G. LONG-RANGE SENSITIVITY ANALYSIS

This section presents estimates which illustrate the sensitivity of the long-range actuarial balance of the OASDI program to changes in selected individual assumptions. The estimates based on the three alternative sets of assumptions (see sections II.D and II.F.2) illustrate the effects of varying all of the principal assumptions simultaneously in order to portray a generally more optimistic or pessimistic future, in terms of the financial status of the OASDI program. In the sensitivity analysis presented in this section, the intermediate alternative II is used as the reference point, and one assumption at a time is varied within that alternative. Similar variations in the selected assumptions within the other alternatives would result in similar relative variations in the long-range estimates.

Each table that follows shows the effects of changing a particular assumption on the OASDI summarized income rates, summarized cost rates, and actuarial balances (as defined earlier in this report) for 25-year, 50-year, and 75-year valuation periods. Because the income rate varies only slightly with changes in assumptions, it is not considered in the discussion of the tables. The change in each of the actuarial balances is approximately equal to the change in the corresponding cost rate, but in the opposite direction.

1. Total Fertility Rate

Table II.G.1 shows the estimated OASDI income rates, cost rates, and actuarial balances, on the basis of alternative II with various assumptions about the ultimate total fertility rate. These assumptions are that the ultimate total fertility rate will be 1.6 children per woman (as assumed for alternative III), 1.9 (as assumed for alternative II), and 2.2 (as assumed for alternative I). The rate is assumed to change gradually from its current level and to reach the various ultimate values in 2016.

TABLE II.G.1.—ESTIMATED OASDI INCOME RATES, COST RATES, AND ACTUARIAL BALANCES, BASED ON ALTERNATIVE II WITH VARIOUS FERTILITY ASSUMPTIONS

[As a percentage of taxable payroll]

Valuation period	Ultimate total fertility rate[1]		
	1.6	1.9	2.2
Summarized income rate:			
25-year: 1992-2016	13.23	13.23	13.23
50-year: 1992-2041	13.17	13.16	13.15
75-year: 1992-2066	13.19	13.16	13.14
Summarized cost rate:			
25-year: 1992-2016	12.07	12.11	12.15
50-year: 1992-2041	13.86	13.75	13.65
75-year: 1992-2066	15.11	14.63	14.17
Actuarial balance:			
25-year: 1992-2016	+ 1.15	+ 1.12	+ 1.08
50-year: 1992-2041	–.69	–.59	–.50
75-year: 1992-2066	–1.92	–1.46	–1.03

[1]The total fertility rate for any year is the average number of children who would be born to a woman in her lifetime if she were to experience the birth rates by age observed in, or assumed for, the selected year, and if she were to survive the entire child-bearing period. The ultimate total fertility rate is assumed to be reached in 2016.

For the 25-year period, the cost rate for the three fertility assumptions varies by only 0.08 percent of taxable payroll. In contrast, the 75-year cost rate varies over a wide range, decreasing from 15.11 to 14.17 percent, as the assumed ultimate total fertility rate increases from 1.6 to 2.2. Similarly, while the 25-year actuarial balance varies by only 0.07 percent of taxable payroll, the 75-year actuarial balance varies over a much wider range, from –1.92 to –1.03 percent.

During the 25-year period, changes in fertility affect the working population only slightly and result in relatively minor changes in the number of child beneficiaries. Hence, the program cost is affected only slightly. For the 75-year long-range period, however, changes in fertility have a relatively greater impact on the labor force than on the beneficiary population. As a result, an increase in fertility significantly reduces the cost rate. Each increase of 0.1 in the ultimate total fertility rate increases the long-range actuarial balance by about 0.15 percent of taxable payroll.

2. Death Rates

Table II.G.2 shows the estimated OASDI income rates, cost rates, and actuarial balances, on the basis of alternative II with various assumptions about future reductions in death rates. The analysis was developed by varying the percentage decrease assumed to occur during 1992-2066 in

the death rates by age, sex, and cause of death. The decreases assumed for this period, summarized as changes in the age-sex-adjusted death rate, are about 17 percent (as assumed for alternative I), 35 percent (as assumed for alternative II), and 52 percent (as assumed for alternative III). It should be noted that these reductions do not apply uniformly to all ages, as some variation by age was assumed (see section II.H.1) consistent with the objective of selecting assumptions for alternatives I and III that are relatively more optimistic and more pessimistic, respectively, in terms of the financing of the OASDI program.

