



The *Actuarial*

[The remainder of the page is obscured by heavy black redaction bars.]

The Actuary

Editor ANDREW C. WEBSTER Correspondence should be addressed:
 Associate Editors . . . COLIN E. JACK *The Actuary*
 FREDERIC SELTZER Mail Drop 13-2, 1740 Broadway
 JONATHAN L. WOOLEY New York, N. Y. 10019
 Tel: (212) 586-4000

Published monthly (except July and August) by the SOCIETY OF ACTUARIES.
 208 S. LaSalle St., Chicago, Illinois, 60604, Robert T. Jackson, President, Jean-Jacques
 Deschènes, Secretary, and Ms. Anna M. Rappaport, Treasurer.

The Society is not responsible for statements made or opinions expressed in the
 articles, criticisms, and discussions in this publication.

EDITORIAL

IT is worth noting that this month's issue has only six pages. Whether due to the summer doldrums, extreme work pressures or indifference, this fact puzzles me. With the raging controversies in our midst surrounding reorganization, ERISA, Social Security, the restructuring of educational requirements and many other vital topics and with audit guides for mutual companies under study by the accountants' task forces, I wonder why we editors do not get more correspondence. In fact, there has been no deluge of material for publication in the past several months.

Could it be that we, as actuaries (in the truest sense of the word), are merely enjoying our comfortable incomes, working hard for our companies and our clients, and actually becoming complacent about the "outside world" of accountants, lawyers, the Federal Government, and others? Matthew Rodermund said in our May issue that the non-life actuaries were being "leaned on" by these people and others. If we are indeed becoming complacent, then we are being or will be "leaned on" too. What can we do to avoid this dilemma?

We can all communicate with each other as Society and Academy members and with the Society and Academy committees currently discussing these controversial matters. We can join those committees and participate in Society and Academy decisions. I wonder if the slackening of material for publication in *The Actuary* is reflective of a similar phenomenon in the mails of committee members and chairmen.

I am sure that all committee members and, of course, we at *The Actuary*, would be extremely happy to receive your comments and ideas on almost any subject, controversial or not.

It appears that enhanced communication is certainly part of the solution to our dilemma. What else must we do to survive as a unique, qualified and recognized professional body over the short or long term? Certainly, we must be organized and present a strong unified front. Have we been naive perhaps in some of our earlier excursions into Washington and elsewhere? Shouldn't we now work collectively to obtain legislation and regulations amenable to our interests before someone with more influence does?

Is it possible that, if we do not act quickly and decisively to avoid being "leaned on", our professional prestige might diminish or even disappear? Do any of us want this to happen?

Jonathan L. Wooley

Note: If a deluge of material were to arrive in the offices of *The Actuary* by August 15, we just might get the next issue out on time!

LETTERS

Disability Termination Rates Proposed New Table

Editor's Note: We are glad to give space to the following letter and trust there will be a large response to Mr. Miller's willingness to prepare the table.

Sir:

In the disability field there is an evident need for a new select table of disability termination rates for each of the principal elimination or deferment periods, viz. 7, 14 and 30 days as well as 3 and 6 months. It is my belief that an accurate diagnosis of the condition of any portfolio of disability business and the essential tracking of trends in the experience require such a table. While it is expected that a suitable table will in due course be developed through a committee representing the actuarial profession and will be given the official blessing of the NAIC, the need for such an instrument is so pressing that I would like to offer the facilities of the *Disability Newsletter* as a medium for collecting and analyzing data from which an interim table representative of recent experience could be developed for the every day use of disability insurers until such time as a new official table becomes available.

Only a few insurers have data in sufficient volume to develop a termination table with all the desired characteristics without including several experience years. In view of the evidence that recovery rates have changed dramatically in recent years, it is obvious that the period of observation should be relatively short. For this reason pooling of data should be of considerable interest and value even to the largest writers.

All insurers are invited to participate in this informal intercompany study of disability claim terminations. The format for the submission of input data is similar to that used by the Society of Actuaries (see *T.S.A.* 1959 Reports Number) and by the New York Insurance Department in its compilation of intercompany experience for its report *Disability Income Cost differentials between Men and Women*. There will be no charge to contributors to the study other than a pro-rata assessment for the EDP costs incurred, not to exceed \$500 per participant.

I should mention that the NAIC Technical Task Force in this field has been

(Continued on page 3)

Letters

(Continued from page 2)

advised of the project.

I would appreciate hearing from interested companies as soon as possible. Detailed input specifications are available. All communications should be sent to me at 451 Russell Avenue, Suffield, Connecticut 06078.

