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A VALUATION STUDY OF DISABILITY BENEFITS INCLUDED IN LIFE INSURANCE POLICIES

WILLIAM H. KELTON

VALUATION ASSUMPTIONS

THE Travelers Insurance Company issued four principal income disability clauses from February 1, 1918 to October 15, 1931 and has issued only a premium waiver clause since the latter date. In an endeavor to reach some conclusion as to our real liabilities for such benefits, we have made a double valuation of our outstanding disability benefits, using (1) a maximum or conservative basis and (2) a minimum or liberal basis. We expected that our real liabilities might lie somewhere between these two valuations, depending largely upon economic conditions during the next ten years, within which time most of our income disability contracts will reach the limiting ages.

For the conservative valuation basis we used the intercompany Period 2 disablement rates and the intercompany 1930–1950 termination rates. For the minimum basis we used our own disablement rates for the period 1946–1950 for our income disability clauses, 70% of Period 2 Benefit 5 intercompany disablement rates for our premium waiver clause, our 1946–1952 select termination rates on income clauses, our 1932–1950 select termination rates for our current premium waiver clause, and the intercompany 1930–1950 ultimate termination rates. A modification of the 1946–1949 Ultimate Basic Mortality Table, eliminating only the first five select years, hereinafter referred to as the 1946–1949$^{(5)}$ Table, and 3% interest were used for both valuations.

Our recent disability experience has been somewhat more favorable; that is, our disablement rates were lower and our termination rates were higher than the corresponding intercompany experience. We felt that this was about the most favorable experience which could be expected over the next ten years, but that something similar to such experience might develop if current economic conditions should continue without much change for that period. The use of 70% of intercompany Period 2 Benefit 5 disablement rates results in rates slightly higher than our 1946–1950 experience on premium waiver disability. Our 1946–1952 income disability termination rates, although generally higher than the corresponding intercompany experiences in the early durations following disability, tended to approach rather closely to such experiences after the lapse of varying numbers of years, depending upon age group and type of disability clause. The intercompany income disability termination rates were accordingly used after durations ranging from 6 to 13 years for our minimum valuation basis.

Our Period 2 disablement experiences were also more favorable than the corresponding intercompany experiences, with the exception of Benefit 5, being 78% of intercompany tabular for Benefit 1, 92% for Benefit 3, 93% for Benefit 4 and 105% for Benefit 5. The exposure periods of our termination experiences do not correspond to the 1930–1950 intercompany study. Our terminations for 1918–1951 were 141% of intercompany tabular for Benefit 1 and 120% for Benefit 3. Our Benefit 5 terminations for 1932–1950 were 120% of intercompany tabular. We chose, however, to use the more conservative intercompany disablement and termination rates for our conservative valuation.

Since we were primarily interested in our real liabilities under disability benefits, we chose a modern insurance mortality table rather than a recognized valuation table. The 1946–1949 Basic Mortality Table appeared to be the most satisfactory for the purposes intended.

VALUATION RESULTS

Active Lives

Both minimum and maximum valuations were made as of December 31, 1953 on business in force June 30, 1953. The minimum valuation has also been made as of December 31, 1954 on business in force June 30, 1954 and we plan to make subsequent test valuations on the minimum basis. There is now reasonable probability that our minimum assumptions will be sufficient for our outstanding income disability contracts, since such contracts will be largely liquidated within the next few years and since current disability experience is more favorable than our minimum assumptions. It is not planned to make another valuation using the maximum assumptions unless need therefor arises. This valuation has been made as a fill-in job over a period of about two years and it now appears that our maximum assumptions were pitched too high.

Reserves computed by our maximum assumptions for our income clauses, issued prior to 1932, were 198% of the reserves computed by our minimum assumptions. Reserves computed by our minimum assumptions on income clauses were 172% of the corresponding Class 3 $3\frac{1}{2}\%$ reserves. We have made no computation of Class 3 3% reserves. In all these computations, gross premiums were automatically substituted for valuation net premiums by the IBM 604 wherever the former were smaller, and the resulting reserves therefore include full premium deficiency reserves.

Reserves computed by our maximum assumptions for our current premium waiver clause issued since 1931, which corresponds to intercompany Benefit 5, were 160% of corresponding reserves computed by our minimum assumptions. Our Class 3 reserves for our current waiver clause are computed at 3½% interest for issues prior to 1940 and at 3% interest for issues of 1940 and later. 3% reserves computed by our minimum assumptions were 99% of Class 3 3½% reserves on issues prior to 1940 and 83% of Class 3 3% reserves on business issued 1940 and later.

