

TRANSACTIONS OF SOCIETY OF ACTUARIES 1959 REPORTS

III. MORTALITY UNDER INDIVIDUAL IMMEDIATE ANNUITIES

THIS report, the latest in a series of intercompany studies of mortality under individual immediate annuities, covers the experience between 1953 and 1958 anniversaries. The previous report covered the experience from 1948 to 1953 anniversaries and also indicated the periods covered by earlier reports (*TSA* 1954 Reports, 36). The present study includes the experience on individual immediate non-refund and refund annuity issues of 1931 to 1957. Contracts providing for either cash or instalment refund payments and annuities with a period certain are classified as refund annuities.

As in previous studies, the following types of annuities were excluded: (a) annuities issued in conjunction with single premium insurance without evidence of insurability, or those providing at all times for the payment of virtually the entire consideration as a death benefit, (b) supplementary contracts, (c) under-average risks with special rate concessions, (d) temporary annuities, (e) joint and survivor annuities (or annuities to single survivors of contracts originally issued on a joint basis), (f) deferred annuities both before and after the end of the deferred period, and (g) annuities under group annuity contracts.

The age at issue was taken as the age nearest birthday on the issue date of the contract (or some reasonable approximation thereto).

Expected deaths were calculated on the Annuity Table for 1949 Ultimate and on the 1937 Standard Annuity Table (using a five-year age setback of the male table for female lives). In addition, expected deaths were calculated on the Annuity Table for 1949 Ultimate with Projection B, allowing for mortality improvement through the period from 1953 to 1958 anniversaries.

The names of the nineteen contributing companies and their proportionate contributions to the experience on nonrefund and refund annuities are given in Table A of the Appendix.

The findings of the present study are based on an experience of 911,004 contract years and \$278,403,557 income years of exposure; 51,103 contracts involving \$16,433,140 of annual income were terminated by death. An analysis of the exposures and deaths by sex, type of annuity, and duration is given in Table B of the Appendix. Refund annuities accounted for 60% of the total exposure by amounts of annual income. Females ac-

counted for 69% of the refund annuity exposure and 68% of the nonrefund annuity exposure by amounts of annual income.

As in previous reports, the experience has been tabulated by both number of contracts and amounts of annual income, analyzed by 10-year attained age groups, and for contract years 1-2, 3-5, and 6 and over. Separate tabulations by sex are shown for nonrefund and refund annuities.

EXPERIENCE IN RELATION TO THE ANNUITY TABLE FOR 1949 ULTIMATE
(WITHOUT PROJECTION)

Tables 1 and 2 present the mortality ratios on the Annuity Table for 1949 Ultimate (*a*-1949 Table) for nonrefund and refund annuities, re-

TABLE 1
INDIVIDUAL IMMEDIATE NONREFUND ANNUITIES
ISSUES OF 1931 TO 1957
EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES
MORTALITY RATIOS ON ANNUITY TABLE FOR 1949 ULTIMATE

ATTAINED AGES	BY NUMBER OF CONTRACTS				BY AMOUNTS OF ANNUAL INCOME			
	Contract Years			All Contract Years	Contract Years			All Contract Years
	1-2	3-5	6 and Over		1-2	3-5	6 and Over	
MALE								
Under 50.....	*	*	*	*	*	*	*	*
50-59.....	*	*	132%	128%	*	*	180%	166%
60-69.....	<i>91%</i>	<i>133%</i>	91	97	<i>111%</i>	<i>68%</i>	127	115
70-79.....	97	98	106	105	75	81	97	93
80 and over.....	60	92	98	97	59	120	107	106
All Ages.....	85%	101%	100%	100%	75%	99%	106%	103%
FEMALE								
Under 50.....	*	*	*	*	*	*	*	*
50-59.....	*	260%	152%	169%	*	131%	106%	107%
60-69.....	<i>88%</i>	96	97	96	<i>85%</i>	85	87	87
70-79.....	69	101	101	100	87	85	100	98
80 and over.....	45	75	96	95	43	77	97	95
All Ages.....	67%	92%	97%	97%	69%	82%	97%	96%

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE 2
 INDIVIDUAL IMMEDIATE REFUND ANNUITIES
 ISSUES OF 1931 TO 1957
 EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES
 MORTALITY RATIOS ON ANNUITY TABLE FOR 1949 ULTIMATE

ATTAINED AGES	BY NUMBER OF CONTRACTS				BY AMOUNTS OF ANNUAL INCOME			
	Contract Years			All Contract Years	Contract Years			All Contract Years
	1-2	3-5	6 and Over		1-2	3-5	6 and Over	
MALE								
Under 50.....	*	*	253%	248%	*	*	248%	258%
50-59.....	230%	149%	119	129	347%	131%	168	179
60-69.....	112	113	140	134	147	87	134	129
70-79.....	102	125	120	119	99	117	117	116
80 and over.....	66	79	101	100	91	93	107	105
All Ages.....	99%	108%	111%	111%	113%	104%	114%	113%
FEMALE								
Under 50.....	*	*	211%	193%	*	*	324%	276%
50-59.....	112%	102%	153	145	99%	91%	160	146
60-69.....	82	111	113	111	71	131	118	115
70-79.....	63	92	110	108	93	131	112	113
80 and over.....	55	78	101	100	52	96	104	103
All Ages.....	66%	90%	105%	104%	75%	116%	108%	107%

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

spectively. The main features of the experience in relation to this mortality table may be summarized as follows:

1. Aggregate Mortality

The mortality ratios for all ages and contract years combined are shown below:

	NONREFUND ANNUITIES		REFUND ANNUITIES	
	By Number of Contracts	By Amounts of Annual Income	By Number of Contracts	By Amounts of Annual Income
Males.....	100%	103%	111%	113%
Females.....	97	96	104	107

TABLE 3
 INDIVIDUAL IMMEDIATE ANNUITIES AT ATTAINED AGES 80 AND OVER
 ISSUES OF 1931 TO 1957
 EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES
 MORTALITY RATIOS ON ANNUITY TABLE FOR 1949 ULTIMATE

ATTAINED AGES	BY NUMBER OF CONTRACTS				BY AMOUNTS OF ANNUAL INCOME			
	Contract Years			All Contract Years	Contract Years			All Contract Years
	1-2	3-5	6 and Over		1-2	3-5	6 and Over	
MALE NONREFUND								
80-84.....	<i>53%</i>	<i>100%</i>	<i>101%</i>	<i>99%</i>	<i>56%</i>	<i>131%</i>	<i>107%</i>	<i>106%</i>
85-89.....	<i>77</i>	<i>101</i>	<i>105</i>	<i>104</i>	<i>85</i>	<i>120</i>	<i>116</i>	<i>116</i>
90 and over.....	*	*	83	81	*	*	90	87
80 and over.....	<i>60%</i>	<i>92%</i>	<i>98%</i>	<i>97%</i>	<i>59%</i>	<i>120%</i>	<i>107%</i>	<i>106%</i>
FEMALE NONREFUND								
80-84.....	<i>31%</i>	<i>79%</i>	<i>96%</i>	<i>95%</i>	<i>32%</i>	<i>77%</i>	<i>97%</i>	<i>95%</i>
85-89.....	<i>75</i>	<i>71</i>	<i>100</i>	<i>99</i>	<i>59</i>	<i>61</i>	<i>107</i>	<i>104</i>
90 and over.....	*	70	88	88	*	160	84	85
80 and over.....	<i>45%</i>	<i>75%</i>	<i>96%</i>	<i>95%</i>	<i>43%</i>	<i>77%</i>	<i>97%</i>	<i>95%</i>
MALE REFUND								
80-84.....	<i>50%</i>	<i>83%</i>	<i>98%</i>	<i>96%</i>	<i>69%</i>	<i>91%</i>	<i>110%</i>	<i>107%</i>
85-89.....	<i>98</i>	<i>81</i>	<i>107</i>	<i>105</i>	<i>149</i>	<i>105</i>	<i>110</i>	<i>111</i>
90 and over.....	*	*	98	97	*	*	95	94
80 and over.....	<i>66%</i>	<i>79%</i>	<i>101%</i>	<i>100%</i>	<i>91%</i>	<i>93%</i>	<i>107%</i>	<i>105%</i>
FEMALE REFUND								
80-84.....	<i>56%</i>	<i>84%</i>	<i>103%</i>	<i>102%</i>	<i>53%</i>	<i>99%</i>	<i>109%</i>	<i>107%</i>
85-89.....	<i>36</i>	<i>62</i>	<i>104</i>	<i>102</i>	<i>50</i>	<i>84</i>	<i>105</i>	<i>103</i>
90 and over.....	*	130	93	93	*	137	96	96
80 and over.....	<i>55%</i>	<i>78%</i>	<i>101%</i>	<i>100%</i>	<i>52%</i>	<i>96%</i>	<i>104%</i>	<i>103%</i>

* Less than 10 contracts terminated by death.

Note.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death

2. Mortality by Attained Age

On nonrefund annuities, there was no clear-cut pattern in the mortality ratios by age although the ratios for both sexes were higher at ages under 60 than at ages 60 and over. On refund annuities there was a pronounced downward trend in the mortality ratios with advancing age for both sexes.

Nonrefund annuities, males.—The mortality ratios for all contract years combined were significantly and appreciably below 100% only at ages 70–79 by amounts of annual income, but were significantly and appreciably above 100% at ages 50–59 by both number of contracts and amounts of annual income and at ages 60–69 by amount.