John H. Miller

* * * *

Estimating Social Security Benefits in an Actuarial Valuation

Sir:

In the April 1977 issue of *The Actuary*, Allan Keith comments on the constant Social Security replacement ratio I suggested for projecting benefits in an actuarial valuation. He pointed out that an employee whose earnings rise in relation to the wage base should receive a lower Social Security benefit than the method indicates, and that such an employee may be typical rather than exceptional.

Besides thanking Mr. Keith for his comments on the method, I wish to note points in response:

(1) The situation he describes can be handled using the replacement ratio concept. Suppose an employee is earning \$11,000 currently and is expected to gain 2 percent annually against the Social Security wage base. Then his salary can be advanced by 2 percent for each year to retirement; the replacement percentage for an employee retiring today at that level can be determined; and that percentage can be applied to his expected final earnings.

(2) The August 1976 Report of the Consultant Panel on Social Security to the Congressional Research Service provides some enlightening statistics on earnings increases relative to the wage base. An individual typically does not enjoy wage increases greater than the national average. His earnings typically grow faster than the national average below age 40, at about the average rate from 40 to 50, and at less than the average thereafter. So while Mr. Keith's concern may be justified with regard to employees in their twenties and thirties, there is no serious problem for the somewhat older employees who normally account for the bulk of costs and liabilities.

Lawrence N. Bader

* * * *

PBGC

(Continued from page 1)

basis for graduation to reflect projected mortality improvement (until 1984, approximately). The table is unisex to the extent that varying age setbacks are assumed to reflect the mortality of an employee group consisting of a specified percentage of women. The basic table assumes an 80% male and a 20% female employee mix. The rates and a discussion of the table may be found in Volume 25 of *The Proceedings of the Conference of Actuaries in Public Practice*.

In the absence of any widely accepted disability experience tables applicable to employees receiving disability benefits from pension plans though not receiving Social Security disability income, use was made of the basic 1984 table set forward four years for males and set back one year for females.

The tables to be used for participants who are receiving Social Security disability payments are based upon unpublished data compiled by the Social Security Administration. Since these tables were promulgated, the Social Security Administration has issued Actuarial Study No. 74 covering the experience of disabled workers under OASDI from 1965 to 1975. This will probably lead to production of new rates.

The actuarial tables in publication 502 should be self explanatory except for the notation with regard to deferred annuities which appears on page 5. An explanation of the factors is provided in Department of Labor regulation 29 C.F.R. Part 2610, entitled Interim Regulation on Valuation of Plan Benefits which was published in the Federal Register on November 3, 1976.

Use of the tables has prompted, and will probably continue to prompt, some criticism. Sources of criticism include questions as to the appropriateness of the mortality table used which, among other things, was derived using data primarily based on hourly paid workers; the failure to use a more sophisticated approach to valuing disabled life benefits; and concern as to the appropriateness of the interest assumptions used. Undoubtedly, the PBGC selected the rates after a reasonable period of consideration tempered by the rather enor-

mous backlog of cases which was developing and by the practical necessity of establishing an easily administered valuation system. It is noted in Publication 501 that the PBGC expects to have sufficient experience within two to five years to develop experience tables.

Concern over the number of plan terminations apparently created the impetus for Publication 503 which contains discussion of alternatives to termination in specific real life situations. The article should prove to be interesting and useful reading to the pension actuary.

All of the above publications may be obtained from the PBGC. In addition, interested individuals can request to be placed on the PBGC mailing list and receive future publications free of charge. The address of the Pension Benefit Guaranty Corporation is: 2020 K Street N.W., Washington, D.C. 20006. □

Scholarship Program

(Continued from page 1)

The new program will offer scholarships from various scholarship funds which will be established for this purpose. Two such funds already exist. The J. Henry Smith Fund was established in 1975 by the Equitable Life Assurance Society of the United States. The Connecticut General Insurance Corporation has recently added the CC Actuarial Science Fellowship for Minorities to the program. The purpose of allowing individual companies or organizations to establish separate funds is to allow large contributors to determine eligibility requirements and general guidelines directly related to their individual recruiting objectives. Any company or organization wishing to establish a separate fund to be administered by the Society is encouraged to contact the Society's office. Scholarships granted from any separate fund will be identified with the particular organization establishing that fund. Contributions received by the Society which are not specifically earmarked, will be placed in a general scholarship fund. As in the past, scholarships will be awarded on the basis of individual merit and financial need.

