

LONG-RANGE COST ESTIMATES FOR OLD-AGE AND SURVIVORS INSURANCE, 1946

By

Robert J. Myers

ACTUARIAL STUDY NO. 23  
April 1947

Federal Security Agency  
SOCIAL SECURITY ADMINISTRATION  
Office of the Actuary

This study has been prepared for the use of the staff of the Social Security Administration and for limited circulation to other administrative, insurance, and research persons concerned with the subject treated. It has not been submitted to the Commissioner for Social Security for official approval.

SUPPLEMENT TO ACTUARIAL STUDY NO. 23  
(Supersedes Table 17)

ESTIMATED PROGRESS OF OASI TRUST FUND UNDER CONTRIBUTION  
SCHEDULE IN 1947 AMENDMENTS<sup>a/</sup>  
(All figures in millions of dollars)

<u>Calendar Year</u>	<u>Contributions</u>	<u>Benefit Payments</u>	<u>Administrative Expenses</u>	<u>Net Income</u>	<u>Interest on Fund<sup>b/</sup></u>	<u>Fund at End of Year</u>
<b>Low Employment, Low Cost Assumptions</b>						
1950	1195	755	26	414	177	9368
1955	1782	1102	31	649	265	13810
1960	1850	1446	37	367	345	17773
1970	2068	2094	48	-74	461	23429
1980	2250	2824	60	-634	487	24497
1990	2418	3469	70	-1121	399	19772
2000	2616	3765	76	-1225	219	10542
<b>Low Employment, High Cost Assumptions</b>						
1950	1191	929	39	223	162	8488
1955	1788	1346	47	395	225	11643
1960	1872	1748	55	69	273	13929
1970	2078	2704	73	-699	274	13595
1980	2182	3919	96	-1833	70	2578
1990	2236	5118	118	-3000		(Fund exhausted in 1982)
<b>High Employment, Low Cost Assumptions</b>						
1950	2105	629	34	1442	250	13716
1955	3198	1046	41	2111	486	25800
1960	3360	1469	49	1842	743	38762
1970	3788	2421	67	1300	1252	64452
1980	4166	3474	85	607	1743	89149
1990	4482	4509	104	-131	2177	110926
2000	4848	5072	115	-339	2583	131604
<b>High Employment, High Cost Assumptions</b>						
1950	2075	952	51	1072	220	12012
1955	3170	1482	62	1626	409	21611
1960	3358	2062	75	1221	600	31172
1970	3762	3442	104	216	901	46005
1980	4010	5191	139	-1320	996	50063
1990	4114	7125	176	-3187	733	35712
2000	4170	8463	202	-4495		(Fund exhausted in 2000)

a/ Combined rate of 2% in 1946-49, 3% in 1950-51, and 4% thereafter. In each instance fund at end of 1945 is taken to be the actual figure of \$7,121,000,000.

b/ Interest taken at 2% on fund at end of previous year plus  $\frac{1}{2}$  of the net income of the current year.

## TABLE OF CONTENTS

---

<u>Section</u>	<u>Page</u>
Foreword.....	(iii)
A. Introduction.....	1
B. Basic Assumptions.....	3
C. Results of Cost Estimates under Level Wage Assumption.....	21
D. The Effect of an Increasing Wage Assumption.....	37
E. Comparison with Previous Estimates.....	39

## LIST OF TABLES AND CHARTS

---

<u>Table</u>	<u>Page</u>
1. Estimated U. S. population in future years.....	5
2a Assumed ratios of persons under age 65 with wage credits in year to total population in age group.....	6
2b Assumed ratios of aged persons with wage credits in year to total population in age group.....	7
3a Assumed percentage distributions of persons with wages in year by quarters with wages, year 1950.....	9
3b Assumed percentage distributions of persons with wages in year by quarters with wages, year 2000.....	10
4. Assumed ratios of insured persons to total population.....	11
5. Relationship of wages of 4-quarter persons and other persons.....	13
6. Estimated persons with wage credits, total credited wages, and average creditable wages, 1945-2000.....	14
7. Estimated insured populations as of beginning of year, 1945-2000..	16

LIST OF TABLES AND CHARTS--continued

<u>Table</u>	<u>Page</u>
8. Estimated monthly old-age beneficiaries in current payment status as of middle of year, 1945-2000.....	22
9. Estimated monthly old-age beneficiaries in current payment status as percent of total aged population, 1945-2000.....	23
10. Estimated monthly younger survivor beneficiaries in current payment status as of middle of year and lump-sum death payments in year, 1945-2000.....	24
11. Estimated aged female beneficiaries qualified for both primary benefits and wife's or widow's benefits, in current payment status as of middle of year, 1945-2000.....	26
12. Estimated average annual old-age benefits in current payment status, 1945-2000.....	27
13. Estimated average annual younger survivor benefits in current payment status and lump-sum death payments, 1945-2000.....	28
14. Estimated benefit payments, 1945-2000.....	29
15. Estimated benefit payments as percent of taxable pay roll, 1945-2000	32
16. Estimated level premium contribution rate into perpetuity for benefit payments and administrative expenses, taking into account accumulated fund as of end of 1945.....	33
17. Estimated progress of trust fund under present contribution schedule, 1945-2000.....	35
18. Estimated progress of trust fund under 2% level contribution schedule, 1945 until exhaustion of fund.....	36

---

<u>Chart</u>	<u>Page</u>
1. Illustrative long-term trends of benefits and contributions.....	31
2. Estimated and actual calendar year 1945 benefit payments.....	40
3. Estimated calendar year 1950 benefit payments.....	41
4. Estimated ultimate (year 2000) benefit payments.....	42
5. Estimated ultimate (year 2000) benefit payments as percent of payroll	43

## FOREWORD

Actuarial Study No. 23 is the fourth study in a series dealing specifically with the old-age and survivors insurance program established in 1939. Amendments to the benefit provisions since then, including those made in 1946, are of minor cost significance. Robert J. Myers had completed studies Nos. 14 and 17, dealing with the old-age and survivors insurance program of 1939, before entering military service in 1943. Dorrance C. Bronson prepared Actuarial Study No. 19 in 1943 and 1944.

This is the last of the series of studies completed under the direction of W. R. Williamson as Actuarial Consultant to the Social Security Board and the Social Security Administration, in which capacity he served from 1936 until March 1947.

# LONG-RANGE COST ESTIMATES FOR OLD-AGE AND SURVIVORS INSURANCE, 1946

## A. Introduction

This report is the fourth in a series of studies in regard to the actuarial costs of the present old-age and survivors insurance program. Prior to 1946 there had been no substantial changes made in the program set up in 1939 other than the repeated "freezing" of the total contribution rate at 2%. The Social Security Act Amendments of 1946 made several relatively minor benefit changes in the existing system which in general increased the costs slightly and which are taken into account in the new estimates of this report. The more important of these amendments are the elimination of the school-attendance requirement for child's benefits, the liberalization of the dependency requirement for parent's benefits, the more liberal definition of currently insured status, and the restriction on lump-sum death payments where the beneficiary is other than the widow or widower.

The Social Security Act Amendments of 1946 contain one major benefit provision in regard to old-age and survivors insurance which was not mentioned above, namely providing survivor protection for veterans for a limited period after discharge (usually three years). These payments are to be on an entirely independent basis, and the costs are to be met by appropriation from the general Treasury. Since the protection is on a temporary basis and the cost is to be met independently of the regular income of the system, the cost illustrations here disregard both the benefits and the appropriations arising under this special provision. Correspondingly no account is taken of the amendment to the Railroad Retirement Act which provides for coordination of Railroad Retirement and OASI wages in determining survivor benefits. At the present time it is not possible to know whether such coordination will result in decreased or additional disbursements by the OASI system; Congress authorized a study to be made as to the actual experience to result in recommendations as to legislative changes necessary for equitable distribution of the financial burden of such awards as between the two systems.

The first cost estimates for the old-age and survivors insurance program were developed at the time the legislation was enacted (1939) and were subsequently presented in Actuarial Study No. 14. The second series of estimates was developed in 1942 and presented in Actuarial Study No. 17; these were made on the basis of a certain amount of actual operations data, as well as of more complete demographic data such as the 1940 census and the Family Composition Study. The third series of cost estimates was developed in 1943-44, being published as Actuarial Study No. 19. This differed from the previous study in that not only was there available more experience data, but also a differential average wage between the low cost and high cost illustrations was introduced. Because

Actuarial Study No. 19 considered the terms "low cost" and "high cost" as indicating absolute dollar costs rather than percentage costs relative to pay roll, certain difficulties of interpretation and analysis arose. Thus, for both estimates the average cost of the benefits from 1945 to 2000 without interest was 5.6% of pay roll which lead some to believe erroneously that although the dollar costs might have a range, the relative costs were fairly closely predictable, a matter of importance in estimating the necessary contribution rates.

The cost estimates presented in this study have been developed in part to circumvent the above difficulty and in part to take into account the following factors: (a) the minor modifications of the 1946 amendments; (b) the higher economic level prevailing at the present time, both as to numbers employed and average wages; (c) the new demographic projections of the National Resources Planning Board; (d) the further bulk of operating data, which have been subject to many analyses including the study of remarriage experience, marriage of child beneficiaries, employment of various categories of beneficiaries, etc.

In order to have properly appropriate ranges in benefit costs both as to dollar amounts and relative to pay roll, there have been developed, in effect, four separate cost illustrations. On the one hand, there is used as a basis low employment assumptions (corresponding roughly and on the average to 1940-41 conditions as to proportion of population in covered employment combined with wage rates prevailing in 1941-42). On the other hand, the high employment assumptions basis is near-full employment (corresponding closely to current conditions). Under the low employment assumptions the resulting proportion of the total population with covered wages in a year at the present time, or near future, is about 40% (60% for men and 20% for women). The corresponding figure for the high employment assumptions is 50% (75% for men and 27% for women).

Within the low employment assumptions there are two separate illustrations: (1) using "low cost" factors (i.e. low cost relative to pay roll) as to fertility, mortality, retirement rates, remarriage rates, etc.; and (2) using "high cost" factors. Likewise, within the high employment assumptions there are the two separate illustrations-- "low cost" and "high cost." As in the previous studies, the terms "low cost" and "high cost" apply in the aggregate since in some of the component parts (e.g. child's and widow's current benefits) the costs are shown to be higher for the "low cost" illustrations than for the "high cost" ones.

B. Basic Assumptions

Throughout the cost estimates the various assumptions have been selected so as to be consistent with the actual operating data and with the other assumptions, and at the same time so as to represent a reasonable range as to what might be expected for the element under consideration. As in previous studies the figures developed do not represent the widest possible range that could reasonably be anticipated, but rather our studied opinions as to a plausible range. The various basic assumptions are:

(1) Mortality.

The low cost estimates are based on constant mortality rates at the levels of the U.S. 1939-41 Life Tables. The high cost estimates are based on decreasing rates corresponding to the National Resources Planning Board low mortality bases up to age 65 but allowing for a greater improvement in mortality beyond that age so as to take into account the possible great gains which may be made in the future through geriatric medical research.

(2) Birth Rates.

The low cost illustrations are based on high birth rates level into the future at approximately 10% above the National Resources Planning Board high rates; this corresponds with the 1940-45 experience. On the other hand, the two high cost estimates use the medium assumptions of the National Resources Planning Board which allow for a continual moderate decline in birth rates.

(3) Immigration.

For both the low and high cost estimates no net immigration is assumed. This element has only a slight effect on old-age and survivors insurance costs.

(4) Population.

The previous assumptions as to fertility, mortality, and immigration when applied to the existing population result in the basic population projections. At the time this study was begun, there was available an official estimate of the U.S. population as of the middle of 1945 subdivided by age, race, and sex. The availability of these data, which incorporated most of the war deaths as well as the actual high fertility and low civilian mortality experience of the war years, along with the assumed modifications made in the future fertility and mortality rates, made it desirable to develop new population projections of the National Resources Planning Board, which however served as a guide both quantitatively and methodologically. These latter are currently being modified by the Bureau of the Census to allow for the actual demographic experience of the war years, but such figures are just currently becoming available.

Table 1 summarizes the two new population projections.<sup>a/</sup> It will be observed that the population for all ages combined does not show a very wide range as between the low cost and high cost assumptions. If these figures had been developed solely for population projection purposes, a wider range would have been reasonable and desirable. In the high cost projection there are considerably more aged persons and somewhat fewer in the productive ages than in the low cost projection because of the lower mortality and lower fertility assumed in the former. For the year 2000 those age 65 and over represent 9 $\frac{1}{2}$ % of the total population for the low cost projection as contrasted with 16 $\frac{1}{2}$ % for the high cost assumptions. Thus in contrast with 1945, when the corresponding figure was 7 $\frac{1}{4}$ %, there is a relative increase in the proportion of the aged of about 30% for the low cost projection and 125% for the high one. In the 55-year period preceding 1945 the actual increase was 87%.

(5) Employment.

