

TRANSACTIONS

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A NEW REMARRIAGE TABLE

A. M. NIESSEN*

SINCE 1947 the Railroad Retirement Board has been paying monthly survivor benefits similar to those payable under the Social Security Act. Until recently, the Board's experience on remarriage of widows was not considered sufficient for the construction of a modern remarriage table. Therefore, for valuation purposes, use was made of adaptations of the 1933 American Remarriage Table.¹ By 1957, it became clear that the Board had already accumulated a sufficient volume of remarriage experience to make the construction of a modern remarriage table practicable and feasible. Accordingly, remarriage studies covering the period 1947-56 were undertaken and the results culminated in a new remarriage table which is the subject of this paper.

UNDERLYING EXPERIENCE

The new remarriage table, named the 1956 RRB Remarriage Table, is wholly based on the Board's experience with widows receiving monthly benefits under the Railroad Retirement Act. There are two categories of such widows, (1) widowed mothers, *i.e.*, widows either with children under the age of 18 or with older eligible disabled children, and (2) aged widows, *i.e.*, widows whose advanced age together with other qualifications entitles them to a monthly survivor benefit regardless of family composition. The qualifying age for the aged widow's benefit is now 60 as compared with age 62 under the Social Security Act.

Although experience was available for the 10-year period 1947-56, it was considered desirable to base the new remarriage table on the most recent experience. After preliminary investigations, it was decided to

* The opinions expressed in this paper are those of the author and do not necessarily reflect the official views of the Railroad Retirement Board.

¹ See "A Revised American Remarriage Table" by A. M. Niessen, *RAIA XXXVIII* (1949) and "Further Remarriage Experience" by Robert J. Myers, *PCAS XXXVI* (1950).

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utilize the experience of widowed mothers for the years 1951-56 and the experience of aged widows for calendar years 1955-56. For the latter category, it was not practical to use earlier experience because the present eligibility age of 60 did not become effective until September 1954. The volume of the experience underlying the new remarriage table is indicated in the accompanying table.

	Exposed*	Actual Remarriages	Actual Deaths
Widowed mothers under 60, 1951-56			
Duration † 0.....	10,341	202	35
1.....	10,152	456	44
2.....	9,605	415	43
3.....	8,968	360	38
4.....	8,601	295	27
5 and over.....	39,804	892	163
Total.....	87,471	2,620	350
Aged widows, ages 60-74, 1955-56			
All durations.....	219,624	618	4,000 ‡
Grand total.....	307,095	3,238	4,350

* Number alive and unremarried at beginning of period of exposure.

† Completed years of widowhood.

‡ Estimated on the basis of a 1953-55 mortality study for aged widows which included 344,154 exposure years and 16,690 actual deaths.

GENERAL CONSIDERATIONS

The remarriage table was needed mainly for valuing: (1) temporary annuities to widowed mothers (generally until the youngest child attains age 18), (2) deferred annuities to all qualified widows under the age of 60, and (3) immediate annuities to widows age 60 and over, since remarriage always terminates the right to a widow's annuity. Of these three annuity types, the first is the least important from the point of view of costs since the temporary annuities to widowed mothers account for only about 3.5 percent of the total cost of widows' annuities. Thus, the main requirement for the new table was that it be appropriate for valuing deferred and immediate annuities to widows regardless of whether such widows have eligible children in their care. Unfortunately, the Board has no data on the remarriage experience of widows without eligible children from the time these widows receive an insurance lump sum to the time they meet the age requirement for an aged widow's benefit. There are some exceptions in cases of widows who elect to receive a special residual benefit in lieu of a potential monthly annuity but this group is relatively small and is strongly atypical. Because of this situation, it was necessary

to combine two groups having markedly different compositions, namely, young widows with eligible children and older widows of all family compositions.

From general reasoning, it would appear that the rates of remarriage for widows with young children should be smaller than for widows in general. But this is by no means certain, because orphaned children retain the right to monthly survivor benefits after the remarriage of their mother. Thus it may well be that the presence of children eligible for monthly benefits would in some cases enhance the chance of their mother's remarriage rather than hamper it. Nevertheless, it was felt that rates of remarriage for widows with children should be sufficiently conservative for widows as a whole. As an added feature of conservatism, a 5-percent safety margin was built into the graduated remarriage probabilities.

The experience of widowed mothers was relied upon generally until attained age 45 or so. For ages from about 45 through 59, the overriding consideration was to have the remarriage probabilities merge properly with the probabilities for aged widows which were available beginning with age 60. Another general requirement decided upon was to concentrate on fit more than on smoothness. However, because of the merging of two experiences, it was necessary to permit certain irregularities in the ratios of actual to expected remarriages which are shown in the second part of Table 1.

