SOCIETY OF ACTUARIES

Article from:

The Actuary

September 1969 – volume 3 - Issue 7

The Actuary

The Newsletter of the Society of Actuaries

VOLUME 3, NO. 7 SEPTEMBER, 1969

COMMITTEE ON CONTINUING EDUCATION

by C. L. Trowbridge

The Committee on Continuing Education is finding its assignment to be challenging, and somewhat elusive. There is agreement on certain basic principles:

1. The rapidly changing environment in which actuaries find themselves requires that education continue throughout the actuarial career.
2. The educational needs of Society members cannot be completely met by the existing Educational and Examination system, though this system is effective for qualification purposes.
3. Continuing education, like the program leading to the FSA designation, must rely largely on individual initiative and self-directed learning.
4. The Society's role in continuing education is to uncover the existing educational opportunities, to develop new sources of education and to bring both to the attention of the membership.

The subject areas in which continuing education is most needed and will be most effective have still to be agreed upon.

The Committee has established four subcommittees, each with a specific assignment, as follows:

Subcommittee 1 —

a. To identify subject areas in which continuing education is particularly needed or desired.

b. To recommend as to each an appropriate technique for continuing education.

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ACTUARIAL SCIENCE PROGRAM AT THE UNIVERSITY OF NEBRASKA

by Stephen G. Kellison

Since 1957 the University of Nebraska has offered a program in actuarial science, open to regularly enrolled University of Nebraska students, as well as to insurance company employees.

Actuarial courses are offered for all the subjects currently on Parts 1 through 5 of the Society of Actuaries' examinations and these actuarial courses constitute a separate department within the university structure. All students are encouraged to write each actuarial examination upon completion of the course work related to that examination.

The program is open to both undergraduate and graduate students. At the undergraduate level the student has a choice of enrolling in the College of Arts and Sciences or in the College of Business Administration. Although the total program will differ somewhat depending upon which college is selected, in either case the student will take a basic core of courses in mathematics, economics, business, English, and computer science, in addition to the actuarial courses. The balance of a student's program is devoted to obtaining as broad an education as possible in areas such as humanities and the social sciences.

At the graduate level the student can obtain a Master of Science degree in Actuarial Science. This degree requires 36 credit hours, which must include all the actuarial courses not previously taken. The remaining hours are taken in supporting areas—usually mathematics, economics, and business. There is considerable flexibility in the choice of these supporting courses, and the student is relatively free to take courses which best fit his interests.

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THE ACTUARY IN STOCKBROKING

by Alistair T. Grant, F.F.A., F.I.A.

Editor's Note: We are glad to welcome another overseas contributor to our columns. Mr. Grant transferred his actuarial affections from a life insurance company to a firm of London stockbrokers. The interesting field of which he writes is practically uninvaded by actuaries in the United States.

The following comments are written from the point of view of a British actuary belonging to a London stockbroking firm, and it should be stated at the outset that there are some points of difference between stockbroking in the U.S.A. and in Great Britain.

One important difference is that whereas in the United States there is a strong flow of young high grade business school graduates into financial and stock market fields of employment, in Britain graduate business schools of this type have been set up only in the last few years.

The United Kingdom has a sizable capital market and a large and well-established actuarial profession, and as the investing institutions grew in importance and professionalism it was only natural that stockbroking firms, like these institutions, should attract actuaries as well as accountants and economists. There are now about 47 Fellows and Associates of the Institute of Actuaries working in London stockbroking firms—my own firm has seven—against about 650 working in life assurance concerns in the U.K., and the flow of actuaries into stockbroking is continuing. These figures should be increased to allow for Fellows of the Faculty of Actuaries who are well represented on the London and provincial Stock Exchanges.

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SOCIAL SECURITY NOTES

Robert J. Myers, *Distribution of SMI Bills and Reimbursements by Type of Service*, Actuarial Note No. 54, pp. 2, Social Security Administration, Washington, July 1969.

This note examines data on numbers of bills and amounts of reimbursements under the Supplementary Medical Insurance program, by type of service, allocated by recording periods. Through December 31, 1968, 92.5% of the reimbursements were for physicians' bills, 1.5% for home health bills, 2.7% for outpatient hospital bills, .5% for independent laboratory bills, and 2.7% for all other bills. These percentages could be distorted somewhat due to the lack of available data on an accrual basis and the fact that the data does not include bills (or reimbursements) that went toward satisfying the deductible.

