TRANSACTIONS OF SOCIETY OF ACTUARIES
1956 VOL. 8 NO. 20

MORTALITY DIFFERENCES BETWEEN PAYEE AND NONPAYEE ELECTIONS ARISING FROM INSURANCE DEATH CLAIMS

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For some years, the Committee on Mortality under Ordinary Insurance and Annuities has collected the experience under life income settlements—with a guaranteed period or a refund provision—arising out of death claims, subdivided into payee and nonpayee elections. No detailed analysis of recent experience has been made. However, Mr. Bowerman discussed some earlier data from a somewhat different viewpoint in *TSA* II, 97.

We should expect the mortality experienced under payee elections to be lower than that experienced under nonpayee elections—and it is. The treatment of this difference varies between companies. Many companies use identical monthly payments per $1,000 for payee and nonpayee elections, while certain other companies differentiate. The differentiation takes the form of an age setback, usually from one to three years. The purpose of this note is to determine what the actual mortality statistics suggest the age setback to be.

In the settlement option study of *TSA* 1951 Reports, page 25, there are tables of payee and nonpayee female mortality ratios on the *a*-1949 ultimate table for ten year attained age groups split into durations 1–2, 3–5, 6 and over. By applying the ultimate ratios for each age group by amount (*i.e.*, for payee elections, 146% for ages 50–59, 120% for ages 60 to 69, and so on) to the *a*-1949 ultimate values of q_x for each age within the group, the ultimate mortality rates were obtained for all ages. Select mortality rates were next grafted on at every fifth year of age by using the ratios indicated in the select portion of the study, durations 1–2 and 3–5 separately. No attempt to graduate was made. A similar procedure was followed for nonpayee female elections. Commutation columns were derived at $2\frac{1}{2}\%$, and net monthly 10 years certain and 20 years certain life incomes were derived at quinquennial issue ages 40 to 80. Intermediate ages were interpolated by use of the Karup-King equation minimizing 4th differences. Values between ages 75 and 80 were obtained by fitting a quadratic equation to the values at ages 70, 75 and 80. Monthly payments per $1,000 for incomes with no certain period were also computed even though the data relate only to term certain and refund incomes.

TABLE 1

10 YEARS CERTAIN MONTHLY PAYMENTS PER $1,000
BASED ON 1951 SETTLEMENT OPTION STUDY

Age	Nonpayee Election	Payee Election	Number of Years of Setback*
45	$3.79	$3.76	.....
46	3.86	3.82	.6
47	3.92	3.87	.8
48	4.00	3.92	1.0
49	4.07	3.98	1.3
50	4.15	4.05	1.3
51	4.23	4.12	1.4
52	4.32	4.20	1.4
53	4.41	4.29	1.3
54	4.51	4.38	1.3
55	4.61	4.48	1.3
56	4.72	4.59	1.2
57	4.84	4.70	1.2
58	4.96	4.82	1.2
59	5.09	4.94	1.2
60	5.23	5.07	1.2
61	5.38	5.21	1.1
62	5.53	5.35	1.2
63	5.69	5.49	1.3
64	5.86	5.65	1.3
65	6.03	5.80	1.4
66	6.20	5.96	1.4
67	6.38	6.12	1.5
68	6.56	6.28	1.6
69	6.75	6.45	1.6
70	6.93	6.63	1.6
71	7.12	6.81	1.7
72	7.31	7.00	1.6
73	7.50	7.20	1.6
74	7.69	7.39	1.6
75	7.87	7.59	1.5
76	8.05	7.79	1.4
77	8.22	7.98	1.4
78	8.40	8.18	1.2
79	8.56	8.38	1.1
80	8.73	8.58	.9
		Average	1.3

* This column is the number of years the true age must be set back on the nonpayee table so that the monthly income from the set back age on the nonpayee table equals that from the true age on the payee table.