TABLE II.G.2—ESTIMATED OASDI INCOME RATES, COST RATES, AND ACTUARIAL BALANCES, BASED ON ALTERNATIVE II WITH VARIOUS DEATH-RATE ASSUMPTIONS

[As a percentage of taxable payroll]

Valuation period	Reduction in death rates[1]		
	17 percent	35 percent	52 percent
Summarized income rate:			
25-year: 1992-2016	13.22	13.23	13.24
50-year: 1992-2041	13.14	13.16	13.18
75-year: 1992-2066	13.13	13.16	13.20
Summarized cost rate:			
25-year: 1992-2016	11.85	12.11	12.37
50-year: 1992-2041	13.24	13.75	14.28
75-year: 1992-2066	13.86	14.63	15.47
Actuarial balance:			
25-year: 1992-2016	+ 1.36	+ 1.12	+ .86
50-year: 1992-2041	–.10	–.59	–1.10
75-year: 1992-2066	–.73	–1.46	–2.27

[1]The measure of the reduction in death rates is the decrease in the age-sex-adjusted death rate during 1992-2066.

The variation in cost for the 25-year period is less pronounced than the variation for the 75-year period because the decreases in death rates are assumed to occur gradually and because of the specific changes in the age composition of the population that are projected to occur. The 25-year cost rate increases from 11.85 percent (for 17-percent lower ultimate death rates) to 12.37 percent (for 52-percent lower ultimate rates). The 75-year cost rate increases from 13.86 to 15.47 percent. The actuarial balance decreases from + 1.36 to + 0.86 percent for the 25-year period, and from –0.73 to –2.27 percent for the 75-year period.

Lower death rates cause both the income (as well as taxable payroll) and the outgo of the OASDI program to be higher than they would otherwise be. The relative increase in outgo, however, exceeds the relative increase in taxable payroll. For any given year, reductions in the death rates for people who have attained the retirement eligibility age of 62 (people whose death rates are the highest) increase the number of

retired-worker beneficiaries (and, therefore, the amount of retirement benefits paid) without adding significantly to the number of covered workers (and, therefore, to the taxable payroll). Although reductions for people aged 50 to retirement eligibility age do result in significant increases to the taxable payroll, those increases are not large enough to offset the sum of the additional retirement benefits mentioned above and the disability benefits paid to additional beneficiaries in this pre-retirement age group. At ages under 50, death rates are so low that even substantial reductions would not result in significant increases in the numbers of covered workers or beneficiaries. Consequently, if death rates for all ages are lowered by about the same relative amount, outgo increases at a rate greater than the rate of growth in payroll, thereby resulting in higher cost rates. Each additional 10-percentage-point reduction in the age-sex-adjusted death rate assumed to occur in 1992-2066, relative to the 35-percent reduction assumed for alternative II, decreases the long-range actuarial balance by about 0.44 percent of taxable payroll.

3. Net Immigration

Table II.G.3 shows the estimated OASDI income rates, cost rates, and actuarial balances, on the basis of alternative II with various assumptions about the magnitude of net immigration. These assumptions are that the annual net immigration will be 600,000 persons (as assumed for alternative III), 750,000 persons (as assumed for alternative II), and 1,000,000 persons (as assumed for alternative I).

TABLE II.G.3.—ESTIMATED OASDI INCOME RATES, COST RATES, AND ACTUARIAL BALANCES, BASED ON ALTERNATIVE II WITH VARIOUS NET-IMMIGRATION ASSUMPTIONS

[As a percentage of taxable payroll]

Valuation period	Net immigration per year		
	600,000	750,000	1,000,000
Summarized income rate:			
25-year: 1992-2016	13.23	13.23	13.22
50-year: 1992-2041	13.17	13.16	13.15
75-year: 1992-2066	13.17	13.16	13.15
Summarized cost rate:			
25-year: 1992-2016	12.15	12.11	12.04
50-year: 1992-2041	13.83	13.75	13.62
75-year: 1992-2066	14.71	14.63	14.50
Actuarial balance:			
25-year: 1992-2016	+ 1.08	+ 1.12	+ 1.18
50-year: 1992-2041	−.66	−.59	−.47
75-year: 1992-2066	−1.54	−1.46	−1.34

For all three periods, the cost rate decreases with increasing rates of net immigration. For the 25-year period, the cost rate decreases from 12.15 percent of taxable payroll (for annual net immigration of 600,000 persons) to 12.04 percent (for annual net immigration of 1,000,000 persons). For the 50-year period, it decreases from 13.83 percent to 13.62 percent, and for the 75-year period, it decreases from 14.71 percent to 14.50 percent. The actuarial balance increases from + 1.08 to + 1.18 percent for the 25-year period, from –0.66 to –0.47 for the 50-year period, and from –1.54 to –1.34 percent for the 75-year period.