As for mortality rates to be combined with the remarriage probabilities, it was felt that no refinements were warranted because the absolute mortality rates were but a small fraction of the corresponding remarriage probabilities. For example, the remarriage probabilities for ages under 40 were ranging from about 4 to 18 percent, as can be seen from the first part of Table 1. By comparison, the 1954 U.S. white female mortality rates for the same group of ages do not exceed $\frac{1}{4}$ percent. On the other hand, at ages where absolute mortality rates are comparable to or larger than remarriage probabilities, the data shown later in the paper under "Mortality Investigations" indicate that there is substantially little difference in the mortality of widows and women in general. It is, therefore, clear that the use of special mortality rates fitting the Board's experience on widows would have made practically no difference in the annuity values produced by the new remarriage table. Because of that, it was decided to use for purposes of the new remarriage table the rates of mortality of the 1950 RRB table for women with a 1-year rateback in age. These rates of mortality together with annuity values at 3 percent derived from them are shown in Table 2.

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GRADUATION

The remarriage rates (technically probabilities rather than rates) for widowed mothers proper (without regard to those for aged widows) could well be graduated by fitting second degree parabolas by the least squares method. However, the extension of the parabolas to ages over 50, or in

TABLE 1
REMARRIAGE EXPERIENCE OF WIDOWS RECEIVING SURVIVOR BENEFITS* UNDER
THE RAILROAD RETIREMENT ACT BETWEEN 1951 AND 1956
ANNIVERSARIES, BY NUMBER OF LIVES

ATTAINED AGE †	DURATION OF WIDOWHOOD ‡					
	0	1	2	3	4	5 and over
Crude Probabilities of Remarriage (per 1,000 per year)						
Under 30	90.48	173.36	177.82	144.39	124.26	94.88
30-34	58.43	132.35	96.77	84.18	93.22	62.12
35-39	39.18	67.87	67.25	66.44	55.22	40.25
40-44	16.08	39.34	49.81	45.10	27.35	23.15
45-49	8.83	24.46	18.65	21.57	19.09	14.46
50-54	#	10.82	9.23	9.95	9.08	7.83
55-59	#	#	#	#	#	3.51
60-64§						4.11
65-69§						3.08
70-74§						1.48
Total	19.53	44.92	43.21	40.14	34.30	5.82
Ratios of Actual to Expected ¶ Remarriages						
Under 30	105.6%	106.7%	126.2%	122.7%	112.5%	108.7%
30-34	104.8	119.3	95.8	92.1	108.2	105.4
35-39	116.3	96.9	101.2	108.2	101.6	111.9
40-44	87.2	97.6	125.7	117.2	89.8	101.2
45-49	72.4	118.8	91.1	104.7	122.6	97.8
50-54	#	104.8	90.0	100.0	94.1	81.8
55-59	#	#	#	#	#	56.2
60-64§						109.6
65-69§						131.0
70-74§						85.2
Total	92.2%	106.8%	108.9%	108.1%	104.6%	104.8%

* Widowed mothers' benefits for ages under 60 and aged widows' benefits for ages 60 and over.

† Age last birthday at the beginning of the year of exposure.

‡ Completed years since date of husband's death.

§ Aggregate experience of aged widows for calendar years 1955-56 only.

¶ According to the 1956 RRB Remarriage Table appearing in this paper.

Less than 10 actual remarriages.

certain cases even to somewhat earlier ages, produced rates which were incompatible with the experience for aged widows. The rates derived from the initial graduations at the older ages were much below the actual remarriage rates for aged widows. In order to take care of these difficulties, the following graduation procedure was adopted.

- (1) The ultimate rates were first graduated graphically with special consideration given to the actual rates for aged widows. From the graph, central rates were read off and reduced by 5 percent. The series was then completed by the application of Jenkins' 5th difference modified osculatory interpolation formula.

TABLE 2
1950 RRB MORTALITY TABLE FOR WOMEN AS ADJUSTED
FOR A 1-YEAR RATEBACK IN AGE
(Mortality Rates and Annuity Values at 3 Percent for Selected Ages)

Age x	1,000 q_x	$a_x^{(12)}$	Age x	1,000 q_x	$a_x^{(12)}$
20.....	.68	26.5787	65.....	19.35	12.0087
25.....	.88	25.5373	70.....	30.73	9.9282
30.....	1.14	24.3533	75.....	50.07	7.9638
35.....	1.56	23.0148	80.....	79.37	6.2326
40.....	2.28	21.5157	85.....	120.62	4.7689
45.....	3.47	19.8614	90.....	178.27	3.5576
50.....	5.26	18.0646	95.....	258.42	2.5623
55.....	7.97	16.1342	100.....	367.32	1.5844
60.....	12.31	14.0987			

- (2) The remarriage rates at duration 0 were obtained by graphic graduation, but the curve was drawn in such a way as to merge with the ultimate rates at age 60. Some hand adjustment was made later to improve the flow of first and second differences.
- (3) For durations 1, 2, and 3, it was possible to retain the parabola graduations up to an age falling somewhere between 45 and 50 and then to continue on a graph so as to merge with the ultimate rates at an age not higher than 60. Furthermore, it was possible to merge the duration 2 and 3 rates into duration 1 rates at approximately age 50.
- (4) Duration 4 showed certain peculiarities which necessitated handling by means of graphic graduation with the parabola graduation being retained only for a short interval of the younger ages. The transition between duration 4 and the ultimate rates for the younger ages is not very smooth. The alternative would have been to introduce a longer select period (perhaps a couple more durations) but this hardly seemed worth while.