In developing bases for estimating both pay rolls and insured populations, it is necessary to have the proportion of the total population who are in covered employment in a given year by age and sex (differentiation by race does not seem necessary). Valuable guides toward developing assumed ratios exist in the form of the actual wage data for 1940-43 along with the readily available total population estimates for this short period after the 1940 census. As mentioned previously, the low employment assumptions are intended to correspond roughly to the level of 1940-41, while the high employment assumptions are supposed to correspond to virtually full employment. In addition it is hypothesized that in the future the past trend of an increasing proportion of the labor force being in covered employment (as a result of the movement from agriculture to industry) will continue, and that correspondingly women will occupy a greater place in the covered labor force. The various assumed ratios as set down in Table 2 were developed with the cooperation and advice of the economists in the Bureau of Research and Statistics and in the Analysis Division of the Bureau of Old-Age and Survivors Insurance.

Table 2a shows the assumed ratios of persons with wage credits in the year to total population for quinquennial age groups from 15 to 65 for three illustrative years for the two employment assumptions. Table 2b shows corresponding figures for persons age 65 and over. For the latter group, within each employment assumption, there are low and high cost figures given as representing the range due to possible variations in retirement rates. Under low employment assumptions aged workers might endeavor to continue working as long as possible; on the other hand, there may be great pressure for them to retire since benefits are available. Under high employment assumptions the favorable

---

<sup>a/</sup> These two projections as well as several others developed for demographic illustrations will be discussed in more detail in Actuarial Study No. 24.

Table 1

ESTIMATED U. S. POPULATION IN FUTURE YEARS  
(Figures in millions of persons)

<u>Calendar Year</u>	<u>Aged 20-64</u>			<u>Aged 65 &amp; Over</u>			<u>All Ages</u>		
	<u>Men</u>	<u>Women</u>	<u>Total</u>	<u>Men</u>	<u>Women</u>	<u>Total</u>	<u>Men</u>	<u>Women</u>	<u>Total</u>
Census Estimate for 1945									
1945	41	42	83	4.8	5.3	10.1	70	70	140
Projection for Low Cost Assumptions									
1950	43	44	87	5.3	5.9	11.2	73	74	147
1955	43	44	87	6.0	6.7	12.7	76	77	153
1960	44	45	89	6.5	7.5	14.0	79	80	159
1970	47	48	95	7.1	8.8	15.9	83	85	168
1980	50	50	100	7.8	10.1	17.9	89	90	179
1990	52	52	104	8.4	11.1	19.5	94	95	189
2000	57	56	113	8.3	10.7	19.0	99	100	199
Projection for High Cost Assumptions									
1950	43	44	87	5.4	6.0	11.4	73	73	146
1955	44	45	89	6.2	6.9	13.1	75	76	151
1960	45	46	91	7.0	7.9	14.9	77	78	155
1970	49	49	98	8.5	10.0	18.5	81	82	163
1980	50	50	100	10.4	12.4	22.8	85	85	170
1990	51	50	101	12.4	14.7	27.1	86	86	172
2000	52	50	102	13.3	15.2	28.5	87	86	173

Note: See text for description of bases of population projections.

Table 2a

ASSUMED RATIOS OF PERSONS UNDER AGE 65 WITH WAGE CREDITS IN YEAR TO TOTAL POPULATION IN AGE GROUP

Age Group	Low Employment			High Employment		
	1950	1970	2000	1950	1970	2000
<b>Males</b>						
15-19	38%	32%	30%	60%	60%	60%
20-24	73	73	73	84	86	86
25-29	76	77	78	86	91	94
30-34	71	73	75	81	88	90
35-39	62	65	67	71	76	80
40-44	58	61	63	68	72	74
45-49	50	52	54	65	69	71
50-54	44	46	48	61	64	66
55-59	40	41	42	55	58	60
60-64	32	33	33	48	51	52
<b>Females</b>						
15-19	18%	20%	20%	31%	33%	34%
20-24	41	43	43	46	49	51
25-29	33	38	41	42	51	57
30-34	27	33	36	39	48	54
35-39	21	27	29	33	41	45
40-44	18	22	24	25	32	36
45-49	14	17	19	19	24	27
50-54	10	12	14	16	20	23
55-59	7	8	10	12	15	17
60-64	6	7	8	8	11	13

Table 2b

**ASSUMED RATIOS OF AGED PERSONS WITH WAGE CREDITS  
IN YEAR TO TOTAL POPULATION IN AGE GROUP**

<u>Age Group</u>	<u>Low Employment</u>			<u>High Employment</u>		
	<u>1950</u>	<u>1970</u>	<u>2000</u>	<u>1950</u>	<u>1970</u>	<u>2000</u>
Males, Low Cost Estimate						
65-69	20%	21%	21%	40%	41%	43%
70-74	12	12	13	25	26	26
75-79	5	5	5	10	10	10
Males, High Cost Estimate						
65-69	15%	16%	16%	20%	20%	21%
70-74	5	5	5	8	8	8
75-79	2	2	2	2	2	2
Females, Low Cost Estimate						
65-69	2%	2%	2%	5%	6%	8%
70-74	1	1	1	2	2	2
75-79	0	0	0	1	1	1
Females, High Cost Estimate						
65-69	1%	1%	1%	2%	2%	2%
70-74	0	0	0	1	1	1
75-79	0	0	0	0	0	0

opportunities combined with good health and a philosophy of desiring to continue at work might result in a considerable postponement; conversely, eligible aged individuals might "retire" under the OASI program, yet continue working in non-covered employment and draw benefits, or else the increasing availability of supplementary old-age benefits from private pension plans might hasten retirements even under high employment conditions.

Likewise, in developing estimates of covered pay roll and insured populations, it is necessary to have a distribution of persons with wages in a year according to the number of quarters with wages. The actual operating data furnish certain information as to such distributions for the current time. The assumed percentages for 1950 are shown in Table 3a where it will be noted a distinction is made for males as between low and high employment assumptions, but no such differentiation seems plausible for females. Along with the assumption that there will be an upward trend in the proportion of the population in covered employment, it follows that there will very likely be a greater proportion of 4-quarter workers and a lower proportion of 1 and 2-quarter workers. This trend has been introduced into the cost estimates; Table 3b shows the corresponding assumed figures for the year 2000.

From the assumptions as to the proportions of the population in covered employment and the proportions of workers by quarters, there may be developed by general reasoning and diagonal projection the assumed proportions of the total population who are insured. As used hereafter the term "insured" includes both fully insured and currently insured only. Below age 65 currently insured status gives eligibility for most of the benefits that fully insured status does. Moreover, at age 65 and over the category of currently insured only is relatively non-existent, and in future years this will be especially true.

Although a single set of assumptions as to covered employment was set forth for each economic assumption, when there are developed therefrom the proportions insured representing the cumulative effect of employment, a range will be necessary because of the uncertainty involved in the extent of year by year progression of covered employment as between individuals. Table 4 shows the resulting empirically developed ratios of insured persons to total population obtained from a consideration of the assumptions as to extent of covered employment. The lower figure of the range in each case applies to the low cost estimate, while the higher figure is used in the high cost estimate.

(6) Credited Wages for 4-Quarter Workers.

Under the two employment assumptions, 4-quarter employees are assumed to have the following average annual credited wages:

	<u>Low Employment</u>	<u>High Employment</u>
Males	\$1800	\$2400
Females	1080	1440

As may be seen from Table 5, the low employment assumptions correspond roughly with the experience in 1941-42. The high employment assumptions

Table 3a

ASSUMED PERCENTAGE DISTRIBUTIONS OF PERSONS WITH WAGES IN  
YEAR BY QUARTERS WITH WAGES, YEAR 1950

<u>Age Group</u>	<u>1 Quarter</u>	<u>2 Quarters</u>	<u>3 Quarters</u>	<u>4 Quarters</u>	<u>Total</u>
<b>Males, Low Employment</b>					
15-19	30%	25%	20%	25%	100%
20-24	15	15	20	50	100
25-29	10	10	15	65	100
30-34	10	10	13	67	100
35-39	10	10	13	67	100
40-44	10	10	13	67	100
45-49	10	10	13	67	100
50-54	10	10	15	65	100
55-59	10	10	15	65	100
60-64	12	11	15	62	100
65+	15	15	15	55	100
<b>Males, High Employment</b>					
15-19	25%	25%	25%	25%	100%
20-24	15	15	20	50	100
25-29	10	10	15	65	100
30-34	10	10	10	70	100
35-39	9	9	10	72	100
40-44	8	8	10	74	100
45-49	7	7	10	76	100
50-54	7	7	10	76	100
55-59	8	8	10	74	100
60-64	10	10	10	70	100
65+	13	13	14	60	100
<b>Females</b>					
15-19	30%	25%	20%	25%	100%
20-24	16	17	17	50	100
25-29	15	15	15	55	100
30-34	14	13	15	58	100
35-39	12	11	15	62	100
40-44	12	11	15	62	100
45-49	12	11	15	62	100
50-54	12	11	15	62	100
55-59	12	11	15	62	100
60-64	12	11	15	62	100
65+	15	15	15	55	100

Table 3b

ASSUMED PERCENTAGE DISTRIBUTIONS OF PERSONS WITH WAGES IN  
YEAR BY QUARTERS WITH WAGES, YEAR 2000

<u>Age Group</u>	<u>1 Quarter</u>	<u>2 Quarters</u>	<u>3 Quarters</u>	<u>4 Quarters</u>	<u>Total</u>
<b>Males, Low Employment</b>					
15-19	25%	22%	20%	33%	100%
20-24	12	13	20	55	100
25-29	8	8	15	69	100
30-34	8	8	13	71	100
35-39	8	8	13	71	100
40-44	8	8	13	71	100
45-49	8	8	13	71	100
50-54	8	8	15	69	100
55-59	8	8	15	69	100
60-64	9	10	15	66	100
65+	12	13	15	60	100
<b>Males, High Employment</b>					
15-19	20%	22%	25%	33%	100%
20-24	12	12	20	56	100
25-29	7	8	15	70	100
30-34	7	8	10	75	100
35-39	7	7	10	76	100
40-44	6	7	10	77	100
45-49	5	6	10	79	100
50-54	5	6	10	79	100
55-59	6	6	10	78	100
60-64	7	8	10	75	100
65+	10	12	14	64	100
<b>Females</b>					
15-19	25%	23%	20%	32%	100%
20-24	13	14	17	56	100
25-29	12	13	15	60	100
30-34	10	11	15	64	100
35-39	9	9	15	67	100
40-44	9	9	15	67	100
45-49	9	9	15	67	100
50-54	9	9	15	67	100
55-59	9	9	15	67	100
60-64	9	9	15	67	100
65+	12	13	15	60	100

Table 4

ASSUMED RATIOS OF INSURED<sup>a/</sup> PERSONS TO TOTAL POPULATION

Age Group	Low Employment			High Employment		
	1950	1970	2000	1950	1970	2000
Males						
15-19	10-15%	11-16%	12-17%	15-25%	17-27%	19-30%
20-24	50-60	50-60	51-61	60-70	63-73	67-78
25-29	58-68	59-69	61-71	70-80	70-80	73-84
30-34	63-73	57-67	59-69	67-77	71-81	75-86
35-39	63-73	56-66	58-68	68-78	70-80	74-85
40-44	59-69	54-64	57-67	62-72	67-77	73-84
45-49	56-66	53-63	57-67	60-70	69-79	73-84
50-54	50-58	63-70	58-68	54-62	68-78	72-83
55-59	45-51	59-69	58-69	48-55	70-80	72-82
60-64	43-49	56-66	59-69	45-51	62-72	74-84
65-69	40-45	53-63	58-69	42-47	60-70	75-85
70-74	35-39	47-54	58-68	37-41	54-62	76-86
75-79	22-25	44-50	57-67	22-25	47-54	74-85
80-84	13-15	42-47	63-72	13-15	45-51	73-83
85+	1- 2	38-43	60-70	1- 2	39-44	70-80
Females						
15-19	6-11%	7-12%	9-14%	7-12%	10-15%	13-19%
20-24	26-34	27-35	29-38	35-45	37-47	40-51
25-29	32-42	28-36	32-41	34-44	39-49	46-57
30-34	28-36	26-34	30-39	29-37	39-49	47-57
35-39	21-28	25-33	29-37	21-28	37-47	48-58
40-44	18-24	26-34	29-37	19-25	36-46	48-58
45-49	15-20	31-41	29-37	14-19	35-45	45-54
50-54	12-16	26-34	29-37	12-16	27-35	43-52
55-59	10-13	19-26	28-36	10-13	21-28	43-51
60-64	6- 9	16-22	28-36	7-10	17-23	41-51
65-69	5- 7	11-16	28-36	6- 8	12-17	39-49
70-74	4- 5	10-14	27-35	5- 5	11-15	37-47
75-79	1- 2	9-11	31-41	2- 2	9-12	36-46
80-84	0- 1	5- 8	26-34	1- 1	7-10	27-35
85+	0- 0	4- 6	17-24	0- 0	5- 7	19-26

a/ Includes both those fully insured and these currently insured only. At older ages and in future years latter category is relatively negligible.

are somewhat above the 1943 experience, and quite close to the preliminary data for 1944-45 (not shown, but tentative figures are about \$2300 for 4-quarter males and \$1400 for 4-quarter females). As in previous studies no age differential in wage is used because the relatively small variations existing for the vast bulk of employees (those between ages 25 and 65) do not warrant the additional computational difficulties that would arise.

The above wages are assumed to be level into the future. In a subsequent section discussion will be given as to the use of an increasing wage assumption.