Nonrefund annuities, females.—The mortality ratios for all contract years combined were significantly and appreciably below 100% at ages 60–69 by amount. The mortality ratios were significantly and appreciably above 100% at ages 50–59 by number.

Refund annuities, males.—The mortality ratios for all contract years combined did not fall below 100% in any age group and exceeded 115% in every age group under 80. The corresponding mortality ratios in the experience between 1948 and 1953 anniversaries showed a similar pattern.

Refund annuities, females.—The mortality ratios for all contract years combined did not fall below 100% in any age group and were significantly and appreciably above 100% in every age group under 80. The corresponding mortality ratios in the experience between 1948 and 1953 anniversaries showed the same pattern.

A more detailed analysis of the experience at attained ages 80 and over on the *a*-1949 Table is given in Table 3. For all contract years combined the mortality ratios by both number and amount increased from ages 80–84 to ages 85–89, but then decreased sharply for ages 90 and over, except in the case of female refund annuities, where the mortality ratios tended to decrease with advancing age. The mortality ratios were appreciably below 100% at ages 90 and over (*a*) on male and female nonrefund annuities, by both number and amount, (*b*) on male refund annuities by amount, and (*c*) on female refund annuities by number.

3. Select Mortality

The temporary effects of self-selection on the part of the purchasers of annuities may be gauged by the progression of mortality ratios for contract years 1–2, 3–5, and 6 and over. The characteristics of the experience appear to be as follows:

Nonrefund annuities, males.—A moderate degree of selection was evident at ages 70–79 by amount.

Nonrefund annuities, females.—Selection was pronounced at ages 80 and over, and was present to a lesser degree at younger ages.

Refund annuities, males.—Little selection was evident except at ages 80 and over by number of contracts.

Refund annuities, females.—The effects of selection were appreciable at ages 60 and over but were confined for the most part to the first two years.

4. *Mortality by Number and by Amount*

The relationship of mortality ratios by amounts of income to those by number of contracts presented a mixed pattern, as follows:

Nonrefund annuities, males.—Amount ratios were generally higher except at attained ages 70–79.

Nonrefund annuities, females.—Amount ratios were appreciably lower at ages below 70, with not much difference apparent at the older ages.

Refund annuities, males.—Amount ratios were slightly lower at attained ages 60–79.

Refund annuities, females.—Amount ratios were generally somewhat higher.

5. *Nonrefund versus Refund Annuities*

Males.—The mortality ratios on nonrefund annuities were 15 to 35 percentage points lower than those on refund annuities at attained ages 60–79, but at attained ages under 60 and at ages 80 and over the differentials in mortality ratios were small.

Females.—The mortality ratios on nonrefund annuities were somewhat lower than those on refund annuities at ages 60 and over by number and appreciably lower at all ages by amount. For all ages combined, the mortality differentials between refund and nonrefund annuities amounted to about 10 percentage points by both number and amount.

The details of the experience on the *a*-1949 Table by ten-year attained age groups for each of the first five contract years and for contract years 6 and over are set forth in Table C of the Appendix.

EXPERIENCE IN RELATION TO THE ANNUITY TABLE FOR 1949 ULTIMATE WITH PROJECTION B

The mortality experience under individual immediate annuities during the period from 1953 to 1958 anniversaries was also compared with that expected on the *a*-1949 Table with Projection B, assuming decreases in mortality from the end of 1950 through the period from 1953 to 1958 anniversaries. The methods used in the computation of expected deaths on this basis are outlined on page 102. Mortality ratios are presented in Tables 4 and 5 for nonrefund and refund annuities, respectively.

TABLE 4
INDIVIDUAL IMMEDIATE NONREFUND ANNUITIES
ISSUES OF 1931 TO 1957
EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES
MORTALITY RATIOS ON ANNUITY TABLE FOR 1949 ULTIMATE
WITH PROJECTION B

ATTAINED AGES	BY NUMBER OF CONTRACTS				BY AMOUNTS OF ANNUAL INCOME			
	Contract Years			All Contract Years	Contract Years			All Contract Years
	1-2	3-5	6 and Over		1-2	3-5	6 and Over	
MALE								
Under 50.....	*	*	*	*	*	*	*	*
50-59.....	*	*	142%	137%	*	*	192%	177%
60-69.....	96%	141%	97	103	118%	72%	135	122
70-79.....	101	102	110	109	78	84	101	96
80 and over.....	61	93	100	99	60	122	108	107
All Ages.....	88%	104%	103%	102%	78%	102%	108%	105%
FEMALE								
Under 50.....	*	*	*	*	*	*	*	*
50-59.....	*	278%	162%	180%	*	140%	113%	114%
60-69.....	93%	102	102	102	90%	90	92	92
70-79.....	72	105	105	104	90	89	104	102
80 and over.....	46	77	97	96	44	78	98	96
All Ages.....	70%	95%	99%	99%	72%	84%	99%	98%

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE 5
 INDIVIDUAL IMMEDIATE REFUND ANNUITIES
 ISSUES OF 1931 TO 1957
 EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES
 MORTALITY RATIOS ON ANNUITY TABLE FOR 1949 ULTIMATE
 WITH PROJECTION B

ATTAINED AGES	BY NUMBER OF CONTRACTS				BY AMOUNTS OF ANNUAL INCOME			
	Contract Years			All Contract Years	Contract Years			All Contract Years
	1-2	3-5	6 and Over		1-2	3-5	6 and Over	
MALE								
Under 50	*	*	<i>271%</i>	<i>262%</i>	*	*	<i>265%</i>	<i>274%</i>
50-59	<i>246%</i>	<i>161%</i>	127	138	<i>370%</i>	<i>142%</i>	179	191
60-69	119	119	149	142	156	92	142	136
70-79	106	131	124	124	103	122	122	120
80 and over	67	81	102	101	93	94	108	107
All Ages	103%	112%	114%	114%	118%	108%	117%	116%
FEMALE								
Under 50	*	*	<i>226%</i>	<i>206%</i>	*	*	<i>347%</i>	<i>295%</i>
50-59	<i>120%</i>	<i>109%</i>	163	155	<i>106%</i>	<i>97%</i>	171	156
60-69	87	118	120	118	75	139	125	122
70-79	66	95	115	113	96	137	117	117
80 and over	56	79	102	101	53	98	105	104
All Ages	69%	93%	107%	106%	78%	120%	110%	110%

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

The main features of the experience in relation to the *a*-1949 Table with Projection B may be summarized as follows:

1. *Aggregate Mortality*

The mortality ratios for all ages and all contract years combined are shown below:

	NONREFUND ANNUITIES		REFUND ANNUITIES	
	By Number of Contracts	By Amounts of Annual Income	By Number of Contracts	By Amounts of Annual Income
Males.....	102%	105%	114%	116%
Females.....	99	98	106	110

2. *Mortality by Attained Age*

On male nonrefund annuities there were no age groups where the mortality ratios for all contract years combined were significantly below 100% of the *a*-1949 Table with Projection B. On female nonrefund annuities the mortality ratios were significantly below 100% only at attained ages 60-69 by amount. The mortality ratios were appreciably above 100% (*a*) on male nonrefund annuities at attained ages 50-59 by both number and amount and at attained ages 60-69 by amount only, and (*b*) on female nonrefund annuities at attained ages 50-59 by both number and amount. On male and female refund annuities, the mortality ratios for all contract years combined were above 100% at all ages, particularly at attained ages under 80, by both number and amount.

3. *With Projection versus without Projection*

On male and female nonrefund and refund annuities, the mortality ratios on the *a*-1949 Table with Projection B for all contract years combined are higher than those on the *a*-1949 Table without projection by about 10 percentage points at attained ages 50-59, by about 7 percentage points at ages 60-69, and by about 4 percentage points at ages 70-79. At attained ages 80 and over the mortality ratios on the *a*-1949 Table with Projection B are virtually the same as those on the *a*-1949 Table without Projection.