A graduation of mortality rates was not involved because, as stated before, use was made of a previously constructed mortality table for women. These mortality rates prior to the rateback adjustment range from 55 percent of the rate for white females in the 1939-41 U.S. life tables for age 30 up to 80 percent for ages 65 and over.

MORTALITY INVESTIGATIONS

It was possible to make a number of mortality studies for widows as a by-product of the remarriage studies which were the prime objective. The results of these studies are presented in Table 3.

TABLE 3
MORTALITY OF WIDOWED MOTHERS RECEIVING BENEFITS
UNDER THE RAILROAD RETIREMENT ACT BETWEEN
1951 AND 1956 ANNIVERSARIES, BY NUMBER OF LIVES

ATTAINED AGE*	EXPOSED	ACTUAL DEATHS	RATIO ACT./EXP.	
			1950 RRB Table†	1955 U.S. White Females
Under 35	9,983	21	161.5%	210.0%
35-39	10,846	25	119.0	138.9
40-44	15,743	55	122.2	137.5
45-49	18,883	75	91.5	102.7
50-54	17,378	108	96.4	106.9
55-59	8,579	66	80.5	89.2
Total	81,412	350	98.6%	110.4%

* Age last birthday at the beginning of the year of exposure.

† With a 1-year rateback as shown in Table 2 of this paper, except that $q_{x+1/2}$ rather than q_x was used.

It was clear from that table that the 1950 RRB Mortality Table for Women as adjusted did not fit the mortality experience of widowed mothers. Table 3 further shows that the Board's experience was also out of line with the U.S. mortality rates for white females as measured by the 1955 rates. It is particularly interesting to note that on the basis of the 1955 rates the excess mortality for widowed mothers was most strongly pronounced at ages under 35. For the 10-year age interval 35-44, the excess mortality was only moderate while for ages 45 and over there was hardly any excess widow mortality at all.

The pattern of the mortality ratios based on the 1955 U.S. rates for white females is generally in line with other findings on the excess mortality of widows. It should be noted, however, that the ratios shown in

the last column of Table 3 are substantially below corresponding ratios during 1949-51. According to Exhibit 2 on page 140 of the *TSA* 1958 Reports, the ratios of death rates for widows to the rates for all females during 1949-51 were about 330 percent for ages 20-24, 234 percent for ages 25-34, 169 percent for ages 35-44, 132 percent for ages 45-54 and 115 percent for ages 55-59. All of these are substantially higher than the Board ratios but there is the similarity that in both experiences the excess mortality of widows decreases with age.

An attempt was made to examine the possibility that excess mortality of widows strongly depends upon the duration since widowhood, but the small number of actual deaths did not permit a refined study. The data were barely sufficient for an examination of the first 5 durations together as contrasted with the ultimate experience comprising durations 5 and over. A comparison of actual to expected ratios for the two groups previously described failed to reveal any consistent pattern of mortality differentials by duration. Insofar as over-all ratios are concerned, the figure for the select period was 111.5 percent (expected deaths according to 1955 U.S. rates for white females) while the ratio for the ultimate experience was 108.7 percent. It must, therefore, be concluded that the Railroad Retirement Board experience does not substantiate a finding that the mortality of widows depends on the duration of widowhood.

THE NEW TABLE

The 1956 RRB Remarriage Table is reproduced in full as Table 4 of this paper. Part *a* of Table 4 gives the remarriage probabilities by age at entry and duration. The remaining parts contain the customary tabular functions, including annuity values. All monetary functions are at 3 percent interest.

As for the construction of the table after graduation, the following formulas were used:

$$p_x^m = (1 - q_x^m) - q_x(1 - \frac{1}{2}q_x^m),$$

$$l_{x+1}^m = l_x^m \cdot p_x^m,$$

where q_x^m is the probability of remarriage in the year of age x to $x + 1$ and q_x is the rate of mortality during the same period. The remaining symbols are obvious and need no explanation.

On occasion it is desirable to compare the value of a widow's annuity terminating upon death or remarriage with the value of an annuity terminating upon death only. Such comparisons may easily be obtained from Table 2 and part *e* of Table 4.