(7) Credited Wage for Other than 4-Quarter Workers.

The annual credited wages of workers employed in less than 4 quarters of a year are shown in the table below as a percentage of the assumed annual earnings of 4-quarter employees, with the same proportions holding for both the low and high employment assumptions.

<u>Quarters</u>	<u>Males</u>	<u>Females</u>
1	9%	12%
2	21	24
3	46	48
4	100	100

These figures are based on the actual experience for 1940-43 as may be seen from Table 5. As was the case with 4-quarter employees, it does not seem necessary to have any differential by age.

(8) Credited Pay Roll.

By applying the previous assumptions as to covered employment and wages to the population estimates there are obtained the total persons with credited wages in various years and the aggregate amount of such wages. The resulting data for selected years are shown in Table 6 along with the developed average wage credits for persons with any wages in the year. The number of persons with wages in the year for a particular employment assumption is somewhat lower for the high cost assumptions than for the low cost ones. This results from the fact mentioned previously that under the low cost assumptions there is assumed higher fertility which produces eventually a greater number of persons in the productive ages. The resulting average wage credits for those with wages in the year are about \$1100 to \$1200 for the low employment assumptions and \$1500 to \$1600 for the high employment assumptions. There is an increasing trend with time due to the assumption of a greater proportion of the labor force in the covered population and thus more 4-quarter employment which more than offsets the higher proportion of women workers with their lower assumed earnings. The actual average wage credits for 1945 and 1946, as shown in Table 6, fell within the above range between the low and high employment assumptions although being closer to the latter.

Table 5

## RELATIONSHIP OF WAGES OF 4-QUARTER PERSONS AND OTHER PERSONS

<u>Year</u>	<u>Ages</u>	<u>Average Wage for 4-Quarter Persons</u>	<u>Average Wage as % of 4-Quarter Average</u>		
			<u>3 Quarters</u>	<u>2 Quarters</u>	<u>1 Quarter</u>
Male					
1940 <sup>a/</sup>	All	\$1511	48%	19%	9%
1941 <sup>a/</sup>	All	1700	42	20	9
1942	All	1924	45	22	9
1943	All	2206	46	22	8
1943	Under 25	1423	43	23	9
1943	25-44	2354	54	27	9
1943	45-64	2264	52	26	9
1943	65+	1843	49	25	9
Female					
1940 <sup>a/</sup>	All	\$ 833	50%	23%	13%
1941 <sup>a/</sup>	All	915	44	23	12
1942	All	1029	47	25	12
1943	All	1277	49	24	9
1943	Under 25	1134	46	23	9
1943	25-44	1372	52	25	9
1943	45-64	1292	52	24	10
1943	65+	1126	48	25	11

<sup>a/</sup> Includes only white persons.

Table 6

**ESTIMATED PERSONS WITH WAGE CREDITS, TOTAL CREDITED WAGES,  
AND AVERAGE CREDITABLE WAGES, 1945-2000**

<u>Calendar Year</u>	<u>Persons with Wages in Year (in millions)</u>			<u>Credited Wages in Year (in billions)</u>	<u>Average Wage</u>
	<u>Males</u>	<u>Females</u>	<u>Total</u>		
Actual Data					
1945 <sup>a/</sup>	28.3	18.1	46.4	\$62.0	\$1336
1946	b/	b/	47.2	67.0	1420
Low Employment, Low Cost Assumptions					
1945	27.2	10.1	37.3	\$41.7	\$1119
1950	27.9	10.5	38.4	43.2	1127
1960	29.2	11.5	40.7	46.0	1131
1980	33.8	14.7	48.5	55.9	1153
2000	38.5	16.8	55.3	65.1	1177
Low Employment, High Cost Assumptions					
1945	27.0	10.0	37.0	\$41.4	\$1119
1950	27.8	10.4	38.2	43.1	1127
1960	29.5	11.6	41.1	46.6	1132
1980	32.8	13.7	46.5	54.3	1166
2000	33.4	13.6	47.0	56.2	1195
High Employment, Low Cost Assumptions					
1945	33.8	13.7	47.5	\$72.2	\$1519
1950	34.9	14.5	49.4	75.4	1526
1960	37.8	16.3	54.1	82.7	1530
1980	44.6	21.4	66.0	102.6	1555
2000	50.6	24.6	75.2	119.4	1587
High Employment, High Cost Assumptions					
1945	33.1	13.6	46.7	\$70.9	\$1517
1950	34.3	14.4	48.7	74.3	1525
1960	37.6	16.4	54.0	82.7	1531
1980	42.7	19.9	62.6	98.8	1577
2000	43.4	20.0	63.4	102.7	1620

a/ Preliminary.

b/ Not available.

(9) Insured Population.

By applying the assumed proportions insured to the total population projections, there are obtained the estimated insured populations shown in Table 7. Although the insured population for all ages combined roughly doubles in the next half century, the insured population age 65 and over rises almost tenfold, with the increase being even greater for females.

(10) Marital and Parental Status.

Assumptions as to marital status are necessary in estimating the costs of the various supplementary and survivor benefits. The various assumptions both for men and women are based on general population census data, the effects of the OASI definitions, and the differential marital proportions of the gainfully occupied. Also considered in adjustment of the census data is the material from the 1940-44 claims and from the Family Composition Study. In the high cost estimates the proportion married in the future is adjusted upward at the older ages to allow for the assumed improved mortality resulting in fewer early broken marriages. Assumptions as to relative ages of husband and wife are based on Family Composition Study data, census data, and claims data.

Assumptions as to the proportion of persons with children and the average number of such children in these cases are developed from the census data, the claims data, and the Family Composition Study data. The age distribution of such children was based on claims data. In the high cost estimate where decreasing fertility is assumed, allowance is made for the reduced number of children in future years.

(11) Differential Mortality by Marital Status.

New studies by the Bureau of the Census have confirmed many earlier limited studies as to the lower mortality of married persons and the higher mortality of widowed persons. It is therefore assumed that the married males in the insured population have lower mortality than all insured males, with the differential ranging from 20% at the younger ages to 10% at the older ages. Correspondingly, it is assumed that widows of insured males have higher mortality than all women (with the excess being over 100% at the young ages, decreasing to about 10% at age 65, and declining slowly thereafter). Both of these marital mortality assumptions result in lower benefit costs since with married males having lower mortality, fewer widows and orphans are created, whereas with widows having higher mortality, fewer survive to age 65 than if mortality did not differ by marital status.

(12) Remarriage Rates.

Both aged widow's and widow's current benefits are terminated upon remarriage. The use of remarriage rates takes account of the saving in cost arising therefrom. The limited experience to date indicates that the actual remarriage rates may be somewhat higher than those in the American Remarriage Table. Therefore, the remarriage rates used in the

Table 7

ESTIMATED INSURED<sup>a/</sup> POPULATIONS AS OF BEGINNING OF YEAR, 1945-2000  
(Figures in millions of persons)

Calendar Year	All Ages			Aged 65 and Over		
	Males	Females	Total	Males	Females	Total
Actual Data						
1945	26.3	12.1	38.4	1.1	.1	1.2
1946 <sup>b/</sup>	c/	c/	41.5	c/	c/	1.4
Low Employment, Low Cost Assumptions						
1945	24.7	9.1	33.8	1.1	.1	1.2
1950	25.7	9.3	35.0	1.7	.2	1.9
1960	27.6	10.8	38.4	2.7	.5	3.2
1980	33.6	16.3	49.9	4.4	1.5	5.9
2000	38.3	20.2	58.5	4.8	2.9	7.7
Low Employment, High Cost Assumptions						
1945	28.8	11.9	40.7	1.2	.1	1.3
1950	30.2	12.5	42.7	1.9	.3	2.2
1960	33.4	14.9	48.3	3.2	.7	3.9
1980	41.4	21.5	62.9	6.8	2.5	9.3
2000	45.1	24.9	70.0	9.2	5.4	14.6
High Employment, Low Cost Assumptions						
1945	24.7	9.2	33.9	1.1	.1	1.2
1950	28.5	10.2	38.7	1.8	.2	2.0
1960	32.4	13.1	45.5	2.8	.5	3.3
1980	41.6	21.8	63.4	5.0	1.7	6.7
2000	48.7	29.9	78.6	6.2	3.7	9.9
High Employment, High Cost Assumptions						
1945	28.8	11.9	40.7	1.2	.1	1.3
1950	33.3	13.4	46.7	2.0	.3	2.3
1960	38.9	17.5	56.4	3.4	.8	4.2
1980	50.3	27.5	77.8	7.6	2.7	10.3
2000	56.0	34.8	90.8	11.3	6.6	17.9

a/ Includes both fully insured and currently insured only. In future years, relatively few of those aged 65 and over will be currently insured only.

b/ Preliminary.

c/ Not available.

low cost estimates are 150% of such tabular rates, while in the high cost estimates the tabular rates are used without modification.

(13) Marriage and Mortality of Child Beneficiaries.

Although the primary cause of final termination of child's benefits is attainment of age 18, death or marriage of child beneficiaries is of some cost significance. A subsidiary study was made using mortality and marriage rates based on actual recent experience. Since the effect of both of these factors was found to be relatively small, the same adjustment is made for each of the estimates, namely, a 1% reduction in the number of beneficiaries based on all surviving to age 18 unmarried.

(14) Parent's Benefits.

This relatively minor category is most difficult to estimate. Considerable variation can arise as to the number of parents considered to be "chiefly dependent." As more and more of the aged become eligible for primary, wife's, or widow's benefits the number eligible for parent's benefits will be relatively less. Because of the relative unimportance of this category, no new estimates as to the number of beneficiaries have been made but rather those of Actuarial Study No. 19 have been used again. However, the benefit payments have been recomputed, based on the somewhat higher wage assumptions in the current estimates.

(15) Proportions of Beneficiaries at Work.

Among the various survivor beneficiary categories, there is a considerable saving in disbursements because individuals otherwise eligible are at work in covered employment. In some instances benefits are withheld, while in other cases the beneficiary never files (notably in the case of widow's current benefits where there are sufficient children to obtain the maximum or near maximum benefit anyhow). In developing the cost estimates, there have been estimated the total number of beneficiaries eligible to file. Then reduction factors are applied to allow both for those whose benefits are withheld because of work and for those who do not file for benefits because of the maximum provisions or because they intend to work continuously and thus can not draw benefits anyhow. The table below indicates for the ultimate situation (several decades hence) the percentages of the potential beneficiaries who are assumed to be actually in current payment status for the three important categories of survivor beneficiaries.

	<u>Low Employment</u>		<u>High Employment</u>	
	<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>
Widow's Current	70%	75%	55%	63%
Child's	95	97	90	93
Aged Widow's	99	100	98	99

(16) Alternative Receipt of Benefits.

An important cost element several decades hence, although not very important currently, is the provision that women may not receive full primary benefits in their own right and full wife's or widow's benefits. In effect, in such cases the larger of the two benefits is payable. As a practical matter, it is to the advantage of the woman to claim the full primary benefit and to obtain any additional wife's or widow's benefit as a supplement since the latter may be suspended for a number of reasons not applicable to the former (namely, employment of the husband, divorce, remarriage, etc.). For this reason it has been assumed in these cost estimates, in contrast with the assumption of Actuarial Study No. 19, that all women eligible for primary benefits file therefor, even though qualified for a larger wife's or widow's benefit. It is assumed they receive the excess of such benefits over their primary benefits as a supplement.

Based on claims data with certain modifications to allow for changes in future distributions, estimates have been made as to the proportions of the cases in which the female primary benefit would be smaller than the widow's benefit or the wife's benefit, and for such cases what the average excess over the primary benefit would be. The number of women qualified for both primary benefits and wife's or widow's benefits has been estimated from the number of female primary beneficiaries distributed by marital status, using the assumption that the probability of being eligible for benefits on the basis of the woman's own earnings and on the basis of her husband's earnings was the same as the probability of a woman of that same marital status in the total population being a primary beneficiary. For instance, for a certain year if the married female primary beneficiaries represent 25% of the married aged female population, then it is assumed that 25% of the aged wives of male primary beneficiaries (in current payment status) are primary beneficiaries, or in other words that 75% of such wives are not primary beneficiaries in their own right but solely wife beneficiaries.

Combining the various above assumptions, it is then possible to obtain the number of women who are solely wife or widow beneficiaries and the number of women who are eligible for primary benefits and wife's or widow's benefits, with the latter category being further subdivided into those who had larger wife's or widow's benefits and thus are eligible to receive supplementary payments over their primary benefits.

(17) Adjustment Factors for Average Benefits.

In computing average benefits on the basis of the assumed average wages, proportions of quarters covered, and proportions of years employed, it is necessary to make an adjustment in the resulting figures because of the weighted nature of the benefit formula. Thus, for a given wage distribution the true average benefit will generally be smaller than the benefit based on the average wage. The amount of the

differential depends on a number of factors such as the distribution of the wages, the varying lengths of time in covered employment, and the minimum and maximum provisions.

