MEDIUM-RANGE AND LONG-RANGE COST ESTIMATES

As stated previously, the principal determinants of future income and expenditures—frequently referred to in this report as medium-range or long-range cost estimates—under the old-age, survivors, and disability insurance program are: the type and level of benefits payable; the size and composition of the population receiving the benefits; and the size and characteristics, including the earnings levels, of the population generating the taxes used to provide such benefits. For the most part, these future determinants of income and expenditures cannot be known with certainty, and assumptions must be made as to the future behavior of relevant demographic and economic factors.

Demographic and economic assumptions

The basic demographic and economic assumptions, as well as the methodology, used in determining the medium-range and long-range cost estimates presented in this report are described in appendix A.

When projections are made for many years into the future, involving social and economic forces—as well as natural forces such as mortality and fertility—it is not unlikely that actual experience will depart significantly from any particular path which may be postulated. Accordingly, cost estimates have been determined and are presented herein based upon three different sets of assumptions, designated as alternatives I, II, and III, in order to indicate the general range in which the cost estimates might reasonably be expected to fall.

Table 25 summarizes the factors which vary from one set of assumptions to another over the period 1977–2051. The factors which have been selected to be varied are the fertility rate, the unemployment rate, the changes in average wages in covered employment and in the Consumer Price Index, and the resulting real-wage changes. These factors have been selected because reasonable variations in them affect the cost estimates significantly. (One exception is the unemployment rate, which was varied even though the variation has relatively little impact on the cost estimates.) All other factors (such as mortality rates, migration rates, labor force participation rates, marriage rates, retirement rates, disability incidence and termination rates, etc.) have not been varied among the three alternative sets of assumptions.

The estimates under alternative I may be characterized as being more "optimistic" than the estimates under the "intermediate" assumptions (alternative II) while those under alternative III may be characterized as being more "pessimistic" than those under the intermediate assumptions.

While it does not seem unreasonable to assume that actual experience will fall within the range defined by alternatives I and III, particularly for the medium-range cost estimates covering the first 25 years of the projection period, there can be no guarantee that this will be the case because of the high degree of uncertainty in economic and forecasting. Estimates of future costs during the early years of the projection period are more predicatable and fall within a narrower range than estimates of costs during the later years of the period. Even though estimates for the later years are less reliable, the preparation and presentation of these cost estimates, as modified periodically in the light of developing trends, can help to prevent undesirable results from materializing without warning.

TABLE 25.—VALUES OF SELECTED ECONOMIC AND DEMOGRAPHIC FACTORS UNDER 3 ALTERNATIVE SETS OF ASSUMPTIONS, CALENDAR YEARS 1977–2051

Calendar year	Percentage increase in average annual: Wages in covered employment	CPI	Real wages [1]	Average annual unemployment rate	Total fertility rate [2]
Alternative I:					
1977	8.4	6.0	2.4	7.1	1,709.9
1978	8.2	5.3	2.9	6.3	1,685.9
1979	7.9	4.6	3.3	5.6	1,662.0
1980	6.6	4.1	2.5	5.0	1,670.2
1981	5.8	3.4	2.4	4.5	1,710.5
1982	5.3	3.0	2.3	4.5	1,750.9
1983	5.25	3.0	2.25	4.5	1,791.2
1984 and later	5.25	3.0	2.25	4.5	[3] 1,300.0
Alternative II:					
1977	8.4	6.0	2.4	7.1	1,709.9
1978	8.1	5.4	2.7	6.3	1,685.9
1979	7.8	5.3	2.5	5.7	1,662.0
1980	7.1	4.7	2.4	5.2	1,662.9
1981	6.4	4.1	2.3	5.0	1,688.8
1982	6.0	4.0	2.0	5.0	1,714.7
1983	5.75	4.0	1.75	5.0	1,740.5
1984 and later	5.75	4.0	1.75	5.0	[3] 2,100.0
Alternative III:					
1977	8.4	6.0	2.4	7.1	1,709.9
1978	7.9	5.7	2.2	6.4	1,685.9
1979	8.1	7.6	0.5	6.6	1,662.0
1980	8.2	5.9	2.3	6.6	1,648.4
1981	7.0	5.1	1.9	6.3	1,645.2
1982	6.5	5.0	1.5	6.0	1,642.1
1983	6.25	5.0	1.25	5.6	1,638.9
1984 and later	6.25	5.0	1.25	5.5	[3] 1,700.0

[1] Expressed as the difference between percentage increases in average annual wages and average annual CPI.
[2] Average number of children born per 1,000 women in their lifetime.
[3] This ultimate total fertility rate is not attained until after 1984. See appendix A for more detailed information.

Benefit levels

Under many social insurance systems, the level of benefits payable upon the retirement, death, or disability of workers in the future is dependent upon changes in earnings levels during the working lifetime of such workers. Accordingly, although future benefit levels and costs under such systems are not readily predictable in absolute dollar amounts, they are nonetheless generally predictable in relation to earnings levels, i.e., as percentage of earnings. However, this is not the case for the old-age, survivors, and disability insurance program under present law, which provides that benefits payable at retirement, death, or disability will be related in a complicated way to increases in both wages and the Consumer Price Index. The result is that the level of benefits payable in the future under present law is highly unpredictable even in relation to earnings.

In examining this matter it is helpful to consider the concept of the "replacement ratio," which may be defined as the ratio of the benefit amount payable to a worker for his first year of retirement to his gross earnings in the year prior to retirement. The effect of various economic assumptions on replacement ratios under present law, and the resulting problems involved in estimating future benefit costs, are illustrated in table 26. Replacement ratios under various economic assumptions are shown in the table for male workers at different earnings levels, namely, a worker with maximum taxable earnings throughout his working life, a worker with earnings equal to the median earnings in covered employment for male workers in each year, and a worker with "low" earnings defined as $4,600 in 1976 and with the

TABLE 26.—ILLUSTRATIVE REPLACEMENT RATIOS FOR RETIRED MALE WORKERS AT SELECTED EARNINGS LEVELS, UNDER VARIOUS ECONOMIC ASSUMPTIONS