TABLE 4a
1956 RRB REMARRIAGE TABLE—NUMBER OF REMARRIAGES
PER 1,000 WIDOWS*

Age at Widow- hood† [x]	SELECT SECTION					ULTIMATE SECTION			
	1,000 q _[x]	1,000 q _{[x]+1}	1,000 q _{[x]+2}	1,000 q _{[x]+3}	1,000 q _{[x]+4}	Attained Age‡ x	1,000 q _x	Attained Age‡ x	1,000 q _x
20.....	134.93	242.06	201.36	164.01	151.71	25.....	109.44	65.....	2.90
21.....	127.42	228.65	190.48	155.46	143.59	26.....	101.76	66.....	2.64
22.....	120.14	215.64	179.91	147.14	135.70	27.....	94.50	67.....	2.42
23.....	113.07	203.02	169.65	139.05	128.02	28.....	87.63	68.....	2.25
24.....	106.21	190.79	159.70	131.19	120.59	29.....	81.07	69.....	2.10
25.....	99.58	178.96	150.06	123.57	113.37	30.....	74.76	70.....	1.98
26.....	93.15	167.52	140.73	116.17	106.38	31.....	68.68	71.....	1.87
27.....	86.94	156.48	131.71	109.01	98.48	32.....	62.80	72.....	1.80
28.....	80.95	145.83	123.00	102.08	90.90	33.....	57.15	73.....	1.69
29.....	75.17	135.58	114.59	95.38	83.64	34.....	51.75	74.....	1.58
30.....	69.61	125.72	106.50	88.91	76.70	35.....	46.67		
31.....	64.26	116.25	98.71	82.68	70.08	36.....	42.00		
32.....	59.13	107.18	91.24	76.67	63.78	37.....	37.83		
33.....	54.21	98.50	84.07	70.90	57.79	38.....	34.25		
34.....	49.51	90.22	77.21	65.36	52.13	39.....	31.13		
35.....	45.04	82.33	70.66	60.05	46.79	40.....	28.41		
36.....	40.74	74.84	64.42	54.97	41.77	41.....	26.03		
37.....	36.56	67.74	58.49	50.13	37.07	42.....	23.87		
38.....	32.51	61.03	52.87	45.52	32.68	43.....	21.91		
39.....	28.64	54.72	47.56	41.06	28.62	44.....	20.09		
40.....	25.13	48.81	42.56	36.75	24.87	45.....	18.42		
41.....	22.06	43.29	37.84	32.60	21.45	46.....	16.89		
42.....	19.49	38.16	33.35	28.66	18.50	47.....	15.46		
43.....	17.39	33.43	29.09	24.95	16.06	48.....	14.14		
44.....	15.72	29.09	25.14	21.51	14.24	49.....	12.91		
45.....	14.41	25.14	21.59	18.44	12.93	50.....	11.78		
46.....	13.32	21.59	18.44	15.80	11.82	51.....	10.75		
47.....	12.38	18.44	15.80	13.63	10.86	52.....	9.80		
48.....	11.54	15.80	13.63	11.86	9.94	53.....	8.94		
49.....	10.79	13.63	11.86	10.42	9.08	54.....	8.15		
50.....	10.08	11.86	10.42	9.25	8.24	55.....	7.44		
51.....	9.35	10.42	9.25	8.26	7.44	56.....	6.79		
52.....	8.64	9.25	8.26	7.44	6.79	57.....	6.19		
53.....	7.98	8.26	7.44	6.79	6.19	58.....	5.65		
54.....	7.41	7.44	6.79	6.19	5.65	59.....	5.15		
55.....	6.93	6.79	6.19	5.65	5.15	60.....	4.69		
56.....	6.50	6.19	5.65	5.15	4.69	61.....	4.27		
57.....	6.08	5.65	5.15	4.69	4.27	62.....	3.88		
58.....	5.61	5.15	4.69	4.27	3.88	63.....	3.53		
59.....	5.14	4.69	4.27	3.88	3.53	64.....	3.20		

* Probabilities of remarriage multiplied by 1,000.
† Age nearest birthday on date of husband's death.
‡ Age nearest birthday.