Based on previous Actuarial Studies and some additional analyses of actual operating data, various modification factors have been derived to allow for this factor. For men, there is a downward adjustment on the average primary benefit of 5% for the low employment estimates and 3% for the high employment estimates for all ages and calendar years. On the other hand, for women it is necessary to vary the adjustment by attained age and calendar year; for the low employment assumptions the downward modification in the early years is 14% at all ages and ultimately 14% at the younger ages, decreasing to 4% at the older ages, while for the high employment assumptions the corresponding figures are 10% for the early years and 10% and 7% ultimately.

Another element necessitating modification of average benefits is the differential in wages by marital status. Thus, married men on the average have higher wages than other men so that the average primary benefit used for monthly survivors benefits should be adjusted upward, while that used for lump-sum death payments should be adjusted downward. Also adjustments are necessary in the various supplementary and survivor benefits to allow for the effect of the minimum and maximum provisions. The lump-sum death payment, when received by other than the spouse, will sometimes be less than six times the primary benefit since such payment cannot be more than actual burial expenses, and thus an adjustment factor should be introduced. Still another modification which should be brought in is to allow for the lower average wages of those dying, in part possibly because of lower economic status on the average and in part because of the effect of the last illness in reducing the average wage; such modification is of significance chiefly only in the early years of operation although it may have some sizable effect even in later years for deaths of young fathers.

The necessary modification factors for the elements discussed in the previous paragraph have all been developed on the basis of actual past claims experience with an informed guess as to the future trend of such element.

(18) Administrative Expenses.

In carrying forward the progress of the trust fund, it is essential to take account of the relatively small item of administrative cost since such outgo in the long run has a significant cumulative affect. After study of the various elements involved, it is believed desirable to base the assumed administrative cost on three factors--pay roll, benefit payments, and a constant amount. The assumptions used for each of the four cost estimates are shown in the table below and seem to give reasonable crude figures both in the short-range and in the long-range. The estimated administrative expenses for a given year are the sum of the results obtained by applying each of the three factors.

	<u>Low Employment</u>		<u>High Employment</u>	
	<u>Low</u>	<u>High</u>	<u>Low</u>	<u>High</u>
% of Pay Roll	0.022%	0.028%	0.022%	0.028%
% of Benefit Payments	1.500%	1.800%	1.600%	1.900%
Flat Amount (millions)	\$5	\$10	\$7	\$12

The application of these assumptions produces estimated annual administrative expenses of \$20-40 million for the present time (as compared with actual expenses of \$30 million in 1945 and \$40 million in 1946) and of \$75-200 million half a century hence when benefit rolls will have expanded greatly. On this basis, ultimately the estimated administrative costs represent only 2 to 2½% of benefit disbursements.

(19) Taxable Pay Roll versus Creditable Pay Roll.

The previous discussion as to wages and pay roll dealt solely with credited wages which are used in determining benefits. However, the effective pay roll on which contributions are based is slightly higher because of the provision that wages in excess of \$3000 when from several employers (with no more than \$3000 from any one employer) are subject to contributions but are not credited toward benefits. In such cases the employee contributions for wages in excess of \$3000 are refundable but those from the employers are not. Study of the actual data for 1940-45 indicates that under low employment (low wage) assumptions the effective taxable pay roll taking into account refunds is about ½% higher than the credited pay roll. For high employment (high wage) assumptions the corresponding figure is 1½%. These factors have been applied to the credited pay roll to yield the taxable pay roll.

### C. Results of Cost Estimates under Level Wage Assumption

In developing the cost estimates the methodology used in computing figures for future years was also applied to obtain figures for 1945, even though the data for that year are known. This is done both as a check on methodology and also to indicate the range in benefit disbursements that there might have been in 1945 under different economic and cost factor conditions. In developing the progress of the trust fund, the progression was assumed to start with the existing fund at the end of the calendar year 1945, with estimates for the years intervening between then and 1950 based on interpolation between the 1945 and 1950 estimates. It will be observed that the two sets of estimates for fiscal years 1947-51 developed for the Seventh Trustees' Report were not used here, since then there would have been seeming inconsistencies in joining the two estimates of that report with the four estimates of this one. Later in this report a comparison is made of the estimates in the Trustees' Report with those presented here.

Table 8 shows the estimated monthly old-age beneficiaries in current payment status for the four series of estimates and also the actual data for 1945. Considering 1945, the high employment, low cost assumptions estimate shows generally fewer beneficiaries than there actually were but the other three estimates are higher than the actual data. Fifty years hence the total monthly old-age beneficiaries are shown to increase from the present level of about 800,000 to a range of from 11 to 23 million. At that time male primary beneficiaries are shown to make up about 40% of the total, female primary beneficiaries about 25%, wife beneficiaries (not eligible for primary benefits) about 10%, widow beneficiaries (not eligible for primary benefits) about 25%, and parent beneficiaries about 1%.

Table 9 relates the estimated total monthly old-age beneficiaries as shown in Table 8 to the total aged population by sex. Whereas at the present time about 9% of all aged men and 6% of all aged women are actually drawing benefits, eventually this proportion will range from 50 to 80% for men and 60 to 80% for women.

Table 10 shows the estimated monthly younger survivor beneficiaries in current payment status for the four estimates as well as the actual data for 1945. Although for all estimates the aged beneficiaries show a steady upward trend, even though to different eventual magnitudes, there are varying trends in the four estimates for the younger survivor beneficiaries. Thus, in the low employment, low cost assumptions there is a steady upward trend with the ultimate figure 50 years hence being about three times the present level. On the other hand, under the low employment, high cost assumptions, a peak of about double the current figure is reached in 1955 with a slow decline thereafter until in the year 2000 the figure is only slightly higher than the present level. The trend under the two high employment estimates is somewhat similar although higher levels are reached. The two diverse trends shown as between the low and high cost assumptions result from the basic assumptions as to fertility.

Table 8

ESTIMATED MONTHLY OLD-AGE BENEFICIARIES IN CURRENT PAYMENT  
STATUS AS OF MIDDLE OF YEAR<sup>a/</sup>, 1945-2000  
(Figures in thousands of persons)

Calendar Year	Primary		Supplementary		Survivor		Total Aged <sup>b/</sup>
	Males	Females	Wife's	Child's	Widow's	Parent's	
Actual Data (as of December)							
1945	447	71	159	13	94	6	777
1946	611	91	216	17	127	7	1052
Low Employment, Low Cost Assumptions							
1945	724	65	249	31	78	23	1139
1950	1291	156	446	50	275	50	2218
1955	1772	237	607	63	570	84	3270
1960	2170	422	735	72	916	111	4354
1970	2886	769	927	94	1570	125	6277
1980	3775	1463	1129	125	2072	127	8566
2000	4228	2873	1104	121	2478	102	10785
Low Employment, High Cost Assumptions							
1945	1002	131	347	44	79	25	1584
1950	1672	261	571	67	287	82	2873
1955	2315	413	786	80	599	145	4258
1960	2890	641	981	87	962	208	5682
1970	4305	1276	1391	107	1688	269	8929
1980	6294	2515	1927	122	2279	292	13307
2000	8617	5349	2441	70	2870	271	19548
High Employment, Low Cost Assumptions							
1945	310	59	111	11	78	23	581
1950	910	155	326	30	276	50	1717
1955	1388	266	490	41	578	84	2806
1960	1765	417	620	48	943	111	3856
1970	2671	747	875	76	1673	125	6091
1980	3696	1459	1119	108	2272	127	8673
2000	4843	3530	1166	121	2768	102	12409
High Employment, High Cost Assumptions							
1945	900	110	315	36	79	25	1429
1950	1634	261	562	61	290	82	2829
1955	2318	459	788	75	604	145	4314
1960	2973	701	1009	84	982	208	5873
1970	4669	1347	1508	109	1777	269	9570
1980	6893	2643	2086	127	2455	292	14369
2000	10483	6532	2665	81	2967	271	22918

a/ For estimated data, this also corresponds to average monthly number in current payment status.

b/ Excludes children of primary beneficiaries and the relatively negligible number of widow's current beneficiaries over 65 but not eligible for widow's benefits.

Note: Women qualified both for primary benefits and for wife's, widow's, or parent's benefits are shown as primary beneficiaries (see Table 1 for estimates of such overlapping cases).

Table 9

ESTIMATED MONTHLY OLD-AGE BENEFICIARIES IN CURRENT PAYMENT STATUS  
AS PERCENT OF TOTAL AGED POPULATION, 1945-2000

Calendar Year	Low Cost Assumptions			High Cost Assumptions		
	Males	Females	Total	Males	Females	Total
Actual Data						
1945	9%	6%	8%	9%	6%	8%
1946	12	8	10	12	8	10
Low Employment Assumptions						
1945	15%	8%	11%	21%	11%	16%
1950	24	16	20	31	20	25
1955	30	22	26	38	28	33
1960	34	29	31	42	35	38
1980	49	47	48	61	56	59
2000	51	61	57	65	71	68
High Employment Assumptions						
1945	6%	5%	6%	19%	10%	14%
1950	17	14	15	30	20	25
1955	24	21	22	38	29	33
1960	28	28	28	43	36	40
1980	48	49	48	67	60	63
2000	59	70	65	79	81	80

Table 10

**ESTIMATED MONTHLY YOUNGER SURVIVOR BENEFICIARIES IN CURRENT  
PAYMENT STATUS AS OF MIDDLE OF YEAR<sup>a/</sup> AND LUMP-SUM  
DEATH PAYMENTS IN YEAR, 1945-2000  
(Figures in thousands of persons)**

<u>Calendar Year</u>	<u>Survivor Benefits</u>		<u>Lump-Sum Payments<sup>b/</sup></u>		
	<u>Widow's Current</u>	<u>Child's</u>	<u>Males</u>	<u>Females</u>	<u>Total</u>
	<u>Actual Data<sup>c/</sup></u>				
1945	121	377	157	29	186
1946	128	445	d/	d/	d/
	<u>Low Employment, Low Cost Assumptions</u>				
1945	104	332	158	35	193
1950	179	591	194	43	237
1955	217	735	231	54	285
1960	236	785	269	71	340
1970	258	838	342	118	460
1980	274	878	401	178	579
2000	313	991	469	304	773
	<u>Low Employment, High Cost Assumptions</u>				
1945	119	343	166	42	208
1950	209	597	193	51	244
1955	244	686	220	61	281
1960	241	647	247	77	324
1970	219	548	316	117	433
1980	202	481	378	181	559
2000	186	409	490	364	854
	<u>High Employment, Low Cost Assumptions</u>				
1945	90	307	158	37	195
1950	149	560	207	48	255
1955	185	727	252	62	314
1960	206	807	298	83	381
1970	238	908	388	134	522
1980	265	999	474	207	681
2000	311	1158	588	397	985
	<u>High Employment, High Cost Assumptions</u>				
1945	107	326	166	42	208
1950	184	577	205	52	257
1955	219	686	237	67	304
1960	222	671	270	84	354
1970	211	597	353	131	484
1980	202	544	434	204	638
2000	192	475	591	433	1024

<sup>a/</sup> For estimated data, this also corresponds to average monthly number in current payment status.

<sup>b/</sup> Number of decedents on whose account payments are made.

<sup>c/</sup> For monthly benefits, as of December.

<sup>d/</sup> Not available.

Table 10 also gives the estimated lump-sum death payments which for all four estimates increase steadily as the insured population grows and becomes older on the average. In the year 2000 the estimated number of lump-sum death payments ranges from about 800,000 to 1 million or about five times the present number. Ultimately almost half of the lump-sum payments will be in respect to women--although at the present time less than 20% are.

Table 11 shows the estimated possible amount of overlapping of female beneficiaries as between primary benefits and wife's or widow's benefits. In the early years there are not many cases of overlapping since relatively few of the current married, older women work sufficiently in covered employment to become insured for primary benefits. However, in later years many married women will have the qualifications for primary benefits due to employment at the younger ages either before or shortly after marriage. Likewise eventually many widows will qualify for primary benefits by reason of employment while single or after the death of their husbands.

In the year 2000 about 15 to 20% of the female primary beneficiaries (as in Table 8) are estimated to be also qualified for wife's benefits. However, since the wife's benefit is only 50% of the husband's primary benefit, in only  $\frac{1}{4}$  to  $\frac{1}{3}$  of such cases is the wife's benefit larger than the wife's primary benefit in her own right.

In the year 2000 approximately 30% of the female primary beneficiaries are estimated as also qualified for widow's benefits. Since the widow's benefit is 75% of the husband's primary benefit, a relatively large proportion of such women (about  $\frac{2}{3}$ ) have a larger widow's benefit than primary benefit in own right. It should be emphasized again that these figures are particularly subject to fluctuations and uncertainty.

Table 12 indicates the estimated average annual old-age benefits in current payment status. Also shown are the additional wife's and widow's average benefits payable for those women who are assumed to receive a full primary benefit which is smaller than the full wife's or widow's benefit otherwise payable. In all instances the average benefit payments show a slow gradual rise. Because of the higher wage assumptions under the high employment estimates, the eventual average benefits are somewhat higher than for the low employment assumptions estimates. For a particular employment assumption the averages tend to be slightly higher under the low cost assumptions than under the high cost assumptions; in general this occurs because the high cost assumptions assume a greater proportion insured and thus by spreading the total covered wages among more persons result in lower average benefits. Table 13 shows estimated average benefits in regard to younger survivors and lump-sum death payments.