We tested the effect of our choice of 1946–1949$^{(5)}$ mortality by valuing our current premium waiver benefit on our maximum assumptions, substituting CSO for 1946–1949$^{(5)}$ mortality. We found that active life reserves for that benefit using 1946–1949$^{(5)}$ mortality were 95.5% of the corresponding reserves when CSO mortality was used, other assumptions remaining unchanged.

Disabled Lives

Reserves computed by our maximum assumptions for our income clauses were 103.5% of the reserves computed by our minimum assumptions and 108% of our annual statement Class 3 3½% reserves as of December 31, 1954. Such reserves computed by our minimum assumptions were 104% of our statement reserves. It is estimated that our annual statement Class 3 income disability claim reserves would be increased about 3% if valued at 3% rather than 3½% interest. It thus appears that intercompany 3% income disability reserves would be about 5% greater than the corresponding Class 3 3% reserves *on our distribution of claims*.

Reserves computed by our maximum assumptions for our current waiver clause were 107% of the reserves computed by our minimum assumptions and 104% of our annual statement Class 3 3½% reserves as of December 31, 1954. Such reserves computed by our minimum assumptions were 97% of our statement reserves. We estimate that our statement reserves in this case would be increased about 4% if computed at 3% rather than 3½% interest. Hence intercompany 3% Benefit 5 disabled life reserves would be approximately the same as Class 3 3% reserves *on our distribution of claims* under our current waiver clause.

VALUATION METHODS

Active Lives

The Travelers disablement rates were graduated by the Whittaker-Henderson "A" formula, minimizing second differences and using $h = 3$ in most instances. However, an h factor of 20 was used in graduating the 1946–1950 Disability A and F data in column 4 of Table 1 and a factor of 18 for graduating the 1935–1939 Disability A and F data in column 1 of Table 5.

No graduations of Travelers termination data were made, since our assumptions were reduced to percentages of the intercompany termination rates. Disabled life monthly annuities-due were computed for quinquennial central ages using final age digits 2 and 7 and values for individual ages at commencement of disability were interpolated by the Karup-King second difference interpolation formula. Annual termination rates were used throughout in computing annuity values, producing more conservative values than would the more detailed use of monthly termination rates for the first two years. All disabled life annuity values were computed on a fully retroactive basis, since most of our claims are currently so adjusted.

Our valuations were made from in-force data grouped into 19 policy form groups and 5-year age groups, using final age digits 2 and 7 as central ages. A prospective reserve formula was used. All computations were made by the electronic calculator (IBM 604).

Male and female data were combined for the valuations. Inasmuch as sex was coded on our cards, the female data were subsequently sorted out and valued separately for the minimum valuations. We found that females accounted for about 2% of the amount of insurance with disability included in the valuation and about $1\frac{1}{2}\%$ of the computed reserves.

Disabled Lives

Disabled life monthly annuities-due had been computed at quinquennial commencement ages, using final age digits 2 and 7, for all durations to terminal ages 45, 55, 60, 65 and for life in connection with the active life valuation. However, the disabled life data were divided for valuation purposes into life annuities and temporary annuities. Each of these two groups was subdivided into 10-year age groups. Ages at commencement of disability for temporary annuities were adjusted upward or downward such that the correct benefit period would terminate the benefit at age 65 in each case. It was found that this process resulted in reasonable approximations to the proper annuity values and the valuation procedure was considerably simplified thereby, since only life annuities and temporary annuities to age 65 were needed.

The data in the various 10-year age groups were tested for average ages and it was found that the mean of the annuity values for final age digits 2 and 7 resulted in reasonable approximations to the proper reserves except for age group 60 and over where age 62 was used.

THE TRAVELERS DISABILITY CLAUSES

The principal disability clauses included in our life insurance policies have been as follows:

Disability 1. Issued from February 1, 1918 to September 14, 1925, providing waiver of premiums plus a monthly life income of $10 per $1,000 of life insurance. This clause covered disability occurring prior to age 60, except in the case of certain contracts of the Retirement Income type where disability was covered to age 65. This was originally a "total and permanent" clause but a provision was added in 1922, retroactively applicable to all Disability 1 contracts, to the effect that, pending due proof of permanence, benefits retroactive to inception of disability would be granted after three months of total disability. Our Disability 1 experience appears in the intercompany disability study as Company C under Benefit 1.