Earnings level	Replacement ratio[1] based on retirement at age 65 in January of—				
		2050, under assumptions of[2]—			
	1977	5–2 3/4	5–3	6–4	5 3/4–4
(1)	(2)	(3)	(4)	(5)	(6)
Worker without spouse:					
Maximum	0.33	0.34	0.38	0.44	0.48
Median	.46	.47	.54	.64	.70
Low	.58	.68	.79	.96	1.06
Worker with spouse aged 65:					
Maximum	.50	.51	.57	.67	.72
Median	.69	.71	.81	.95	1.04
Low	.88	1.02	1.19	1.44	1.59

[1] The replacement ratios are defined in the text.
[2] The two figures shown in each column heading represent assumed annual percentage increases in average wages in covered employment and in average CPI, respectively, during the period 1938–2050. During 1977–82, the assumed rates of increase in wages and in CPI are based on the pattern of those included in the intermediate set of assumptions (alternative II) described earlier in this report.

values for earlier years deflated according to the trend in median earnings. The $4,600 figure is based on the assumption that the minimum Federal wage-level in 1976 or $2.30 per hour is paid for 50 work-weeks of 40 hours each. These examples are not intended to suggest that all workers fall neatly into one of these earnings categories, but rather to illustrate the instability of the benefit formula under present law. Also the level of the replacement ratios shown is not as important as the trend and instability of these ratios. For example, the level of the replacement ratios would be substantially higher if the definition thereof were changed so as to relate benefits amounts, which are not subject to taxes, to preretirement earnings after taxes, especially in the case of workers at median or maximum earnings levels.

Column (2) of the table shows the replacement ratios for male workers retiring at age 65 in January 1977 at different earnings levels. The figures represent the ratio of the worker's benefits for calendar year 1977 to his earnings in calendar year 1976. For example the replacement ratio for a worker without a spouse retiring in January 1977 who has had maximum taxable earnings throughout his working life is 0.33, meaning that his benefits payable for 1977 are 33 percent of his earnings in 1976.

Columns (3) to (6) show replacement ratios for male workers retiring at age 65 in January 2050 at different earnings levels and under different wage-CPI assumptions. The various long-range (1983 and later) wage-CPI assumptions shown—that is, the ultimate average annual increase in wages in covered employment and the ultimate average annual increase in the Consumer Price Index—are those that have been the bases for the intermediate cost estimates presented in recent issues of this report. The short-range (1977–82) wage-CPI assumptions are based on the pattern of such assumptions in alternative II and are adjusted to attain the different ultimate values in a gradual manner.

When the automatic adjustment provisions were adopted in 1972, it was assumed, for purposes of estimating future costs that the long-range wage-CPI assumptions would be 5 percent and 2¾ percent, respectively. (These were the assumptions used in the 1972 and 1973 Annual Reports of the Board of Trustees.) Based on these long-range

assumptions, the replacement ratios for male workers retiring at age 65 in January 2050 are shown in column (3) of table 26. These projections show that, except for the worker with low earnings, the replacement ratios are almost constant from 1977 to 2050.

Column (4) shows replacement ratios under the long-range economic assumptions used in the 1974 annual report, namely wage-CPI assumptions of 5 percent and 3 percent, respectively. Under these assumptions the replacement ratios do not remain essentially constant as under the prior year's assumptions.

For the 1975 annual report the long-range wage-CPI assumptions were increased to 6 percent and 4 percent, respectively. These changes significantly increased projected future replacement ratios as illustrated in column (5) of table 26. The cost of such increased replacement ratios was correspondingly higher and accounted for much of the increase in the actuarial deficit which was reported in the 1975 annual report as compared with that reported in the 1974 report.

For reasons stated earlier, the cost estimates presented in this annual report (as in last year's report) are on the basis of three alternative sets of assumptions. Under the intermediate set of assumptions (alternative II) it has been assumed that after 1982 average wages in covered employment will increase at the rate of 5¾ percent per year and that after 1981 the CPI will increase at the rate of 4 percent per year. (These are substantially the same assumptions as were used in last year's report.) Under these assumptions, the projected benefit levels will increase in the future as illustrated in column (6) of table 26. A comparison of those projected levels with the ones prevailing in 1977 (as shown in column (2)) shows that the benefit levels are expected to increase substantially in the future. In addition, a comparison of the currently projected benefit levels (as shown in column (6)) with those which would be projected today based on the wage-CPI assumptions used in the 1972–73 annual reports (as shown in column (3)) shows that the benefit levels are expected to increase to significantly higher levels than was expected only a few years ago.

Whereas table 26 shows the different levels of the replacement ratios under the various wage-CPI assumptions used in previous reports, table 27 shows the widely varying levels resulting from the range of such assumptions contained in this year's report.

A comparison of the figures for alternatives I and III shows that for a given individual the replacement ratios vary significantly under different wage-CPI assumptions. Under alternative III with its relatively high 5-percent CPI assumption and low real-wage gain assumption of 1¼ percent (as measured by the difference between the percentage increases in the average annual wage and the CPI), the ratios increase from their 1977 levels by more than 30 percent by the turn of the century, more than 65 percent by 2025, and more than 95 percent by 2050. However, under alternative I with its relatively low 3 percent CPI assumption and high real-wage gain assumption of 2¼ percent, those ratios increase by less than 25 percent over the entire 75-year period.

It is necessary that this report on the actuarial status of the trust funds be based on projected future costs under present law, even though (1) such projections, based upon the alternative II assumptions, result in future estimated replacement ratios of the magnitude

TABLE 27.—ILLUSTRATIVE REPLACEMENT RATIOS FOR RETIRED MALE WORKERS AT SELECTED EARNINGS LEVELS UNDER ALTERNATIVES I, II, AND III

Earnings level and year of retirement	Replacement ratio					
	Worker without spouse			Worker with spouse age 65		
	Alternative I	Alternative II	Alternative III	Alternative I	Alternative II	Alternative III
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Low:						
1977	0.58	0.58	0.58	0.88	0.88	0.88
2000	.67	.75	.87	1.00	1.13	1.31
2025	.71	.94	1.26	1.06	1.41	1.89
2050	.72	1.06	1.57	1.08	1.59	2.36
Median:						
1977	.46	.46	.46	.69	.69	.69
2000	.47	.53	.61	.71	.80	.92
2025	.49	.63	.83	.73	.95	1.25
2050	.49	.70	.99	.74	1.04	1.49
Maximum:						
1977	.33	.33	.33	.50	.50	.50
2000	.33	.38	.43	.50	.57	.65
2025	.35	.45	.56	.52	.67	.84
2050	.35	.48	.65	.53	.72	.98