EXPERIENCE IN RELATION TO THE 1937 STANDARD ANNUITY TABLE

Tables 6 and 7 present the mortality ratios on the 1937 Standard Annuity Table for nonrefund and refund annuities, respectively. The

TABLE 6
INDIVIDUAL IMMEDIATE NONREFUND ANNUITIES
ISSUES OF 1931 TO 1957
EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES
MORTALITY RATIOS ON 1937 STANDARD ANNUITY TABLE

ATTAINED AGES	BY NUMBER OF CONTRACTS				BY AMOUNTS OF ANNUAL INCOME			
	Contract Years			All Contract Years	Contract Years			All Contract Years
	1-2	3-5	6 and Over		1-2	3-5	6 and Over	
MALE								
Under 50	*	*	*	*	*	*	*	*
50-59	*	*	103%	100%	*	*	141%	130%
60-69	73%	108%	74	79	90%	55%	103	93
70-79	88	89	97	95	67	73	89	84
80 and over	63	98	108	106	61	126	117	115
All Ages	78%	95%	102%	100%	70%	95%	108%	104%
FEMALE								
Under 50	*	*	*	*	*	*	*	*
50-59	*	136%	79%	88%	*	69%	55%	56%
60-69	57%	63	63	63	55%	55	57	57
70-79	59	86	88	87	74	73	88	86
80 and over	52	88	118	117	50	91	122	120
All Ages	58%	83%	105%	103%	62%	77%	108%	105%

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE 7
INDIVIDUAL IMMEDIATE REFUND ANNUITIES
ISSUES OF 1931 TO 1957
EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES
MORTALITY RATIOS ON 1937 STANDARD ANNUITY TABLE

ATTAINED AGES	BY NUMBER OF CONTRACTS				BY AMOUNTS OF ANNUAL INCOME			
	Contract Years			All Contract Years	Contract Years			All Contract Years
	1-2	3-5	6 and Over		1-2	3-5	6 and Over	
MALE								
Under 50.....	*	*	<i>147%</i>	<i>142%</i>	*	*	<i>144%</i>	<i>149%</i>
50-59.....	<i>180%</i>	<i>118%</i>	93	101	<i>270%</i>	<i>103%</i>	130	139
60-69.....	91	92	114	109	119	71	108	104
70-79.....	91	112	108	108	89	105	106	105
80 and over.....	68	84	110	108	94	97	116	115
All Ages.....	<i>89%</i>	<i>99%</i>	<i>110%</i>	<i>108%</i>	<i>102%</i>	<i>96%</i>	<i>112%</i>	<i>110%</i>
FEMALE								
Under 50.....	*	*	<i>98%</i>	<i>90%</i>	*	*	<i>151%</i>	<i>129%</i>
50-59.....	<i>58%</i>	<i>53%</i>	79	75	<i>51%</i>	<i>47%</i>	83	76
60-69.....	52	71	74	72	45	84	76	75
70-79.....	54	78	96	94	79	113	97	98
80 and over.....	62	90	124	123	59	110	129	127
All Ages.....	<i>55%</i>	<i>79%</i>	<i>109%</i>	<i>107%</i>	<i>64%</i>	<i>103%</i>	<i>112%</i>	<i>110%</i>

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

main features of the experience in relation to this mortality table may be summarized as follows:

1. *Aggregate Mortality*

The mortality ratios for all ages and all contract years combined are shown below:

	NONREFUND ANNUITIES		REFUND ANNUITIES	
	By Number of Contracts	By Amounts of Annual Income	By Number of Contracts	By Amounts of Annual Income
Males.....	100%	104%	108%	110%
Females.....	103	105	107	110

That the mortality ratios for the aggregate experience are not less than 100% of the 1937 Standard Annuity Table is due primarily to the weight of the experience at attained ages 80 and over, where the 1937 Standard Annuity Table materially understates actual experience.

2. *Mortality by Attained Age*

On nonrefund annuities, the mortality ratios for all contract years combined generally increased with advancing age for both sexes. However, on male nonrefund annuities the mortality ratios at ages 50–59 were much higher than those at older ages by both number and amount, while the mortality ratio at ages 70–79 by amount was 9 percentage points lower than that at ages 60–69. On both male and female nonrefund annuities there was a sharp rise in the mortality ratios from ages 70–79 to ages 80 and over. There was no definite trend in the mortality ratios with advancing age on male refund annuities. The mortality ratios on female refund annuities were lowest in the 50–59 age range, rising rapidly thereafter with advancing age by both number and amount.

Nonrefund annuities, males.—The mortality ratios for all contract years combined were appreciably below 100% at ages 60–69 by number (79%) and at ages 70–79 by amount (84%). The mortality ratios were appreciably above 100% at ages 80 and over by both number and amount and at ages 50–59 by amount. In the experience from 1948 to 1953 anniversaries the mortality ratios at ages 60–69 were also appreciably below 100%.

Nonrefund annuities, females.—The mortality ratios for all contract years combined were markedly below 100% at ages under 80. At ages 80 and over the mortality ratios were about 120% of the 1937 Standard

Annuity Table by both number and amount. The corresponding mortality ratios in the experience from 1948 to 1953 anniversaries showed the same pattern.

Refund annuities, males.—The mortality ratios for all contract years combined were above 100% in every age group, being about 110% at ages 60 and over by number and 105% to 115% by amount. The corresponding mortality ratios in the experience from 1948 to 1953 anniversaries showed a similar pattern.

Refund annuities, females.—The mortality ratios for all contract years combined were about 75% of the 1937 Standard Annuity Table at ages 50–69 by both number and amount, while at ages 80 and over the mortality ratios were close to 125%. The experience from 1948 to 1953 anniversaries was very similar.

A detailed analysis of the experience at attained ages 80 and over on the 1937 Standard Annuity Table is given in Table 8. For all contract years combined the mortality ratios by both number and amount on male nonrefund annuities rose sharply from ages 80–84 to ages 85–89, and then decreased sharply for ages 90 and over, where the mortality ratios were about the same as those for ages 80–84. On male refund annuities and on female nonrefund and refund annuities there was also a sharp increase in the mortality ratios from ages 80–84 to ages 85–89, but the mortality ratios at ages 90 and over were about the same as those at ages 85–89. The mortality ratios were appreciably greater than 100% at attained ages 85–89 in all four categories and at ages 90 and over in all but the male nonrefund experience.

3. *Select Mortality, Mortality by Number and by Amount, Nonrefund versus Refund*

The comments previously made on these aspects of the experience when measured against the Annuity Table for 1949 (without projection) apply equally when the 1937 Standard Annuity Table is used as the basis for expected deaths.

The details of the experience on the 1937 Standard Annuity Table by ten-year attained age groups for each of the first five contract years and for contract years 6 and over are set forth in Table C of the Appendix.

COMPARISONS WITH PREVIOUS STUDIES

Experience in Relation to the 1937 Standard Annuity Table

A comparison of the experience under individual immediate annuities from 1953 to 1958 anniversaries with that between 1948 and 1953 anniversaries and that between 1941 and 1948 anniversaries is presented in Tables 9 and 10 for nonrefund and refund annuities, respectively. The

TABLE 8
INDIVIDUAL IMMEDIATE ANNUITIES AT ATTAINED AGES 80 AND OVER
ISSUES OF 1931 TO 1957
EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES
MORTALITY RATIOS ON 1937 STANDARD ANNUITY TABLE

ATTAINED AGES	BY NUMBER OF CONTRACTS				BY AMOUNTS OF ANNUAL INCOME			
	Contract Years			All Contract Years	Contract Years			All Contract Years
	1-2	3-5	6 and Over		1-2	3-5	6 and Over	
MALE NONREFUND								
80-84	<i>59%</i>	<i>101%</i>	<i>103%</i>	<i>101%</i>	<i>57%</i>	<i>133%</i>	<i>109%</i>	<i>108%</i>
85-89	<i>85</i>	<i>112</i>	<i>117</i>	<i>116</i>	<i>92</i>	<i>132</i>	<i>129</i>	<i>128</i>
90 and over	*	*	102	100	*	*	111	107
80 and over	<i>63%</i>	<i>98%</i>	<i>108%</i>	<i>106%</i>	<i>61%</i>	<i>126%</i>	<i>117%</i>	<i>115%</i>
FEMALE NONREFUND								
80-84	<i>34%</i>	<i>85%</i>	<i>105%</i>	<i>104%</i>	<i>35%</i>	<i>84%</i>	<i>105%</i>	<i>103%</i>
85-89	<i>93</i>	<i>90</i>	<i>127</i>	<i>126</i>	<i>73</i>	<i>78</i>	<i>136</i>	<i>133</i>
90 and over	*	<i>104</i>	<i>134</i>	<i>134</i>	*	<i>233</i>	<i>130</i>	<i>131</i>
80 and over	<i>52%</i>	<i>88%</i>	<i>118%</i>	<i>117%</i>	<i>50%</i>	<i>91%</i>	<i>122%</i>	<i>120%</i>
MALE REFUND								
80-84	<i>50%</i>	<i>85%</i>	<i>100%</i>	<i>98%</i>	<i>70%</i>	<i>92%</i>	<i>112%</i>	<i>109%</i>
85-89	<i>107</i>	<i>90</i>	<i>118</i>	<i>117</i>	<i>162</i>	<i>116</i>	<i>122</i>	<i>123</i>
90 and over	*	*	<i>120</i>	<i>121</i>	*	*	<i>117</i>	<i>116</i>
80 and over	<i>68%</i>	<i>84%</i>	<i>110%</i>	<i>108%</i>	<i>94%</i>	<i>97%</i>	<i>116%</i>	<i>115%</i>
FEMALE REFUND								
80-84	<i>61%</i>	<i>91%</i>	<i>112%</i>	<i>110%</i>	<i>57%</i>	<i>107%</i>	<i>118%</i>	<i>116%</i>
85-89	<i>45</i>	<i>78</i>	<i>132</i>	<i>130</i>	<i>63</i>	<i>107</i>	<i>133</i>	<i>131</i>
90 and over	*	<i>194</i>	<i>142</i>	<i>142</i>	*	<i>200</i>	<i>146</i>	<i>146</i>
80 and over	<i>62%</i>	<i>90%</i>	<i>124%</i>	<i>123%</i>	<i>59%</i>	<i>110%</i>	<i>129%</i>	<i>127%</i>

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE 9
COMPARISON OF MORTALITY RATIOS ON INDIVIDUAL IMMEDIATE NONREFUND ANNUITIES
EXPERIENCE BETWEEN 1941-48, 1948-53, AND 1953-58 ANNIVERSARIES
Expected Deaths Based on 1937 Standard Annuity Table