(Continued on page 4)

Scholarship Program

(Continued from page 3)

Over the past five years, the generous contributions from actuarial employers, actuarial clubs, and individual Society members have made our recruitment program of minority and women students possible. We have had a demonstrable impact on bringing more minority group members and women into the profession and we by no means want to lessen our efforts at this time. The new program is expected to generate even more positive results and we hope that we will continue to have your support and encouragement. □

Update from Chicago

(Continued from page 1)

educational programs. A general announcement was made, and in addition letters were sent to a number of persons who, we, felt might have particularly good qualifications.

I am happy to report that we have had a number of qualified candidates apply for the position, and we are at present in the process of interviewing several of the best qualified. We hope to fill the position in the very near future.

A second activity which should be of considerable interest to the membership is the feasibility study for the computerization of Society records which is now underway. This feasibility study was approved by the Executive Committee at its June 10th meeting. At the present time, a consultant is working with us to determine which records should be converted, and what type computer should be used. The feasibility study is expected to be completed for the meeting of the Executive Committee in September. Assuming that the study indicates that computerization of records is desirable, we expect to begin the actual implementation as soon as possible after approval.

I find the computerization project very exciting. I look at it as far more than an opportunity to convert our membership file and other miscellaneous records to a computerized system. As the size and needs of the profession expand, and as the staff support function expands, we will have an increasing opportunity to provide additional services to mem-

SOCIAL SECURITY FINANCING

United States Senate Committee on Finance, *Staff Data and Materials Relating to Social Security Financing*, pp. iv., 101, U.S. Government Printing Office, Washington, D.C. 20402, 1977, 55 cents.

by Richard S. Foster

As indicated by the recently announced 1977 reports of the Board of Trustees of the Social Security trust funds, unless additional financing is provided the Social Security disability insurance trust fund will run out of money early in 1979 and the old-age and survivors insurance fund will be exhausted by about 1983. Consequently, legislative action will be necessary in the very near future to correct the current operating deficits. As an assist to our legislators, the staff of the Senate Finance Committee has prepared a report on the financial status of the old-age, survivors, and disability insurance program (OASDI) and how this status would be affected by the various financing proposals now under consideration.

The report is divided into four sections. The first provides a brief description of the financing basis of social security and the structure of OASDI benefits. The second section gives an evaluation of the current and projected financial condition of the program. A detailed discussion of the Carter Administration's financing proposal, along with other possible methods of alleviating future deficits, forms the basis for the third section. For the short-run, this last discussion focuses on the cost effects of various "traditional" financing changes (involving tax rate and wage base increases). In the long-run, several

bers and others if we have a well-designed computer system.

To help achieve this, I have already asked for suggestions from various interested parties as to what additional information we should be compiling, and what additional services we should be providing. I hope that any member of the Society will feel free to write to me with any suggestions he might have in this regard. I cannot promise that we will adopt all of them, but I will promise to consider all of them carefully in the designing of the system.

P.W.P.

proposals to revise the benefit formula in order to correct the "overindexing" problem are analyzed. The fourth section contains a number of charts designed to help evaluate the differences between the various benefit revision proposals. Most of the estimates and cost projections were calculated by the Office of the Actuary, Social Security Administration, using the intermediate set of assumptions from the 1977 Trustees Report. The results are shown in forty detailed tables.

The material on the financial condition of OASDI will be familiar to readers of the annual Trustees Reports, but much of the information on the cost effects of the alternative proposals is being published for the first time. While the report concentrates on these topics, it also contains interesting discussions (including historical backgrounds) on a number of related topics such as the appropriate contingency reserve level of the trust funds, measures of benefit adequacy, the origins of the current and projected deficits, and the criteria for determining the actuarial soundness of OASDI.

Overall, the report is an excellent collection of material relating to Social Security financing. At a time when the mere mention of Social Security is likely to bring forth misunderstanding, misinformation, and displays of self-interest, it is refreshing to observe that the Committee's report is unbiased and remarkably free from error. While the report does not offer any conclusions or indications of Congressional intent in this area, it is sufficiently complete as a source of information to allow the reader to develop his own conclusions. □

Actuarial Meetings

July, 26, Seattle Actuarial Club

August 11, Baltimore Actuaries Club

September 8, Baltimore Actuaries Club

September 20, Boston Actuaries' Club

October 3 & 4, Annual Meeting —
Conference of Actuaries in
Public Practice

THE INEQUITY OF EQUALITY

by Robert J. Johansen

Actuaries, economists, analysts, accountants and others involved in financial analyses can readily understand that the financial perspective is paramount when comparing two groups of annuitants for pricing purposes. The important point is that the cost of periodic payments to the two groups of individuals for their remaining lifetime depends on the numbers alive in each group at the time of each payment, not on the respective distributions of deaths by age.