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Charles R. Owen, *The Farmington, West Virginia, Mine Disaster: An Actuarial Analysis of Survivor Benefits Payable*, Actuarial Note No. 53, pp. 4, Social Security Administration, Washington, June 1969.

This note presents an analysis of the benefits awarded to the survivors of the 78 men who lost their lives in the mine disaster near Farmington, W. Va. in November 1968. Assuming an interest rate of 4¼%, the present value of all estimated payments (including benefits which will be awarded to the widows in the future) amounts to $1.9 million.

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Robert J. Myers and Margaret A. Lannen, *Comparison of Actual Experience under OASDHI System with Short-Range Cost Estimates*, Actuarial Note No. 52, pp. 3, Social Security Administration, Washington, June 1969.

This note compares actual experience for calendar year 1968 under the OASDHI system with the short-range cost estimates given in the 1968 Trustees Reports. The balance in each of the trust funds at the end of calendar years 1960-68 is compared with the estimate made at the beginning of each of the same years. The actual balances in the OASI and DI Trust Funds on December 31, 1968 were slightly higher than estimated. The balance in the SMI Trust Fund was about 25% higher than estimated due primarily to a greater lag in filing and adjudicating claims than anticipated.

Because the General Fund of the Treasury did not totally reimburse the HI Trust Fund during the calendar year for costs relating to uninsured persons, the actual experience under HI during calendar year 1968 could not be compared with the estimates (which assumed total reimbursement).

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Copies of these notes may be obtained gratis from Robert J. Myers, Chief Actuary, Social Security Administration, Washington, D. C. 20201. □

University of Nebraska

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Booklets describing the actuarial profession and the University program are distributed to high schools and colleges in the state of Nebraska in an effort to inform students of opportunities in actuarial science. In addition, the Bankers Life Insurance Company of Nebraska has instituted a scholarship program at the high school level which has proven successful (see John Fibiger's letter, *The Actuary*, September 1968.)

The enrollment in the actuarial courses in recent years has been encouraging as has been the examination record of the students. On the May 1969 examinations, there were 43 passes in Parts 1-4 by University of Nebraska students. Almost all these students are native Nebraskans. It is hoped that in the future more out-of-state students will be attracted into the program.

The actuarial program at Nebraska receives significant support from the Nebraska Actuaries Club and the insurance industry. Industry support is a key factor in the success and the continued growth of the program. □

A SIMPLIFIED ILLUSTRATION OF LIDSTONE'S THEOREM

by Richard W. Zink

The following illustration of the validity of Lidstone's Theorem is different from that given in the Part 4 textbook *Life Contingencies* 2nd Ed., by C. Wallace Jordan, on pg. 119, and for some students may be simpler. This illustration is not tailor-made for Part 4 students because knowledge of the 3-factor dividend formula, first covered extensively on Part 7, is a prerequisite. However, a quick explanation of the gain from interest, gain from loading and gain from mortality elements of the 3-factor dividend formula will usually suffice for most Part 4 students.

Consider a participating insurance of uniform amount 1 with level annual premiums.

Let P = Net annual premium based on i and q

L = e = Level annual expense provision and expense, respectively, due or incurred at the beginning of each policy year. In this illustration they will always be considered level by duration and equal to each other.

GP = Gross premium

= P + L (i.e. the net premium plus loading)

${}_tD$ = t—th year dividend payable at the end of every year if the insured paid the premium for the t—th year at the beginning of that year.

i′ = experience rate of interest

q′ = experience rate of mortality

$(GP-v'{}_tD)$ = Net payment by policyholder at beginning of t—th year.

It can be shown (see page 24 *Distribution of Surplus* by Joseph B. Maclean) that the contribution to surplus at the end of the t—th policy year for the plan under discussion which will leave the terminal reserve unchanged is

$$({}_{t-1}V + P)(i' - i) + (L - e)(1 + i') + (q - q')(1 - {}_tV),$$

the familiar 3-factor contribution formula. Since L=e, the gain from loading will equal zero, but is included for completeness.