ATTAINED AGES	BY NUMBER OF CONTRACTS									BY AMOUNTS OF ANNUAL INCOME								
	Contract Years 1-5			Contract Years 6 and Over			All Contract Years			Contract Years 1-5			Contract Years 6 and Over			All Contract Years		
	1941- 48	1948- 53	1953- 58	1941- 48	1948- 53	1953- 58	1941- 48	1948- 53	1953- 58	1941- 48	1948- 53	1953- 58	1941- 48	1948- 53	1953- 58	1941- 48	1948- 53	1953- 58
MALES																		
81 Under 60.....	110%	<i>66%</i>	<i>103%</i>	98%	78%	100%	102%	74%	101%	97%	<i>97%</i>	<i>162%</i>	113%	73%	128%	108%	81%	137%
60-69.....	85	75	92	103	72	74	97	73	79	84	99	73	107	82	103	99	88	93
70-79.....	90	79	88	101	103	97	98	99	95	86	75	70	96	117	89	94	107	84
80 and over.....	98	67	85	114	100	108	111	97	106	87	80	101	126	101	117	119	98	115
All Ages.....	91%	<i>74%</i>	<i>88%</i>	106%	98%	102%	102%	94%	100%	86%	81%	84%	110%	105%	108%	105%	100%	104%
All Ages Adjusted.....	92%	<i>74%</i>	<i>88%</i>	109%	99%	102%	105%	95%	100%	86%	81%	84%	116%	105%	108%	109%	100%	104%
FEMALES																		
Under 60.....	61%	<i>49%</i>	<i>127%</i>	70%	62%	75%	66%	58%	85%	57%	<i>49%</i>	<i>58%</i>	90%	58%	52%	76%	54%	53%
60-69.....	64	53	60	79	71	63	73	66	63	68	60	55	74	71	57	72	68	57
70-79.....	78	64	76	98	94	88	94	91	87	87	64	73	108	98	88	103	92	86
80 and over.....	103	70	77	132	121	118	128	119	117	93	73	76	123	124	122	119	120	120
All Ages.....	77%	<i>62%</i>	<i>74%</i>	106%	105%	105%	99%	100%	103%	82%	65%	71%	109%	109%	108%	104%	103%	105%
All Ages Adjusted.....	82%	<i>63%</i>	<i>74%</i>	118%	109%	105%	113%	106%	103%	85%	66%	71%	116%	113%	108%	111%	107%	105%

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE 10
COMPARISON OF MORTALITY RATIOS ON INDIVIDUAL IMMEDIATE REFUND ANNUITIES
EXPERIENCE BETWEEN 1941-48, 1948-53, AND 1953-58 ANNIVERSARIES
Expected Deaths Based on 1937 Standard Annuity Table

ATTAINED AGES	BY NUMBER OF CONTRACTS									BY AMOUNTS OF ANNUAL INCOME								
	Contract Years 1-5			Contract Years 6 and Over			All Contract Years			Contract Years 1-5			Contract Years 6 and Over			All Contract Years		
	1941- 48	1948- 53	1953- 58	1941- 48	1948- 53	1953- 58	1941- 48	1948- 53	1953- 58	194- 48	1948- 53	1953- 58	1941- 48	1948- 53	1953- 58	1941- 48	1948- 53	1953- 58
MALES																		
Under 60.....	100%	102%	140%	111%	96%	101%	106%	97%	106%	123%	161%	181%	127%	115%	133%	126%	128%	141%
60-69.....	102	98	91	110	103	114	107	102	109	100	114	93	129	112	108	117	113	104
70-79.....	99	98	105	110	110	108	107	108	108	107	98	99	126	116	106	121	112	105
80 and over.....	111	100	79	117	104	110	116	104	108	107	114	96	130	108	116	125	109	115
All Ages.....	102%	99%	95%	113%	106%	110%	110%	105%	108%	106%	109%	99%	128%	112%	112%	122%	111%	110%
All Ages Adjusted.....	103%	99%	95%	114%	106%	110%	111%	105%	108%	106%	108%	99%	128%	112%	112%	123%	111%	110%
FEMALES																		
Under 60.....	70%	47%	53%	88%	88%	82%	80%	78%	77%	76%	47%	47%	92%	95%	93%	86%	82%	84%
60-69.....	74	80	64	82	80	74	79	80	72	77	86	68	79	77	76	79	79	75
70-79.....	92	80	70	103	98	96	100	96	94	93	79	100	106	103	97	103	100	98
80 and over.....	128	109	82	133	128	124	132	127	123	126	113	93	138	129	129	136	128	127
All Ages.....	92%	85%	71%	108%	109%	109%	104%	106%	107%	94%	87%	89%	112%	111%	112%	107%	108%	110%
All Ages Adjusted.....	97%	87%	71%	117%	113%	109%	114%	110%	107%	98%	89%	89%	120%	114%	112%	117%	113%	110%

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

1937 Standard Annuity Table was used as the basis of expected mortality for this comparison because the experience for periods prior to 1948 was available only on this table. Since the distributions of the exposures by attained age and duration have changed markedly from the earlier to the later periods, and because the 1937 Standard Annuity Table does not uniformly reflect the incidence of mortality by attained age, the mortality ratios based on this table for all ages or all durations combined must be interpreted with caution. To allow for the changes in age distribution, "adjusted" mortality ratios were computed for all ages combined for the periods 1941-48 and 1948-53, and are shown in Tables 9 and 10. The adjusted ratio for all ages combined within a particular duration group is the weighted average of the ratios for component age groups, the weights being the corresponding expected deaths in the 1953-58 experience. These adjusted ratios in effect represent what the mortality ratios for all ages combined would have been if the distribution of exposures by the four attained age groups had been the same in the two earlier periods as in the 1953-58 period. The adjusted all-age ratios for contract years 1-5 and 6 and over were weighted in accordance with the proportions of the expected deaths in these duration groups in the 1953-58 experience to provide an adjusted ratio for all contract years combined.

The main features of the comparisons may be summarized as follows:

1. The general downward trend in the mortality ratios from the 1941-48 to the 1948-53 period, noted in the previous report, was generally halted or reversed for male lives in the 1953-58 experience. Females, on the other hand, continued to show somewhat lower mortality

	BY NUMBER OF CONTRACTS			BY AMOUNTS OF ANNUAL INCOME		
	1941-1948	1948-1953	1953-1958	1941-1948	1948-1953	1953-1958
	Nonrefund Annuities					
Males.....	105%	95%	100%	109%	100%	104%
Females.....	113	106	103	111	107	105
	Refund Annuities					
Males.....	111%	105%	108%	123%	111%	110%
Females.....	114	110	107	117	113	110

ratios, with the notable exception of nonrefund annuities in the first five contract years.

The table on page 83 shows adjusted mortality ratios for all ages and contract years combined.

2. *Nonrefund annuities, males.*—The reversal of the downward trend in mortality applied to almost every age and duration group shown in Table 9, whether by number of contracts or by amounts of annual income. Appreciably higher mortality during the 1953–58 period compared with the 1948–53 period occurred (a) by number of contracts at all ages in the first five contract years and at attained ages under 60, and 80 and over, in the sixth and later contract years, and (b) by amounts of annual income at attained ages under 60, and 80 and over, in the first five contract years and at all ages except 70–79 in the sixth and later contract years. Substantially lower mortality during the 1953–58 period compared with the earlier periods occurred only at attained ages 70–79 for all contract years by amount and at attained ages 60–69 in the first five contract years, also by amount.
3. *Nonrefund annuities, females.*—The pattern of mortality changes in this category was more mixed. There was a reduction in the mortality ratios for contract years 6 and over at almost all ages, but a general increase in the first five contract years. At attained ages 60–69 the mortality ratios during the 1953–58 period were somewhat lower than in earlier studies in the first five contract years by amount, and appreciably lower in the sixth and later contract years by both number and amount. At attained ages 70–79 the mortality ratios by both number and amount were higher during the 1953–58 period than during the 1948–53 period in the first five contract years, but in the sixth and later contract years the mortality ratios during the 1953–58 period were appreciably below those in the earlier studies. At attained ages 80 and over the mortality ratios during the 1953–58 period were not significantly different from those in the 1948–53 study.
4. *Refund annuities, males.*—There was also a mixed pattern of mortality changes in this category, with lower mortality ratios in some age groups and higher ratios in other age groups without any consistency in the experience by duration, by number of contracts or by amounts of annual income.
5. *Refund annuities, females.*—During the 1953–58 period the mortality ratios in this category showed a fairly consistent decline from their 1948–53 levels, which in turn were below the 1941–48 levels. The 1953–58 mortality ratios were appreciably lower than those in the 1948–53 period at attained ages 60–69 and 80 and over in the first five contract

years by number and amount and at ages 70-79 by number, but at ages 70-79 the 1953-58 mortality ratio by amount was appreciably higher than the corresponding ratios in the earlier periods.