Table 14 summarizes the estimated benefit payments along with the actual data for 1945. In general the actual 1945 data are somewhat higher than the high employment, low cost estimate but are lower

Table 11

ESTIMATED AGED FEMALE BENEFICIARIES QUALIFIED FOR BOTH PRIMARY BENEFITS  
AND WIFE'S OR WIDOW'S BENEFITS<sup>a/</sup>, IN CURRENT PAYMENT STATUS  
AS OF MIDDLE OF YEAR<sup>b/</sup>, 1945-2000  
(Figures in thousands of persons)

Calendar Year	Qualified for Primary and Wife's		Qualified for Primary and Widow's	
	Total Eligible	With Smaller Primary Benefit	Total Eligible	With Smaller Primary Benefit
Low Employment, Low Cost Assumptions				
1945	2	—	1	—
1950	6	1	6	3
1955	11	3	20	11
1960	24	6	51	27
1970	57	14	140	77
1980	156	39	318	178
2000	380	100	826	479
Low Employment, High Cost Assumptions				
1945	4	1	2	—
1950	13	3	11	6
1955	25	6	36	19
1960	46	10	82	45
1970	128	35	237	134
1980	364	107	546	318
2000	956	319	1628	1004
High Employment, Low Cost Assumptions				
1945	1	—	1	—
1950	4	1	6	3
1955	10	2	22	12
1960	19	4	54	29
1970	50	12	148	81
1980	150	37	348	195
2000	558	147	1209	701
High Employment, High Cost Assumptions				
1945	3	1	2	—
1950	13	3	11	6
1955	28	7	40	22
1960	52	13	92	51
1970	144	39	266	151
1980	416	122	626	365
2000	1484	496	2266	1398

a/ Number eligible for both primary and parent's benefits is relatively negligible.

b/ This also corresponds to average monthly number in current payment status.

Table 12

ESTIMATED AVERAGE ANNUAL OLD-AGE BENEFITS IN  
CURRENT PAYMENT STATUS, 1945-2000

Calendar Year	Primary		Supplementary <sup>a/</sup> Wife's		Survivor		Parent's
	Males	Females	With No Primary Benefit	With Smaller Primary Benefit <sup>b/</sup>	With No Primary Benefit	With Smaller Primary Benefit <sup>b/</sup>	
Actual Data (as of December)							
1945	\$302	\$235	b/\$155	b/	b/\$242	b/	\$156
Low Employment, Low Cost Assumptions							
1945	\$293	\$231	\$152	\$44	\$231	\$93	\$168
1950	303	250	159	46	233	96	171
1960	328	263	169	49	237	102	179
1980	345	271	176	56	257	115	184
2000	380	261	194	63	275	127	184
Low Employment, High Cost Assumptions							
1945	\$293	\$229	\$153	\$44	\$240	\$93	\$162
1950	303	234	159	47	226	97	167
1960	321	250	165	52	238	106	173
1980	332	234	170	64	252	122	180
2000	360	217	184	75	262	139	180
High Employment, Low Cost Assumptions							
1945	\$290	\$237	\$149	\$44	\$231	\$93	\$196
1950	313	258	164	46	232	96	199
1960	372	331	189	49	255	102	208
1980	417	342	214	56	305	115	215
2000	437	314	223	63	322	127	215
High Employment, High Cost Assumptions							
1945	\$293	\$227	\$153	\$44	\$241	\$93	\$190
1950	315	261	165	47	234	97	195
1960	369	312	187	52	254	106	202
1980	400	320	205	64	297	122	210
2000	419	295	214	75	310	139	210

a/ Supplementary child's benefits average about the same as survivor child's benefits and are included therewith (see Table 13).

b/ Subdivision not available, but most beneficiaries in 1945 were not also primary beneficiaries.

Note: Women qualified both for primary benefits and for wife's, widow's, or parent's benefits are shown as primary beneficiaries (see Table 1 for estimates of such overlapping cases).

Table 13

ESTIMATED AVERAGE ANNUAL YOUNGER SURVIVOR BENEFITS  
IN CURRENT PAYMENT STATUS AND LUMP-SUM  
DEATH PAYMENTS, 1945-2000

Calendar Year	Survivor Benefits		Lump-Sum Payments <sup>b/</sup>		
	Widow's Current	Child's <sup>a/</sup>	Males	Females	Total
	Actual Data <sup>c/</sup>				
1945	\$240	\$150	\$151	\$120	\$148
	Low Employment, Low Cost Estimate				
1945	\$240	\$154	\$146	\$111	\$140
1950	235	164	149	116	143
1960	246	174	160	123	153
1980	270	185	170	126	155
2000	281	193	181	125	159
	Low Employment, High Cost Estimate				
1945	\$235	\$152	\$145	\$109	\$139
1950	234	161	150	113	143
1960	241	166	154	119	145
1980	262	174	164	115	148
2000	274	184	171	105	143
	High Employment, Low Cost Estimate				
1945	\$233	\$154	\$152	\$115	\$144
1950	242	171	164	133	157
1960	282	195	185	148	176
1980	317	215	203	155	188
2000	331	227	211	150	187
	High Employment, High Cost Estimate				
1945	\$243	\$155	\$151	\$113	\$144
1950	245	168	161	128	156
1960	270	187	178	144	169
1980	307	206	194	150	180
2000	323	216	201	144	177

<sup>a/</sup> Includes supplementary child's benefits which average about the same size.

<sup>b/</sup> Based on number of decedents on whose account payments are made.

<sup>c/</sup> For monthly benefits, as of December.

Table 14

ESTIMATED BENEFIT PAYMENTS, 1945-2000  
(Figures in millions of dollars)

Calendar Year	Monthly Old-Age Benefits					Monthly Younger Survivor Benefits		Lump-sum Death Benefits	Total Benefits
	Primary	Wife's	Widow's	Parent's	Total	Widow's Current	Child's		
Actual Data									
1945	134	22	21	1	178	28	56	26	288
1946	196	32	29	1	258	33	69	27	388
Low Employment, Low Cost Assumptions									
1945	227	38	18	4	287	25	56	27	395
1950	430	71	64	9	574	42	105	34	755
1955	624	100	134	15	873	53	134	42	1102
1960	823	124	220	20	1187	58	149	52	1446
1970	1203	164	399	23	1789	67	166	72	2094
1980	1698	201	552	23	2474	74	186	90	2824
2000	2358	220	742	19	3339	88	215	123	3765
Low Employment, High Cost Assumptions									
1945	324	53	19	4	400	28	59	29	516
1950	567	91	66	14	738	49	107	35	929
1955	829	128	141	25	1123	58	124	41	1346
1960	1088	163	234	36	1521	58	122	47	1748
1970	1759	237	428	47	2471	56	112	65	2704
1980	2677	335	613	53	3678	53	105	83	3919
2000	4267	473	892	49	5681	51	88	122	5942
High Employment, Low Cost Assumptions									
1945	104	17	18	5	144	21	49	28	242
1950	325	53	64	10	452	36	101	40	629
1955	558	86	142	17	803	49	141	53	1046
1960	794	117	243	23	1177	58	167	67	1469
1970	1353	185	485	26	2049	72	203	97	2421
1980	2040	241	716	27	3024	84	238	128	3474
2000	3224	269	980	22	4495	103	290	184	5072
High Employment, High Cost Assumptions									
1945	289	48	19	5	361	26	56	30	473
1950	582	93	69	16	760	45	107	40	952
1955	927	138	148	29	1242	56	134	50	1482
1960	1315	190	254	42	1801	60	141	60	2062
1970	2278	308	512	55	3153	62	140	87	3442
1980	3604	436	775	61	4876	62	138	115	5191
2000	6323	607	1113	57	8100	62	120	181	8463

Note: Where women are qualified both for primary benefits and for wife's, widow's, or parent's benefits, the full primary benefit is assumed to be paid with supplementary payment of the excess of the other benefit if larger. The relatively small amounts of benefit payments to children of primary beneficiaries are included above with child's survivor benefits.

than the other three estimates. The benefit payments increase from the level of about \$300 million in 1945 to a year 2000 load of \$3.8 to \$5.9 billion under the low employment assumptions and \$5.1 to \$8.5 billion under the high employment assumptions. Primary benefits constitute from 60 to 70% of the total benefit payments in the year 2000, with the other old-age benefits making up all but about 10% of the total. This contrasts sharply with the actual 1945 data in which primary benefits were 47%, other old-age benefits were 15%, and younger survivor and lump-sum death benefits were 38%.

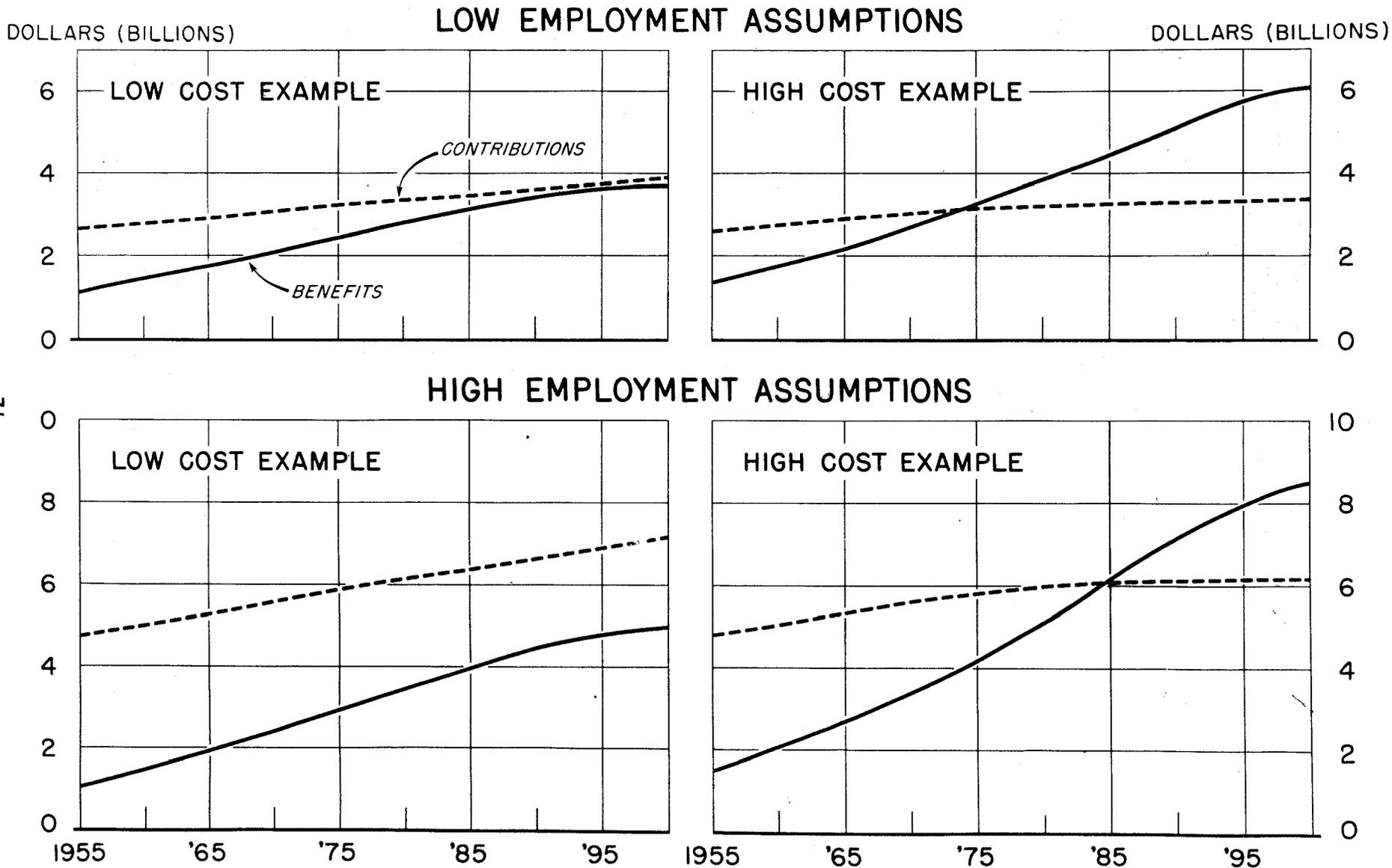
Chart 1 presents graphically the trend of the benefit disbursements from 1950 on, plotted from quinquennial year values, as contrasted with the contribution income at the statutory 6% rate. Under the two low cost examples benefit payments are lower than contributions in all years although under low employment assumptions benefits are almost as large as contributions in 1990 and after. On the other hand, under the high cost examples the benefits exceed the contributions with the crossing point being 1975 for the low employment assumptions and 1985 for the high employment assumptions.

Table 15 relates the estimated benefits to taxable pay roll. The cost for the year 2000 ranges from 5.8 to 10.5% of pay roll for the low employment assumption and from 4.2 to 8.1% for the high employment assumptions. For the low employment assumptions, the benefit cost first exceeds 2% of pay roll in 1952 for the low cost estimate and in 1950 for the high cost estimate; the corresponding figures for the high employment assumptions are 1963 and 1957 respectively. The average cost of the benefits over the next 55 years, disregarding interest, ranges from 4.3 to 6.2% of pay roll for the low employment assumptions, and from 2.8 to 4.6% for the high employment assumptions.