Note: Alternatives I, II, and III and the replacement ratio are defined in the text. It is assumed the worker retires at age 65 at the beginning of the year shown in col. (1).

illustrated in table 27, (2) at the time that the automatic adjustment provisions were adopted in 1972, it was apparently not anticipated that economic experience and expectations would change so as to cause replacement ratios to rise substantially from the levels then prevailing, and (3) it is undesirable to allow projected replacement ratios such as those associated with alternative II to materialize. The projection of future costs under the present law system provides valuable information on the nature and magnitude of this long-range financial problem. Nonetheless, because of this problem, useful information can also be obtained by considering cost estimates based on a more stable system. Therefore, later in this report illustrative projections are presented on a "modified theoretical" old-age, survivors, and disability insurance system which maintains through time the relationship existing at the beginning of calendar year 1979 between average awarded benefits and average earnings. It is assumed that under this modified theoretical system, as under present law, benefits after retirement, death, or disability would be increased automatically to keep up with increases in the CPI. This modified theoretical system is assumed to apply to insured workers who retire, die, or become disabled after 1978.

Expenditures as percent of taxable payroll

Basic to the discussion of the medium-range and long-range cost estimates is the concept of expenditures as percent of taxable payroll. The expenditures include benefit payments; administrative expenses; net transfers under the financial interchange between the old-age, survivors, and disability insurance trust funds and the railroad retirement account; and payments for vocational rehabilitation services for disability beneficiaries. The taxable payroll consists of the total earnings which are subject to social security taxes, adjusted to reflect the lower contribution rates on self-employment income, tips, and multiple-employer "excess wages." This adjustment is made so that

the expenditures expressed as percent of taxable payroll—that is, the expenditures divided by the taxable payroll and expressed as a percentage—will be comparable to the combined employer-employee tax rate in the law.

Medium-range cost estimates: 1977–2001

In this section of the report medium-range cost estimates are presented in order to highlight the status of the old-age and survivors insurance and disability insurance trust funds during the first 25 years of the long-range period, namely 1977–2001. In general, estimates for the medium-range period are less sensitive to changes in demographic and economic assumptions than those for the long-range period. In particular, variations in projected fertility rates have little effect on estimated costs for the medium-range period since almost all covered workers and beneficiaries projected for this period were born prior to the start of the projection period. Furthermore, the degree of certainty that can be placed on demographic and economic assumptions is greater for the first 25 years than for the entire 75 year period. Nonetheless, the degree of sensitivity of the cost estimates to changes in economic assumptions is still significant. Economic factors such as wage and price increases are subject to such a wide range of possible variation that the projections of expenditures over the medium-range period should be considered only as an indication of the trend and the general range within which they may be expected to fall.

Table 28 presents the medium-range old-age, survivors, and disability insurance cost estimates under alternative II for present law and for the modified theoretical system. The table shows that the 25-year average cost of 12.24 percent of taxable payroll under present law is 0.28 percent of taxable payroll higher than the 25-year average cost of 11.96 percent of taxable payroll under the modified theoretical system. This illustrates the reduction in cost over the next 25 years that can be obtained by stabilizing replacement ratios at their 1979 levels. The stabilization of replacement ratios would affect only those persons first becoming eligible for benefits after 1978 and would have no effect on persons already receiving benefits at the beginning of 1979.

In projecting the expenditures under the modified theoretical system it was assumed that, during a transition period of several years beginning with 1979, new beneficiaries would be eligible to receive the higher of the benefit from the present law benefit table or the benefit under the modified theoretical system. As a result of this choice the expenditures as percent of taxable payroll projected under the modified theoretical system, as shown in table 28, are higher than under present law in the early years.

Also from table 28, a comparison of estimated expenditures in 2001 of 14.12 percent of taxable payroll under present law and 13.02 percent of taxable payroll under the modified theoretical system indicates the degree to which increasing replacement ratios affect the cost by the end of the medium-range period. Every year that passes without stabilizing the replacement ratios results in increments in such ratios which permanently affect the level of benefits for all persons first becoming eligible for benefits in the future. These increases in re-

TABLE 28.—ESTIMATED EXPENDITURES OF PRESENT LAW AND MODIFIED THEORETICAL OLD-AGE SURVIVORS, AND DISABILITY INSURANCE SYSTEMS AS PERCENT OF TAXABLE PAYROLL FOR CALENDAR YEARS 1977-2001 UNDER ALTERNATIVE II

[In percent]

Calendar year	Expenditures as percent of taxable payroll [1] under—					
	Present law			Modified theoretical system		
	Old-age and survivors insurance	Disability insurance	Total	Old-age and survivors insurance	Disability insurance	Total
1977	9.40	1.50	10.91	9.40	1.50	10.91
1978	9.37	1.53	10.89	9.37	1.53	10.89
1979	9.30	1.55	10.86	9.31	1.55	10.86
1980	9.21	1.59	10.80	9.23	1.60	10.83
1981	9.24	1.65	10.88	9.26	1.65	10.91
1982	9.31	1.70	11.01	9.33	1.71	11.04
1983	9.40	1.77	11.17	9.42	1.77	11.19
1984	9.51	1.84	11.35	9.52	1.84	11.36
1985	9.64	1.92	11.56	9.64	1.90	11.54
1986	9.77	1.99	11.76	9.76	1.97	11.73
1987	9.86	2.06	11.92	9.83	2.02	11.85
1988	9.95	2.13	12.08	9.90	2.07	11.97
1989	10.03	2.20	12.23	9.96	2.12	12.08
1990	10.12	2.27	12.39	10.02	2.17	12.19
1991	10.20	2.34	12.54	10.07	2.22	12.29
1992	10.28	2.41	12.68	10.12	2.26	12.38
1993	10.35	2.48	12.83	10.17	2.30	12.47
1994	10.42	2.56	12.98	10.22	2.35	12.57
1995	10.50	2.64	13.14	10.26	2.39	12.65
1996	10.54	2.73	13.27	10.27	2.44	12.71
1997	10.60	2.83	13.43	10.27	2.50	12.77
1998	10.66	2.92	13.58	10.27	2.56	12.83
1999	10.72	3.02	13.74	10.28	2.61	12.89
2000	10.79	3.12	13.91	10.27	2.67	12.94
2001	10.89	3.23	14.12	10.29	2.73	13.02
25-yr average: 1977-2001	10.00	2.24	12.24	9.86	2.10	11.96