Disability A. Issued from September 15, 1925 to January 14, 1929, providing waiver of premiums plus a monthly life income of $10 per $1,000 of life insurance with disability coverage to age 65. This was a 90-day presumptive and retroactive clause, similar to Benefit 3 in the intercompany study except for the coverage to age 65, but was not included in the intercompany study because of such coverage.

Disability F. Issued from January 15, 1929 to March 14, 1930, providing waiver of premiums plus a monthly life income of $10 per $1,000 of life insurance. This was also a 90-day presumptive and retroactive clause, covering disability occurring prior to age 60, which corresponded to Benefit 3 of the intercompany study. Our experience under Disability F was included in the intercompany Benefit 3 study.

Disability 4. Issued from March 15, 1930 to October 15, 1931, providing waiver of premiums plus monthly life income of $10 per $1,000 of insurance. This was a 120-day waiting period clause with no income benefits for the first four months. It was similar to Benefit 4 of the intercompany study but was not included in that study because our data were less than the minimum set by the committee for inclusion in the study.

Disability 6. Issued from January 1, 1932 to date, providing waiver of premiums for disability occurring prior to age 60 with a 6 months waiting period. This clause is similar to Benefit 5 of the intercompany study and was included in that study.

THE TRAVELERS MINIMUM RATES OF DISABLEMENT

The rates of disablement used for our minimum valuation basis are set forth in Table 1. Our rates of disablement were determined for only our regular business excluding Salary Allotment but our valuations were made for regular and Salary Allotment combined. It was determined from a special study covering the calendar years 1947–1950 inclusive that our Salary Allotment income disablement rates were about 46% in excess of the corresponding income disablement rates on our regular business. This resulted in a weighted experience about 107% of the experience on regular business alone. We accordingly increased all the graduated income disablement rates determined from our 1946–1950 experience on regular business by 10% in order to provide a conservative valuation basis for regular and Salary Allotment business combined in Table 1. Our termination experience has been based on regular and Salary Allotment combined and no such adjustment was needed for termination rates. The rates of

TABLE 1

RATES OF DISABLEMENT PER THOUSAND
TRAVELERS MINIMUM BASIS

Based on Travelers 1946–1950 Experience for Income Clauses and 70% of Period 2 Benefit 5 Disablement Rates for Premium Waiver Clause

Attained Age	Clauses Corresponding to Benefit 1		Clauses Corresponding to Benefit 3		Clauses Corresponding to Benefit 4		Premium Waiver Clause Corresponding to Benefit 5			
	Coverage to 60	Coverage to 65	Coverage to 60	Coverage to 65	Coverage to 60	Coverage to 65	Att. Age x	$1,000\ r_x$	Att. Age x	$1,000\ r'_x$
	(1)	(2)	(3)	(4)	(5)	(6)		(7)		(8)
40....	2.75	2.75	3.86	3.58	2.15	2.15	20...	.53	45...	1.55
41....	2.68	2.68	4.16	4.05	2.49	2.49	21...	.57	46...	1.65
42....	2.42	2.42	4.09	4.44	2.75	2.75	22...	.62	47...	1.79
43....	2.59	2.59	3.72	4.79	3.06	3.06	23...	.64	48...	1.95
44....	2.71	2.71	3.53	5.17	3.39	3.39	24...	.67	49...	2.16
45....	2.75	2.75	3.96	5.68	3.76	3.76	25...	.70	50...	2.43
46....	2.83	2.83	4.94	6.36	4.33	4.33	26...	.71	51...	2.77
47....	3.08	3.08	6.40	7.21	5.06	5.06	27...	.74	52...	3.18
48....	3.55	3.55	8.25	8.15	5.86	5.86	28...	.75	53...	3.68
49....	4.02	4.02	9.79	9.12	6.66	6.66	29...	.77	54...	4.28
50....	4.27	4.27	10.89	10.11	7.41	7.41	30...	.78	55...	4.98
51....	4.70	4.70	11.99	11.18	8.43	8.43	31...	.81	56...	5.87
52....	5.31	5.31	12.71	12.33	9.30	9.30	32...	.83	57...	6.53
53....	6.09	6.09	13.26	13.61	10.48	10.48	33...	.85	58...	7.25
54....	7.13	7.13	14.44	15.04	11.66	11.66	34...	.87	59...	8.01
55 ...	8.45	8.45	16.02	16.51	12.79	12.79	35...	.90		
56....	10.12	10.12	17.60	17.85	13.77	13.77	36...	.94		
57....	12.25	10.81	19.72	18.96	14.58	14.58	37...	.98		
58....	14.80	11.84	22.66	19.73	17.30	15.05	38...	1.03		
59....	17.39	12.82	25.55	20.03	19.43	15.18	39...	1.09		
60....	......	13.85	......	20.36	......	15.50	40...	1.15		
61....	......	14.92	......	20.71	......	15.79	41...	1.21		
62....	......	16.04	......	21.10	......	15.97	42...	1.29		
63....	......	17.22	......	21.52	......	16.09	43...	1.37		
64....	......	18.67	......	21.96	......	16.45	44...	1.45		