TABLE 2

20 YEARS CERTAIN MONTHLY PAYMENTS PER $1,000
BASED ON 1951 SETTLEMENT OPTION STUDY

Age	Nonpayee Election	Payee Election	Number of Years of Setback*
45	$3.69	$3.65	.....
46	3.74	3.70	.8
47	3.80	3.75	.8
48	3.86	3.79	1.2
49	3.92	3.85	1.2
50	3.98	3.90	1.3
51	4.04	3.96	1.3
52	4.11	4.02	1.3
53	4.18	4.09	1.3
54	4.25	4.15	1.4
55	4.32	4.22	1.4
56	4.39	4.29	1.4
57	4.46	4.36	1.4
58	4.53	4.43	1.4
59	4.59	4.50	1.4
60	4.66	4.57	1.3
61	4.73	4.64	1.3
62	4.79	4.70	1.4
63	4.86	4.77	1.3
64	4.92	4.83	1.4
65	4.97	4.89	1.5
66	5.02	4.94	1.6
67	5.06	4.99	1.6
68	5.10	5.04	1.5
69	5.14	5.08	1.5
70	5.17	5.12	1.5
71	5.19	5.15	1.7
72	5.21	5.18	1.5
73	5.23	5.20	1.5
74	5.24	5.22	1.5
75	5.25	5.24	1.0
76	5.26	5.25	1.0
77	5.27	5.26	1.0
78	5.27	5.27	1.0
79	5.27	5.27	.....
80	5.27	5.27	.....
		Average	1.3

* This column is the number of years the true age must be set back on the nonpayee table so that the monthly income from the set back age on the nonpayee table equals that from the true age on the payee table.

TABLE 3

NO REFUND MONTHLY PAYMENTS PER $1,000
BASED ON 1951 SETTLEMENT OPTION STUDY

Age	Nonpayee Election	Payee Election	Number of Years of Setback*
45	$3.82	$3.81	.....
46	3.89	3.86	.4
47	3.96	3.91	.7
48	4.03	3.96	1.0
49	4.11	4.01	1.3
50	4.19	4.08	1.4
51	4.28	4.16	1.4
52	4.37	4.24	1.4
53	4.47	4.33	1.4
54	4.57	4.43	1.4
55	4.69	4.54	1.3
56	4.81	4.66	1.3
57	4.94	4.79	1.2
58	5.08	4.92	1.2
59	5.24	5.07	1.1
60	5.40	5.22	1.1
61	5.58	5.38	1.1
62	5.77	5.55	1.2
63	5.97	5.73	1.2
64	6.18	5.92	1.3
65	6.41	6.12	1.3
66	6.65	6.32	1.4
67	6.90	6.52	1.5
68	7.17	6.74	1.6
69	7.46	6.98	1.7
70	7.77	7.24	1.8
71	8.11	7.52	1.8
72	8.46	7.80	1.9
73	8.84	8.11	2.0
74	9.25	8.48	1.9
75	9.71	8.94	1.8
76	10.21	9.48	1.5
77	10.76	10.09	1.2
78	11.34	10.77	1.0
79	11.96	11.52	.7
80	12.62	12.33	.4
		Average	1.3

* This column is the number of years the true age must be set back on the nonpayee table so that the monthly income from the set back age on the nonpayee table equals that from the true age the payee table.

The statistics used were based on experience from anniversaries in 1945 to anniversaries in 1950. The monthly payments per $1,000 would be inappropriate for incomes to be effective now or in the future, since allowance was not made for mortality improvement. However, it is not unreasonable to assume that the mortality improvement will be roughly equal under the two classes. The calculations indicate (see Tables 1, 2, 3) that female payee elections could be quoted on a table for female nonpayee elections but set back about 1.3 years on the average. A weighted average does not change the results appreciably. A similar calculation for males was not carried out because the male experience was only 4% of the data. Moreover, the 1951 Reports indicate that the male data are not homogeneous. However, the mortality ratios certainly show that the male setback would be much greater than the female. The previous settlement option study also pointed out the greater male difference.

The writer would like to thank Mr. R. A. Leggett and Mr. J. E. Hoskins for their helpful suggestions.