Another concept of long-range cost is the level premium contribution rate required to support the system into perpetuity based on discounting at 2% interest and assuming that benefit payments and taxable pay roll remain level after the year 2000. If such a level rate were adopted, relatively large accumulation of reserves in the trust fund would result, and in consequence also sizable eventual income from interest. Even though such a method of financing is not followed, this concept may nevertheless be used as a convenient measure of long-range costs. In one respect this is a better cost concept since it takes into account the heavy deferred load although, on the other hand, some may feel it unrealistic because it deals with periods beyond the year 2000, and also it is dubious to assume a leveling off or stabilization at any time.

Table 16 deals with level premium contribution rates into perpetuity by further taking into account administrative expenses and the accumulated fund on hand at the end of 1945. The resulting net level premium would, if actual experience is the same as the particular estimate, be the level contribution rate, which if in effect hereafter would result in an exactly self-supporting system; then funds accumulating at interest would supply income eventually sufficient to offset

CHART I.  
**ILLUSTRATIVE LONG-TERM TRENDS OF BENEFITS AND CONTRIBUTIONS**  
 (SUBJECT TO THE LIMITATIONS STATED IN THE TEXT)



- 31 -

Table 15

ESTIMATED BENEFIT PAYMENTS AS PERCENT OF TAXABLE PAY ROLL, 1945-2000

Calendar Year	Monthly Old-Age Benefits				Total	Monthly Younger Survivor Benefits		Lump-Sum Death Benefits	Total Benefits
	Primary	Wife's	Widow's	Parent's		Widow's Current	Child's		
Actual Data									
1945	.22%	.04%	.03%	*	.29%	.04%	.09%	.04%	.46%
1946	.29	.05	.04	*	.38	.05	.10	.04	.57
Low Employment, Low Cost Assumptions									
1945	.55%	.09%	.04%	.01%	.69%	.06%	.13%	.06%	.94%
1950	.99	.16	.15	.02	1.32	.10	.25	.08	1.75
1960	1.78	.27	.47	.04	2.56	.13	.32	.11	3.12
1980	3.02	.36	.98	.04	4.40	.13	.33	.16	5.02
2000	3.60	.34	1.13	.03	5.10	.13	.33	.19	5.75
1946-2000 <sup>a/</sup>	2.61	.30	.79	.04	3.74	.13	.31	.14	4.32
Level Premium <sup>b/</sup>	2.83	.31	.86	.03	4.03	.13	.31	.15	4.62
Low Employment, High Cost Assumptions									
1945	.77%	.13%	.05%	.01%	.96%	.07%	.14%	.07%	1.24%
1950	1.32	.21	.15	.03	1.71	.11	.25	.08	2.15
1960	2.32	.35	.50	.08	3.25	.12	.26	.10	3.73
1980	4.92	.61	1.12	.10	6.75	.10	.19	.15	7.19
2000	7.55	.84	1.58	.09	10.06	.09	.16	.21	10.52
1946-2000 <sup>a/</sup>	4.27	.52	.92	.08	5.79	.10	.21	.14	6.24
Level Premium <sup>b/</sup>	5.07	.60	1.07	.08	6.82	.10	.19	.16	7.27
High Employment, Low Cost Assumptions									
1945	.14%	.02%	.02%	.01%	.19%	.03%	.07%	.04%	.33%
1950	.43	.07	.08	.01	.59	.05	.13	.05	.82
1960	.95	.14	.28	.03	1.40	.07	.20	.08	1.75
1980	1.95	.23	.69	.03	2.90	.08	.23	.12	3.33
2000	2.67	.22	.81	.02	3.72	.08	.24	.15	4.19
1946-2000 <sup>a/</sup>	1.70	.19	.55	.02	2.46	.07	.21	.11	2.85
Level Premium <sup>b/</sup>	1.94	.19	.60	.02	2.75	.08	.22	.12	3.17
High Employment, High Cost Assumptions									
1945	.39%	.07%	.03%	.01%	.50%	.04%	.08%	.04%	.66%
1950	.78	.12	.09	.02	1.01	.06	.14	.05	1.26
1960	1.57	.23	.30	.05	2.15	.07	.17	.07	2.46
1980	3.60	.43	.78	.06	4.87	.06	.14	.11	5.18
2000	6.07	.58	1.07	.05	7.77	.06	.12	.17	8.12
1946-2000 <sup>a/</sup>	3.21	.37	.62	.05	4.25	.06	.14	.11	4.56
Level Premium <sup>b/</sup>	3.95	.42	.73	.05	5.15	.06	.13	.12	5.46

\* Less than .005%.

a/ Average cost of benefits, without interest, over the 55-year period.

b/ Level premium contribution rate (based on 2% interest) for benefit payments after 1945 and in perpetuity, not taking into account accumulated funds through 1945 (see also Table 16).

Note: Where women are qualified both for primary benefits and for wife's, widow's, or parent's benefits, the full primary benefit is assumed to be paid with supplementary payment of the excess of the other benefit if larger. The relatively small amounts of benefit payments to children of primary beneficiaries are included above with child's survivor benefits.

Table 16

ESTIMATED LEVEL PREMIUM CONTRIBUTION RATE INTO PERPETUITY<sup>a/</sup>  
FOR BENEFIT PAYMENTS AND ADMINISTRATIVE EXPENSES, TAKING INTO  
ACCOUNT ACCUMULATED FUND AS OF END OF 1945

<u>Level Premium Equivalent to</u>	<u>Low Employment Assumptions</u>		<u>High Employment Assumptions</u>	
	<u>Low Cost</u>	<u>High Cost</u>	<u>Low Cost</u>	<u>High Cost</u>
	Interest at 2%			
Benefit Payments	4.62%	7.27%	3.17%	5.46%
Administrative Expenses	.10	.18	.08	.14
Interest on 1945 Fund <sup>b/</sup>	.25	.27	.14	.15
Net <sup>c/</sup>	4.47	7.18	3.11	5.45
	Interest at 2½%			
Benefit Payments	4.38%	6.71%	2.96%	4.99%
Administrative Expenses	.10	.17	.08	.14
Interest on 1945 Fund <sup>b/</sup>	.32	.34	.18	.19
Net <sup>c/</sup>	4.16	6.54	2.96	4.94
	Interest at 1½%			
Benefit Payments	4.87%	7.92%	3.39%	5.99%
Administrative Expenses	.10	.19	.08	.15
Interest on 1945 Fund <sup>b/</sup>	.18	.20	.10	.11
Net <sup>c/</sup>	4.79	7.91	3.37	6.03

- <sup>a/</sup> Level premium contribution rate (based on discounting at interest) for payments after 1945 and in perpetuity.
- <sup>b/</sup> Interest on trust fund existing at end of 1945 as earned in future years expressed as a level premium (in percentage of taxable pay roll). For instance, at 2% interest the interest income from the existing \$7,121 million fund is \$142.4 million per year; this amount payable each year into the future is equivalent to a level premium of .25% of the pay rolls under the low employment, low cost assumptions.
- <sup>c/</sup> Level premium for benefit payments plus level premium for administrative expenses minus level premium equivalent to interest on accumulated fund.

the excess of benefit payments over contributions. The resulting figures are shown for three interest rates--2% (the current rate on new investments in special issues), 1½%, and 2½%.

At 2% interest the estimated net level premium ranges from 4.5 to 7.2% of pay roll for the low employment assumptions and from 3.9 to 5.4% for the high employment assumptions. In other words, for the present system a total level contribution rate of as little as 3% might be sufficient or, on the other hand, a rate of somewhat more than 7% might be necessary under adverse circumstances. Using a higher interest rate naturally results in somewhat lower costs and vice versa. A differential of ½% in the interest rate has a net effect on the level premium of about ½% of pay roll under the low cost assumptions and of about ¼% of pay roll under the high cost assumptions.

Table 17 presents the estimated progress of the trust fund at 2% interest under the present contribution schedule. In the low employment, high cost estimate the fund rises from the present level of over \$7 billion to a peak of \$51 billion between 1980 and 1985, and declines thereafter until in the year 2000 it is \$31 billion and is exhausted in about 10 or 15 years thereafter. On the other hand, under the other three estimates the fund increases steadily, being over \$100 billion in the year 2000 for the low employment, low cost estimate and well above this figure for the two high employment assumptions estimates. These trends of the trust fund are naturally to be anticipated on the basis of Table 16 which shows that the net level premiums at 2% interest are less than the 6% contribution rate scheduled for 1949 and thereafter for all but the low employment, high cost estimate. Therefore the fund in the other three cases would grow steadily, rather than reaching a peak and then declining.

Table 18 shows the progress of the trust fund under a 2% level total contribution rate in contrast with Table 17 which was on the basis of the present contribution schedule. In between these two contribution scales there are numerous alternatives, and it is quite possible that the actual rates that will be in effect in the future will not correspond to either of these two relative extremes. Maintaining a 2% level contribution rate, the relevant data in regard to the progress of the fund are shown in the table below:

	Fund at Peak		Fund Exhausted
	In Year	Amount (in billions)	
Low Employment, Low Cost	1954	\$9.5	1971
Low Employment, High Cost	1950	8.2	1965
High Employment, Low Cost	1968	23.7	1990
High Employment, High Cost	1953	14.3	1973

It would naturally be expected that the fund would eventually be exhausted under a 2% total contribution rate since in accordance with Table 16 the net level premium required exceeds 3% even under the most favorable conditions (based on a level wage assumption).

Table 17

ESTIMATED PROGRESS OF TRUST FUND UNDER PRESENT CONTRIBUTION  
SCHEDULE<sup>a/</sup>, 1945-2000<sup>b/</sup>  
(All figures in millions of dollars)

Calendar Year	Contributions	Benefit Payments	Administrative Expenses	Net Income	Interest on Fund <sup>c/</sup>	Fund at End of Year
Low Employment, Low Cost Assumptions						
1950	2607	755	26	1826	245	13459
1955	2674	1102	31	1541	448	23568
1960	2776	1446	37	1293	641	33336
1970	3102	2094	48	960	1031	53042
1980	3374	2824	60	490	1419	72586
1990	3628	3469	70	89	1790	91306
2000	3925	3765	76	84	2189	111700
Low Employment, High Cost Assumptions						
1950	2598	929	39	1630	230	12563
1955	2682	1346	47	1289	407	21382
1960	2809	1748	55	1006	569	29513
1970	3116	2704	73	339	852	43580
1980	3272	3919	96	-743	1008	50956
1990	3353	5118	118	-1883	944	47150
2000	3388	5942	133	-2687	637	d/ 31140
High Employment, Low Cost Assumptions						
1950	4592	629	34	3929	370	20912
1955	4796	1046	41	3709	809	43071
1960	5039	1469	49	3521	1270	66486
1970	5683	2421	67	3195	2284	118073
1980	6249	3474	85	2690	3437	176609
1990	6722	4509	104	2109	4714	241462
2000	7271	5072	115	2084	6187	315580
High Employment, High Cost Assumptions						
1950	4526	952	51	3523	339	19100
1955	4755	1482	62	3211	727	38658
1960	5036	2062	75	2899	1122	58615
1970	5644	3442	104	2098	1927	99257
1980	6016	5191	139	686	2673	136575
1990	6171	7125	176	-1130	3222	163657
2000	6255	8463	202	-2410	3518	178173

a/ Combined rate of 2% in 1946-47, 5% in 1948, and 6% in 1949 and thereafter.

b/ In each instance, fund at end of 1945 is taken to be the actual figure of \$7,121,000,000.

c/ Interest taken at 2% on fund at end of previous year plus  $\frac{1}{2}$  of the net income of the current year.

d/ Assuming net income constant after 2000, the fund would be exhausted in about 10-15 years.

Table 18

ESTIMATED PROGRESS OF TRUST FUND UNDER 2% LEVEL CONTRIBUTION  
 SCHEDULE, 1945 UNTIL EXHAUSTION OF FUNDS<sup>a/</sup>  
 (All figures in millions of dollars)

<u>Calendar Year</u>	<u>Contributions</u>	<u>Benefit Payments</u>	<u>Administrative Expenses</u>	<u>Net Income</u>	<u>Interest on Fund<sup>b/</sup></u>	<u>Fund at End of Year</u>
<b>Low Employment, Low Cost Assumptions</b>						
1950	869	755	26	88	177	9042
1955	891	1102	31	-242	188	9417
1960	925	1446	37	-558	166	8132
1970	1034	2094	48	-1108	23	586
1980	1125	2824	60	-1759		(Fund exhausted in 1971)
<b>Low Employment, High Cost Assumptions</b>						
1950	866	929	39	-102	162	8163
1955	894	1346	47	-499	148	7247
1960	936	1748	55	-867	93	4247
1970	1039	2704	73	-1738		(Fund exhausted in 1965)
<b>High Employment, Low Cost Assumptions</b>						
1950	1531	629	34	868	250	13142
1955	1599	1046	41	512	348	17979
1960	1680	1469	49	162	420	21473
1970	1894	2421	67	-594	468	23553
1980	2083	3473	85	-1475	353	17200
1990	2241	4505	104	-2368		(Fund exhausted in 1990)
<b>High Employment, High Cost Assumptions</b>						
1950	1509	952	51	506	220	11446
1955	1585	1482	62	41	273	13875
1960	1679	2062	75	-458	280	14009
1970	1881	3442	104	-1665	121	5293
1980	2005	5191	139	-3325		(Fund exhausted in 1973)

a/ In each instance, fund at end of 1945 is taken to be the actual figure of \$7,121,000,000.

b/ Interest taken at 2% on fund at end of previous year plus  $\frac{1}{2}$  of the net income of the current year.