disablement in Table 1 for income clauses start with age 40, since our recent experience is very limited below that age because of our not having issued such clauses since 1931.

The coverage to age 60 disablement rates for clauses corresponding to intercompany Benefit 1 in column 1 of Table 1 are based on experience under our Clause 1. The coverage to 65 disablement rates in column 2 have been estimated by extrapolating ratios of our Disability 1 to our combined Disability A and F disablement rates and have been used for valuing our Disability 1 contracts on retirement income type policies which provide coverage to 65. The inclusion of a small amount of coverage to age 65 in our Disability 1 experience results in somewhat too low rates of disablement at ages 58 and 59 for the age 60 coverage in column 1 of Table 1. We have assumed that this is offset in our valuation by the use of too high rates at these ages for our coverage to age 65 under Benefit 3 type clauses in column 4 due to combining the experiences under Clause A (coverage to 65) and Clause F (coverage to 60) in developing the disablement rates for column 4.

The coverage to age 60 disablement rates for clauses corresponding to intercompany Benefit 3 in column 3 of Table 1 are based on experience under our Clause F. The coverage to age 65 disablement rates in column 4 are based upon our experience under combined Clauses A and F. The combined experiences were used to obtain increased and hence more reliable data and have the conservative effect of increasing slightly the rates of disablement for a few ages prior to 60 for a clause running to age 65 because of the inclusion of some experience from a clause terminating at 60. Our 1946–1950 crude disablement rate of .01476 for age 64 under Clause A (Table 4, column 3) was lower than for any of the ages 55–63 inclusive and resulted in decreasing graduated rates of disability for ages above 59. We therefore substituted our 1935–1939 Clause A disablement rate of .01996 at age 64 (Table 4, column 1) and used a high smoothing factor in developing the 1946–1950 graduated rates of disablement for ages 60–64 under our combined Clauses A and F in column 4 of Table 1.

The coverage to 65 disablement rates for clauses corresponding to Benefit 4 in column 6 of Table 1 were obtained by applying to the extended Benefit 4 disablement rates (Table 5, column 5) the ratios of our combined Disability A and F 1946-1950 disablement rates to extended Benefit 3 disablement rates (Table 5, column 3). The limited experience which we have under our Disability 4 (which corresponds to Benefit 4) indicates that the ratios of such experience to Benefit 4 are similar to those of our Disability A and F experiences to Benefit 3. The coverage to 60 disablement rates for Benefit 4 type clauses in column 5 of Table 1

TABLE 2

Disability Termination Rates
Travelers Minimum Basis

Based on:
Travelers 1946–1952 Select Termination Experience for Income Clauses
Travelers 1932–1950 Select Termination Experience for Premium Waiver Clause
Intercompany 1930–1950 Ultimate Termination Rates

Expressed as Percentages of Intercompany 1930–1950 Experience
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Ages under 40		Ages 40–49		Ages 50–59	
Disability Years (1)	Ratios (2)	Disability Years (3)	Ratios (4)	Disability Years (5)	Ratios (6)
Disability Clauses Corresponding to Benefit 1 — Ratios to Benefit 1 Termination Rates					
1 and over	100%	1–6	140%	1–13	125%
		7 and over	100	14 and over	100
Disability Clauses Corresponding to Benefit 3 — Ratios to Benefit 3 Termination Rates					
1 and over	100%	1–2	120%	1–10	120%
		3 and over	100	11 and over	100
Premium Waiver Clause — Ratios to Benefit 5 Termination Rates					
1–3	120%	1–3	120%	1–3	120%
4–15	110	4–15	110	4–15	110