Let the company pay out the entire contribution to surplus as a dividend. Now if the dividend increases with duration, then the net payments of $(GP-v'{}_tD)$ made by the policyholder will decrease. What we have in effect is a decreasing premium plan with decreasing net premiums of $(P-v'{}_tD)$ and a level amount of insurance.

Now consider a non-participating insurance of uniform amount 1 with level annual premiums.

Let P′ = Net annual premium based on i′ and q′.

GP′ = P′ + L (i.e. the experience net premium plus loading)

Comparison of Reserves

Let us compare various reserves on the participating and non-participating contracts respectively. On the participating contract the reserve on the decreasing premium plan based on experience interest and mortality is always equal to the reserve on the participating level premium plan based on valuation interest and mortality because of the nature of the 3-factor dividends. On the non-participating level premium plan let the reserve be based on experience assumptions.

Now it should be obvious that if the benefits on two policies are the same, the reserves on the one with decreasing premiums will be higher than the reserves on the one with level premiums, if both are based on the same assumptions. An extreme example is the reserves on single premium Whole Life, compared to the reserves on annual premium Whole Life.

Since the experience par reserves have decreasing net premiums, these reserves will be greater than the non-par experience reserves. But the par experience reserves are equal to the par valuation reserves. Hence the non-par reserves on experience assumptions are lower than the par reserves on valuation assumptions if the 3-factor dividends increase with duration. The opposite will be true if the 3-factor dividends decrease with duration.

We can now generalize these results to say that the reserves on a level premium, level benefit plan based on i and q will be higher (lower) than those based on i′ and q′ if

$$({}_{t-1}V + P)(i' - i) + (q - q')(1 - {}_tV)$$

increases (decreases) with duration, which result is Lidstone's theorem and completes the example. □

Continuing Education

(*Continued from page* 1)

Subcommittee 2 —

To investigate the best means of

a. accomplishing a literature search as to each of the subject areas identified by Subcommittee 1.

b. developing an appropriate bibliography or reading list for each subject area.

c. identifying places where the literature is weak.

Subcommittee 3 —

a. To investigate the best means of developing new literature to fill in the weak places (assuming that weak places can be identified through means recommended by Subcommittee 2.)

b. To make a recommendation as to how we might make available to Society membership the Study Notes developed by the education side of E&E committee.

Subcommittee 4 —

a. To investigate how other professions, with similar needs, have faced up to the matter of continuing education.

b. To investigate the possibilities of continuing education through the resources of some educational institution(s).

The Committee hopes to have some recommendations to make to the Society's Fall Board of Governors meeting. Meantime the Chairman will be glad to hear from any members with their suggestions within or without the areas delineated above. □

PROGRAMMING LANGUAGE

by Manuel R. Cueto

The article "Developing an Actuarial Programming Language" by Russell J. Mueller (*The Actuary*, April) suggests that "a study should be undertaken to determine the feasibility of developing" such a language. In this connection, I feel it to be appropriate to draw attention to some practical considerations which should form part of such a study.

In his article, Mr. Mueller refers to "IBM's support of APL—a computer language for statisticians." This language was devised by Dr. Kenneth Iverson, who is presently with the Research Division of IBM. Nevertheless, IBM has made this program author-supported only and not of a type which is supported by the IBM Corporation as are such high-level languages as COBOL, FORTRAN and PL/I. Moreover, APL is really a "time-sharing" language and not just a language for statisticians.

The question of "support" is concerned with the problems of compilers for, and maintenance of, high-level languages. Because such languages are not completely computer-independent, it is necessary for each manufacturer of computing equipment, if such language is to be supported and made available to the user to provide "compiler programs" for their respective computers. A compiler program translates the instructions written in the high-level language of the source program into machine language.

With respect to the maintenance of such languages, it should be noted that in today's computer environment it is also necessary to obtain the support of each operating system whether an electronic installation uses a tape, disk or full operating system. Briefly, operating systems which are generally furnished by the manufacturer of equipment consist of a comprehensive set of service programs and high-level language translators under the supervisory control and coordination of an integrated set of control routines. Furthermore, each version or "release" of an operating system, which incorporates certain improvements and advances over prior versions, must also include support of the high-level language. It follows, therefore, that modifications and improvements have also to be made in high-level

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