The cost rate decreases with increasing rates of net immigration because immigration occurs at relatively young ages, thereby increasing the numbers of covered workers earlier than the numbers of beneficiaries. Each additional group of 100,000 immigrants relative to the 750,000 net immigration assumed for alternative II, increases the long-range actuarial balance by about 0.05 percent of taxable payroll.

4. Real-Wage Differential

Table II.G.4 shows the estimated OASDI income rates, cost rates, and actuarial balances, on the basis of alternative II with various assumptions about the real-wage differential. These assumptions are that the ultimate real-wage differential will be 0.6 percentage point (as assumed for alternative III), 1.1 percentage points (as assumed for alternative II), and 1.7 percentage points (as assumed for alternative I). In each case, the ultimate annual increase in the CPI is assumed to be 4.0 percent (as assumed for alternative II), yielding ultimate percentage increases in average annual wages in covered employment of 4.6, 5.1, and 5.7 percent under alternatives III, II, and I, respectively.

For the 25-year period, the cost rate decreases from 12.50 percent (for a real-wage differential of 0.6 percentage point) to 11.66 percent (for a differential of 1.7 percentage points). For the 50-year period, it decreases from 14.28 to 13.13 percent, and for the 75-year period it decreases from 15.18 to 13.95 percent. The actuarial balance increases from + 0.77 to + 1.53 percent for the 25-year period, from –1.07 to –0.02 for the 50-year period, and from –1.97 to –0.85 percent for the 75-year period.

TABLE II.G.4.—ESTIMATED OASDI INCOME RATES, COST RATES, AND ACTUARIAL BALANCES, BASED ON ALTERNATIVE II WITH VARIOUS REAL-WAGE ASSUMPTIONS

[As a percentage of taxable payroll]

Valuation period	Ultimate percentage increase in wages-CPI[1]		
	4.6-4.0	5.1-4.0	5.7-4.0
Summarized income rate:			
25-year: 1992-2016	13.26	13.23	13.19
50-year: 1992-2041	13.21	13.16	13.11
75-year: 1992-2066	13.21	13.16	13.11
Summarized cost rate:			
25-year: 1992-2016	12.50	12.11	11.66
50-year: 1992-2041	14.28	13.75	13.13
75-year: 1992-2066	15.18	14.63	13.95
Actuarial balance:			
25-year: 1992-2016	+ .77	+ 1.12	+ 1.53
50-year: 1992-2041	−1.07	−.59	−.02
75-year: 1992-2066	−1.97	−1.46	−.85

[1]The first value in each pair is the assumed ultimate annual percentage increase in average wages in covered employment. The second value is the assumed ultimate annual percentage increase in the Consumer Price Index. The difference between the two values is the real-wage differential.

The cost rate decreases with increasing real-wage differentials, because the higher real-wage levels increase the taxable payroll, while benefit increases are not affected. Although the initial benefit levels are higher because of the higher wages, these increases are more than offset by the increases in the taxable payroll of future workers. Each 0.5-percentage-point increase in the assumed real-wage differential increases the long-range actuarial balance by about 0.50 percent of taxable payroll.

5. Consumer Price Index

Table II.G.5 shows the estimated OASDI income rates, cost rates, and actuarial balances, on the basis of alternative II with various assumptions about the rate of increase for the Consumer Price Index (CPI). These assumptions are that the ultimate annual increase in the CPI will be 3.0 percent (as assumed for alternative I), 4.0 percent (as assumed for alternative II), and 5.0 percent (as assumed for alternative III). In each case, the ultimate real-wage differential is assumed to be 1.1 percentage points (as assumed for alternative II), yielding ultimate percentage increases in average annual wages in covered employment of 4.1, 5.1, and 6.1 percent under alternatives I, II, and III, respectively.