Benefit 3 Ultimate Termination Rates used for Premium Waiver Clause

SELECT TERMINATION RATES PER THOUSAND
AGES 60–64—ALL CLAUSES

Disability Year	Termination Rates	Disability Year	Termination Rates	Disability Year	Termination Rates
1	411	6	90	11	95
2	188	7	89	12	97
3	120	8	89	13	100
4	106	9	90	14	105
5	96	10	93	15	111

Benefit 3 Ultimate Termination Rates used for Ages 60–64

were obtained by copying the coverage to 65 rates from column 6 to age 57 and assuming that the rates at ages 58 and 59 bore the same ratio to the age 65 coverage rates as our Disability F rates bore to Disability A rates.

The ratio of 70% of Period 2 Benefit 5 disablement rates for our premium waiver only clause in columns 7 and 8 of Table 1 was determined from a study of experience under our Disability 6 clause. This experience for the period 1946–1950, excluding the first two policy years as in the intercompany study, averaged 62% of Period 2 Benefit 5 tabular. The highest ratio of actual to tabular for any age group was 70%, with the exception of a ratio of 133% for age group 15–19 where the data were very scanty.

THE TRAVELERS MINIMUM TERMINATION RATES

The select termination rate assumptions of our minimum valuation are given in Table 2. For ages under 60, these are based on our 1946–1952 experience for income clauses and our 1932–1950 experience for our premium waiver clause and are expressed as percentages of the intercompany 1930-1950 termination rates. The age group 60–64 termination rates are derived from our Disability A 1946–1952 experience in Table 6 for the first two years of disability. Our Disability A data were too small to be reliable after the first two years and for select years 2–15 we have used the same age 60–64 termination rates for our minimum valuation as were used for our maximum valuation. Such maximum valuation termination rates are an extension of the intercompany 1930–1950 Benefit 3 termination rates and are taken from column 2 of Table 8 of this paper.

Table 3 compares the disabled life annuity values (at commencement) derived from the above termination assumptions for our minimum valuation basis with those derived from the intercompany 1930–1950 termination rates for Benefits 1, 3 and 5. The extended values for age 62 have been added.

EXTENSION OF INTERCOMPANY PERIOD 2 RATES OF DISABLEMENT TO AGE 64

One of the principal problems encountered in connection with the use of intercompany experience for our conservative valuation was the fact that some of our income disability clauses covered disability occurring prior to age 65, making it necessary to devise an extension of the intercompany disablement rates to age 64 and to develop termination rates for disability occurring at age group 60–64. For this purpose we relied on our limited experience for ages 60–64 at disability and attempted to maintain the same similarity between our experience and the intercompany experience for ages 60–64 that had developed for ages prior to 60.

Our Disability A and F clauses were similar in most important respects, except that Clause A granted coverage to age 65 while Clause F granted coverage only to age 60. Both of these clauses were similar to Benefit 3 of the intercompany study and our Disability F data were included in that study. We have compiled our experience under these two disability provisions for periods corresponding to 2 and 4 of the intercompany study, with the resulting crude and graduated rates of disablement shown in Table 4.

TABLE 3

COMPARISON OF DISABLED LIFE ANNUITY VALUES

$\ddot{a}^{i(12)}_{[x+\frac{1}{2}]}$—3% INTEREST

(x = age at policy anniversary preceding disablement)

x	BENEFIT 1		BENEFIT 3		BENEFIT 5	
	Inter-company 1930–1950	Travelers Minimum	Inter-company 1930–1950	Travelers Minimum	Inter-company 1930–1950	Travelers Minimum
17..........	5.875	5.875	2.719	2.719	3.679	2.970
22..........	6.757	6.757	2.882	2.882	3.501	2.781
27..........	7.408	7.408	3.149	3.149	3.441	2.695
32..........	7.808	7.808	3.474	3.474	3.560	2.770
37..........	7.895	7.895	3.830	3.830	3.841	2.999
42..........	7.773	6.004	4.202	3.306	4.281	3.396
47..........	7.503	5.838	4.567	3.717	4.843	3.943
52..........	7.240	5.989	4.974	3.902	5.543	4.669
57..........	7.045	5.901	5.442	4.456	6.317	5.533
62..........	5.227	4.502	5.227	4.502		