TABLE 4b
1956 RRB REMARRIAGE TABLE— $l_{[x]+n}^m$ COLUMNS

SELECT SECTION						ULTIMATE SECTION			
Age at Widow- hood* [x]	$l_{[x]}^m$	$l_{[x]+1}^m$	$l_{[x]+2}^m$	$l_{[x]+3}^m$	$l_{[x]+4}^m$	Attained Age† x	l_x^m	Attained Age† x	l_x^m
20.....	270,428	233,769	177,033	141,265	117,993	25.....	100,000	65.....	21,625
21.....	226,769	197,720	152,379	123,244	103,990	26.....	88,973	66.....	21,144
22.....	192,263	169,028	132,459	108,528	92,470	27.....	79,842	67.....	20,642
23.....	164,695	145,949	116,209	96,400	82,913	28.....	72,224	68.....	20,115
24.....	142,469	127,223	102,848	86,336	74,932	29.....	65,824	69.....	19,560
25.....	124,392	111,901	91,781	77,927	68,223	30.....	60,419	70.....	18,974
26.....	109,582	99,278	82,560	70,863	62,559	31.....	55,836	71.....	18,354
27.....	97,245	88,701	74,738	64,819	57,683	32.....	51,936	72.....	17,699
28.....	87,023	79,893	68,162	59,705	53,542	33.....	48,609	73.....	17,007
29.....	78,502	72,519	62,610	55,364	50,015	34.....	45,766	74.....	16,278
30.....	71,360	66,314	57,902	51,665	47,004	35.....	43,333	75.....	15,513
31.....	65,341	61,066	53,893	48,503	44,425	36.....	41,245	76.....	14,736
32.....	60,235	56,598	50,458	45,784	42,205	37.....	39,445	77.....	13,924
33.....	55,868	52,765	47,494	43,430	40,281	38.....	37,883	78.....	13,081
34.....	52,103	49,449	44,914	41,374	38,598	39.....	36,513	79.....	12,212
35.....	48,835	46,561	42,653	39,565	37,114	40.....	35,301	80.....	11,325
36.....	45,973	44,025	40,654	37,958	35,794	41.....	34,219	81.....	10,426
37.....	43,450	41,785	38,876	36,523	34,611	42.....	33,244	82.....	9,524
38.....	41,219	39,800	37,290	35,236	33,547	43.....	32,362	83.....	8,626
39.....	39,238	38,033	35,867	34,074	32,585	44.....	31,559	84.....	7,742
40.....	37,478	36,452	34,585	33,022	31,714	45.....	30,826	85.....	6,881
41.....	35,916	35,036	33,427	32,067	30,921	46.....	30,152	86.....	6,051
42.....	34,533	33,768	32,383	31,202	30,201	47.....	29,529	87.....	5,260
43.....	33,311	32,635	31,442	30,420	29,547	48.....	28,952	88.....	4,516
44.....	32,236	31,627	30,599	29,715	28,955	49.....	28,414	89.....	3,826
45.....	31,292	30,733	29,845	29,079	28,414	50.....	27,910	90.....	3,194
46.....	30,453	29,933	29,165	28,498	27,911	51.....	27,435	91.....	2,625
47.....	29,710	29,221	28,553	27,965	27,438	52.....	26,984	92.....	2,120
48.....	29,051	28,587	27,998	27,470	26,988	53.....	26,553	93.....	1,681
49.....	28,459	28,015	27,487	27,005	26,557	54.....	26,138	94.....	1,306
50.....	27,922	27,495	27,012	26,564	26,140	55.....	25,734	95.....	992
51.....	27,424	27,012	26,564	26,140	25,734	56.....	25,338	96.....	736
52.....	26,963	26,564	26,140	25,734	25,338	57.....	24,947	97.....	532
53.....	26,529	26,140	25,734	25,338	24,947	58.....	24,557	98.....	373
54.....	26,118	25,734	25,338	24,947	24,557	59.....	24,166	99.....	254
55.....	25,720	25,338	24,947	24,557	24,166	60.....	23,770	100.....	167
56.....	25,331	24,947	24,557	24,166	23,770	61.....	23,367	101.....	106
57.....	24,944	24,557	24,166	23,770	23,367	62.....	22,953	102.....	64
58.....	24,556	24,166	23,770	23,367	22,953	63.....	22,526	103.....	26
59.....	24,166	23,770	23,367	22,953	22,526	64.....	22,084		

* Age nearest birthday on date of husband's death.

† Age nearest birthday.

