FURTHER OBSERVATIONS ON THE INTEREST-ADJUSTED METHOD

by A. B. Nelsen

The Traditional Method of illustrating policy costs, by not taking interest into account, has been properly criticized as not recognizing the incidence of payments. A correction for this has been introduced under the Interest-Adjusted Method by the use of assumed interest rate. While the use of an interest adjustment corrects one of the weaknesses of the Traditional Method, other not commonly recognized shortcomings are not corrected.

The average annual cost of a policy surrendered at the end of a specified period derived under the Traditional Method may be expressed as (a) plus (b) minus (c), where:

(a) = arithmetical average of the mortality costs for each policy year for the net amounts at risk.

(b) = arithmetical average of total expense (and other) charges for each policy year.

(c) = arithmetical average of interest credited each year.

For the Interest-Adjusted Method, the (c) term drops out assuming that the adjustment interest rate corresponds to the interest rate used for dividends, and the annual cost figures derived may be expressed as the sum of (a') and (b'), where:

(a') = interest-adjusted average of the mortality costs for each policy year for the net amounts at risk.

(b') = interest adjusted average of total expense (and other) charges for each policy year.

Under both methods, the part of the premium required to build up the cash value at the end of a specified period is subtracted, leaving in effect the residual premium for decreasing term insurance in amounts corresponding to the net amounts at risk (face amounts less cash values) plus expense and other charges that are, however, associated with the total policy premium. Since the result may be viewed as representing the cost of the decreasing term insurance, there is an implicit assumption that no part of the expense charges relate to the part of the premium that is used to build up

the cash value. This has not been serious under the Traditional Method because the overstatement of expense charges is generally more than compensated for by allowing the interest credited as an offset to the cost. However, under the Interest-Adjusted Method the resulting indices produce an overstatement of the cost of the decreasing term insurance.

While there is no valid way of splitting expense charges, since they are assessed in the aggregate for a policy, this does not justify the result. In effect, the Interest-Adjusted Method represents a splitting of a policy into its savings part and a pure insurance protection part, with all of the expense charges associated with the decreasing term insurance part for which the results are obtained. Accordingly, it is not a suitable basis for comparison of dissimiliar plans, nor will it generally produce figures that have any real meaning to the purchaser.

In a paper presented at the 1971 fall meeting of the Society of Actuaries by J. Stanley Hill, "Net Cost Comparison of Dissimilar Life Insurance Contracts; The Standard Mortality Cost Method," a modification of the Interest-Adjusted Method was introduced to enable comparison of dissimilar plans. His method is to determine standard mortality costs as the interest-adjusted averages of the year-by-year products of the net amount at risk for each year and the probability of dying in that year based upon the 1958 CSO mortality table, and then dividing the Interest-Adjusted costs by such standard mortality costs. While his technique adjusts for the differences in the amounts of decreasing term insurance by dividing Interest-Adjusted costs by net amount at risk factors, it magnifies the expense charges for policies with relatively small decreasing term insurance elements. Mr. Hill gave the following justification for his treatment of expense charges:

"To some readers the proposed method may seem unfairly to identify all the contract expenses with the mortality element, with no 'loading' attributed to the investment element. This was done intentionally in order to meet the financial marketplace on its own terms. Almost without exception, the usual avenues of near-riskless investment available to the buyer (savings accounts, certificates

of deposit, bonds, repayment of indebtedness) have their yields quoted in net terms. Moreover, buyers in general implicitly accept premium-to-claim ratios in other lines of insurance which are comparable to the costs per dollar of standard mortality cost."

In his paper, Mr. Hill goes on to make analyses as to which policies constitute "best buys" based upon his resulting cost indices. Such comparisons and the rationale cited above appear questionable for the following reasons:

(1) The investment element of a policy as represented by the cash value is not comparable with a near-riskless investment available to the buyer. It is an incidental part of the policy and is not segregated in the payment fo death benefits or in the applications of death benefit proceeds under settlement option guarantees. Furthermore, under the nonforfeiture benefits, cash values can be applied to continue insurance benefits in the form of either extended term insurance or reduced paid-up insurance.

(2) In the extreme case of a deferred annuity contract, with minimal death benefits, an inflated cost index would result for the decreasing term benefit by associating total expense charges with such a small benefit, and then magnifying the result by dividing by a net amount at risk factor. The same applies in diminishing degrees to retirement income, endowment, limited payment life, and whole life policies. To assume that there is not a greater utility to the purchaser in applying payments towards the investment element of a policy than in making a near-riskless investment, appears contrary to fact. A near-riskless investment just does not produce the same benefits.