A partial explanation of the relatively low crude rates of disablement above age 59 compared with ages immediately prior to 60 lies in the fact that a portion of our claimants under Disability Provision A also had policies under either our Provision 1 or our Provision F, both of which provisions granted coverage to age 60 only. A sample test of claims for the period 1946–1950 shows that about 20% of our Disability A claimants also had coverage under one or more of our disability provisions which provided coverage only to age 60. Some of our Disability A claimants had disability contracts in other companies which provided coverage only to age 60. Hence, our Disability A experience above age 60 is not the experience which would derive from pure coverage to age 65, but is a suitable experience to use for valuation of our particular coverage.

We should expect that a disability clause granting coverage to age 60 would develop higher rates of disablement for a few ages prior to 60 than a similar clause granting coverage to 65. Our experience in Table 4 above shows this expected trend only for ages 58 and 59 in the crude 1946–1950 experience and only for age 58 in the crude 1935–1939 experience. Prior to age 58 the comparable rates of disablement under the two clauses fluctuate in both directions and such fluctuations appear to be accidental.

Our first step in extending intercompany Benefit 3 rates of disablement to age 64 was to reduce the disablement rates prior to age 60 to what

TABLE 4

RATES OF DISABLEMENT PER THOUSAND

Age	Crude Rates				Graduated Rates				
	1935–1939		1946–1950		1935–1939		1946–1950		1935–1939
	Trav. A (1)	Trav. F (2)	Trav. A (3)	Trav. F (4)	Trav. A (5)	Trav. F (6)	Trav. A (7)	Trav. F (8)	Interco. Ben. 3 (9)
50......	15.48	13.45	8.40	7.64	14.28	13.42	8.79	9.90	14.33
51......	14.30	12.44	8.82	12.56	13.98	13.64	9.32	10.90	15.48
52......	10.87	17.33	11.53	13.12	14.09	13.88	10.14	11.55	16.87
53......	17.12	14.32	8.09	9.14	15.12	13.73	11.23	12.05	18.52
54......	15.22	8.94	13.69	12.84	16.49	13.96	13.06	13.13	20.45
55......	16.60	19.17	15.94	17.08	18.31	15.52	15.04	14.56	22.70
56......	22.16	14.31	15.13	15.21	20.27	17.71	16.78	16.00	25.27
57......	25.95	16.01	20.10	14.79	21.49	21.02	18.21	17.93	28.17
58......	17.74	37.16	21.78	23.22	21.71	24.82	18.69	20.61	31.40
59......	22.95	21.38	15.34	23.04	22.17	26.81	18.22	23.23	34.97
60......	23.05		16.48		22.77		17.83		
61......	19.68		17.65		23.70		17.59		
62......	24.46		16.97		25.20		17.13		
63......	35.63		19.74		26.21		16.27		
64......	19.96		14.76		25.40		14.61		

might be expected under a benefit running to age 65 rather than to age 60. The ratios of our graduated Disability A to Disability F rates of disablement for ages 58 and 59 were 87% and 83% respectively for the 1935–1939 exposure and 91% and 78% respectively for the 1946–1950 exposure. We started with the highest of our Disability A to Disability F ratios, namely, 91% at age 58, graded this back to 99% at age 54 and used 88% at age 59. The ratio of 88% at age 59 is well above the two actual ratios which we have of 83% and 78%, but we thought it best to use a somewhat high ratio at this age, partly to be conservative and partly to offset the fact that we had graded the ratios below 100% for a few ages prior to 57 which was not indicated by the experience.

The extension of Benefit 3 disablement rates to age 64 was based upon a conservative extrapolation of the ratios of Benefit 3 to Travelers 1935–1939 experience, continuing above age 59 the upward trend evident in the ratios for ages below 60. Disablement rates for Benefits 1 and 4 were extended to age 64 by extrapolating the ratios of the disablement rates for these benefits to the Benefit 3 disablement rates for corresponding ages. The results are set forth in Table 5.