TABLE II.G.5.—ESTIMATED OASDI INCOME RATES, COST RATES, AND ACTUARIAL BALANCES, BASED ON ALTERNATIVE II WITH VARIOUS CPI-INCREASE ASSUMPTIONS

[As a percentage of taxable payroll]

Valuation period	Ultimate percentage increase in wage-CPI[1]		
	4.1-3.0	5.1-4.0	6.1-5.0
Summarized income rate:			
25-year: 1992-2016	13.24	13.23	13.21
50-year: 1992-2041	13.17	13.16	13.15
75-year: 1992-2066	13.18	13.16	13.15
Summarized cost rate:			
25-year: 1992-2016	12.25	12.11	11.98
50-year: 1992-2041	13.95	13.75	13.56
75-year: 1992-2066	14.85	14.63	14.41
Actuarial balance:			
25-year: 1992-2016	+ 1.00	+ 1.12	+ 1.23
50-year: 1992-2041	–.77	–.59	–.41
75-year: 1992-2066	–1.67	–1.46	–1.26

[1]The first value in each pair is the assumed ultimate annual percentage increase in average wages in covered employment. The second value is the assumed ultimate annual percentage increase in the Consumer Price Index.

For all three periods, the cost rate decreases with greater assumed rates of increase in the CPI. For the 25-year period, the cost rate decreases from 12.25 (for CPI increases of 3.0 percent) to 11.98 percent (for CPI increases of 5.0 percent). For the 50-year period, it decreases from 13.95 to 13.56 percent, and for the 75-year period, it decreases from 14.85 to 14.41 percent. The actuarial balance increases from + 1.00 to + 1.23 percent for the 25-year period, from –0.77 to –0.41 for the 50-year period, and from –1.67 to –1.26 percent for the 75-year period.

The patterns described above result primarily from the time lag between the effects of the CPI changes on taxable payroll and on benefit payments. When assuming a greater rate of increase in the CPI (in conjunction with a constant real-wage differential), the effect on taxable payroll of the implied greater rate of increase in average wages is experienced immediately, while the effect on benefits of the greater rate of increase in the CPI is experienced with a lag of about 1 year. In addition, the effect on benefits of the greater rate of increase in average wages is experienced no sooner than 2 years later. Thus, the higher taxable payrolls have a stronger effect than the higher benefits, thereby resulting in lower cost rates. The effect of each 1.0-percentage-point increase in the rate of change assumed for the CPI is an increase in the long-range actuarial balance of about 0.20 percent of taxable payroll.

6. Real-Interest Rate

Table II.G.6 shows the estimated OASDI income rates, cost rates, and actuarial balances, on the basis of alternative II with various assumptions about the annual nominal real-interest rate for special public-debt obligations issuable to the trust funds, which are compounded semiannually. These assumptions are that the ultimate annual real-interest rate will be 1.5 percent (as assumed for alternative III), 2.3 percent (as assumed for alternative II), and 3.0 percent (as assumed for alternative I). In each case, the ultimate annual increase in the CPI is assumed to be 4.0 percent (as assumed for alternative II), resulting in ultimate annual yields of 5.6, 6.4, and 7.1 percent under alternatives III, II, and I, respectively.

TABLE II.G.6.—ESTIMATED OASDI INCOME RATES, COST RATES, AND ACTUARIAL BALANCES, BASED ON ALTERNATIVE II WITH VARIOUS REAL-INTEREST ASSUMPTIONS

[As a percentage of taxable payroll]

Valuation period	Ultimate annual real-interest rate		
	1.5 percent	2.3 percent	3.0 percent
Summarized income rate:			
25-year: 1992-2016	13.20	13.23	13.25
50-year: 1992-2041	13.14	13.16	13.18
75-year: 1992-2066	13.15	13.16	13.18
Summarized cost rate:			
25-year: 1992-2016	12.18	12.11	12.06
50-year: 1992-2041	14.04	13.75	13.51
75-year: 1992-2066	15.09	14.63	14.24
Actuarial balance:			
25-year: 1992-2016	+ 1.03	+ 1.12	+ 1.19
50-year: 1992-2041	–.91	–.59	–.33
75-year: 1992-2066	–1.94	–1.46	–1.06

For the 25-year period, the cost rate decreases slightly with increasing real-interest rates from 12.18 percent (for an ultimate real-interest rate of 1.5 percent) to 12.06 percent (for an ultimate real-interest rate of 3.0 percent). For the 50-year period, it decreases from 14.04 to 13.51 percent, and for the 75-year period, it decreases from 15.09 to 14.24 percent. The actuarial balance increases from + 1.03 to + 1.19 percent for the 25-year period, from –0.91 to –0.33 percent for the 50-year period, and from –1.94 to –1.06 percent for the 75-year period. Each 0.5-percentage-point increase in the assumed real-interest rate increases the long-range actuarial balance by about 0.29 percent of taxable payroll.