Actuaries, accustomed to thinking in terms of life table functions and life contingencies, accept without question a statement that if Mortality Table A has lower death rates than Table B, then the cost of an annuity under Table A will be higher than under Table B. To the non-actuary the financial effects of longer survival among persons in Group A than among those in Group B may not be so obvious or significant. Demonstrations of the financial effects of differing life expectancies have appeared from time to time. A demonstration that ignores the financial effect of longevity and minimizes what to the actuary is significant may nevertheless have some appeal even though it produces a specious result. The primary purpose of this article is to rebut one such recent demonstration and suggest other ways of analyzing life tables so as to promote a better understanding of the important financial effects of mortality differences.

In an affidavit filed earlier this year in U.S. District Court for the District of Maine, *EEOC vs. Colby College and TIAA-CREF, Barbara R. Bergmann** claimed that the established differences between male and female mortality should be disregarded in view of her demonstration based on matching deaths in two life tables.

As shown in Table 1, Professor Bergmann, using male and female life tables starting with 1,000 lives each at age 65, paired the female deaths at each age against the male deaths at the same ages. Column (3) in Table 1 shows the "matched" deaths. Thus, 799 female deaths and 799 male deaths, or about 80 percent of the total 2,000 deaths, can be "matched;" the unmatched male deaths occur at the younger ages (about 10 percent of the total), while the unmatched female deaths occur at the older ages. Professor Bergmann states in her affidavit that because (i) 80 percent of the total cohort "can be paired up as dying in the same year" and (ii) only 20 percent of all deaths occur early or late, different annuity rates for males and females are not justified. She then asserts that "assignment of benefits to the men and burdens to the women ignores the fact that 80 percent of the men and women in the cohort have an identical year of death."

A fundamental weakness in the Bergmann "matching" (or "Overlap") theory is that it ignores an important fact—at the ages where the numbers of deaths of males and females are about equal, the numbers of female deaths reflect lower female mortality rates applied to the substantially greater numbers of females surviving to these same ages. Thus, the Bergmann argument rests on the excess of female lives over

male lives at each age after 65 resulting from the greater longevity of the females. It is, however, solely because of this excess of female lives over male lives that annuity payments to females must be smaller than those paid to male lives for the same amount of consideration. Note that the Bergmann reasoning can be used also to "demonstrate" that the same annuity rates should be charged at age 60 as at age 65 — about 80 percent of the total deaths can be "matched."

Recognizing that annuity payments are made to the living, it is essential to relate the number of females living at each age to the number of males living at the same age. From Barbara Bergmann's figures in Table 1, the numbers of male and female lives at each age were computed together with the number of female lives at each age not matched with male lives at the same age. As shown in Table 2, there were only 9 unmatched female lives at age 66, but the number of unmatched female lives reached 106 at age 75, and a maximum of 201 at age 86. At this point, the number of female survivors exceeded the number of males by almost 60 percent. By age 90, the number of surviving females was almost double the number of surviving males.

We then summed the numbers of male and female survivors at each year of age in Table 2 and found that the female total exceeded the male by 4,098 or 23.5 percent. If each survivor were to receive \$1 at the beginning of each year of age that the survivor enters, then the total annuity payments to the cohort of 1,000 females over their lifetimes would exceed the payments to the 1,000 males by 23.5 percent. In no way can it be asserted that this excess number of payments is financially inconsequential.

Table 3 shows a modification of the Bergmann matching technique. Using the figures from Table 1, we matched the male deaths at each successive age with an *equal number* of female deaths *not already matched* with male deaths at earlier ages. Then we calculated for each matched set of male and female deaths the average number of annual payments received from age 65 through and including the year of death. In order to match the 16 male deaths at age 65, we must include female deaths at ages 65, 66 and 67. We then find that while the 16 males collected just one payment, the 16 females collected an average of one and two-thirds payments. To match the 17 male deaths occurring at age 66, we have to include unmatched female deaths at ages 67 and 68. In this case, the 17 males received two payments, the 17 females received three and one-half payments.

To further illustrate this matching comparison, the 23 males who die at age 70 are matched with 23 previously unmatched females who die at ages 73 and 74. We find that the 23 males have collected six payments while the matched females received about three and two-thirds *extra* payments on the average. Column (3) of Table 3 shows that at almost all ages, to nearly the end of the table, the matched females received three and one-half to four and one-half payments in excess of those paid to their male counterparts.

