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THE CALCULATION OF THE FIRST LIFE TABLE: A HISTORICAL NOTE

by Robert Schoen

The first life table, or life table model, was produced in 1662 by John Graunt in his *Natural and Political Observations*. That brief, crude table was both inaccurate and unrealistic. It implied an expectation of life at birth of only 17.5 years and a Total Fertility Rate of about 8 in the stationary life table population. Nonetheless, it proved to be the source of one of the most powerful concepts and valuable tools in demography and actuarial science.

It has been the subject of a considerable amount of speculation as to how Graunt arrived at his figures. After gauging from his data that about 36 of 100 live births die before the age of 6, and guessing that only one survived age 76, Graunt "sought six mean proportional numbers between 64, the remainder, living at six years, and the one, which survives 76, and finds, that the numbers following are practically near enough to the truth; for men do not die in exact Proportions, nor in Fractions" (See Table 1).

Graunt's description of his method has been found wanting. Major Greenwood (in "Graunt and Petty", *Journal of the Royal Statistical Society*, Vol. XCI, Part 1, 1928, p. 82) observed that a constant ratio of .62 would give a good fit. W. F. Willcox, in his introduction to the 1939 edition of Graunt's book, suggested that Graunt might have experimented with the fraction $\frac{5}{8}$. M. Ptoukha (in "John Graunt, fondateur de la demographie", *Congrès International de Population* Paris, Vol 2, 1937, p. 71-72) advanced the idea that Graunt may have used a factor of .63. D.V.

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20th INTERNATIONAL CONGRESS OF ACTUARIES

There are 85 United States Actuaries who have already registered for the Congress which will meet in Tokyo from October 25 through November 1, 1976. The Organizing Committee of the Congress has announced that it will accept additional registrations for the Congress for a few more weeks. Registration is open to all members of the International Actuarial Association. (If you are not already a member, see the last paragraph for information on joining the I.A.A.)

The United States Section of the I.A.A. is sponsoring two package tours in conjunction with the Congress (15 and 22 days). Attractive rates for air fares, hotels and land arrangements are being offered to allow members to attend the Congress and then see some of Japan and other parts of the Orient.

Hard-bound copies of the *Transactions* (papers submitted for the Congress) will be available to anyone wishing a set. The price will be 18,000Yen (approximately \$60), with delivery in Spring, 1977. Participants will receive paper bound copies and may purchase hard bound copies at the same price.

If you are interested in the Congress or would like to order a copy of the *Transactions*, please contact Fred Rathgeber (Prudential Plaza, Newark, N.J. 07101) no later than March 26.

THE NORTHERN ROUTE

by Kenneth T. Clark

This is a report of recent activity in Canada of that phenomenon which is called the "alternative route" by careful users of the language, which is called the "alternate route" by persons not falling into that category, and which therefore is called the "alternat route" by the vast majority of North American actuaries. For this report, the abbreviation "AR" is safe.

First, the background. The Garber committee of the Society of Actuaries has recommended a method of implementing the AR if the Society and the other sponsoring actuarial bodies want an AR. The Society has accepted the report in principle and put it before the other sponsoring bodies for discussion. The discussion is still going on. Briefly, the method recommended by the Garber committee is that a student will be granted Associateship if he takes the right courses at one of the right universities, gets the right grades, and passes one Comprehensive Society examination covering all the Associateship material.

In Canada discussion of an AR has been stimulated in other ways as well. Our actuarial education and examination have traditionally been in English only. But Canada is a bilingual country and we want to have education and examination in French too. Obviously, this will take a lot of work. Perhaps some of it can be avoided by making greater use of the universities, where a choice of language already exists.

It may be easier to implement an AR in Canada than in the U.S.A. In Canada, the actuarial population is concentrated in a few places. So are the universities with actuarial programs, and

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Northern Route

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mainly in the same places. The variation among programs and standards is less than in the U.S.