TABLE 5

EXTENSION OF INTERCOMPANY RATES OF DISABLEMENT TO AGE 64

Att. Age	Rates of Disablement per Thousand					Ratios		
	Travelers A & F Combined 1935–1939 (1)	Benefit 3 (2)	Extended Benefit 3 (3)	Extended Benefit 1 (4)	Extended Benefit 4 (5)	Extended Benefit 3 to Trav. A & F (6)	Extended Benefit 1 to Benefit 3 (7)	Extended Benefit 4 to Benefit 3 (8)
50.....	12.94	14.33	14.33	7.43	10.53	111%	52%	73%
51.....	13.70	15.48	15.48	8.31	11.60	113	54	75
52.....	14.51	16.87	16.87	9.35	12.81	116	55	76
53.....	15.46	18.52	18.52	10.57	14.23	120	57	77
54.....	16.56	20.45	20.25	11.99	15.59	122	59	77
55.....	17.86	22.70	22.25	13.35	17.36	125	60	78
56.....	19.23	25.27	24.26	15.04	18.68	126	62	77
57.....	20.51	28.17	26.48	16.68	20.39	129	63	77
58.....	21.58	31.40	28.57	18.28	21.71	132	64	76
59.....	22.49	34.97	30.77	20.31	23.39	137	66	76
60.....	23.31		33.10	22.18	25.16	142	67	76
61.....	24.12		35.45	24.11	26.59	147	68	75
62.....	24.98		37.97	26.58	28.48	152	70	75
63.....	25.71		40.62	28.84	30.47	158	71	75
64.....	26.10		43.33	31.20	32.50	166	72	75

EXTENSION OF INTERCOMPANY TERMINATION RATES TO AGE GROUP 60–64

We have extended only the Benefit 3 termination rates to age group 60–64 and have also used these rates for Benefits 1 and 4 in our conservative valuation. We used two principal methods in making the extension, as follows:

1. Experience under Travelers Disability A was used for disability years 1 and 2.
2. Ratios to ultimate rates for corresponding attained ages, tested by first differences both by duration and age group, were used for disability years 3–15.

Our Disability A termination experience for age group 60–64 has been as shown in Table 6.

It seemed preferable to operate separately on the probabilities of recovery and death, since the former are declining rapidly and the latter are increasing rapidly with increasing age at the higher age groups. Table 7 shows, for the first three years of disability, the proportion of intercompany Benefit 3 terminations by death for age groups 45–49, 50–54 and 55–59, the corresponding Travelers Disability A proportion for age group 60–64 based upon a sample of claims for the years 1947–1950, and the assumed Benefit 3 proportions for age group 60–64.

TABLE 6

TRAVELERS DISABILITY A TERMINATIONS BETWEEN DISABILITY ANNIVERSARIES IN YEARS INDICATED
Ages 60–64 at Disability

Disability Year	Actual Terminations (in Thousands of Insurance)		Termination Rates per Thousand	
	1918–1952	1946–1952	1918–1952	1946–1952
1	$4,043	$1,873	427	411
2	1,035	504	206	188
3	460	215	131	116
4	319	175	114	108
5	241	104	109	80
6	139	93	83	84
7	69	36	50	38
8	124	91	116	130
9	49	10	60	18
10	40	36	68	89

TABLE 7

PROPORTION OF TERMINATIONS BY DEATH

Disability Year	Benefit 3			Ages 60–64	
	Ages 45–49 (1)	Ages 50–54 (2)	Ages 55–59 (3)	Travelers 1947–1950 (4)	Assumed Benefit 3 (5)
1	20%	28%	40%	55%	55%
2	32	42	56	67	67
3	38	49	61	67*	70

* Based on very limited data.