[1] Expenditures and taxable payroll are calculated under the intermediate set of assumptions (alternative II) which incorporates ultimate annual increases of 5¾ percent in average wages in covered employment and 4 percent in CPI, an ultimate unemployment rate of 5 percent, and an ultimate total fertility rate of 2.1 children per woman. (See the text for futher detail.) Taxable payroll is adjusted to take into account the lower contribution rates on self-employment income, on tips, and on multiple-employer "excess wages" as compared with the combined employer-employee rate.

placement ratios result in significant additional cost over the entire 75-year long-range period. Therefore, from a long-range perspective, an immediate stabilization of replacement ratios is strongly advisable, more so than is apparent from an examination of the costs projected for the medium-range period.

A comparison of the average expenditures shown in table 28 for the next 25 years with the corresponding average tax rate of 9.9 percent in present law shows that the old-age, survivors, and disability insurance system is estimated to be underfinanced by 2.34 percent of taxable payroll under present law and by 2.06 percent of taxable payroll if the replacement ratios are stabilized as under the modified theoretical system. Thus, although the medium-range financial problem of the old-age, survivors, and disability insurance system can be alleviated by stabilizing the replacement ratios, it cannot be solved by that action alone. In fact, even if replacement ratios were to be stabilized at their levels at the beginning of 1979 (as under the modified theoretical system), the expenditures as percent of taxable payroll would continue to rise throughout the balance of the 25-year period as indicated in table 28. This is attributable in large part to the following factors:

1. The average replacement ratio for all beneficiaries on the rolls will continue to increase in future years. This results from the fact that

replacement ratios have been lower in the past and that the full effect on the average replacement ratio of the leveling of replacement ratios for new beneficiaries would be delayed until all beneficiaries on the rolls have been awarded benefits based on the modified theoretical system.

2. Recent fertility experience will result in a higher number of beneficiaries relative to the number of covered workers.

3. A higher proportion of the aged population will become eligible for benefits in the near future.

4. Recent adverse trends in disability experience are projected to continue, thereby resulting in a relatively larger number of disabled-worker beneficiaries.

The results in table 28 are based on the alternative II assumptions. Cost estimates have also been prepared under alternatives I and III, which are described earlier in this report. Table 29 presents the estimates prepared for the old-age, survivors, and disability insurance system under all three alternatives for both present law and the modified theoretical system.

Table 29 shows that the estimated average expenditures for the medium-range period vary from 11.57 to 13.14 percent of taxable payroll under present law and from 11.56 to 12.36 percent of taxable payroll under the modified theoretical system. A comparison of those estimated expenditures with the corresponding average tax rate of 9.9 percent in present law shows that the old-age, survivors, and disa-

TABLE 29.—ESTIMATED EXPENDITURES FOR PRESENT LAW AND MODIFIED THEORETICAL OLD-AGE, SURVIVORS, AND DISABILITY INSURANCE SYSTEMS AS PERCENT OF TAXABLE PAYROLL UNDER ALTERNATIVES I, II, AND III, FOR CALENDAR YEARS 1977–2001

[In percent]

Calendar year	Expenditures as percent of taxable payroll under—					
	Present law			Modified theoretical system		
	Alternative I	Alternative II	Alternative III	Alternative I	Alternative II	Alternative III
1977	10.91	10.91	10.91	10.91	10.91	10.91
1978	10.89	10.89	10.91	10.89	10.89	10.91
1979	10.79	10.86	11.11	10.79	10.86	11.12
1980	10.71	10.80	11.29	10.73	10.83	11.30
1981	10.71	10.88	11.41	10.74	10.91	11.43
1982	10.79	11.01	11.52	10.83	11.04	11.51
1983	10.90	11.17	11.64	10.90	11.19	11.58
1984	11.04	11.35	11.83	11.07	11.36	11.74
1985	11.16	11.56	12.10	11.18	11.54	11.94
1986	11.28	11.76	12.36	11.31	11.73	12.13
1987	11.39	11.92	12.59	11.41	11.85	12.28
1988	11.50	12.08	12.81	11.51	11.97	12.40
1989	11.61	12.23	13.03	11.63	12.08	12.53
1990	11.73	12.39	13.26	11.73	12.19	12.64
1991	11.80	12.54	13.49	11.80	12.29	12.75
1992	11.88	12.68	13.72	11.88	12.38	12.84
1993	11.95	12.83	13.94	11.95	12.47	12.93
1994	12.02	12.98	14.18	12.03	12.57	13.02
1995	12.10	13.14	14.42	12.10	12.65	13.10
1996	12.15	13.27	14.66	12.14	12.71	13.17
1997	12.23	13.43	14.92	12.20	12.77	13.23
1998	12.30	13.58	15.18	12.24	12.83	13.30
1999	12.38	13.74	15.46	12.30	12.89	13.36
2000	12.45	13.91	15.75	12.34	12.94	13.41
2001	12.55	14.12	16.10	12.40	13.02	13.51
25-yr average: 1977–2001	11.57	12.24	13.14	11.56	11.96	12.36

Note: Taxable payroll is adjusted to take into account the lower contribution rates on self-employment income, on tips and on multiple-employer "excess wages" as compared with the combined employer-employee rate. Alternatives I, II, and III are defined in the text.

bility insurance system is estimated to be underfinanced by 1.67 to 3.24 percent of taxable payroll under present law and by 1.66 to 2.46 percent of taxable payroll under the modified theoretical system. Under both systems and under all three alternative sets of assumptions, the old-age, survivors, and disability insurance system is underfinanced over the medium-range period; hence, expenditures may be expected to exceed income for the next 25 years even if replacement ratios are stabilized and even if actual future economic experience is quite favorable. Thus, in order to resolve the medium-range financial problem of the old-age, survivors, and disability insurance system, in addition to stabilizing replacement ratios, it will be necessary to increase income or decrease outgo, or both.