Experience in Relation to the Annuity Table for 1949 Ultimate

A comparison of the experience under individual immediate annuities in relation to the *a*-1949 Table for the period from 1953 to 1958 contract anniversaries with that from 1948 to 1953 anniversaries is presented in Tables 11 and 12 for nonrefund and refund annuities, respectively. This comparison is of value because the *a*-1949 Table provides a better measure of the incidence of mortality by attained age than the 1937 Standard Annuity Table. To minimize the effect of different age distributions in the two periods, "adjusted" all-age mortality ratios for the 1948-53 period were computed in the same way as the "adjusted" ratios in Tables 9 and 10 based on the 1937 Standard Annuity Table. The adjusted mortality ratios for all ages and contract years combined are shown in the table below:

	BY NUMBER OF CONTRACTS		BY AMOUNTS OF ANNUAL INCOME	
	1948-1953	1953-1958	1948-1953	1953-1958
	Nonrefund Annuities			
Males.....	96%	100%	100%	103%
Females.....	101	97	100	96
	Refund Annuities			
Males.....	108%	111%	114%	113%
Females.....	109	104	111	107

The changes in the mortality ratios from 1948-1953 anniversaries when measured by the *a*-1949 Table are generally similar to those observed in the ratios based on the 1937 Standard Annuity Table. In interpreting the appreciably higher mortality during the 1953-58 period compared with the 1948-53 period on male nonrefund annuities at attained ages 80 and over for all contract years, it may be noted that, in a discussion following publication of the 1948-53 Immediate Annuity experience, it had been suggested that higher mortality at attained ages 80 and over

TABLE 11

COMPARISON OF MORTALITY RATIOS ON INDIVIDUAL IMMEDIATE NONREFUND ANNUITIES
EXPERIENCE BETWEEN 1948-53 AND 1953-58 ANNIVERSARIES
Expected Deaths Based on Annuity Table for 1949 Ultimate

ATTAINED AGES	BY NUMBER OF CONTRACTS									BY AMOUNTS OF ANNUAL INCOME								
	Contract Years 1-5			Contract Years 6 and Over			All Contract Years			Contract Years 1-5			Contract Years 6 and Over			All Contract Years		
	1948-53 (without Projection)	1953-58 (without Projection)	1953-58 (with Projection B)	1948-53 (without Projection)	1953-58 (without Projection)	1953-58 (with Projection B)	1948-53 (without Projection)	1953-58 (without Projection)	1953-58 (with Projection B)	1948-53 (without Projection)	1953-58 (without Projection)	1953-58 (with Projection B)	1948-53 (without Projection)	1953-58 (without Projection)	1953-58 (with Projection B)	1948-53 (without Projection)	1953-58 (without Projection)	1953-58 (with Projection B)
MALES																		
Under 60	<i>89%</i>	<i>134%</i>	<i>142%</i>	<i>103%</i>	<i>131%</i>	<i>140%</i>	<i>99%</i>	<i>132%</i>	<i>141%</i>	<i>127%</i>	<i>211%</i>	<i>225%</i>	<i>95%</i>	<i>168%</i>	<i>180%</i>	<i>106%</i>	<i>180%</i>	<i>193%</i>
60-69	92	113	120	89	91	97	90	97	103	123	90	95	101	127	135	108	115	122
70-79	88	98	102	113	106	110	109	105	109	83	78	81	128	97	101	118	93	96
80 and over	64	81	82	93	98	100	90	97	99	76	96	98	93	107	108	91	106	107
All Ages	80%	95%	98%	101%	100%	103%	97%	100%	102%	86%	89%	91%	105%	106%	108%	102%	103%	105%
All Ages Adjusted	80%	95%	98%	99%	100%	103%	96%	100%	102%	85%	80%	91%	103%	106%	108%	100%	103%	105%
FEMALES																		
Under 60	<i>98%</i>	<i>247%</i>	<i>263%</i>	<i>121%</i>	<i>146%</i>	<i>156%</i>	<i>114%</i>	<i>165%</i>	<i>176%</i>	<i>94%</i>	<i>111%</i>	<i>118%</i>	<i>112%</i>	<i>101%</i>	<i>108%</i>	<i>106%</i>	<i>103%</i>	<i>110%</i>
60-69	83	93	98	109	97	102	102	96	102	93	85	90	109	87	92	104	87	92
70-79	75	90	93	109	101	105	105	100	104	75	86	89	112	100	104	106	98	102
80 and over	61	66	68	101	96	97	99	95	96	63	65	66	101	97	98	98	95	96
All Ages	73%	83%	86%	104%	97%	99%	101%	97%	99%	73%	77%	79%	105%	97%	99%	101%	96%	98%
All Ages Adjusted	71%	83%	86%	103%	97%	99%	101%	97%	99%	72%	77%	79%	104%	97%	99%	100%	96%	98%

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death

TABLE 12

COMPARISON OF MORTALITY RATIOS ON INDIVIDUAL IMMEDIATE REFUND ANNUITIES
 EXPERIENCE BETWEEN 1948-53 AND 1953-58 ANNIVERSARIES
 Expected Deaths Based on Annuity Table for 1949 Ultimate

ATTAINED AGES	BY NUMBER OF CONTRACTS									BY AMOUNTS OF ANNUAL INCOME								
	Contract Years 1-5			Contract Years 6 and Over			All Contract Years			Contract Years 1-5			Contract Years 6 and Over			All Contract Years		
	1948-53 (with- out Pro- jec- tion)	1953-58 (with- out Pro- jec- tion)	1953-58 (with Pro- jec- tion B)	1948-53 (with- out Pro- jec- tion)	1953-58 (with- out Pro- jec- tion)	1953-58 (with Pro- jec- tion B)	1948-53 (with- out Pro- jec- tion)	1953-58 (with- out Pro- jec- tion)	1953-58 (with Pro- jec- tion B)	1948-53 (with- out Pro- jec- tion)	1953-58 (with- out Pro- jec- tion)	1953-58 (with Pro- jec- tion B)	1948-53 (with- out Pro- jec- tion)	1953-58 (with- out Pro- jec- tion)	1953-58 (with Pro- jec- tion B)	1948-53 (with- out Pro- jec- tion)	1953-58 (with- out Pro- jec- tion)	1953-58 (with Pro- jec- tion B)
	MALES																	
Under 60.....	136%	<i>185%</i>	<i>197%</i>	128%	134%	143%	130%	142%	152%	215%	<i>241%</i>	<i>257%</i>	154%	178%	190%	171%	189%	201%
60-69.....	121	112	119	128	140	149	126	134	142	140	114	121	138	134	142	139	129	136
70-79.....	110	117	122	122	120	124	120	119	124	110	110	114	128	117	122	124	116	120
80 and over.....	94	75	76	97	101	102	97	100	101	109	92	94	100	107	108	101	105	107
All Ages.....	110%	105%	109%	111%	111%	114%	111%	111%	114%	122%	108%	112%	116%	114%	117%	117%	113%	116%
All Ages Adjusted...	108%	105%	109%	109%	111%	114%	108%	111%	114%	118%	108%	112%	114%	114%	117%	114%	113%	116%
	FEMALES																	
Under 60.....	93%	<i>104%</i>	<i>111%</i>	172%	160%	171%	152%	151%	161%	92%	<i>92%</i>	<i>98%</i>	186%	183%	196%	160%	164%	175%
60-69.....	125	100	106	125	113	120	125	111	118	135	106	112	119	118	125	122	115	122
70-79.....	95	82	85	114	110	115	111	108	113	93	117	121	120	112	117	116	113	117
80 and over.....	96	72	73	107	101	102	106	100	101	99	82	83	106	104	105	106	103	104
All Ages.....	102%	82%	85%	112%	105%	107%	111%	104%	106%	103%	101%	105%	113%	108%	110%	112%	107%	110%
All Ages Adjusted...	101%	82%	85%	111%	105%	107%	109%	104%	106%	103%	101%	105%	112%	108%	110%	111%	107%	110%

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE B
EXPOSURES AND DEATHS UNDER INDIVIDUAL IMMEDIATE ANNUITIES
ISSUES OF 1931 TO 1957
EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES

CONTRACT YEARS	NONREFUND ANNUITIES		REFUND ANNUITIES	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income
Exposures				
<i>Males:</i>				
1-5.....	11,747	\$ 7,684,386	20,133	\$ 9,280,012
6 and over.....	66,655	28,418,633	127,081	42,485,143
All Contract Years.....	78,402	\$ 36,103,019	147,214	\$ 51,765,155
<i>Females:</i>				
1-5.....	20,522	\$ 8,759,948	39,605	\$ 14,515,720
6 and over.....	230,568	66,386,822	394,693	100,872,893
All Contract Years.....	251,090	\$ 75,146,770	434,298	\$ 115,388,613
Deaths				
<i>Males:</i>				
1-5.....	559	\$ 385,747	887	\$ 447,706
6 and over.....	5,201	2,514,039	8,844	3,055,144
All Contract Years.....	5,760	\$ 2,899,786	9,731	\$ 3,502,850
<i>Females:</i>				
1-5.....	532	\$ 240,608	893	\$ 397,736
6 and over.....	13,478	4,122,492	20,709	5,269,668
All Contract Years.....	14,010	\$ 4,363,100	21,602	\$ 5,667,404

TABLE C
INDIVIDUAL IMMEDIATE ANNUITIES
ISSUES OF 1931 TO 1957
EXPERIENCE BETWEEN 1953 AND 1958 ANNIVERSARIES
NONREFUND—MALE LIVES