The Joint Special Committee on Life Insurance Costs chaired by Mr. Moorhead made this observation:

"It is necessary first to bring up a fundamental question concerning the separation of a life or endowment policy into a decreasing risk element and an increasing savings element. This is a common textbook process that gives useful insight into how a life insurance policy works. But a danger is observed that use of such analysis may create misunderstanding rather than enlightenment. A life insurance policy is designed

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from knowledge of the latter, to return by a computational inversion process to the desired distribution function. Techniques for the inversion process, such as the Fast Fourier Transform, are becoming increasingly efficient and tend to outmode methods such as Esscher's approximations.

The third invited lecture was presented by Dr. Harald Bohman, President of the Swedish Actuarial Society, under the title, "A Mathematical Model of Insurance Business Designed to Control Equity, Solvency and Profitability in the Business." He considers that a mathematical model is necessary in a management information system. He illustrated the insurance business model by analogy with a water system with three main subsystems for direct business, reinsurance accepted, and reinsurance ceded. Each main sub-system is further subdivided into systems for "equity groups." Means are provided to control equity, solvency and profitability. Thus there are adaptive mechanisms built into the model.

A highlight of the Conference was a general session on aviation liability insurance. David Halmstad and Edward Lew presented an outline and tables from an extensive simulation study of such insurance with respect to passengers on jumbo jet aircraft. This is in anticipation of reinsurance needs against jumbo jet plane crashes where deferred settlements may run in excess of $125,000,-000. Large amounts of capital are required for such a reinsurance venture, and the large life insurance companies are a likely source. The simulation study was based on a conservative model and it is hoped that it provides the beginning for a participating premium rate structure. A second analysis of the capital requirements for insuring airplane passenger deaths was presented by John Boermeester and Newton Bowers. In their essentially experimental study a comparison is made of results obtained by simulation and by the Normal Power (Cornish-Fisher) approximation.

Two other contributions were "Applications of Moments for the Collective Stochastic Process" by John Beekman and Newton Bowers, and "Collective Risk Models with Investment Fluctuations" by Clement Jackson.

Vigorous and wide ranging discussion

followed the lectures and presentation of papers and the presence of so many European leaders in risk theory gave a special atmosphere and authority to the Conference and an unusual opportunity for exchanges between our own and European researchers. The Conference provided a step forward in bringing the theory of risk into closer contact with our actuarial practice.

This Conference, the sixth of a series, saw the end of Ed Lew's Chairmanship of the Committee. He has been Chairman since its organization in 1963 and to his enthusiasm and tireless efforts must be attributed the success of the Committee's work, including the various conferences. The value of Ed's work was properly acknowledged by the tributes paid to him at the Conference dinner.

Plans for distributing copies of the proceedings of the Conference are under way and will be announced in due course.   □

Letters

"Beta" Concept

Sir:

Apropos Bill Dreher's article, "New Horizons" (*The Actuary*, December 1971), any actuary heeding the call of investment-related work will quickly confront *beta* and other measures of investment uncertainty that so many purveyors of investment performance services use in discussing investment risks for pension funds.

The most clearly written description of *beta* and related concepts is contained in J. Peter Williamson's *Investments: New Analytic Techniques*, 1970, New York (Praeger Publishers, Inc.). Actuaries who have struggled with the ponderous literature on performance and risk measurements, portfolio and stock selection, security analysis, will find this lucid book a sheer joy to read.

For insight into the current popularity of the *beta* concept on Wall Street and the flavor of the controversy it has evoked, see the lively article in the September 1971 *Institutional Investor*, "The *beta* revolution: Learning to live with risk."

Philip J. Feuer

Interest-Adjusted Method

to be and has been consistently interpreted by courts as a single entity. This single entity offers rights and benefits beyond those that are available to persons who buy a decreasing term policy and build a savings fund independently thereof."

In that the Interest-Adjusted Method produces separate costs for the decreasing risk element with the total policy expenses associated with that element, there may be some danger that the use of this method may "create misunderstanding rather than enlightenment." The Interest-Adjusted Method is an improved way of comparing the costs of similar policies, but it is valid only in this context as a comparative index. Its limitations should be recognized.   □

Board of Governors

year in which it started, i.e., F.S.A. 1946 in 1970 and F.S.A. 1951 in 1971, on sees a reduction of only four, rather than five, years *at time of election.*

Any change in the median year is the result of more dramatic changes in only about one-third of the 29-member Board: under normal circumstances involving no vacancies, the number of new members can vary from four to 12. This year, there were nine (the new Secretary, the new Treasurer and seven new Governors). Four positions were filled by the election of persons serving in other positions on last year's Board, 14 remained filled by last year's incumbents and two were filled by automatic succession.

Range of Fellowship Years

Perhaps of more interest than the median year is the range of years of attaining Fellowship. Before the election, no Board member had attained Fellowship after 1957; after the election, there were four (1958, 1960, 1963, and 1966). At the other end, there were three members on last year's Board with Fellowship prior to 1938; now there are non

Whether this is the beginning of a trend or a fluctuation, only time—and the nominations by the Election Committee and the voting by the Fellows of the Society—will tell.   □