The medium-range cost estimates shown throughout this report do not refer to any particular size of the trust funds nor to any possible increase or decrease in that size. Consequently, at the time of developing any financing provisions, it will be necessary to determine the desired level of the trust funds and the point in time at which such level is to be attained, so that the tax schedule can be designed to meet the expenditures and, in addition, to provide for the desired change in the size of the trust fund. For example, if it were considered appropriate to provide for increasing the old-age and survivors and the disability insurance trust funds to the level of the next year's expenditures by the end of the 25-year period, the trust funds would require, under alternative II, an additional amount of income equivalent to about 0.39 percent of taxable payroll per year over the 25-year period. This is an estimate of the amount of income required in excess of the amount needed to meet expenditures and in excess of interest income (which is assumed to accrue at the rate of 6.6 percent per year.)

Long-range cost estimates under present law: 1977–2051

In this section of the report, in accordance with the customary presentation of previous reports, long-range cost estimates are shown for the 75-year period beginning with the year of the report (1977–2051). Table 30 contains the projected expenditures and tax rates of the old-age, survivors, and disability insurance system under present law based on the intermediate set of assumptions (alternative II) for the long-range period. Projected expenditures are shown under all three alternative sets of assumptions in table 33.

Under the intermediate set of assumptions (alternative II) the cost of the old-age and survivors insurance program is projected to increase slowly during the remainder of this century. After the turn of the century, expenditures are expected to increase very rapidly for two reasons. One is that the replacement ratios increase sharply. The second is that the number of beneficiaries will be increasing faster than the number of covered workers, since the large number of persons born during the period from the post-World-War-II years through the late 1950's and into the 1960's (when fertility rates were high) will reach retirement age and begin to receive benefits while the relatively small number of persons born during the period of current and projected low fertility rates will comprise the labor force.

During the last years of the projection period, expenditures continue to increase but at a much slower rate, thereby reflecting both the low

TABLE 30.—ESTIMATED EXPENDITURES OF OLD-AGE, SURVIVORS, AND DISABILITY INSURANCE SYSTEM AS PERCENT OF TAXABLE PAYROLL FOR SELECTED YEARS, 1977–2055 UNDER ALTERNATIVE II

[In percent]

Calendar year	Expenditures as percent of taxable paryroll[1]			Tax rate in law	Difference
	Old-age and survivors insurance	Disability insurance	Total		
1977	9.40	1.50	10.91	9.90	−1.01
1980	9.21	1.59	10.80	9.90	−0.90
1985	9.64	1.92	11.56	9.90	−1.66
1990	10.12	2.27	12.39	9.90	−2.49
1995	10.50	2.64	13.14	9.90	−3.24
2000	10.79	3.12	13.91	9.90	−4.01
2005	11.30	3.66	14.96	9.90	−5.06
2010	12.46	4.11	16.57	9.90	−6.67
2015	14.47	4.42	18.89	11.90	−6.99
2020	17.05	4.59	21.64	11.90	−9.74
2025	19.75	4.55	24.30	11.90	−12.40
2030	21.57	4.45	26.02	11.90	−14.12
2035	22.26	4.43	26.69	11.90	−14.79
2040	22.12	4.55	26.67	11.90	−14.77
2045	21.83	4.76	26.59	11.90	−14.69
2050	22.02	4.91	26.93	11.90	−15.03
2055	22.53	4.98	27.51	11.90	−15.61
25-yr averages:					
1977–2001	10.00	2.24	12.24	9.90	−2.34
2002–26	14.65	4.20	18.85	11.18	−7.67
2027–51	21.86	4.61	26.47	11.90	−14.57
75-yr average: 1977–2051	15.51	3.68	19.19	10.99	−8.20

[1] Expenditures and taxable payroll are calculated under the intermediate set of assumptions (alternative II) which incorporates ultimate annual increases of 5¾ percent in average wages in covered employment and 4 percent in CPI, an ultimate unemployment rate of 5 percent, and an ultimate total fertility rate of 2.1 children per woman. (See the text for further detail.) Taxable payroll is adjusted to take into account the lower contribution rates on self-employment income on tips, and on multiple-employer "excess wages" as compared with the combined employer-employee rate.

birth rates experienced during the 1970's and projected through the 1980's and the slower increases in replacement ratios.

Table 31 compares the average tax rates in present law with the average expenditures as percent of taxable payroll of the old-age, survivors, and disability insurance system as projected under the intermediate set of assumptions (alternative II). The comparisons are for three successive 25-year periods beginning with 1977 as well as for the entire 75-year period (1977–2051). According to these calculations the system is estimated to be underfinanced over the customary long-range 75-year period by an average annual amount equivalent to 8.20 percent of taxable payroll.

Over the first 25-year period the expenditures would exceed taxes by an average annual amount equivalent to 2.34 percent of taxable payroll, over the second 25-year period by 7.67 percent, and over the third by 14.57 percent. In all cases the underfinancing is more pronounced for the disability insurance program than for the old-age and survivors insurance program when measured as a proportion of the cost of each program.

As stated earlier in the report, the high cost of the old-age, survivors, and disability insurance program projected to occur after the turn of the century, indicated in tables 30 and 31, is due partially to unintended results from the present law method of computing benefits. This method, together with the economic assumptions currently underlying the projections, cause future projected benefits to increase substantially faster than wages and therefore result in extremely high benefits for persons first becoming eligible for benefits in the next

TABLE 31.—COMPARISON OF AVERAGE EXPENDITURES AND TAXES FOR OLD-AGE, SURVIVORS AND DISABILITY INSURANCE SYSTEM AS PERCENT OF TAXABLE PAYROLL UNDER ALTERNATIVE II

[In percent]

Item	Old-age and survivors insurance	Disability insurance	Total
1st 25-yr period (1977–2001):			
Expenditures as percent of taxable payroll [1]	10.00	2.24	12.24
Tax rate in law	8.55	1.35	9.90
Difference	−1.45	−.89	−2.34
2d 25-yr period (2002–26):			
Expenditures as percent of taxable payroll [1]	14.65	4.20	18.85
Tax rate in law	9.59	1.59	11.18
Difference	−5.06	−2.61	−7.67
3d 25-yr period (2027–51):			
Expenditures as percent of taxable payroll [1]	21.86	4.61	26.47
Tax rate in law	10.20	1.70	11.90
Difference	−11.66	−2.91	−14.57
Total 75-yr period (1977–2051):			
Expenditures as percent of taxable payroll [1]	15.51	3.68	19.19
Tax rate in law	9.45	1.54	10.99
Difference	−6.06	−2.14	−8.20