D. The Effect of an Increasing Wage Assumption

Throughout economic history there has been a general upward trend in the wage level. Paralleling this to some extent there has also been an increasing trend in the living standard level. In other words, the increase in wage levels was in large part counter-balanced by increased desires for higher living standards with the definition of minimum adequacy moving steadily upward.

The preceding cost estimates were developed on the basis of level wage assumptions which may seem on the surface a rather artificial and unrealistic hypothesis. However, offsetting this is the fact that the plan itself is usually presented as static as to its benefit provisions, an unreasonable assumption if wages increase greatly over time. With such an increase, not only would benefits awarded at the time of retirement on the basis of earnings over the entire working career of some 45 or 50 years be low compared to then current earnings, but also the weighted nature of the benefit formula would produce smaller relative amounts. Therefore it is the belief of this office that cost estimates for the static present system under a rising wage assumption are rather misleading, although such estimates are, of course, under increased ranges of tolerance technically possible.

Actuarial Study No. 19(a) dealt with the changes in the results of Actuarial Study No. 19 if an increasing wage assumption were introduced. The reader is referred to that study for further discussion of the meaningfulness of using an increasing wage assumption. Especially noteworthy therein is a historical study made as to the type of basic benefit formula which would have been adopted if the system had been instituted about 50 years ago. The resulting formula is 40% of the first \$15 of average monthly wage plus 10% of the next \$60, as contrasted with the present formula where the corresponding figures are \$50 and \$200. Thus, on the basis of the 1894 formula being left unchanged until the present time, most of the primary benefits payable today would range from about \$12 to \$15 monthly with an absolute maximum of \$17. It is not reasonable to contend that the benefit formula would have stood unadjusted under the wage history which has eventualized since 1894.

At first glance an increasing wage trend would seem to result in lower costs because of two reasons:

- (1) The benefits in effect in a given year are based on a lower average wage than the contributions of that year and thus carry a lighter impact;
- (2) With a higher average wage, benefits computed from this type of weighted formula are lower relative to wage.

However, if the benefit formula keeps pace with the wage level, there might well be increased costs in respect to the then current contributions. Benefits would then be paid at a level consistent with the then current wage level despite the fact that contributions for those benefits have been made on lower wage levels so that any financing help to be obtained from accumulated funds would be relatively lessened.

Having considered the limitations of the use of an increasing wage assumption, there are now presented in connection with the new cost estimates certain crude results of introducing a 1% annual compound rate of increase in assumed wages, the same as in Actuarial Study No. 19(a). Benefit disbursements in the year 2000 are only about 10% higher under an increasing wage assumption than under a level assumption regardless of low or high employment assumptions or low or high cost assumptions. On the other hand, contributions are increased by about 50% under the low employment (and low wage in early years) assumptions and by about 35% under the high employment assumptions. The increase is less for the high employment assumptions because of the greater effect of the \$3000 maximum provision on wages subject to contributions. The annual benefits as related to pay roll for the year 2000 are as follows:

	<u>Rising Wage</u>	<u>Level Wage</u>
Low employment, low cost assumptions	4.2%	5.8%
Low employment, high cost assumptions	7.7	10.5
High employment, low cost assumptions	3.4	4.2
High employment, high cost assumptions	6.6	8.1

On comparison, the annual cost of benefits relative to contributions half a century hence is decreased by about 20 to 25% under an increasing wage assumption for a static benefit formula.

There was previously developed the level premium costs of the benefits now provided by the system, or, in other words, the average contribution rate required in financing the system into perpetuity at a 2% interest rate. These ranged from 3% of pay roll for the high employment, low cost estimate to over 7% for the low employment, high cost estimate. Using an increasing wage assumption, this range might be reduced to from 2½% to 6%.

D. The Effect of an Increasing Wage Assumption

Throughout economic history there has been a general upward trend in the wage level. Paralleling this to some extent there has also been an increasing trend in the living standard level. In other words, the increase in wage levels was in large part counter-balanced by increased desires for higher living standards with the definition of minimum adequacy moving steadily upward.

The preceding cost estimates were developed on the basis of level wage assumptions which may seem on the surface a rather artificial and unrealistic hypothesis. However, offsetting this is the fact that the plan itself is usually presented as static as to its benefit provisions, an unreasonable assumption if wages increase greatly over time. With such an increase, not only would benefits awarded at the time of retirement on the basis of earnings over the entire working career of some 45 or 50 years be low compared to then current earnings, but also the weighted nature of the benefit formula would produce smaller relative amounts. Therefore it is the belief of this office that cost estimates for the static present system under a rising wage assumption are rather misleading, although such estimates are, of course, under increased ranges of tolerance technically possible.

Actuarial Study No. 19(a) dealt with the changes in the results of Actuarial Study No. 19 if an increasing wage assumption were introduced. The reader is referred to that study for further discussion of the meaningfulness of using an increasing wage assumption. Especially noteworthy therein is a historical study made as to the type of basic benefit formula which would have been adopted if the system had been instituted about 50 years ago. The resulting formula is 40% of the first \$15 of average monthly wage plus 10% of the next \$60, as contrasted with the present formula where the corresponding figures are \$50 and \$200. Thus, on the basis of the 1894 formula being left unchanged until the present time, most of the primary benefits payable today would range from about \$12 to \$15 monthly with an absolute maximum of \$17. It is not reasonable to contend that the benefit formula would have stood unadjusted under the wage history which has eventualized since 1894.

At first glance an increasing wage trend would seem to result in lower costs because of two reasons:

- (1) The benefits in effect in a given year are based on a lower average wage than the contributions of that year and thus carry a lighter impact;
- (2) With a higher average wage, benefits computed from this type of weighted formula are lower relative to wage.

However, if the benefit formula keeps pace with the wage level, there might well be increased costs in respect to the then current contributions. Benefits would then be paid at a level consistent with the then current wage level despite the fact that contributions for those benefits have been made on lower wage levels so that any financing help to be obtained from accumulated funds would be relatively lessened.

Having considered the limitations of the use of an increasing wage assumption, there are now presented in connection with the new cost estimates certain crude results of introducing a 1% annual compound rate of increase in assumed wages, the same as in Actuarial Study No. 19(a). Benefit disbursements in the year 2000 are only about 10% higher under an increasing wage assumption than under a level assumption regardless of low or high employment assumptions or low or high cost assumptions. On the other hand, contributions are increased by about 50% under the low employment (and low wage in early years) assumptions and by about 35% under the high employment assumptions. The increase is less for the high employment assumptions because of the greater effect of the \$3000 maximum provision on wages subject to contributions. The annual benefits as related to pay roll for the year 2000 are as follows:

	<u>Rising Wage</u>	<u>Level Wage</u>
Low employment, low cost assumptions	4.2%	5.8%
Low employment, high cost assumptions	7.7	10.5
High employment, low cost assumptions	3.4	4.2
High employment, high cost assumptions	6.6	8.1

On comparison, the annual cost of benefits relative to contributions half a century hence is decreased by about 20 to 25% under an increasing wage assumption for a static benefit formula.

There was previously developed the level premium costs of the benefits now provided by the system, or, in other words, the average contribution rate required in financing the system into perpetuity at a 2% interest rate. These ranged from 3% of pay roll for the high employment, low cost estimate to over 7% for the low employment, high cost estimate. Using an increasing wage assumption, this range might be reduced to from 2½% to 6%.

E. Comparison with Previous Estimates

As mentioned in the Introduction, there have been three previous sets of long-range cost estimates for the old-age and survivors insurance program. In addition, there are the short-range cost estimates in the Seventh Trustees' Report which extend to the fiscal year 1951 so that comparison therewith may be made for the calendar year 1950 (with the figures on a fiscal year basis being adjusted to apply to calendar year 1950). Also the actual data for the calendar year 1945 may be compared with the estimates of this study and the previous three Actuarial Studies.

Chart 2 shows that the actual payments for 1945 were lower than the low estimates of both Actuarial Studies No. 17 and No. 14 although lying within the range of the low and high estimates of Actuarial Study No. 19. The estimates of the two early Actuarial Studies were on the high side because they were based on low employment assumptions with a large proportion retiring, and did not sufficiently take into account the lag which developed and is still present. In part on this account, the low employment estimates of this study show a range somewhat above the actual experience, in fact, closely in line with the estimates of Actuarial Study No. 17 which in turn had been considerably lower than Actuarial Study No. 14. On the other hand, the high employment estimates of this study have a range within which the actual experience falls, although it is closer to the low cost estimate. The high employment, low cost estimate of this study is very close to the low estimate of Actuarial Study No. 19, but the high cost estimate shows a wider possible range.

Chart 3 compares the various estimates for the calendar year 1950. Except for the earliest estimates, Actuarial Study No. 14, all the studies indicate a range in benefit payments for that year of \$600 million to \$900 million. It will be noted that the estimates of this study show the widest range, whereas in the Seventh Trustees' Report and to a somewhat lesser extent in Actuarial Study No. 19, the indicated range is relatively narrow.

Chart 4 compares the estimated benefit payments in the year 2000. The two earliest studies showed a range of from \$3 to \$5 billion, while for Actuarial Study No. 19, the range was \$3 to \$6 billion. In this study, which for both the low and high employment assumptions had relatively higher wage hypotheses, the range is considerably higher and wider--running from somewhat less than \$4 billion for the low employment, low cost estimate to about \$8½ billion for the high employment, high cost estimates.

Chart 5 presents the estimated cost of the benefit payments relative to pay roll in the year 2000. The two early estimates showed a range of about 7½ to 12%. On the other hand, Actuarial Study No. 19 shows the relatively narrow range of 9 to 10½% since, as discussed

CHART 2.

# ESTIMATED AND ACTUAL CALENDAR YEAR 1945 BENEFIT PAYMENTS

DOLLARS (MILLIONS)