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON <i>a</i> -1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Con- tracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Con- tracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Con- tracts	Amounts of Annual Income
<i>Year 1</i>												
Under 50...	34	\$ 13,937	1	\$ 485	.22	\$ 92	*	*	.12	\$ 54	*	*
50-59.....	251	107,370	4	1,984	3.68	1,592	*	*	2.88	1,247	*	*
60-69.....	969	579,564	19	20,041	28.93	17,590	<i>66%</i>	<i>114%</i>	23.41	14,269	<i>81%</i>	<i>140%</i>
70-79.....	979	930,264	54	40,583	57.45	53,024	<i>94</i>	<i>77</i>	51.90	47,608	<i>104</i>	<i>85</i>
80 and over..	308	301,062	16	19,169	33.37	32,826	<i>48</i>	<i>58</i>	34.83	34,297	<i>46</i>	<i>56</i>
All Ages..	2,541	\$ 1,932,197	94	\$ 82,262	123.65	\$ 105,124	<i>76%</i>	<i>78%</i>	113.14	\$ 97,475	<i>83%</i>	<i>84%</i>
<i>Year 2</i>												
Under 50...	25	\$ 12,454	0	\$ 0	.18	\$ 72	*	*	.08	\$ 42	*	*
50-59.....	227	92,100	4	2,109	3.41	1,388	*	*	2.67	1,087	*	*
60-69.....	883	480,875	22	9,141	26.95	14,834	<i>82%</i>	<i>62%</i>	21.87	12,048	<i>101%</i>	<i>76%</i>
70-79.....	996	851,136	48	27,970	58.52	49,208	<i>82</i>	<i>57</i>	52.87	44,258	<i>91</i>	<i>63</i>
80 and over..	367	330,899	30	23,441	40.10	36,570	<i>75</i>	<i>64</i>	41.97	38,393	<i>71</i>	<i>61</i>
All Ages..	2,498	\$ 1,767,464	104	\$ 62,661	129.16	\$ 102,072	<i>81%</i>	<i>61%</i>	119.46	\$ 95,828	<i>87%</i>	<i>65%</i>

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE C—Continued
NONREFUND—MALE LIVES—Continued

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON 1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Con- tracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Con- tracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Con- tracts	Amounts of Annual Income
<i>Year 3</i>												
Under 50...	26	\$ 13,658	0	\$ 0	.16	\$ 78	*	*	.09	\$ 41	*	*
50-59.....	177	69,032	2	1,309	2.71	1,060	*	*	2.13	831	*	*
60-69.....	772	391,733	28	9,017	23.93	12,288	117%	67%	19.43	9,992	144%	90%
70-79.....	990	694,442	44	28,202	58.59	41,855	75	67	53.05	37,995	83	74
80 and over.	369	342,609	45	53,521	41.94	38,354	107	140	44.41	40,458	101	132
All Ages..	2,334	\$ 1,511,474	119	\$ 92,049	127.33	\$ 93,635	93%	98%	119.11	\$ 89,317	100%	103%
<i>Year 4</i>												
Under 50...	26	\$ 12,185	2	\$ 3,388	.14	\$ 74	*	*	.08	\$ 40	*	*
50-59.....	141	49,300	1	109	2.12	760	*	*	1.67	598	*	*
60-69.....	682	318,622	23	5,165	21.35	10,103	108%	51%	17.39	8,231	132%	63%
70-79.....	974	619,079	45	23,123	56.90	37,166	79	62	51.33	33,726	88	69
80 and over.	368	312,344	38	44,983	43.02	34,922	88	129	45.97	36,805	83	122
All Ages..	2,191	\$ 1,311,530	109	\$ 76,768	123.53	\$ 83,025	88%	92%	116.44	\$ 79,400	94%	97%
<i>Year 5</i>												
Under 50...	25	\$ 8,416	0	\$ 0	.13	\$ 53	*	*	.09	\$ 30	*	*
50-59.....	123	45,867	1	109	1.81	685	*	*	1.42	536	*	*
60-69.....	621	268,887	19	2,867	19.33	8,390	98%	34%	15.76	6,831	121%	42%
70-79.....	985	515,212	64	28,828	57.34	30,640	112	94	51.68	27,733	124	104
80 and over.	429	323,339	49	40,203	50.01	36,631	98	110	53.41	38,720	92	104
All Ages..	2,183	\$ 1,161,721	133	\$ 72,007	128.62	\$ 76,399	103%	94%	122.36	\$ 73,850	109%	98%

TABLE C—Continued
NONREFUND—MALE LIVES—Continued

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON <i>a</i> -1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income
<i>Years 6 and over</i>												
Under 50...	795	\$ 264,630	3	\$ 343	4.53	\$ 1,613	*	*	2.61	\$ 941	*	*
50-59.....	3,464	896,077	52	18,748	50.33	13,330	103%	141%	39.28	10,421	132%	180%
60-69.....	11,273	4,245,383	250	133,331	337.45	128,858	74	103	273.55	104,578	91	127
70-79.....	26,914	11,230,588	1,593	616,705	1,650.71	696,276	97	89	1,503.87	635,770	106	97
80 and over..	24,209	11,781,955	3,303	1,744,912	3,069.06	1,491,102	108	117	3,355.91	1,628,901	98	107
All Ages..	66,655	\$28,418,633	5,201	\$2,514,039	5,112.08	\$2,331,179	102%	108%	5,175.22	\$2,380,611	100%	106%
<i>All Years</i>												
Under 50...	931	\$ 325,280	6	\$ 4,216	5.36	\$ 1,982	*	*	3.07	\$ 1,148	*	*
50-59.....	4,383	1,259,746	64	24,368	64.06	18,815	100%	130%	50.05	14,720	128%	166%
60-69.....	15,200	6,285,064	361	179,562	457.94	192,063	79	93	371.41	155,949	97	115
70-79.....	31,838	14,840,721	1,848	765,411	1,939.51	908,169	95	84	1,764.70	827,090	105	93
80 and over..	26,050	13,392,208	3,481	1,926,229	3,277.50	1,670,405	106	115	3,576.50	1,817,574	97	106
All Ages..	78,402	\$36,103,019	5,760	\$2,899,786	5,744.37	\$2,791,434	100%	104%	5,765.73	\$2,816,481	100%	103%

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE C—Continued
NONREFUND—FEMALE LIVES

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON <i>a</i> -1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income
<i>Year 1</i>												
Under 50...	34	\$ 18,516	0	\$ 0	.16	\$ 90	*	*	.05	\$ 42	*	*
50-59.....	319	146,529	3	263	3.29	1,494	*	*	1.73	778	*	*
60-69.....	1,571	653,916	13	6,763	32.19	13,463	40%	50%	20.77	8,693	63%	78%
70-79.....	1,492	841,136	27	16,341	58.18	33,564	46	49	49.15	28,649	55	57
80 and over..	391	269,869	21	14,058	29.51	20,651	71	68	33.59	23,620	63	60
All Ages..	3,807	\$ 1,929,966	64	\$ 37,425	123.33	\$ 69,262	52%	54%	105.29	\$ 61,782	61%	61%
<i>Year 2</i>												
Under 50...	30	\$ 13,569	0	\$ 0	.13	\$ 66	*	*	.05	\$ 32	*	*
50-59.....	289	134,267	4	1,011	2.98	1,366	*	*	1.56	712	*	*
60-69.....	1,589	600,899	24	7,582	33.10	12,605	73%	60%	21.49	8,203	112%	92%
70-79.....	1,635	784,590	45	31,864	64.24	31,535	70	101	54.45	26,996	83	118
80 and over..	422	265,741	11	6,522	32.34	20,907	34	31	37.09	24,266	30	27
All Ages..	3,965	\$ 1,799,066	84	\$ 46,979	132.79	\$ 66,479	63%	71%	114.64	\$ 60,209	73%	78%
<i>Year 3</i>												
Under 50...	15	\$ 5,324	0	\$ 0	.07	\$ 26	*	*	.01	\$ 12	*	*
50-59.....	263	105,717	6	1,707	2.75	1,092	*	*	1.43	571	*	*
60-69.....	1,518	510,141	19	6,910	31.81	10,723	60%	64%	20.67	6,980	92%	99%
70-79.....	1,726	776,583	47	15,474	68.01	30,772	69	50	57.70	26,199	81	59
80 and over..	530	308,057	28	13,102	40.96	24,654	68	53	47.28	28,927	59	45
All Ages..	4,052	\$ 1,705,822	100	\$ 37,193	143.60	\$ 67,267	70%	55%	127.09	\$ 62,689	79%	59%

TABLE C—Continued
NONREFUND—FEMALE LIVES—Continued

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON a-1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income
<i>Year 4</i>												
Under 50...	24	\$ 8,244	1	\$ 181	.10	\$ 38	*	*	.04	\$ 17	*	*
50-59.....	255	102,126	3	392	2.62	1,073	*	*	1.38	563	*	*
60-69.....	1,545	471,116	17	2,228	32.50	9,877	<i>52%</i>	<i>23%</i>	21.18	6,420	<i>80%</i>	<i>35%</i>
70-79.....	1,775	726,819	57	19,735	70.09	29,001	<i>81</i>	<i>68</i>	59.53	24,745	<i>96</i>	<i>80</i>
80 and over..	594	321,415	39	20,068	46.92	26,085	<i>83</i>	<i>77</i>	54.86	30,872	<i>71</i>	<i>65</i>
All Ages..	4,193	\$ 1,629,720	117	\$ 42,604	152.23	\$ 66,074	<i>77%</i>	<i>64%</i>	136.99	\$ 62,617	<i>85%</i>	<i>68%</i>
<i>Year 5</i>												
Under 50...	25	\$ 10,819	0	\$ 0	.10	\$ 42	*	*	.03	\$ 20	*	*
50-59.....	266	96,990	2	50	2.74	966	*	*	1.42	503	*	*
60-69.....	1,575	482,679	25	7,810	33.25	10,012	<i>75%</i>	<i>78%</i>	21.68	6,494	<i>115%</i>	<i>120%</i>
70-79.....	1,962	777,633	82	31,606	78.32	31,820	105	99	66.94	27,474	122	115
80 and over..	677	327,253	58	36,941	53.98	26,692	107	138	63.46	31,689	91	117
All Ages..	4,505	\$ 1,695,374	167	\$ 76,407	168.39	\$ 69,532	<i>99%</i>	<i>110%</i>	153.53	\$ 66,180	<i>109%</i>	<i>115%</i>