TABLE 4c
1956 RRB REMARRIAGE TABLE— $D_{[x]+n}^m$ FUNCTIONS AT 3%

Age at Widow- hood* [x]	SELECT SECTION					ULTIMATE SECTION			
	$D_{[x]}^m$	$D_{[x]+1}^m$	$D_{[x]+2}^m$	$D_{[x]+3}^m$	$D_{[x]+4}^m$	At- tained Age† x	D_x^m	Attained Age† x	D_x^m
20	149,729.5	125,662.3	92,392.1	71,577.8	58,044.8	25	47,760.6	65	3,166.2
21	121,899.4	103,188.5	77,209.2	60,627.9	49,666.2	26	41,256.3	66	3,005.6
22	100,340.5	85,645.1	65,161.1	51,833.6	42,877.9	27	35,944.0	67	2,848.8
23	83,449.6	71,797.3	55,502.1	44,700.2	37,326.5	28	31,567.4	68	2,695.2
24	70,085.3	60,762.5	47,690.1	38,867.5	32,751.1	29	27,932.2	69	2,544.5
25	59,410.4	51,887.9	41,318.8	34,060.1	28,950.2	30	24,891.8	70	2,396.4
26	50,812.6	44,693.9	36,085.1	30,070.4	25,773.5	31	22,333.7	71	2,250.5
27	43,778.6	38,769.2	31,714.8	26,704.6	23,072.5	32	20,168.7	72	2,107.0
28	38,035.8	33,902.3	28,081.9	23,881.2	20,792.3	33	18,326.9	73	1,965.7
29	33,312.0	29,876.9	25,043.2	21,499.9	18,857.0	34	16,752.4	74	1,826.6
30	29,399.4	26,524.7	22,485.5	19,479.0	17,205.6	35	15,399.8	75	1,690.1
31	26,135.6	23,714.2	20,319.1	17,754.3	15,787.9	36	14,230.8	76	1,558.7
32	23,391.5	21,338.9	18,469.9	16,270.9	14,562.1	37	13,213.4	77	1,429.9
33	21,063.7	19,314.4	16,878.6	14,984.7	13,493.5	38	12,320.5	78	1,304.2
34	19,072.0	17,659.3	15,496.8	13,859.6	12,553.1	39	11,529.5	79	1,182.1
35	17,355.1	16,065.0	14,288.0	12,867.6	11,718.9	40	10,821.8	80	1,064.3
36	15,862.2	14,747.6	13,221.7	11,985.4	10,972.9	41	10,184.5	81	951.3
37	14,555.0	13,589.6	12,275.3	11,196.4	10,301.2	42	9,606.2	82	843.7
38	13,405.5	12,567.0	11,431.5	10,487.2	9,693.7	43	9,078.9	83	741.9
39	12,389.6	11,659.3	10,675.0	9,846.0	9,141.5	44	8,595.8	84	646.4
40	11,489.1	10,849.1	9,993.6	9,264.1	8,638.0	45	8,151.6	85	557.8
41	10,689.6	10,124.0	9,377.7	8,734.2	8,176.7	46	7,741.1	86	476.2
42	9,978.6	9,473.4	8,820.2	8,251.0	7,753.7	47	7,360.4	87	401.9
43	9,345.2	8,888.9	8,314.5	7,809.9	7,364.9	48	7,006.4	88	335.0
44	8,780.2	8,363.4	7,855.9	7,406.7	7,007.1	49	6,675.9	89	275.6
45	8,274.8	7,890.3	7,439.1	7,037.1	6,675.9	50	6,366.5	90	223.4
46	7,818.4	7,461.1	7,057.9	6,695.6	6,366.7	51	6,075.8	91	178.2
47	7,405.5	7,071.5	6,708.5	6,379.0	6,076.5	52	5,801.9	92	139.7
48	7,030.3	6,716.5	6,386.5	6,083.6	5,802.8	53	5,542.9	93	107.6
49	6,686.4	6,390.4	6,087.4	5,806.4	5,543.8	54	5,297.4	94	81.1
50	6,369.2	6,089.1	5,807.9	5,545.2	5,297.8	55	5,063.6	95	59.8
51	6,073.4	5,807.9	5,545.2	5,297.8	5,063.6	56	4,840.5	96	43.1
52	5,797.4	5,545.2	5,297.8	5,063.6	4,840.5	57	4,627.0	97	30.2
53	5,537.9	5,297.8	5,063.6	4,840.5	4,627.0	58	4,422.0	98	20.6
54	5,293.3	5,063.6	4,840.5	4,627.0	4,422.0	59	4,224.8	99	13.6
55	5,060.8	4,840.5	4,627.0	4,422.0	4,224.8	60	4,034.6	100	8.7
56	4,839.1	4,627.0	4,422.0	4,224.8	4,034.6	61	3,850.6	101	5.4
57	4,626.4	4,422.0	4,224.8	4,034.6	3,850.6	62	3,672.3	102	3.1
58	4,421.8	4,224.8	4,034.6	3,850.6	3,672.3	63	3,499.0	103	1.2
59	4,224.8	4,034.6	3,850.6	3,672.3	3,499.0	64	3,330.4		

* Age nearest birthday on date of husband's death.
† Age nearest birthday.

