SECTION II—DISABILITY CLAIMS UNDER THE GROUP LIFE WAIVER OF PREMIUM CLAUSE

A. INTRODUCTION

EARLY in 1938, most companies writing group life insurance adopted a disability clause for new policies which provided for the waiver of premiums during disability on receipt of proof of permanent total disability occurring before age 60. Under this provision, total disability is presumed to be permanent after it has continued for nine months, but proof of continued total disability is required annually. This report presents a study of disability claims approved under the Waiver of Premium Disability Clause through December 31, 1948. The total experience involves 5,461 claims representing a total of $10,085,761 of insurance.

In evaluating the significance of the material brought out in this study a number of factors should be kept in mind. For one thing, this disability clause has been in effect for a relatively short time and the volume of insurance has been growing rapidly. Consequently, the experience to date under approved claims does not represent the level that may ultimately be attained.

Widely differing employer practices exist with regard to continuing or terminating premium payments on disabled employees. The full effect of these has undoubtedly not been felt nor has the impact of changing economic factors on such practices been experienced. Then too, the rate of recovery from disability is greatly affected by economic considerations. The period covered by this study, although dislocated by the war, was one of relative prosperity.

B. FORM OF THE CONTRIBUTION

The contributing companies prepared an individual punched card for each life becoming disabled prior to January 1, 1949. Data was included for amount of insurance; date of approval; mode of termination of disability, if terminated; date of termination; age nearest birthday at date of approval; and sex (except for a large contributor whose cards were not coded for sex). The study was contributed to by the Aetna Life Insurance Company, Connecticut General Life Insurance Company, Equitable Life Assurance Society, John Hancock Mutual Life Insurance Company, Metropolitan Life Insurance Company, Prudential Insurance Company of America, Sun Life Assurance Company of Canada and The Travelers Insurance Company.

Table I exhibits the total experience by age at disability for both lives

and amounts. Because of the small amount of data as yet available, it was decided to complete the study by combining all ages at disability.

C. ANALYSIS BY LIVES AND AMOUNTS

Using the data for both sexes and all ages combined, the exposed to risk of death and exposed to risk of recovery were computed for each year of disability, beginning with the time of disability claim approval. Crude death and recovery rates were then computed for each of the first 10 years of disability. (There was no exposure after 10 years of disability.)

TABLE I

Total Experience Contributed to the Study

Age at Approval	Existing	Recoveries	Deaths	Total
		Lives		
10–19	7	2	1	10
20–29	304	220	76	600
30–39	510	230	137	877
40–49	847	208	267	1,322
50–59	1,507	214	541	2,262
60 and up	267	26	97	390
Total	3,442	900	1,119	5,461
		Amounts		
10–19	$ 6,000	$ 2,000	$ 1,000	$ 9,000
20–29	497,050	340,609	107,250	944,909
30–39	930,680	418,906	228,650	1,578,236
40–49	1,616,401	361,200	492,683	2,470,284
50–59	2,907,898	405,690	992,658	4,306,246
60 and up	569,136	43,110	164,840	777,086
Total	$6,527,165	$1,571,515	$1,987,081	$10,085,761

The crude rates of recovery were graduated by a Whittaker-Henderson type A formula, with a = 1. Enough zeroes were added to the series of observed rates of recovery to force the graduated rates to taper off to zero in the 11th year of disability.

The graduation of the crude death rates was also done by a Whittaker-Henderson type A formula with a = 1, extending the death rates by means of Hunter's ultimate rates of mortality appearing in T.A.S.A. XII, page 51, "Reserves and Net Premiums for 'Waiver of Premium' on Permanent Disability". The average age at approval of disability claim in the experience was found to be 46 by lives and 47 by amounts. Therefore, the aver-

TABLE II

Experience by Lives

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year of Disability	In force Beginning of Year	Recoveries	Deaths	Existing	Exposed to Recovery	Exposed to Death	Crude		Graduated	
							Recovery Rate	Death Rate	Recovery Rate	Death Rate
	I_n	W_n	θ_n	e_n	$I_n - \frac{1}{2}(\theta_n + e_n)$	$I_n - \frac{1}{2}(W_n + e_n)$	(3) ÷ (6)	(4) ÷ (7)		
1	5461	413	686	1121	4557	4694	.09063	.14614	.09822	.13534
2	3241	280	229	711	2771	2745	.10105	.08342	.08836	.09638
3	2021	124	102	618	1661	1650	.07465	.06182	.07136	.07167
4	1177	50	54	409	945	947	.05291	.05702	.05471	.05503
5	664	17	21	234	536	538	.03172	.03903	.04066	.04513
6	392	8	14	132	319	322	.02508	.04348	.03083	.04127
3	238	6	10	108	179	181	.03352	.05525	.02388	.04072
8	114	2	1	69	79	78	.02532	.01282	.01655	.04150
9	42	0	2	30	26	27	0	.07407	.00868	.04649
10	10	0	0	9	5	5	0	0	.00305	.04898
11	1	0	0	1	0	0	0	0	0	0
Total.....	13,361	900	1,119	3,442	11,078	11,187				