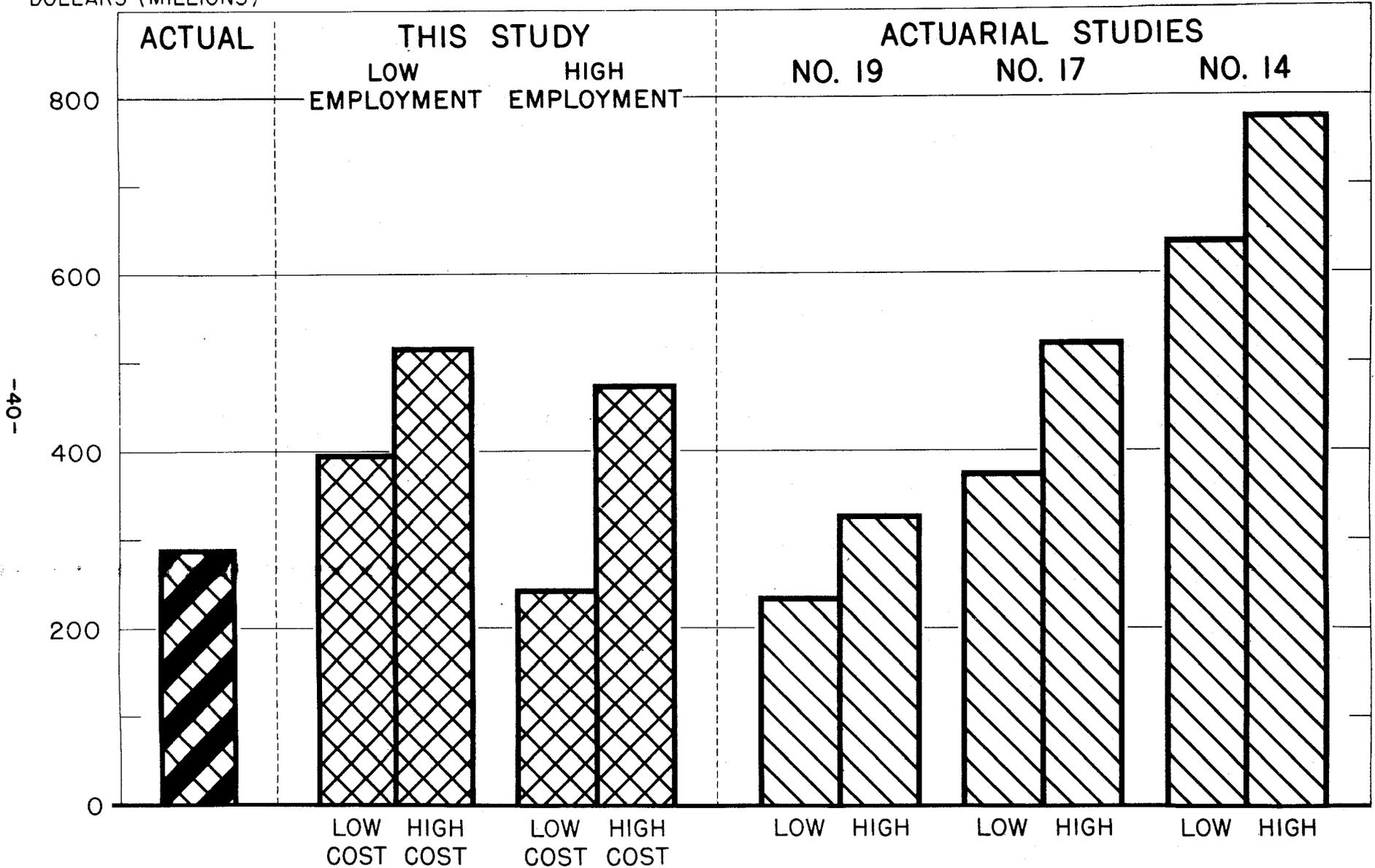
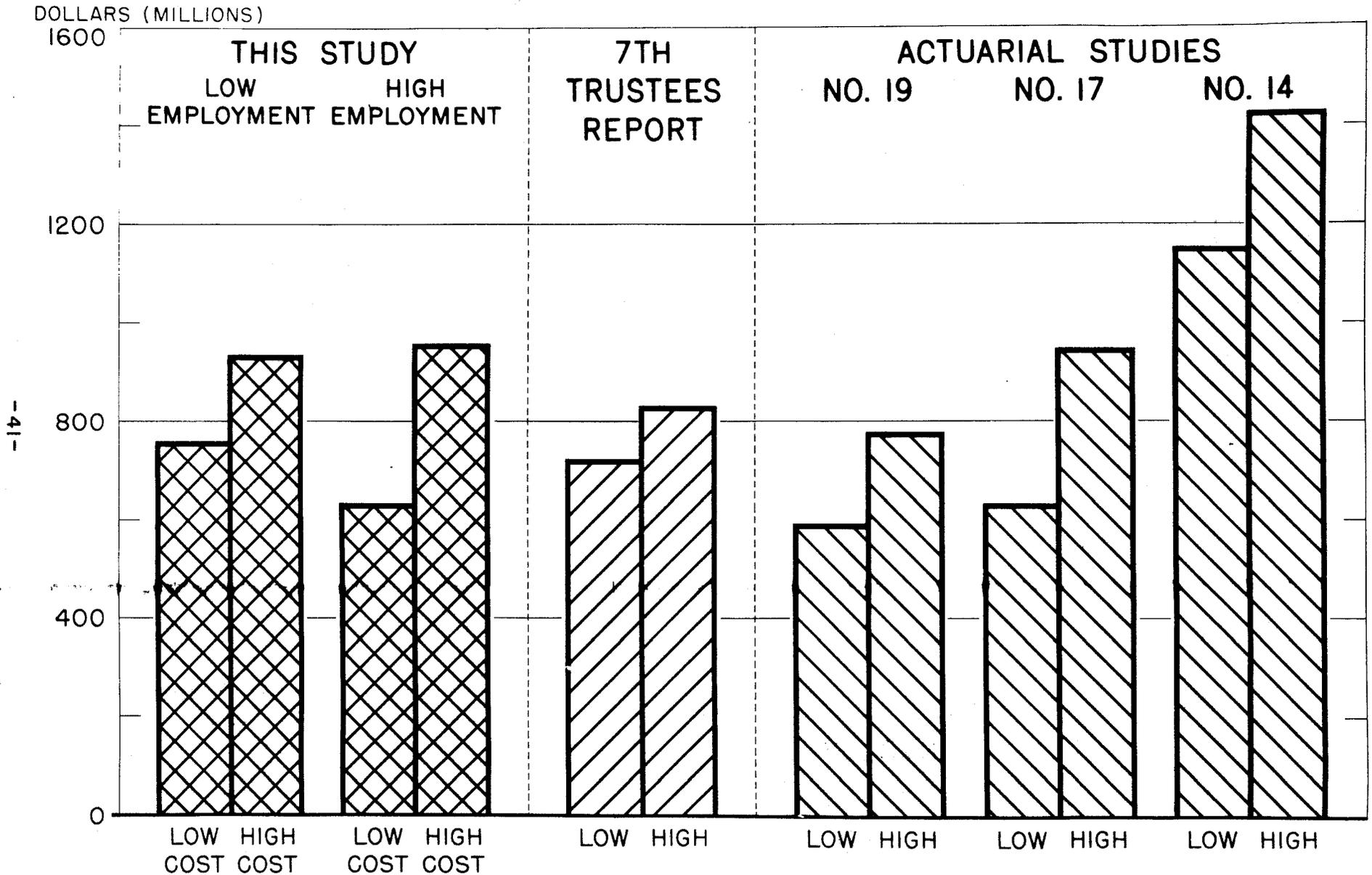
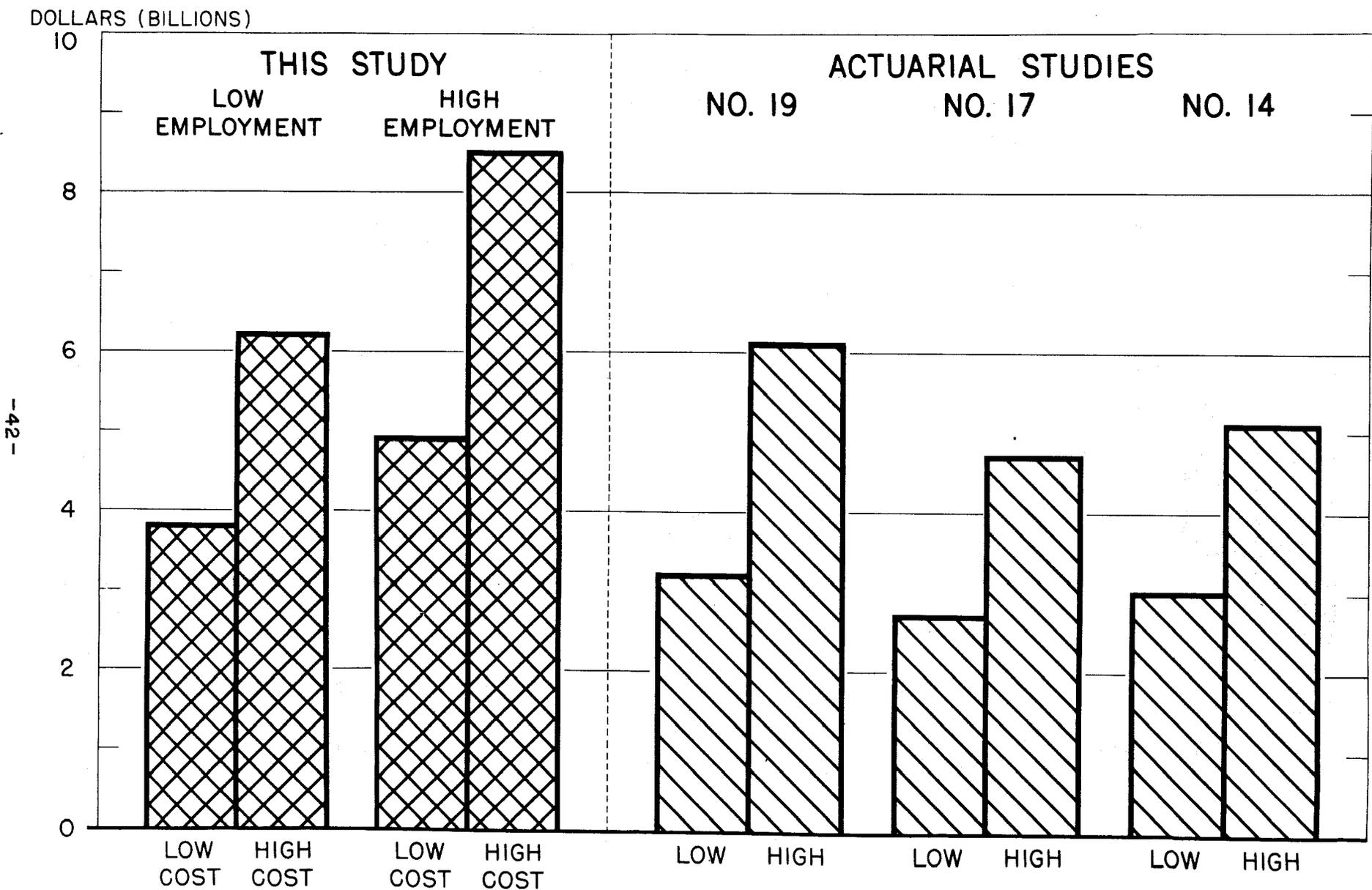


CHART 3.  
**ESTIMATED CALENDAR YEAR 1950 BENEFIT PAYMENTS**



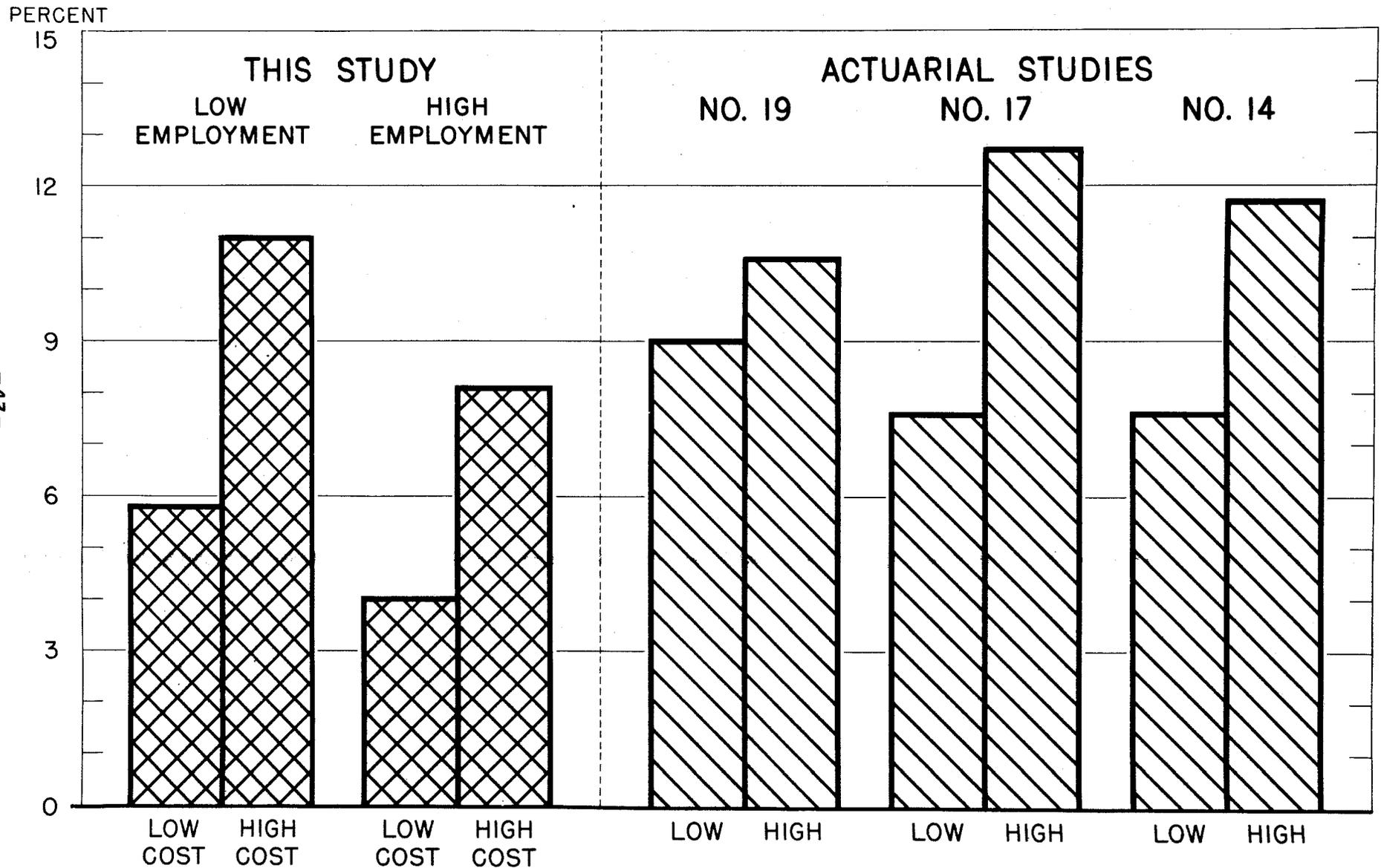
- 41 -

CHART 4.  
**ESTIMATED ULTIMATE (YEAR 2000) BENEFIT PAYMENTS**



-42-

CHART 5.  
**ESTIMATED ULTIMATE (YEAR 2000) BENEFIT PAYMENTS AS  
 PERCENT OF PAYROLL**



-43-

ACTUARIAL STUDY NO. 23

previously, this estimate was developed primarily to show a range in dollar costs rather than costs relative to pay roll. The estimates of the present study indicate a very wide possible range. For the low employment assumptions the range is from about 6 to 11%, or quite similar to the range for Actuarial Studies No. 14 and No. 17, although somewhat lower. On the other hand, for the high employment assumptions the range is from 4 to 8%, or far lower than any of the estimates previously developed. In large part this arises because of the relatively high wage assumptions used on the basis of recent and current experience and the relatively low retirement rates arising under high employment conditions.