[1] Expenditures and taxable payroll are calculated under the intermediate set of assumptions (alternative II) which incorporates ultimate annual increases of 5¾ percent in average wages in covered employment and 4 percent in CPI, an ultimate unemployment rate of 5 percent, and an ultimate total fertility rate of 2.1 children per woman. (See the text, for further detail.) Taxable payroll is adjusted to take into account the lower contribution rates on self-employment income on tips, and on multiple-employer "excess wages" as compared with the combined employer-employee rate.

century. The portion of the projected program costs presented in tables 30 and 31 which is related to the increases in replacement ratios is expected to materialize only if the present law benefit adjustment procedure is retained. (See the later section on "Long-range Cost Estimates under a Modified Theoretical System: 1977–2051" for cost estimates that exclude the effect of increases in replacement ratios.)

The ultimate values assumed in the intermediate set of assumptions (alternative II) for the selected economic and demographic factors, which are summarized in table 27 and which underlie the results in tables 30 and 31, are basically the same as those used in last year's report. One exception is that the assumed ultimate total fertility rate in this year's report is 2.1 children per woman instead of 1.9 as in last year's report. In addition, changes have been made in other assumptions. Table 32 summarizes the effect of such changes on the estimated 75-year average long-range cost.

The major factors underlying the cost estimates shown herein under alternative II that differ from those underlying the cost estimates under alternative II in last year's report are summarized below.

As mentioned in the Highlights section, the dependency requirements for husbands and widowers were changed due to Supreme Court decisions early in 1977.

In changing from the valuation period of last year's report, 1976–2050, to the valuation period of this year's report, 1977–2051, the year 1976, a year of relatively low cost, is replaced by 2051, a year of relatively high cost, thereby increasing the estimated average expenditures even in the absence of any other changes. (In previous reports, this item was included under "All other factors.")

TABLE 32.—CHANGES IN LONG-RANGE EXPENDITURES OF OLD-AGE, SURVIVORS, AND DISABILITY INSURANCE PROGRAM AS PERCENT OF TAXABLE PAYROLL, BY REASON FOR CHANGE

[In percent]

Item	Old-age and survivors insurance	Disability insurance	Total
Estimated average expenditures as percent of taxable payroll in last year's report [1]	15.42	3.51	18.93
Changes in estimated expenditures due to changes in:			
Dependency requirements for husbands and widowers [2]	+0.12	0	+0.12
Valuation date	+.19	+.05	+.24
Economic assumptions	−.10	−.02	−.12
Mortality assumptions	+.62	+.02	+.64
Fertility assumptions	−.59	−.07	−.66
Disability assumptions	0	+.26	+.26
All other factors	−.15	−.07	−.22
Total change in estimated expenditures	+.09	+.17	+.26
New estimated average expenditures as percent of taxable payroll [3]	15.51	3.68	19.19

[1] Expenditures and taxable payroll are calculated under the intermediate set of assumptions (alternative II) described in last year's report which incorporates ultimate annual increases of 5¾ percent in average wages in covered employment and 4 percent in CPI, an ultimate unemployment rate of 5 percent, and an ultimate total fertility rate of 1.9 children per woman.

[2] See sec. (j) of Highlights for further detail on Supreme Court decisions that produced this change.

[3] Expenditures and taxable payroll are calculated under the intermediate set of assumptions (alternative II) described in the text of this report. The ultimate values for annual increases in average wages in covered employment, for annual increases in CPI, and for the unemployment rate, are the same as those included in the intermediate set of assumptions described in last year's report. The ultimate total fertility rate is assumed to be 2.1 children per woman.

Note: All figures are expressed as percent of taxable payroll which is adjusted to take into account the lower contribution rates on self-employment income, on tips, and on multiple-employer "excess wages" as compared with the combined employer-employee rate.

The ultimate economic assumptions as to wage-CPI increases are the same as in last year's report. The decrease in cost due to economic assumptions is primarily due to projected increases in the proportion of the population in covered employment.

In the demographic area, both the mortality assumptions and the fertility assumptions have been changed. The ultimate mortality level assumed in this year's report is about 12 percent lower than in last year's report. The difference in mortality levels assumed for the two reports results from incorporating in this year's projection not only the additional year of experience in determining the trends but also preliminary data for two additional years in determining the level at the beginning of the projection period. Both factors reflect more improvement in mortality than was previously assumed.

The assumptions regarding the total fertility rate in this year's report differ from those in last year's in several ways. The present decline in fertility is assumed to continue until the 12-month period ending June 30, 1980, whereas in last year's report it was assumed to reach its minimum level in the 12-month period ending June 30, 1977. In addition, the assumed minimum level is lower in this year's report than in last year's. (1.65 children per woman as compared with 1.75). Also, the ultimate total fertility rate is assumed to be 2.1 children per woman instead of 1.9 as in last year's report. The effect of assuming lower total fertility rates in the short range is to increase the 75-year average cost by 0.18 percent of taxable payroll. The effect of assuming an ultimate fertility rate of 2.1 instead of 1.9 is to decrease the 75-year average cost by 0.84 percent of taxable payroll. The net effect of these

two changes in assumptions is a decrease in the 75-year average cost of 0.66 percent of taxable payroll.

The largest increase in the cost of the disability insurance program is due to changes in assumptions regarding disability incidences and terminations. The principal factor is that the termination rates based on the experience of 1968–74, which were used in last year's report without adjustment, have been adjusted this year to reflect more recent termination experience.

The overall result of the changes described above is to increase the estimated average expenditures as percent of taxable payroll over the 75-year period from 18.93 percent to 19.19 percent. A more detailed description of the assumptions used for this year's cost estimates and the rationale for their selection are included in appendix A of this report.