7. Disability Incidence Rates

Table II.G.7 shows the estimated OASDI income rates, cost rates, and actuarial balances, on the basis of alternative II with various assumptions concerning future disability incidence rates. These assumptions provide that the total gross annual incidence rates will increase from the 1991 level of 4.9 per thousand to levels, in 2026, of 5.8 per thousand for alternative I, 6.9 per thousand for alternative II, and 9.0 per thousand for alternative III.

TABLE II.G.7.—ESTIMATED OASDI INCOME RATES, COST RATES, AND ACTUARIAL BALANCES, BASED ON ALTERNATIVE II WITH VARIOUS DISABILITY INCIDENCE ASSUMPTIONS

[As a percentage of taxable payroll]

Valuation period	Disability incidence rates based on alternative—		
	I	II	III
Summarized income rate:			
25-year: 1992-2016	13.23	13.23	13.23
50-year: 1992-2041	13.16	13.16	13.16
75-year: 1992-2066	13.16	13.16	13.17
Summarized cost rate:			
25-year: 1992-2016	11.92	12.11	12.40
50-year: 1992-2041	13.53	13.75	14.10
75-year: 1992-2066	14.39	14.63	15.00
Actuarial balance:			
25-year: 1992-2016	+ 1.31	+ 1.12	+ .83
50-year: 1992-2041	–.38	–.59	–.94
75-year: 1992-2066	–1.23	–1.46	–1.83

For the 25-year period, the cost rate increases with increasing disability incidence rates from 11.92 percent (for the relatively low rates assumed for alternative I) to 12.40 percent (for the relatively high rates assumed for alternative III). For the 50-year period, it increases from 13.53 to 14.10 percent, and for the 75-year period, it increases from 14.39 to 15.00 percent. The actuarial balance decreases from + 1.31 to + 0.83 percent for the 25-year period, from –0.38 to –0.94 percent for the 50-year period, and from –1.23 to –1.83 percent for the 75-year period. Each 1.0-percentage point increase in the ultimate assumed gross incidence rate decreases the long-range OASDI actuarial balance by about 0.19 percent of taxable payroll.

8. Disability Termination Rates

Table II.G.8 shows the estimated OASDI income rates, cost rates, and actuarial balances, on the basis of alternative II with various assumptions about future disability termination rates.

For all three alternatives, death-termination rates by age and sex are assumed to decline throughout the 75-year period. At the end of that period, they reach levels that, in comparison to the corresponding annual rates experienced during the base period, 1977-80, are lower by about 20 percent for males and 10 percent for females for alternative I, lower by about 30 percent for males and 20 percent for females for alternative II, and lower by about 45 percent for males and 35 percent for females for alternative III.

For all three alternatives, ultimate recovery-termination rates by age and sex are assumed to be attained in 2000. For alternative I, they are about 25 percent higher than the corresponding rates experienced during the base period. For alternative III, they are about 15 percent lower than the base-period rates. For alternative II, such rates are about 5 percent higher than those experienced in the base period, in order to reflect the effects of the additional periodic reviews that began in 1981.

TABLE II.G.8.—ESTIMATED OASDI INCOME RATES, COST RATES, AND ACTUARIAL BALANCES, BASED ON ALTERNATIVE II WITH VARIOUS DISABILITY TERMINATION ASSUMPTIONS

[As a percentage of taxable payroll]

Valuation period	Disability termination rates based on alternative—		
	I	II	III
Summarized income rate:			
25-year: 1992-2016	13.23	13.23	13.23
50-year: 1992-2041	13.16	13.16	13.16
75-year: 1992-2066	13.16	13.16	13.17
Summarized cost rate:			
25-year: 1992-2016	12.06	12.11	12.17
50-year: 1992-2041	13.69	13.75	13.83
75-year: 1992-2066	14.56	14.63	14.72
Actuarial balance:			
25-year: 1992-2016	+ 1.16	+ 1.12	+ 1.06
50-year: 1992-2041	–.53	–.59	–.67
75-year: 1992-2066	–1.40	–1.46	–1.55

For the 25-year period, the cost rate increases with decreasing disability termination rates from 12.06 percent (for the relatively high rates assumed for alternative I) to 12.17 percent (for the relatively low rates assumed for alternative III). For the 50-year period, it increases from 13.69 to 13.83 percent, and for the 75-year period, it increases from 14.56 to 14.72 percent. The actuarial balance decreases from + 1.16 to + 1.06 percent for the 25-year period, from –0.53 to –0.67 percent for the 50-year period, and from –1.40 to –1.55 percent for the 75-year period.