TABLE 4d
1956 RRB REMARRIAGE TABLE— $N_{[x]_{t+n}}^m$ FUNCTIONS AT 3%

Age at Widowhood* [x]	SELECT SECTION					ULTIMATE SECTION			
	$N_{[x]}^m$	$N_{[x+1]}^m$	$N_{[x+2]}^m$	$N_{[x+3]}^m$	$N_{[x+4]}^m$	Attained Age† x	N_x^m	Attained Age† x	N_x^m
20	1,046,087.3	896,357.8	770,695.5	678,303.4	606,725.6	25	548,680.8	65	39,181.3
21	913,511.4	791,612.0	688,423.5	611,214.3	550,586.4	26	500,920.2	66	36,015.1
22	805,522.1	705,181.6	619,536.5	554,375.4	502,541.8	27	459,663.9	67	33,009.5
23	716,495.6	633,046.0	561,248.7	505,746.6	461,046.4	28	423,719.9	68	30,160.7
24	642,309.0	572,223.7	511,461.2	463,771.1	424,903.6	29	392,152.5	69	27,465.5
25	579,847.7	520,437.3	468,549.4	427,230.6	393,170.5	30	364,220.3	70	24,921.1
26	526,764.0	475,951.4	431,257.5	395,172.4	365,102.0	31	339,328.5	71	22,524.6
27	481,034.5	437,255.9	398,486.7	366,771.9	340,067.3	32	316,994.8	72	20,274.1
28	441,519.6	403,483.8	369,581.5	341,499.6	317,618.4	33	296,826.1	73	18,167.1
29	407,088.2	373,776.2	343,899.3	318,856.1	297,356.2	34	278,499.2	74	16,201.4
30	376,841.0	347,441.6	320,916.9	298,431.4	278,952.4	35	261,746.8	75	14,374.8
31	350,058.1	323,922.5	300,208.3	279,889.2	262,134.9	36	246,347.0	76	12,684.7
32	326,149.5	302,758.9	281,411.9	262,949.2	246,678.3	37	232,116.2	77	11,126.0
33	304,637.7	283,574.0	264,259.6	247,381.0	232,396.3	38	218,902.8	78	9,696.1
34	285,137.1	266,065.1	248,491.8	232,995.0	219,135.4	39	206,582.3	79	8,391.9
35	267,347.8	249,992.7	233,927.7	219,639.7	206,772.1	40	195,053.2	80	7,209.8
36	251,021.2	235,159.0	220,411.4	207,189.7	195,204.3	41	184,231.4	81	6,145.5
37	235,964.4	221,409.4	207,819.8	195,544.5	184,348.1	42	174,046.9	82	5,194.2
38	222,025.6	208,620.1	196,053.1	184,621.6	174,134.4	43	164,440.7	83	4,350.5
39	209,073.2	196,683.6	185,024.3	174,349.3	164,503.3	44	155,361.8	84	3,608.6
40	196,999.9	185,510.8	174,661.7	164,668.1	155,404.0	45	146,766.0	85	2,962.2
41	185,716.6	175,027.0	164,903.0	155,525.3	146,791.1	46	138,614.4	86	2,404.4
42	175,150.2	165,171.6	155,698.2	146,878.0	138,627.0	47	130,873.3	87	1,928.2
43	165,236.3	155,891.1	147,002.2	138,687.7	130,877.8	48	123,512.9	88	1,526.3
44	155,919.8	147,139.6	138,776.2	130,920.3	123,513.6	49	116,506.5	89	1,191.3
45	147,147.8	138,873.0	130,982.7	123,543.6	116,506.5	50	109,830.6	90	915.7
46	138,863.8	131,045.4	123,584.3	116,526.4	109,830.8	51	103,464.1	91	692.3
47	151,029.3	123,623.8	116,552.3	109,843.8	103,464.8	52	97,388.3	92	514.1
48	123,606.1	116,575.8	109,859.3	103,472.8	97,389.2	53	91,586.4	93	374.4
49	116,557.9	109,871.5	103,481.1	97,393.7	91,587.3	54	86,043.5	94	266.8
50	109,855.3	103,486.1	97,397.0	91,589.1	86,043.9	55	80,746.1	95	185.7
51	103,470.4	97,397.0	91,589.1	86,043.9	80,746.1	56	75,682.5	96	125.9
52	97,386.5	91,589.1	86,043.9	80,746.1	75,682.5	57	70,842.0	97	82.8
53	91,581.8	86,043.9	80,746.1	75,682.5	70,842.0	58	66,215.0	98	52.6
54	86,039.4	80,746.1	75,682.5	70,842.0	66,215.0	59	61,793.0	99	32.0
55	80,743.3	75,682.5	70,842.0	66,215.0	61,793.0	60	57,568.2	100	18.4
56	75,681.1	70,842.0	66,215.0	61,793.0	57,568.2	61	53,533.6	101	9.7
57	70,841.4	66,215.0	61,793.0	57,568.2	53,533.6	62	49,683.0	102	4.3
58	66,214.8	61,793.0	57,568.2	53,533.6	49,683.0	63	46,010.7	103	1.2
59	61,793.0	57,568.2	53,533.6	49,683.0	46,010.7	64	42,511.7		

* Age nearest birthday on date of husband's death.
† Age nearest birthday.

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TABLE 4c
1956 RRB REMARRIAGE TABLE ANNUITY VALUES— $a_{[x]:\ddot{1}|}^m$ AT 3%

