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LEVIATHAN?

Advisory Council on Social Security, "*Reports of the* 1971 *Advisory Council on Social Security*," Washington, D. C., March 31, 1971, 183 pp.

by Robert J. Myers

This extensive report, required by law to be submitted by Jan. 1, 1971, was completed and released some three months late because of pending legislation in Congress. Even so, the Advisory Council did not have a firm base on which to build, because legislation was then being actively considered by the House Committee on Ways and Means.

The report is, in essence, divided into three separate reports—dealing with Social Security cash benefits, Medicare, and financing—and appended are dissenting statements of several Council members and four appendices. The latter include a report of the Office of the Actuary and the Report of a Panel of Actuaries and Economists who reviewed the cost estimates and the financial policy.

Composition of Council

The 13 members, appointed by the Secretary of HEW, included seven representatives of the general public, three from labor, and three from business. The labor representatives were two high officials of AFL-CIO international unions and the full-time Social Security staff official of the AFL-CIO. The three business members were high-ranking executives of large corporations and, as has been the case in every past Advisory Council, included an actuary (Charles A. Siegfried).

The seven public members were heavily weighted on what might be called the liberal side. Thus, on seeing the initial constitution of the Council, one could safely have predicted in advance that its recommendations would be for a significant expansion of the program.

The Council made a considerable number of recommendations for expanding

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Schools Offering Actuarial Science Courses

A subcommittee of the Public Relations Committee has just completed a survey of schools in the United States and Canada that offer specific courses in actuarial science. The resulting list is published on Page 8 of this issue of *The Actuary*.

The schools listed are those which, as a minimum, offer a course covering part 4 (life contingencies) of the actuarial examinations sponsored by the Society of Actuaries. Many unlisted schools offer courses covering parts 1 to 3 of these examinations. Most schools listed as offering a program for full-time students will also accept students for selected courses on a part-time basis.

Any readers who know of additional schools that offer such courses are asked to inform Russel H. Smith, Jr., Chairman of the subcommittee.

PENSION PLANNING AND THE ENVIRONMENT

by Richard E. Ullman

James C. Hickman's "Input-Output" article in the May issue of *The Actuary* mentioned that pension planning is not limited to securing IRS qualification of plans. Indeed, it is not. In its broadest sense, pension planning is the job of enabling employees to retire and live in a manner reasonably close to that to which they have been accustomed. The income from the plan plus the income from Social Security must generally be sufficient to do the job. Usually, personal savings are not considered in this equation.

But neither is another factor generally considered. And I submit that this factor will be more and more important in

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TO BE CONTINUED

Editor's Note: This is the third of a series of articles from the Committee on Continuing Education. The rule is one article to one subject to give the non-specialist in that subject up-to-date general information and to encourage further research in the subject if the reader is so minded. Comments will be welcomed by the Committee and by the Editor. This article is condensed from a paper presented by the author to the Southeastern Actuaries Club at its June, 1971 meeting.

Ulpian's Table

by Walter J. Mays

The origin of life tables may be traced to the lavishness of wealthy Romans in making bequests to parties other than their heirs. To protect the heirs, the Falcidian Law (40 B.C.) provided that a testator must leave a clear fourth of the value of his estate to his heirs free from legacies (gifts) to third parties. These legacies sometimes took the form of life income, and factors corresponding to the expectation of life were established to value them for compliance with the law.

Ulpian's Table is a table of life expectancies dating from about 220 A.D. and attributed to the eminent jurist and praetorian prefect, Domitius Ulpianus. It is preserved in Justinian's *Digest* (Lib. XXXV, Tit.II, lxviii). The cited passage was extracted from the writings of the jurist, Aemilius Macer, a contemporary of Ulpian. Macer first presents Ulpian's Table and then states a cruder method, which he says was the one commonly employed. The latter, for convenience, may be called Macer's Table. Both tables are exhibited on page 6.