TABLE III

Experience by Amounts

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Year of Disability	In Force Beginning of Year	Recoveries W_n	Deaths θ_n	Existing e_n	Exposed to Recovery $I_n - \frac{1}{2}(\theta_n + e_n)$	Exposed to Death $I_n - \frac{1}{2}(W_n + e_n)$	Crude: Recovery Rate (3) ÷ (6)	Crude: Death Rate (4) ÷ (7)	Graduated: Recovery Rate	Graduated: Death Rate
1	10,085,761	742,135	1,267,083	2,302,201	8,301,119	8,563,593	.08940	.14796	.09886	.13760
2	5,774,342	515,310	411,348	1,281,652	4,927,842	4,875,861	.10457	.08436	.08734	.09510
3	3,566,032	203,100	158,650	1,173,733	2,899,840	2,877,615	.07004	.05513	.06740	.06791
4	2,030,549	70,670	82,050	778,749	1,600,149	1,605,839	.04416	.05109	.04850	.04981
5	1,099,080	21,000	30,450	446,360	860,675	865,400	.02440	.03519	.03348	.03936
6	601,270	9,100	17,500	194,270	495,385	499,585	.01837	.03503	.02373	.03555
7	380,400	8,000	15,800	162,300	291,350	295,250	.02746	.05351	.01761	.03600
8	194,300	2,200	2,000	132,900	126,850	126,750	.01734	.01578	.01172	.03812
9	57,200	0	2,200	35,000	38,600	39,700	0	.05542	.00591	.04518
10	20,000	0	0	19,000	10,500	10,500	0	0	.00193	.05301
11	1,000	0	0	1,000	500	500	0	0	0	0
Total.....	23,809,934	1,571,515	1,987,081	6,527,165	19,552,810	19,760,598				

TABLE IV

Mortality Assumpton After Ten Years	Interest Rate	Net Single Premium		Total
		First Ten Years	Succeeding Years	
Experience by Lives, all Ages and both Sexes Combined Average Age at Approval of Disability Claim 46				
Hunter's	2½%	$352.30	$195.71	$548.01
	3	346.81	177.12	523.93
A M (5)	2½	352.30	173.04	525.34
	3	346.81	153.00	499.81
C S O	2½	352.30	172.41	524.71
	3	346.81	152.36	499.17
Experience by Amounts, all Ages and both Sexes Combined Average Age at Approval of Disability Claim 47				
Hunter's	2½%	$346.46	$210.99	$557.45
	3	341.04	191.21	532.25
A M (5)	2½	346.46	187.98	534.44
	3	341.04	166.68	507.72
C S O	2½	346.46	187.24	533.70
	3	341.04	165.92	506.96

TABLE V

Disability Claim Reserves per $1,000 of Insurance Assuming Hunter's Ultimate Mortality Rates after 10 Years

Duration	Experience by Amounts		Experience by Lives	
	2½%	3%	2½%	3%
0	$557	$532	$548	$524
1	567	537	555	527
2	594	560	579	547
3	624	588	608	574
4	654	616	638	601
5	680	641	666	628
6	703	664	691	652
7	724	685	713	675
8	740	702	732	694
9	752	715	745	707
10	760	723	754	716

age age at the beginning of the 10th disability year was assumed to be 55 and 56, respectively. In the graduation, the death rates were graded smoothly into Hunter's ultimate death rates at those ages. The assumptions as to the average ages at the 10th year of disability might be open to

some question if there were a significant variation in the age at approval between the existing and the terminated by recovery or death, but the data was too limited to permit investigation of this point. In any event, a deviation of a year or so in age would have little effect on the results.

A tabulation of the average age at approval by calendar year of disability did show a definite upward trend in the average age. This trend can be expected to continue until the experience under group life insurance policies with waiver of premium benefits becomes fully mature.

Table II exhibits this experience by lives and Table III by amounts. These tables show for each duration of disability the deaths, recoveries, existing, exposures, and the crude and graduated rates of recovery and death.

D. VALUE AT DATE OF APPROVAL

The graduated death and recovery rates shown in Tables II and III were used to construct double decrement tables for the first 10 years following approval of disability claim. Commutation columns were also constructed based on three different assumptions as to mortality after the first 10 years of disability and with the use of 2½% and 3% interest rates.

1. Hunter's ultimate mortality rates referred to above.
2. American Men Ultimate Table of Mortality.
3. Commissioners Standard Ordinary Mortality Table.

Net single premiums at date of approval were computed from the graduated data per $1,000 of benefit payable in the event of death while disabled. The value of the coverage for the first 10 years of disability represents the major portion of the cost of the benefit so that, as Table IV shows, the mortality basis assumed for deaths after 10 years does not influence the total single premiums greatly.

In order to test for any bias introduced by the graduation, the above single premiums were also computed using the ungraduated data. The ungraduated totals were about 1% smaller than the graduated values.

An analysis of the data by sex indicated that, for females, the net single premium at time of approval of disability claim for a benefit payable in the event of death during disability, would be considerably lower than $500. However, inasmuch as around 40% of the experience was on lives uncoded by sex, and the experience on lives coded "female" was only around 12% of the total experience, it was not felt that sufficient data was at hand to warrant the publication of separate figures for males and females.

E. RESERVES

Reserves for the first 10 years after approval of disability were computed at $2\frac{1}{2}\%$ and 3% interest, using the graduated mortality and recovery rates and Hunter's ultimate death rates and appear in Table V. Hunter's ultimate reserves can be used for consistent factors for higher durations.