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SOME VIEWS ABOUT ADJUSTMENT OF EARNINGS

by Robert S. Espie

The following thought has occurred to me in connection with recent discussions as to adjustment of earnings of a life insurance company. I offer it in the hope that I can be enlightened by your readers if I am in error.

My thesis is, simply, that the distortion of earnings is caused by the establishment of a statutory reserve in the annual statement which differs from a realistic evaluation of the future liability. As a corollary, the concept of pre-paid acquisition expense as a basis of adjustment will be seen to be inappropriate.

For simplicity of algebraic manipulation I assume a one-year term policy (or block of policies) in which (1) the interest element has been omitted for simplicity; (2) the premium is paid in advance (and is therefore "annual" or "single" as you choose); (3) the expenses of issue are all disbursed at date of issue and can be analyzed into "acquisition" expenses which, under some accounting theories, should be amortized over the period of the contract, and other issue expense which should not be; (4) all other expenses and the benefit payment itself are spread evenly throughout the policy period and can be measured on a realistic basis.

Let π be the gross premium
  a be the acquisition expenses
  e be the other issue expenses
  r be the realistic value of benefits and on-going expenses
  p be the profit margin
  v be the initial reserve set up in the annual statement to cover the benefits and on-going expenses realistically valued at r.

1901 .. Mortimer Spiegelman .. 1969

It is with deep regret that we report the death of Mortimer Spiegelman on March 25. Mort's contribution to the success of *The Actuary* has been great. His wide experience in both writing and publishing was "a very present help in trouble" to an otherwise neophyte Editorial Board, and perhaps of even greater help to his colleagues were his patience and good humor.

It was both a privilege and a delight to work with Mort Spiegelman, a modest gentleman who made light of his own great talents in his willingness to help others. He will be greatly missed.

A.C.W.

ACTUARIAL SCIENCE AT UNIVERSITY OF IOWA

by James C. Hickman

In grade school geography class students learn to associate Iowa with the production of corn and livestock. They do not learn that for over 50 years Iowa has also been associated with the production of actuaries.

Courses related to actuarial topics were given at the University of Iowa, Iowa City, before 1918. In that year H. L. Rietz came to the University as head of the Department of Mathematics. Mr. Rietz had become interested in actuarial science and statistics while he served on the faculty of the University of Illinois. At Iowa, he directed the building of strong academic programs in actuarial science and statistics.

At present work in actuarial science at Iowa is centered in the Department of Statistics, College of Liberal Arts. The Department of Statistics along with the Departments of Mathematics and Computer Science make up the Division of Mathematical Sciences.

NATIONAL SCIENCE FOUNDATION SUMMER INSTITUTES

by Herbert J. Boothroyd

The National Science Foundation conducts Summer Institutes in science and mathematics all over the United States. These Institutes are conducted for the benefit of high school teachers in these subjects to keep them abreast of current developments in each area.

In the summer of 1967 Bartley L. Munson invited the teachers attending an Institute at Lawrence College to visit the Home Office of the Aid Association for Lutherans in Appleton, Wisc. On the basis of his experience, he suggested that these Institutes would offer an excellent opportunity to reach mathematics students through their teachers. The Public Relations Committee set up a Subcommittee to look into the matter and their preliminary study led to a pilot program this past summer.

For its first effort the NSFSI Subcommittee, with the assistance of the Subcommittee for Relations with Colleges and Universities, selected two appropriate Institutes in each of eight areas and appointed an Actuarial Representative to work with each Institute Director. The basic idea was to allow the teachers to have informal discussions with actuaries and their associates on topics such as the nature of actuarial work, the background and training required, computer utilization, and an overall view of the actuary's role either in the operations of a life insurance company or as a consultant. In 14 programs the teachers visited the office of a life insurance company or actuarial consulting firm. Three programs were conducted by actuaries at the colleges.