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Ulpian's Table

(Continued from page 1)

Table I

Age	Expectation of Life Macer	Ulpian
19 years and under	30 years	30 years
20 - 24	30	28
25 - 29	30	25
30 - 34	29 - 25*	22
35 - 39	24 - 20*	20
40	19	19
41	18	18
42	17	17
43	16	16
44	15	15
45	14	14
46	13	13
47	12	12
48	11	11
49	10	10
50 - 54	9 - 5*	9
55 - 59	4 - 0*	7
60 and over	—	5

**Expectation of life by Macer's Table decreases uniformly by one year for each year increase in age in the interval. If this were the exact rate of decrease throughout any age interval, a necessary consequence would be that no deaths occurred in the interval. Strictly interpreted, Macer's Table would imply that those living at age 29 all survived to age 59 and then died before attaining age 60, while Ulpian's Table would imply that those living at age 39 all survived to age 50.*

Through a misinterpretation of the Latin text, the values according to Macer's Table for age 30 and over have been taken to be one year greater than those shown in the above table. Critical examination of the text establishes the correct values and makes clear that the two tables coincide from age 39 through age 50, as well as at the ages below 20. Such coincidence makes plausible the assumption that Ulpian's Table is a refinement of Macer's Table with corrections introduced in the two ranges where the latter was most seriously in error—that is, in the neighborhood of age 30 where the expectation of life had been overstated and of age 60 where no survivors had been assumed. In consequence, we believe that the basis of values in Ulpian's Table was not purely arbitrary and that investigation of the underlying mortality is justified.

In order to develop the mortality rates, let it be assumed that the values in Ulpian's Table represent the curtate expectation of life and that the mortality rates from age 25 upward follow Makeham's Law. The three ages for which the values would seem to be most reliable are 27, 45, and 57. Age 45 lies in the middle of the range where the two tables coincide and presumably where no correction to Macer's Table was deemed necessary. The other two ages are in the ranges where Macer's Table was most seriously in error and therefore where corrections would be most carefully considered. Thus we seek values of the Makeham constants A, B, and c that will reproduce the complete expectations of life:

$\mathring{e}_{27} = 25.5$; $\mathring{e}_{45} = 14.5$; $\mathring{e}_{57} = 7.5$.

A set of first approximations for the constants is readily found from Calderon's generalized Makeham tables (JIA, Vol. XXXV, p. 157). These are tested by substitution in the series expansion of $\mathring{e}_x$ due to McClintock (*The Assurance Magazine*, Vol. XVIII, p. 242). First order corrections are applied and final values are obtained as follows:

$A = .01613025$; $B = .0000213685$;
$c = 1.14536554$.

The resulting mortality rates for quinquennial ages are set forth in the following table, together with mortality rates from other tables for comparison.

Table II

Age x	$1000q_x$ Ulpian	*All India Male* 1901-1911	*Halley (Breslau* 1687-1691)	1958 *CSO Male*	*U.S. Total Population* 1959-61	*Ulpian as % of U.S. Total Population* 1959-61
25	16.67	20.3	12.35	1.93	1.26	1323%
30	17.32	23.5	15.07	2.13	1.43	1211
35	18.60	27.8	18.37	2.51	1.94	959
40	21.12	32.3	20.22	3.53	3.00	704
45	26.07	37.2	25.19	5.35	4.76	548
50	35.74	42.8	31.79	8.32	7.74	462
55	54.54	49.9	34.25	13.00	11.61	470
60	90.52	59.8	41.32	20.34	17.61	514
65	157.47	75.5	52.08	31.75	26.22	601
70	275.37	101.7	77.46	49.79	38.66	712
75	461.64	148.0	113.64	73.37	57.99	796

SYSTEMS, COMPUTERS AND USERS

by Malcolm D. MacKinnon

The LOMA Systems Forum was held in New York, March 15-17, with a program including 99 speakers, 15 of whom were members of the Society. Forum proceedings are being sent to member companies and to registrants in two mailings.

The range of topics was very broad. Space permits the mention of only a few of the papers. In *The Corporate Financial Model—Its Application and Development,* George W. Gershefski gave a first-rate overview. "In the simplest of terms," he stated, "a corporate model is a simulation of a company's operations used to provide a fast, reliable method for forecasting the future of the company. At a minimum, it will produce an income statement, a balance sheet, and a cash flow statement. It may also project manpower, equipment and space requirements."

Application of modeling techniques to life insurance was covered by Michael Rosenfelder in a paper describing the work of the LOMA Management Research Techniques Committee. He described a model composed of submodels relating to marketing, policies, administration, assets, the mandatory securities valuation reserve, federal income tax, liabilities, operations and surplus. In another paper, Richard C. Murphy described models for projecting manpower and for evaluating capital investments.

T. J. Gordon, Vice President of the Institute for the Future, predicted a trend to benefits measured in terms of services rather than dollars.

Other topics included the use of remote terminals, the application of management science to life insurance product design, policy issue systems, data entry by optical scanner, the data processing department as a profit center and systems requirements for the Investment Company Act of 1940.

Proceedings of the LOMA Systems Forum are available at $12 each. □