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE C—Continued
NONREFUND—FEMALE LIVES—Continued

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON a-1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Con- tracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Num- ber of Con- tracts	Amounts of An- nual Income	Number of Contracts	Amounts of Annual Income	Num- ber of Con- tracts	Amounts of An- nual Income
<i>Years 6 and over</i>												
Under 50...	1,348	\$ 446,666	2	\$ 369	5.47	\$ 1,843	*	*	2.57	\$ 861	*	*
50-59.....	5,805	1,869,789	47	10,532	59.46	19,072	79%	55%	31.00	9,938	152%	106%
60-69.....	35,787	10,410,038	482	125,702	761.97	220,859	63	57	498.39	144,280	97	87
70-79.....	97,361	26,482,943	3,643	988,140	4,125.69	1,124,680	88	88	3,616.06	986,891	101	100
80 and over..	90,267	27,177,386	9,304	2,997,749	7,877.15	2,461,217	118	122	9,719.27	3,103,179	96	97
All Ages..	230,568	\$66,386,822	13,478	\$4,122,492	12,829.74	\$3,827,671	105%	108%	13,867.29	\$4,245,149	97%	97%
<i>All Years</i>												
Under 50...	1,476	\$ 503,138	3	\$ 550	6.03	\$ 2,105	*	*	2.75	\$ 984	*	*
50-59.....	7,197	2,455,418	65	13,955	73.84	25,063	88%	56%	38.52	13,065	169%	107%
60-69.....	43,585	13,128,789	580	156,995	924.82	277,539	63	57	604.18	181,070	96	87
70-79.....	105,951	30,389,704	3,901	1,103,160	4,464.53	1,281,372	87	86	3,903.83	1,120,954	100	98
80 and over..	92,881	28,669,721	9,461	3,088,440	8,080.86	2,580,206	117	120	9,955.55	3,242,553	95	95
All Ages..	251,090	\$75,146,770	14,010	\$4,363,100	13,550.08	\$4,166,285	103%	105%	14,504.83	\$4,558,626	97%	96%

TABLE C—Continued
REFUND—MALE LIVES

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON a-1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income
<i>Year 1</i>												
Under 50...	154	\$ 75,519	0	\$ 0	.74	\$ 359	*	*	.43	\$ 205	*	*
50-59.....	447	176,734	12	4,403	6.55	2,593	<i>183%</i>	<i>170%</i>	5.10	2,021	<i>235%</i>	<i>218%</i>
60-69.....	1,718	833,965	44	34,363	50.93	24,968	<i>86</i>	<i>138</i>	41.18	20,215	<i>107</i>	<i>170</i>
70-79.....	1,228	763,747	57	32,957	69.60	42,772	<i>82</i>	<i>77</i>	62.44	38,274	<i>91</i>	<i>86</i>
80 and over..	371	223,818	29	26,395	39.70	23,467	<i>73</i>	<i>112</i>	41.16	24,209	<i>70</i>	<i>109</i>
All Ages..	3,918	\$ 2,073,783	142	\$ 98,118	167.52	\$ 94,159	<i>85%</i>	<i>104%</i>	150.31	\$ 84,924	<i>94%</i>	<i>116%</i>
<i>Year 2</i>												
Under 50...	142	\$ 62,459	1	\$ 145	.71	\$ 295	*	*	.41	\$ 165	*	*
50-59.....	426	156,030	11	8,665	6.25	2,247	<i>176%</i>	<i>386%</i>	4.89	1,749	<i>225%</i>	<i>495%</i>
60-69.....	1,701	753,073	49	22,875	51.41	23,045	<i>95</i>	<i>99</i>	41.65	18,700	<i>118</i>	<i>122</i>
70-79.....	1,301	774,030	73	44,130	72.93	44,009	<i>100</i>	<i>100</i>	65.28	39,494	<i>112</i>	<i>112</i>
80 and over..	418	221,644	29	17,499	45.10	23,377	<i>64</i>	<i>75</i>	46.93	24,178	<i>62</i>	<i>72</i>
All Ages..	3,988	\$ 1,967,236	163	\$ 93,314	176.40	\$ 92,973	<i>92%</i>	<i>100%</i>	159.16	\$ 84,286	<i>102%</i>	<i>111%</i>
<i>Year 3</i>												
Under 50...	149	\$ 61,366	1	\$ 401	.71	\$ 281	*	*	.38	\$ 153	*	*
50-59.....	418	137,407	7	955	6.05	2,031	*	*	4.72	1,583	*	*
60-69.....	1,621	679,118	49	14,057	50.01	21,186	<i>98%</i>	<i>660%</i>	40.62	17,229	<i>121%</i>	<i>82%</i>
70-79.....	1,364	732,578	79	49,837	77.24	41,837	<i>102</i>	<i>119</i>	69.26	37,559	<i>141</i>	<i>133</i>
80 and over..	469	255,749	34	14,411	51.41	27,069	<i>66</i>	<i>53</i>	53.79	28,044	<i>63</i>	<i>51</i>
All Ages..	4,021	\$ 1,866,218	170	\$ 79,661	185.42	\$ 92,404	<i>92%</i>	<i>86%</i>	168.77	\$ 84,568	<i>101%</i>	<i>94%</i>

* Less than 10 contracts terminated by death.

Note.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE C—Continued
REFUND—MALE LIVES—Continued

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON G-1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income
<i>Year 4</i>												
Under 50 . . .	163	\$ 58,030	1	\$ 1,831	.81	\$ 307	*	*	.44	\$ 179	*	*
50-59	391	122,157	7	2,289	5.64	1,766	*	*	4.41	1,378	*	*
60-69	1,473	591,242	33	9,043	46.21	18,441	71%	49%	37.61	15,006	88%	60%
70-79	1,461	714,183	88	32,789	82.80	41,048	106	80	74.24	36,894	119	89
80 and over . .	509	250,204	53	32,994	56.91	27,531	93	120	59.90	28,837	88	114
All Ages . . .	3,997	\$ 1,735,816	182	\$ 78,946	192.37	\$ 89,093	95%	89%	176.60	\$ 82,294	103%	96%
<i>Year 5</i>												
Under 50 . . .	158	\$ 55,060	1	\$ 365	.86	\$ 314	*	*	.48	\$ 184	*	*
50-59	377	114,501	6	2,347	5.30	1,622	*	*	4.14	1,260	*	*
60-69	1,431	532,441	47	16,637	44.69	16,720	105%	100%	36.39	13,619	129%	122%
70-79	1,671	695,103	118	46,684	93.97	39,823	126	117	84.14	35,789	140	130
80 and over . .	572	239,854	58	31,634	65.00	27,022	89	117	68.77	28,507	84	111
All Ages . . .	4,209	\$ 1,636,959	230	\$ 97,667	209.82	\$ 85,501	110%	114%	193.92	\$ 79,359	119%	123%

TABLE C--Continued
REFUND—MALE LIVES—Continued

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON <i>q</i> -1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income
<i>Years 6 and over</i>												
Under 50...	5,012	\$ 1,685,835	41	\$ 13,953	27.81	\$ 9,677	<i>147%</i>	<i>144%</i>	16.20	\$ 5,636	253%	248%
50-59.....	11,244	3,442,426	150	64,361	162.07	49,347	93	130	126.26	38,396	119	168
60-69.....	29,512	9,766,838	994	315,594	874.96	291,042	114	108	708.84	235,882	140	134
70-79.....	48,009	16,509,849	3,118	1,044,986	2,875.05	987,198	108	106	2,607.14	894,784	120	117
80 and over..	33,304	11,080,195	4,541	1,616,250	4,133.26	1,388,210	110	116	4,495.74	1,514,961	101	107
All Ages..	127,081	\$42,485,143	8,844	\$3,055,144	8,073.15	\$2,725,474	110%	112%	7,954.18	\$2,689,659	111%	114%
<i>All Years</i>												
Under 50...	5,778	\$ 1,998,269	45	\$ 16,695	31.64	\$ 11,233	<i>142%</i>	<i>149%</i>	18.34	\$ 6,522	245%	256%
50-59.....	13,303	4,149,255	193	83,020	191.86	59,606	101	139	149.52	46,387	129	179
60-69.....	37,456	13,156,677	1,216	412,569	1,118.21	395,402	109	104	906.29	320,651	134	129
70-79.....	55,034	20,189,490	3,533	1,251,383	3,271.59	1,196,687	108	105	2,962.50	1,082,794	119	116
80 and over..	35,643	12,271,464	4,744	1,739,183	4,391.38	1,516,676	108	115	4,766.29	1,648,736	100	105
All Ages..	147,214	\$51,765,155	9,731	\$3,502,850	9,004.68	\$3,179,604	108%	110%	8,802.94	\$3,105,090	111%	113%