Age at Widow- hood* [x]	SELECT SECTION					ULTIMATE SECTION			
	$a_{[x]}^{m(12)}$	$a_{[x]+1}^{m(12)}$	$a_{[x]+2}^{m(12)}$	$a_{[x]+3}^{m(12)}$	$a_{[x]+4}^{m(12)}$	Attained Age† x	$a_x^{m(12)}$	Attained Age† x	$a_x^{m(12)}$
20.....	6.4448	6.5914	7.7999	8.9347	9.9110	25.....	10.9464	65.....	11.8332
21.....	6.9523	7.1298	8.3746	9.5397	10.5440	26.....	11.6000	66.....	11.4410
22.....	7.4862	7.6921	8.9661	10.1536	11.1786	27.....	12.2466	67.....	11.0455
23.....	8.0443	8.2754	9.5705	10.7725	11.8100	28.....	12.8810	68.....	10.6488
24.....	8.6230	8.8757	10.1830	11.3904	12.4320	29.....	13.4977	69.....	10.2524
25.....	9.2183	9.4883	10.7982	12.0017	13.0392	30.....	14.0904	70.....	9.8576
26.....	9.8254	10.1074	11.4094	12.5999	13.6241	31.....	14.6519	71.....	9.4670
27.....	10.4462	10.7367	12.0230	13.1927	14.1974	32.....	15.1755	72.....	9.0806
28.....	11.0663	11.3597	12.6191	13.7582	14.7341	33.....	15.6545	73.....	8.7004
29.....	11.6788	11.9688	13.1905	14.2889	15.2273	34.....	16.0827	74.....	8.3280
30.....	12.2763	12.5571	13.7305	14.7790	15.6712	35.....	16.4551	75.....	7.9636
31.....	12.8572	13.1177	14.2330	15.2229	16.0618	36.....	16.7691	76.....	7.5963
32.....	13.4014	13.6464	14.6949	15.6190	16.3980	37.....	17.0250	77.....	7.2393
33.....	13.9210	14.1403	15.1148	15.9672	16.6811	38.....	17.2257	78.....	6.8928
34.....	14.4089	14.5986	15.4933	16.2694	16.9150	39.....	17.3766	79.....	6.5574
35.....	14.8629	15.0196	15.8306	16.5275	17.1026	40.....	17.4824	80.....	6.2325
36.....	15.2834	15.4039	16.1287	16.7451	17.2480	41.....	17.5477	81.....	5.9184
37.....	15.6702	15.7509	16.3882	16.9232	17.3541	42.....	17.5765	82.....	5.6148
38.....	16.0206	16.0589	16.6086	17.0628	17.4220	43.....	17.5707	83.....	5.3223
39.....	16.3332	16.3275	16.7908	17.1659	17.4535	44.....	17.5325	84.....	5.0409
40.....	16.6050	16.5575	16.9357	17.2332	17.4490	45.....	17.4629	85.....	4.7688
41.....	16.8319	16.7466	17.0429	17.2648	17.4107	46.....	17.3646	86.....	4.5074
42.....	17.0109	16.8936	17.1108	17.2595	17.3371	47.....	17.2390	87.....	4.2560
43.....	17.1397	16.9960	17.1385	17.2162	17.2288	48.....	17.0869	88.....	4.0144
44.....	17.2164	17.0516	17.1235	17.1342	17.0852	49.....	16.9101	89.....	3.7809
45.....	17.2409	17.0588	17.0656	17.0143	16.9101	50.....	16.7096	90.....	3.5572
46.....	17.2195	17.0221	16.9684	16.8617	16.7091	51.....	16.4872	91.....	3.3433
47.....	17.1518	16.9403	16.8321	16.6779	16.4853	52.....	16.2439	92.....	3.1383
48.....	17.0402	16.8149	16.6601	16.4668	16.2414	53.....	15.9815	93.....	2.9379
49.....	16.8904	16.6515	16.4575	16.2318	15.9790	54.....	15.7009	94.....	2.7481
50.....	16.7062	16.4536	16.2280	15.9751	15.6997	55.....	15.4047	95.....	2.5637
51.....	16.4950	16.2280	15.9751	15.6997	15.4047	56.....	15.0936	96.....	2.3794
52.....	16.2566	15.9751	15.6997	15.4047	15.0936	57.....	14.7689	97.....	2.2000
53.....	15.9956	15.6997	15.4047	15.0936	14.7689	58.....	14.4323	98.....	2.0117
54.....	15.7127	15.4047	15.0936	14.7689	14.4323	59.....	14.0846	99.....	1.8112
55.....	15.4130	15.0936	14.7689	14.4323	14.0846	60.....	13.7269	100.....	1.5732
56.....	15.0978	14.7689	14.4323	14.0846	13.7269	61.....	13.3610	101.....	1.2546
57.....	14.7707	14.4323	14.0846	13.7269	13.3610	62.....	12.9874	102.....	.8454
58.....	14.4329	14.0846	13.7269	13.3610	12.9874	63.....	12.6080		
59.....	14.0846	13.7269	13.3610	12.9874	12.6080	64.....	12.2230		

* Age nearest birthday on date of husband's death.

† Age nearest birthday.

CONCLUSION

The 1956 RRB Remarriage Table appears to be suitable for valuing benefits to widows of railroad workers. Since there is no particular reason to believe that other widows would have a substantially different remarriage experience, the 1956 RRB table may also be suitable for valuing survivor benefits to other groups of widows. It may well be that the Board's experience, particularly for ages under 60, is not typical of the remarriage experience of widows as a whole. This is a question which could not be answered on the basis of data known to the author. It is hoped that comparative remarriage studies will be possible in the near future after other modern remarriage tables are published.

As for mortality of widows, the railroad retirement data show the usual high ratios of actual to expected deaths at the early ages, grading to 100 percent at or before age 60. However, the ratios developed are neither so high nor persist so long as those developed for 1949-51 by the U.S. Public Health Service. Here too, truly comparative studies will be possible only after mortality data on recipients of widows' benefits under other plans are published.