TABLE 8

INCOME DISABILITY TERMINATION RATES PER THOUSAND INTERCOMPANY BENEFIT 3

Disability Year	Ultimate Rates* Ages 60–64 (1)	Select Rates: Assumed Ages 60–64 (2)	Select Rates: Actual Ages 55–59 (3)	Select Rates: Actual Ages 50–54 (4)	Ratios Select to Ultimate Rates*: Assumed Ages 60–64 (5)	Ratios Select to Ultimate Rates*: Actual Ages 55–59 (6)	Ratios Select to Ultimate Rates*: Actual Ages 50–54 (7)
			Recovery				
1.......	13.7	150	201	292	1,095%	994%	1,090%
2.......	12.4	50	71	114	403	375	446
3.......	11.1	36	50	73	324	281	300
4.......	9.8	26	34	46	265	210	199
5.......	8.5	18	24	29	212	159	135
6.......	7.2	12	17	20	167	125	100
7.......	5.9	8	13	19	119	106	100
8.......	4.6	5	11	18	109	100	100
9.......	3.3	3	10	16	100	100	100
10.......	2.0	2	9	15	100	100	100
11.......	0.7	1	7	14	100	100	100
12.......	0.0	0	6	12	100	100	100
			Death				
1.......	47.7	180	134	113	377	402	440
2.......	50.8	100	89	82	197	247	308
3.......	54.1	84	78	70	155	203	252
4.......	57.4	80	72	63	139	172	214
5.......	60.8	78	68	59	128	153	188
6.......	64.3	78	67	56	121	140	168
7.......	68.0	81	67	55	119	133	154
8.......	71.8	84	69	55	117	127	142
9.......	75.7	87	70	55	115	122	131
10.......	79.9	91	72	55	114	118	122
11.......	84.6	94	73	55	111	114	115
12.......	89.7	97	75	55	108	110	109
13.......	95.6	100	76	57	105	106	104
14.......	102.4	105	78	58	103	103	102
15.......	109.7	111	81	61	101	101	100
16.......	117.6	118	85	64	100	100	100
17.......	126.1	126	90	68	100	100	100

* For attained central ages.

The assumed intercompany Benefit 3 select death and recovery rates for age group 60–64 are given in column 2 of Table 8. Rates for the first two years are approximately 80% of Travelers 1946–1952 Disability A termination rates, using the assumed proportions of terminations by death from Table 7. Actual Benefit 3 termination rates for each of the first two years for age groups 40–49 and 50–59 ranged from 79% to 82% of the corresponding Travelers 1946–1952 Disability A termination rates. Rates for the third and subsequent years are based upon the ratios of the select to the ultimate termination rates for the same attained ages in column 5. These termination rates were tested and adjusted by taking out the differences both by duration and by age group. The termination rates grade into the ultimate termination rates for Benefit 3 on page 106 of *TSA* 1952 Reports.

I wish to express my gratitude to Mr. Dickinson C. Duffield for graduating The Travelers disablement rates presented in this paper and to Mr. Richard A. Getman for planning the machine processes by which the valuations were made.

DISCUSSION OF PRECEDING PAPER

W. RULON WILLIAMSON:

Mr. Kelton's paper on Disability Benefits is of particular interest to me, and should be of value to the President's Commission on Veterans Pensions which is currently considering the knotty problem of disability. It should also interest the Senate Finance Committee as it gets ready to review H.R. 7225, the Social Security Amendments providing cash benefits for extended disability.

When men buy Ordinary life insurance they often combine death and living insurance (Equitable's advertising). The addition of permanent total disability, with its aspect of "living death," rounds out the service. The man who really buys and pays for such protection against the triple threat of death, old age, and extended disability must have considerable preference for an active, not a disabled twilight period. Mr. Kelton's favorable experience comes from a company whose accident business preceded its life department, a company intending to make money for the stockholders, perhaps more cost-conscious than high-premium mutual companies, and selling its wares in competition with such companies. The policyholders in such companies must also be a rather canny lot and, as against those persons subsidized by their employers or all employers and future taxpayers, more motivated by enlightened self-interest than by social generosity. I should expect low—relatively low—disability cost in such a setting. Mr. Kelton says: "Our recent disability experience has been somewhat more favorable; that is, our disability rates were lower and our termination rates were higher than the corresponding intercompany experience."

If Mr. Myers begins to use this experience in connection with his work on H.R. 7225, I believe he should also consult the German and Czechoslovakian social insurance experience with invalidity—where concepts much like those probably present in fringe benefits exist, where to get one's full compensation one is tempted to collect the maximum for disablement.

Finally, the life insurance business could expect somewhat more unfavorable experience themselves under permanent total disability, were all their clients to be offered $100 more a month from OASI in case of disablement.

(AUTHOR'S REVIEW OF DISCUSSION)

WILLIAM H. KELTON:

I greatly appreciate Mr. Williamson's interesting comments on the paper. Claim settlement may be partly responsible for our relatively favorable experience, particularly in the case of recent income disability experience where the effects of selection should be largely worn off. I believe that congressional committees should use the more conservative intercompany Period 2 experience for their purposes rather than that of a single company and particularly that the use of recent experience should be avoided for long term purposes. In the case of experience beyond age 59, which is not available from the intercompany study, our Period 2 experience should be used with caution in view of the effect on such experience of concurrent policies with disability terminating at age 60.