We have also been stimulated by the development of an AR "down-under"—i.e., in Australia and New Zealand. The Institute of Actuaries (London), which is the qualifying body for most actuaries in Australia and New Zealand, has agreed to waive certain examinations for students completing certain courses and getting certain grades at Macquarie University. The Institute has had for some time a "partial" AR for students in the U.K. and this will probably expand as time goes on. The Faculty of Actuaries has an AR comparable to that of the Institute for Students at Macquarie University and applying in varying degrees to students from other universities. Thus the AR's are different in different countries with due regard for equivalence and consistency.

Finally, in Canada the Chartered Accountants (CPA's in U.S.A.), who traditionally have had a do-it-yourself-education and examination system like ours, are making more use of the universities. Their policy is: "... for the transfer of as much of the education as possible to the universities, leaving the professional training courses as a responsibility of the Institutes." This suggests we look at what the accountants are doing to see if there is anything in it for us.

At the November 1975 meeting of the Canadian Institute of Actuaries, Ernie Vogt presented a paper, "Preparatory Actuarial Education, an Alternative for Canadians." The paper proposes this AR as a basis for discussion:

(1) To start the examinations, a student must have a university degree, perhaps with at least a minor in mathematics or statistics.

(2) Exemptions will *not* be granted from Part 1 or Part 2 of the actuarial examinations, at least not at first.

(3) Exemptions are available from the remaining Associateship examinations.

To be eligible for an exemption, the student must have at least two years of study at an accredited university. The paper sets forth standards for the courses

and staff which would be necessary for accreditation. A student gets credit for an Associateship examination if he has taken the right courses and has good grades.

The main differences between the Vogt and the Garber committee proposal are these: that the Garber committee proposal

(1) provides an AR for Part 1 and 2, as well as the other Associateship exams,

(2) provides an all-or-nothing Associateship, rather than exemption from individual Associateship examinations, and

(3) requires a comprehensive Society examination in addition to good university grades.

It is possible that the Vogt proposal would be workable in Canada but not in the U.S.A.

The appendices to the paper include information about the AR in Australia and New Zealand and on what the accountants are doing in Canada. This material is very useful. Indeed, the appendices may be the best part of the paper.

Where will all this lead us? I suppose it is possible that the Society and the other North American actuarial bodies will decide that the AR should develop along different lines in Canada and the U.S.A. This would not be a new principle in the E&E system. For example, the Graduate Record Examinations have for many years been used in the U.S.A. as a kind of mini-AR.

Also, we now have, in Part 9, specialized Canadian and U.S. material for life and health insurance, accounting, law, and taxation, and for social insurance. In Canada, Part 9 can be written in French or English. So, a Canadian AR which differs from a U.S. AR should not be unacceptable in principle.

There is, of course, the danger of too much fragmentation of our E&E system. Many actuaries strongly want to preserve our international system. I certainly am among them and I hope we comprise a big majority. The international system has served all of us very well, if not perfectly, and can continue to do so if it is changed gradually along sensible lines. □

Deaths

Arthur E. Erickson, Jr.
Wendell A. Milliman
Leo Nordquist
Walter Tebbetts

Letters

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consensus had been established or how to do it, i.e. a particular programming language, a particular computer system, general coding techniques, etc.

It seems that these are related and that a solution exists which will satisfy them all. This is to include in one of the Associateship examinations study material concerning the design, testing, and implementation of computer systems. This material would include presentation and analysis of the general concepts involved together with examples presented at the *algorithm* level. If this were incorporated with the existing Part 5 material, Risk Theory and Mortality Studies would be excellent sources for examples.

Material presented at the algorithm level would be independent of a given machine or programming language. More importantly, it would provide the working actuary with the necessary procedures for testing existing systems enabling him to use them with confidence. Also, this material would be of great importance to the significant number of actuaries who design, test, and implement systems.

The above does not exhaust the benefits of such an addition to the Syllabus but, I hope, will result in more discussion of this proposal.

Thomas C. Foley

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Enrolled Actuary

Sir:

With all the fuss about "enrolled actuary" one can't help but wonder why ERISA doesn't provide for "enrolled attorney" or "enrolled accountant."

While it is true that all actuaries aren't conversant with retirement benefits, I would warrant that the most "removed" actuary would be more familiar with pensions than his legal or accounting counterpart.

But let us not lose heart!

Melvin L. Gold