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE C—Continued
REFUND—FEMALE LIVES

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON Q-1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income
<i>Year 1</i>												
Under 50...	305	\$ 146,105	1	\$ 655	1.22	\$ 622	*	*	.58	\$ 291	*	*
50-59.....	992	480,033	4	3,403	9.78	4,721	*	*	5.08	2,443	*	*
60-69.....	2,959	1,177,252	29	12,056	58.26	23,085	50%	52%	37.05	14,661	78%	82%
70-79.....	2,197	927,752	34	23,311	86.60	36,758	39	63	73.54	31,264	46	75
80 and over.	570	264,415	18	7,515	42.18	19,307	43	39	47.66	21,660	38	35
All Ages..	7,023	\$ 2,995,557	86	\$ 46,940	198.04	\$ 84,493	43%	56%	163.91	\$ 70,319	52%	67%
<i>Year 2</i>												
Under 50...	287	\$ 136,259	0	\$ 0	1.10	\$ 581	*	*	.54	\$ 271	*	*
50-59.....	924	423,064	7	1,162	9.14	4,156	*	*	4.74	2,154	*	*
60-69.....	3,033	1,116,067	33	8,345	60.42	22,132	55%	38%	38.59	14,106	86%	59%
70-79.....	2,470	961,817	65	36,033	97.78	38,472	66	94	83.20	32,869	78	110
80 and over.	742	311,095	43	17,431	55.57	22,993	77	76	63.02	25,897	68	67
All Ages..	7,456	\$ 2,948,302	148	\$ 62,971	224.01	\$ 88,334	66%	71%	190.09	\$ 75,297	78%	84%
<i>Year 3</i>												
Under 50...	263	\$ 125,541	0	\$ 0	.97	\$ 513	*	*	.47	\$ 237	*	*
50-59.....	859	357,113	2	201	8.48	3,484	*	*	4.37	1,803	*	*
60-69.....	3,101	1,094,485	43	18,922	62.70	22,068	69%	86%	40.25	14,167	107%	134%
70-79.....	2,684	965,830	67	35,830	106.42	38,865	63	92	90.63	33,313	74	108
80 and over.	891	354,749	57	36,049	67.52	26,869	84	134	76.99	30,624	74	118
All Ages..	7,798	\$ 2,897,718	169	\$ 91,002	246.09	\$ 91,799	69%	99%	212.71	\$ 80,144	79%	114%

TABLE C—Continued
REFUND—FEMALE LIVES—Continued

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON <i>q</i> -1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income
<i>Year 4</i>												
Under 50...	292	\$ 136,186	1	\$ 249	1.06	\$ 543	*	*	.47	\$ 255	*	*
50-59.....	810	302,108	8	3,058	7.99	2,961	*	*	4.16	1,534	*	*
60-69.....	3,145	1,020,143	43	16,974	64.28	20,611	<i>67%</i>	<i>82%</i>	41.45	13,245	<i>104%</i>	<i>128%</i>
70-79.....	3,036	1,021,848	87	48,231	121.02	41,313	<i>72%</i>	<i>117%</i>	103.35	35,498	<i>84%</i>	<i>136%</i>
80 and over..	1,062	345,511	70	26,482	81.65	26,582	<i>86%</i>	<i>100%</i>	93.89	30,577	<i>75%</i>	<i>87%</i>
All Ages..	8,345	\$ 2,825,796	209	\$ 94,994	276.00	\$ 92,010	<i>76%</i>	<i>103%</i>	243.32	\$ 81,109	<i>86%</i>	<i>117%</i>
<i>Year 5</i>												
Under 50...	299	\$ 132,596	0	\$ 0	1.06	\$ 516	*	*	.49	\$ 242	*	*
50-59.....	810	305,542	3	1,179	8.11	3,011	*	*	4.20	1,562	*	*
60-69.....	3,208	973,861	52	16,609	66.03	19,815	<i>79%</i>	<i>84%</i>	42.68	12,759	<i>122%</i>	<i>130%</i>
70-79.....	3,352	1,034,488	127	52,970	132.71	41,494	<i>96%</i>	<i>128%</i>	112.96	35,516	<i>112%</i>	<i>149%</i>
80 and over..	1,314	401,860	99	31,071	102.48	31,348	<i>97%</i>	<i>99%</i>	118.91	36,436	<i>83%</i>	<i>85%</i>
All Ages..	8,983	\$ 2,848,347	281	\$ 101,829	310.39	\$ 96,184	<i>91%</i>	<i>106%</i>	279.24	\$ 86,515	<i>101%</i>	<i>118%</i>

* Less than 10 contracts terminated by death.

NOTE.—Mortality ratio in italics where less than 50 but not less than 10 contracts terminated by death.

TABLE C—Continued
REFUND—FEMALE LIVES—Continued

ATTAINED AGES BY CONTRACT YEAR	EXPOSURES		ACTUAL DEATHS		BASED ON 1937 STANDARD ANNUITY TABLE				BASED ON a-1949 TABLE			
					EXPECTED DEATHS		MORTALITY RATIO		EXPECTED DEATHS		MORTALITY RATIO	
	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of An- nual Income	Number of Contracts	Amounts of Annual Income	Number of Contracts	Amounts of An- nual Income
<i>Years 6 and over</i>												
Under 50 . . .	9,219	\$ 3,090,666	35	\$ 18,105	35.62	\$ 11,994	98%	151%	16.60	\$ 5,591	211%	324%
50-59	21,466	6,816,404	169	55,517	213.16	66,867	79	83	110.60	34,620	153	160
60-69	84,951	23,093,339	1,299	363,513	1,765.44	477,314	74	76	1,145.13	309,052	113	118
70-79	160,227	39,500,590	6,369	1,596,224	6,649.93	1,638,636	96	97	5,776.04	1,423,192	110	112
80 and over . .	118,830	28,371,894	12,837	3,236,309	10,321.66	2,505,440	124	129	12,711.67	3,114,982	101	104
All Ages . . .	394,693	\$100,872,893	20,709	\$5,269,668	18,985.81	\$4,700,251	109%	112%	19,760.04	\$4,887,437	105%	108%
<i>All Years</i>												
Under 50 . . .	10,665	\$ 3,767,353	37	\$ 19,009	41.03	\$ 14,769	92%	129%	19.15	\$ 6,887	193%	276%
50-59	25,861	8,684,264	193	64,520	256.66	85,200	75	76	133.15	44,116	145	146
60-69	100,397	28,475,147	1,499	436,419	2,077.13	585,025	72	75	1,345.15	377,990	111	115
70-79	173,966	44,412,325	6,749	1,792,599	7,194.46	1,835,538	94	98	6,239.72	1,591,652	108	113
80 and over . .	123,409	30,049,524	13,124	3,354,857	10,671.06	2,632,539	123	127	13,112.14	3,260,176	100	103
All Ages . . .	434,298	\$115,388,613	21,602	\$5,667,404	20,240.34	\$5,153,071	107%	110%	20,849.31	\$5,280,821	104%	107%

IMPROVEMENT RATES AND PROJECTION FACTORS ACCORDING TO PROJECTION B

The mortality ratios in Tables 4 and 5 were based on expected deaths calculated on the *a*-1949 Table with Projection B. Such expected deaths were calculated from those on the *a*-1949 Table without projection by multiplying the latter by projection factors reflecting the improvement in mortality, according to Projection B, through the period covered by the present study.

In calculating the projection factors, the assumptions detailed in the paper, "A New Mortality Basis for Annuities" (*TS.A I*, page 424), were followed. Briefly, it was assumed that the mortality rates of the *a*-1949 Table continued throughout the calendar year 1950, and that the first decrease in mortality occurred at the beginning of 1951. Since the present study covers the period from 1953 to 1958 anniversaries, the average improvement was assumed to be

$$\frac{1}{10} \left[\left(1 - \frac{S_x}{100}\right)^{1953-1950} + \left(1 - \frac{S_x}{100}\right)^{1958-1950} \right] + \frac{1}{5} \sum_{t=1954}^{t=1957} \left(1 - \frac{S_x}{100}\right)^{t-1950}$$

As a practical matter, the formula

$$\frac{1}{2} \left[\left(1 - \frac{S_x}{100}\right)^{1953-1950} + \left(1 - \frac{S_x}{100}\right)^{1958-1950} \right]$$

was used to represent the average improvement factor for the experience from 1953 to 1958 anniversaries. While it would have been desirable to apply projection factors separately to each calendar year's experience, the form of the data precluded such a procedure.

The table below shows the annual rates of improvement in mortality according to Projection B and the projection factors which were applied to expected deaths for the 1953-58 experience.

PROJECTION B IMPROVEMENT FACTORS

Attained Age	Rate of Decrease per Year in Mortality Rate	Reduction in Mortality Rate from 1950 through 1953-58
10-50	1.25%	6.638%
60	1.20	6.382
65	1.10	5.866
70	.95	5.087
75	.75	4.039
80	.50	2.712
85	.25	1.365
90	.00	0