecting the net cash flow of existing assets and liabilities is reinvested according to the assumed reinvestment strategy for the first year. Next, the subsequent years' net cash flows are modified to reflect the incremental effect of the future cash flow resulting from reinvestment. This process is then repeated for year 2 and subsequently for each following year. If the reserve is to be adequate for that path, the accumulated value at the end of the projection period must be positive.

The accumulated value could also be derived by applying accumulation factors to the original cash flow stream (i.e., before any reinvestment). The accumulation factor to be applied to the cash flow of any given year can be determined by taking \$1 of cash flow emerging in that year and accumulating it, using the basic progressive accumulation approach outlined above, to the end of the projection period.

Now to discounting. Here a definition of present value broader than the traditional definition and involving future accumulation potential is needed. The definition might be:

The present value of specified cash flow emerging in some future year is the amount of current cash needed to produce, over the assumed path, the same accumulated value to which the specified cash flow will ultimately grow, provided both the current cash and specified cash flow are reinvested in accordance with the assumed reinvestment strategy.

Under this definition present value is a function of both future interest rates and reinvestment strategy. Note that traditional discounting at a single interest rate in a level interest rate environment represents a special case.

Discount factors appropriate for changing future interest rates can be derived by dividing the accumulation factors by the ultimate accumulation value of \$1 of cash emerging at the valuation date.

Comments

(1) One interesting ramification of this approach to discounting occurs

FOR YOUR READING

Robert M. Jennings & Andrew P. Trout, *The Tontine: From the Reign of Louis XIV to the French Revolutionary Era*, pp. 91. Paperback \$14.95, Richard D. Irwin, Homewood, Ill.

An excellent fresh exploration of a fascinating subject in a Huebner Foundation Monograph.

J. David Cummins & three others, *Risk Classification in Life Insurance*, pp. 320. Kluwer Nijhoff, Boston, \$45.

Outcome of a 2-year study at Wharton School in cooperation with ACLI. Its three sections are: I. Fundamentals, II. Current Procedures, III. Multivariate Analysis of Risk Factors and Mortality.

Geoffrey N. Calvert, *Social Security Problems: Radical Approaches to Social Security Design*, pp. 14, mms. Available from author at his Yearbook address.

Text of a 1982 presentation to CAPP. Examines outlook and solutions in context of four "tidal waves"—demographic, economic, technological, global. Characteristically vivid, and in parts controversial.

Actuarial Note No. 114, *Social Security Coverage in 1972 by Marital Status and Reasons for Non-Coverage*. Wilfredo Cruz.

Finding is that at ages below 65, 82% of men, but only 49% of women, are covered.

Actuarial Note No. 115, *Average Wages for 1981 for Indexing under SSA, and Automatic Determinations for 1983*. Eli N. Donkar, A.S.A. & James P. Buchman.

Sequel to SSA Actuarial Note No. 112.

(1) *Guide to Health Insurance for People with Medicare*, pp. 7.

(2) *Where To Get Answers at HCFA*, pp. 26. Both available gratis from Health Care Financing Administration, Office of Financial and Actuarial Analysis, Baltimore, MD 21207.

Booklet (1) was developed jointly by NAIC and HCFA. Booklet (2) tells one which offices within HCFA are responsible for various matters.

Journal of the Institute of Actuaries, Vol. 109, Part II, September 1982.

Contains the discussion in London of W. W. Truckle's questions on actuarial education and training that were summarized in this newsletter's April 1982 issue. Other subjects include the European Community, making mortality studies from observed data, and immunization. Borrow a copy from your nearest Institute member.

"Marketfacts". Issued monthly. Available from LIMRA for \$30. per year (\$75. by subscribers not in a member company).

This new LIMRA publication aims to keep readers informed on current events and trends in life insurance marketing. Looks well worth its subscription price for actuaries who have dealings with the field or agency department.

when a reserve turns out to be inadequate for a given non-level interest rate path. Not surprisingly, the book value of additional assets needed to make up the projected deficit will vary depending on the assets selected. But, the market values and present values based on a level discount rate are likely to vary also. Only the present values would be equal regardless of the assets selected.

(2) What about using discount factors of the form

$1/(1 + i_1)(1 + i_2) \dots (1 + i_n)$, where i_j is the assumed prevailing rate for year j . This would work satisfactorily only if the reinvestment strategy always called for one-year investments (and borrowings) and the assumed interest rates were short-term (one-year) rates.

(3) If the assumed reinvestment stra-

tegy under a non-level rate path is not symmetrical (i.e., if the method of dealing with negative cash flow is not the mirror image of the strategy appropriate to positive cash flow) or if the yield curve is not flat, neither accumulation nor discount factors may solve the problem. The progressive accumulation approach would, however, still produce valid results.

A paper which expands upon these ideas and contains numerical examples can be obtained by writing to me at my Yearbook address.

Ed. Note: Two mathematical papers on Internal Rate of Return in Respect of an Arbitrary Cash Flow have recently appeared in J.I.A., viz. C. C. Taylor, Vol. 107 (1980), 487, and H. O. Worger, 108 (1981), 285. □