Reactions to the initial visits were enthusiastically favorable. Teachers and Institute Directors appreciated the op-

Belth Theory

tive. It shows that the Belth "yearly price per $1000 of protection" is higher for the policy with the higher cash values (Policy C) for every year except the first. Although Policy C is obviously preferable from the policyholder's view-point, since it has higher cash values than Policy D with no difference in premiums, the "level prices" calculated by methods (a), (b) and (c) are *higher* for Policy C than for Policy D.

Method (a) involves weighting the yearly figures by the yearly amounts of protection, without discounting; method (b) involves discounting for interest; method (c) involves discounting for interest and mortality. It is only when lapse rates are also introduced into the calculation by method (d)—which is Dr. Belth's method—that the "level price" for Policy C becomes less than for Policy D. Thus, although the "level prices" by method (d) are not obviously wrong in this example (i.e. the figure for Policy C is not higher than that for Policy D), this result is merely an accident of arithmetic.

The last sentence of the report on the workshop as published in *The Actuary* stated, in reference to Dr. Belth's method of calculating "level prices," that:

> A "price" reflecting probabilities of survivorship and persistency could be more meaningful than a "price" based on the assumption that the policyholder will survive to the end of the policy year.

This statement is not too clear and differs from the text originally submitted for publication; I am sure that the published statement does not represent the views expressed by the workshop discussants. In my own view, a "level price" involving probabilities of survivorship and persistency is a very technical concept at best and cannot be particularly meaningful to the individual policyholder. I think that a measure of prospective cost that is determined as an average of the prospective costs for different categories of policyholders (e.g., those who will survive to the end of the designated period and those who will not) would surely be less meaningful *to the individual policyholder* than would a measure that pertains directly to the specific category of those who will survive to the end of the period.   □

TABLE 1
"Level Price" Calculations per Belth Formulae

10 Year Endowment for $1000, Issue Age 50
Cash Values Based on 1958 CSO Table at 3%
Gross Annual Premium = $95.24

Policy Year	Policy C Cash Value (Full Reserve)	Policy C "Yearly Price per $1000 Protection"	Policy D Cash Value (Statutory Minimum)	Policy D "Yearly Price per $1000 Protection"
1	$ 85.04	$ 14.46	$ 44.46	$ 59.38
2	172.71	15.89	136.01	9.18
3	263.20	17.57	230.52	10.02
4	356.75	19.55	328.22	10.92
5	453.60	22.08	429.36	11.93
6	554.06	25.40	534.28	12.96
7	658.48	30.21	643.34	14.04
8	767.27	38.56	756.95	15.14
9	880.92	59.98	875.64	15.70
10	1000.00	591.30	1000.00	0.69

Method	"Level Price per $1000 Protection"	"Level Price per $1000 Protection"
(a) Simple Weighting	$ 22.34	$ 20.09
(b) Discounted, using only interest (3%)	21.65	20.74
(c) Discounted, using Interest and Mortality (1958 CSO)	21.38	20.97
(d) Discounted, using Interest, Mortality and Lapse (½ Linton's A rates)	20.90	21.77

Note: The interest and lapse assumptions indicated above are those specified by Dr. Belth in his book, "The Retail Price Structure in American Life Insurance." The mortality basis specified by Dr. Belth is the X_{18} Table with Buck's select modification, but the basis used above was the 1958 CSO Table, for convenience.

Summer Institutes

portunity to talk with actuaries and actuarial students, to learn something about an actuarial career, and to see inside an insurance company or consulting office: 99% felt that the programs should be continued; 65% were interested in having a speaker visit their high school. Most teachers were surprised to find another career opportunity for their students, and actuaries once again discovered how few have ever heard of their profession.

These programs should have the participation of Society members at all levels. The most important ingredient is the personal contact between individual actuaries and teachers.

The NSFSI Subcommittee has now appointed 10 area Chairmen to implement plans for 1969 and future years. Three to five Institute visits will be made each summer for each region and follow-up contacts with teachers in their home area high schools will be made to answer any questions or to provide an actuary-speaker for student groups.

The present members of the Subcommittee and the actuaries who participated in the pilot program are confident that these meetings can help to attract new recruits to the profession. However, they feel strongly that their ultimate success will depend on the contributions of individual actuaries as they work with the Summer Institutes.   □