It is evident from this demonstration that the female lives would receive more annuity payments than the male lives and

* Professor of Economics, University of Maryland

the payments of equal dollar amounts to males and females for equal considerations would be inequitable. It is also evident that the Bergmann matching or overlap theory is not pertinent to the question at issue.

While the dilemma of providing equal benefits to males and females under a retirement program is not easily solved, any proposal for equal periodic payments which denies that under such a program the total payments made to the group of male lives would be materially less than the total payments to the female annuitants is not an acceptable or equitable

solution. If an employer wishes to provide equal periodic payments to both males and females, then the employer must make up the extra cost. Where the retirement contributions from the employer are a percentage of salary, there is no equitable way to require equal periodic payments: if the amounts of periodic payments to male and female retirees are equal, the females will collect more because they will live longer; the males will receive less. The differences in longevity are real, not theoretical. One might just as well legislate that the circumference of a circle is three times the diameter.

Age	Deaths		Number of Deaths Among Females Paired [¶] With Deaths Among Males at the Same Age
	Male	Female	
	(1)	(2)	(3)
65	16	7	7
66	17	8	8
67	19	9	9
68	20	10	10
69	21	11	11
70	23	12	12
71	25	13	13
72	26	15	15
73	28	16	16
74	30	18	18
75	32	20	20
76	34	22	22
77	36	24	24
78	38	26	26
79	39	28	28
80	41	31	31
81	42	33	33
82	43	36	36
83	44	38	38
84	44	41	41
85	44	43	43
86	43	44	43
87	41	46	41
88	39	47	39
89	37	47	37
90	34	47	34
91	30	45	30
92	26	43	26
93	22	40	22
94	18	37	18
95	14	32	14
96	11	28	11
97	8	23	8
98	6	18	6
99	4	14	4
100	3	10	3
101	2	7	2
102	0	5	0
103	0	3	0
104	0	2	0
105	0	1	0
Σ	1,000	1,000	799

Age	Survivors		Excess of Female Lives Over Male Lives
	Male	Female	
	(1)	(2)	(3)=(2)-(1)
65	1,000	1,000	0
66	984	993	9
67	967	985	18
68	948	976	28
69	928	966	38
70	907	955	48
71	884	943	59
72	859	930	71
73	833	915	82
74	805	899	94
75	775	881	106
76	743	861	118
77	709	839	130
78	673	815	142
79	635	789	154
80	595	761	165
81	555	730	175
82	513	697	184
83	470	661	191
84	426	623	197
85	382	582	200
86	338	539	201
87	295	495	200
88	254	449	195
89	215	402	187
90	178	355	177
91	144	308	164
92	114	263	149
93	88	220	132
94	66	180	114
95	48	143	95
96	34	111	77
97	23	83	60
98	15	60	45
99	9	42	33
100	5	28	23
101	2	18	16
102	0	11	11
103	0	6	6
104	0	3	3
105	0	1	1
Σ	17,420	21,518	4,098

Male Age at Death	Average Number of Payments Received Through Year of Death		Excess Payments to Females
	Male	Matched [#] Female	
	(1)	(2)	(3)=(2)-(1)
65	1	1.625	.625
66	2	3.529	1.529
67	3	5.316	2.316
68	4	6.850	2.850
69	5	8.381	3.381
70	6	9.652	3.652
71	7	10.960	3.960
72	8	12.231	4.231
73	9	13.357	4.357
74	10	14.467	4.467
75	11	15.563	4.563
76	12	16.618	4.618
77	13	17.667	4.667
78	14	18.684	4.684
79	15	19.692	4.692
80	16	20.659	4.659
81	17	21.619	4.619
82	18	22.581	4.581
83	19	23.523	4.523
84	20	24.455	4.455
85	21	25.386	4.386
86	22	26.302	4.302
87	23	27.220	4.220
88	24	28.128	4.128
89	25	29.054	4.054
90	26	30.000	4.000
91	27	30.967	3.967
92	28	31.885	3.885
93	29	32.773	3.773
94	30	33.667	3.667
95	31	34.571	3.571
96	32	35.455	3.455
97	33	36.375	3.375
98	34	37.333	3.333
99	35	38.250	3.250
100	36	39.333	3.333
101	37	40.500	3.500

[§]Based on Bergmann figures (A-1949 Table Projected 25 Years-Modified) adjusted to add to total of 1,000.

[#]See text.

[¶]Calculated as the lesser of col. (1) or col. (2).