The long-range cost estimates shown throughout this report do not refer to any particular size of the trust funds nor to any possible increase or decrease in that size. Consequently, at the time of developing any financing provisions, it will be necessary to determine the desired level of the trust funds and the point in time at which such level is to be attained, so that the tax schedule can be designed to meet the expenditures and in addition to provide for the desired change in the size of the trust fund. For example, if it were considered appropriate to provide for increasing the old-age and survivors and the disability insurance trust funds to the level of the next year's expenditures by the end of the 75-year valuation period the trust funds would require an additional amount of income equivalent to about 0.24 percent of taxable payroll. This is an estimate of the amount of income required in excess of the amount needed to meet expenditures and in excess of interest income (which is assumed to accrue at the rate of 6.6 percent per year).

The results in tables 30–32 should be read with full recognition of the uncertainties involved in the projection of economic and demographic factors over long-range periods as discussed above. In addition, due to the sensitivity of future benefit levels under present law to changes in the long-range economic conditions these results are subject to wide variation. An indication of the degree of variation possible is shown in table 33 which presents cost estimates under alternatives I, II, and III.

Table 34 shows that in the first 25-year period (1977–2001) the difference between expenditures and taxes varies from 1.67 to 3.24 percent of taxable payroll. In the second (2002–26) the difference varies from 3.94 to 13.33 percent of taxable payroll, and in the final 25 years (2027–51) it varies from 6.03 to 31.71 percent of taxable payroll. For the 75-year period the difference varies from 3.88 to 16.09 percent of taxable payroll.

In both tables 33 and 34, it can be seen that the largest variations in expenditures and in the difference between expenditures and taxes materialize in the latter part of the 75-year projection period. To a large extent this characteristic results from the automatic benefit-adjustment provisions in present law and to the shift in the age composition of the population, both of which were described previously.

TABLE 33.—ESTIMATED EXPENDITURES OF OLD-AGE, SURVIVORS, AND DISABILITY INSURANCE SYSTEM AS PERCENT OF TAXABLE PAYROLL UNDER ALTERNATIVES I, II, AND III, FOR SELECTED YEARS, 1977–2055

[In percent]

Calendar year	Expenditures as percent of taxable payroll		
	Alternative I	Alternative II	Alternative III
1977	10.91	10.91	10.91
1980	10.71	10.80	11.29
1985	11.16	11.56	12.10
1990	11.73	12.39	13.26
1995	12.10	13.14	14.42
2000	12.45	13.91	15.75
2005	12.94	14.96	17.60
2010	13.83	16.57	20.42
2015	15.14	18.89	24.40
2020	16.72	21.64	29.32
2025	18.10	24.30	34.55
2030	18.67	26.02	41.08
2035	18.46	26.69	42.03
2040	17.86	26.67	44.09
2045	17.32	26.59	45.85
2050	17.17	26.93	47.85
2055	17.25	27.51	49.77
25-yr averages:			
1977–2001	11.57	12.24	13.14
2002–2026	15.12	18.85	24.51
2027–2051	17.93	26.47	43.61
75-yr average: 1977–2051	14.87	19.19	27.08

Note: Taxable payroll is adjusted to take into account the lower contribution rates on self-employment income, on tips, and on multiple-employer "excess wages" as compared with the combined employer-employee rate. Alternatives I, II, and III are defined in the text.

TABLE 34.—COMPARISON OF AVERAGE EXPENDITURES AND TAXES FOR OLD-AGE, SURVIVORS, AND DISABILITY INSURANCE SYSTEM UNDER PRESENT LAW AS PERCENT OF TAXABLE PAYROLL UNDER ALTERNATIVES I, II, AND III

[In percent]

Item	Alternative I	Alternative II	Alternative III
1st 25-yr period (1977–2001):			
Expenditures as percent of taxable payroll	11.57	12.24	13.14
Tax rate in law	9.90	9.90	9.90
Difference	−1.67	−2.34	−3.24
2d 25-yr period (2002–26):			
Expenditures as percent of taxable payroll	15.12	18.85	24.51
Tax rate in law	11.18	11.18	11.18
Difference	−3.94	−7.67	−13.33
3d 25-yr period (2027–51):			
Expenditures as percent of taxable payroll	17.93	26.47	43.61
Tax rate in law	11.90	11.90	11.90
Difference	−6.03	−14.57	−31.71
Total 75-yr period (1977–2051):			
Expenditures as percent of taxable payroll	14.87	19.19	27.08
Tax rate in law	10.99	10.99	10.99
Difference	−3.88	−8.20	−16.09

Notes: Taxable payroll is adjusted to take into account the lower contribution rates on self-employmet income, on tips, and on multiple-employer "excess wages" as compared with the combined employer-employee rate. The assumptions specified in alternative I, II, and III are described in the text.

Long-range cost estimates under a modified theoretical system: 1977–2051

Because of the problems with the present law system which are demonstrated in the earlier discussion of replacement ratios, it is useful for long-range financial planning to illustrate the general

trends in expenditures for a system under which benefits would be stable with respect to earnings. Consequently, cost projections have been prepared on the basis of the modified theoretical old-age, survivors, and disability insurance system described earlier. This system maintains through time the relationship existing at the beginning of calendar year 1979 between average awarded benefits and average earnings. The estimated expenditures for this system are presented under all three alternative sets of assumptions in table 35.

It may be observed from table 35 that the long-range cost of the modified theoretical old-age, survivors, and disability insurance system would be much less sensitive than the present law system to changes in the basic economic assumptions. Much of the variation of the long-range costs shown in table 35 is due to the different fertility assumptions used in the three alternative projections (as described earlier). This is demonstrated by the various sensitivity tests presented in appendix A. It can also be noted from the table that the overall level of estimated expenditures is reduced as a result of stabilizing the replacement ratios.

Table 36 compares the estimated cost under the modified theoretical system with the average tax rate for successive 25-year periods and for the entire 75-year valuation period. Under alternatives I, II, and III, the actuarial imbalance over the customary 75-year period would be reduced to a range of about 3.26 to 6.52 percent of taxable payroll. This table illustrates that the variation in the estimated program deficit is substantially reduced under the modified theoretical system. Nonetheless, it also illustrates that, since even under such a system a substantial deficit is still projected, the long-range financial difficulties cannot be resolved by only stabilizing the replacement ratios.

TABLE 35.—ESTIMATED EXPENDITURES FOR MODIFIED THEORETICAL OLD-AGE, SURVIVORS, AND DISABILITY INSURANCE SYSTEM AS PERCENT OF TAXABLE PAYROLL UNDER ALTERNATIVES I, II, AND III FOR SELECTED YEARS, 1977–2055

[In percent]

Calendar year	Expenditures as percent of taxable payroll		
	Alternative I	Alternative II	Alternative III
1977	10.91	10.91	10.91
1980	10.73	10.83	11.30
1985	11.18	11.54	11.94
1990	11.73	12.19	12.64
1995	12.10	12.65	13.10
2000	12.34	12.94	13.41
2005	12.62	13.29	13.91
2010	13.29	14.11	15.02
2015	14.42	15.46	16.76
2020	15.82	17.10	18.94
2025	17.04	18.62	21.12
2030	17.52	19.40	23.76
2035	17.28	19.40	23.27
2040	16.65	18.91	23.34
2045	16.10	18.45	23.32
2050	15.90	18.29	23.42
2055	15.92	18.34	23.53
25-yr averages:			
1977–2001	11.56	11.96	12.36
2002–2026	14.45	15.49	16.85
2027–2051	16.73	18.89	23.31
75-yr average: 1977–2051	14.25	15.45	17.51

Notes: See text for description of modified theoretical system. Taxable payroll is adjusted to take into account the lower contribution rates on self-employment income, on tips, and on multiple-employer "excess wages" as compared with the combined employer-employee rate. Alternatives I, II, and III are defined in the text.

TABLE 36.—COMPARISON OF AVERAGE EXPENDITURES AND TAXES FOR MODIFIED THEORETICAL OLD-AGE, SURVIVORS, AND DISABILITY INSURANCE SYSTEM AS PERCENT OF TAXABLE PAYROLL UNDER ALTERNATIVES I, II, AND III

[In percent]

Item	Alternative I	Alternative II	Alternative III
1st 25-yr period (1977–2001):			
Expenditures as percent of taxable payroll	11.56	11.96	12.36
Tax rate in law	9.90	9.90	9.90
Difference	—1.66	—2.06	—2.46
2d 25-yr period (2002–26):			
Expenditures as percent of taxable payroll	14.45	15.49	16.85
Tax rate in law	11.18	11.18	11.18
Difference	—3.27	—4.31	—5.67
3d 25-yr period (2027–51):			
Expenditures as percent of taxable payroll	16.73	18.89	23.31
Tax rate in law	11.90	11.90	11.90
Difference	—4.83	—6.99	—11.41
Total 75-yr period (1977–2051):			
Expenditures as percent of taxable payroll	14.25	15.45	17.51
Tax rate in law	10.99	10.99	10.99
Difference	—3.26	—4.46	—6.52

Notes: See text for description of modified theoretical system. Taxable bayroll is adjusted to take into account the lower contribution rates on self-employment income, on tips, and on multiple-employer "excess wages" as compared with the combined employer-employee rate. Alternatives I, II, and III are defined in the text.

Conclusion

The actuarial cost estimates presented in this report indicate that the declines in the assets of the old-age and survivors insurance and disability insurance trust funds which began in 1975 will continue. Without legislation to improve the financial status of the program, the assets of the disability insurance trust fund will be exhausted in 1979 under all three of the alternative sets of economic assumptions for which estimates have been presented in this report. Similarly, the assets of the old-age and survivors insurance trust fund will be exhausted in 1982 under the most pessimistic set of assumptions, in 1983 under the intermediate set, and in 1984 under the most optimistic set of assumptions.

The Board recommends that action be taken to strengthen the actuarial status of the old-age, survivors, and disability insurance system over the near term beginning in calendar year 1978, if feasible, and certainly no later than calendar year 1979. In view of the rapid rate of decline projected for the assets of the disability insurance trust fund, and the low level which that fund is expected to reach by the end of 1978, the Board strongly recommends action to strengthen the disability insurance trust fund beginning January 1, 1978. If no additional income is provided for the old-age, survivors, and disability insurance system until 1979, the Board recommends that the total contribution rate for both trust funds, of 4.95 percent for employees and employers, each, be reallocated to give a larger share to the disability insurance trust fund starting in calendar year 1978.

The medium-range actuarial cost estimates of the program indicate that, for each of the next 25 years, the estimated expenditures under present law will exceed the estimated income from taxes. This excess

increases with time, and is estimated to average about 2.3 percent of taxable payroll over the 25-year period (1977–2001) based upon the intermediate cost estimates. Under more optimistic assumptions this excess of expenditures over income is projected to average 1.7 percent of taxable payroll, and under more pessimistic assumptions this excess is projected to average 3.2 percent of taxable payroll. Therefore, all alternative medium-range cost estimates presented in this report indicate that over the remainder of this century the present old-age, survivors, and disability insurance program will require either additional revenues or a restructuring of future benefits, or both. The reduction in cost resulting from the restructuring of benefits so as to stabilize replacement ratios will not be sufficient to bring the system into actuarial balance over the medium-range period. In addition, it will be necessary to increase revenues or restructure benefits beyond the stabilization of replacement ratios.

The Board recommends that high priority be given to the development of plans to strengthen the actuarial status of the old-age, survivors, and disability insurance program over the next 25 years.

The long-range cost of the present program projected to occur after the turn of the century will substantially exceed the taxes scheduled in present law. Although those projected costs are highly sensitive to variations in the demographic and economic assumptions, all reasonable assumptions indicate that there will be significant excesses of expenditures over income. Estimates have been presented in this report under three alternative sets of assumptions indicating a broad range within which actual future experience may fall; however, no assurance can be given that these estimates define the broadest possible range of variation in the long-range cost estimates.

The Board recognizes, as it has done in the last two reports, that the high cost projected to occur after the turn of the century results in part from the method of computing benefits which is included in present law. This method, together with the economic assumptions currently underlying the projections, causes future projected benefits to increase substantially faster than wages and therefore results in extremely high benefit levels for persons first becoming eligible for benefits in the next century. The Board is in full concurrence with the intent of the 1975 Advisory Council on Social Security that the benefit structure be revised in a responsible manner. The Board recommends the adoption of a specific plan as soon as possible in order to prevent the high benefit levels projected for the future from materializing, to improve the predictability of future benefit levels, and to reduce the long-range cost of the system.