APPENDIX A.—ASSUMPTIONS AND METHODS UNDERLYING THE MEDIUM-RANGE AND LONG-RANGE ESTIMATES

This appendix describes the assumptions and methods which underlie the estimates in this report, based on each of the four alternatives unless specifically stated otherwise. The basic assumptions comprising each alternative have been summarized in an earlier subsection entitled "Economic and Demographic Assumptions" and thus will be discussed here only in the context of the methods used. Further details about the assumptions, methods, and cost estimates can be obtained from the Office of the Actuary, Social Security Administration. Projections of the trust fund operations over the long-range period, expressed in dollar amounts, will be published by the Office of the Actuary, shortly after the issuance of this report.

TOTAL POPULATION

Projections were made of the population in the Social Security coverage area by age, sex, and marital status for future years through 2060. The starting point was the U.S. population, including armed forces overseas, on July 1, 1982, as estimated by the Bureau of the Census, based on the 1980 Census and adjusting for births, deaths, and net immigration during 1980-82. This population estimate was adjusted for net census undercount and was increased by the estimated populations in the geographic areas covered by the OASDI program but not included in the estimate made by the Bureau of the Census. The population for future years was then projected using assumed rates of birth and death and assumed net immigration.

Historically, fertility rates in the United States have fluctuated widely. The total fertility rate is defined to be the average number of children that 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 childbearing period. The total fertility rate decreased from 3.3 after World War I to 2.1 during the Great Depression, rose to about 3.7 in 1957 and then fell to 1.7 in 1976. Since then, it has been about 1.8 children per woman.

The past variations in fertility rates have resulted from changes in social attitudes, economic conditions, and medical knowledge. Future fertility rates may exceed the present low level, because such a low level has never been experienced in the United States over a long period of time, and because such a level is well below that needed to prevent a declining population, in the absence of increased immigration. The recent trends in certain population characteristics, however, are consistent with a continued low fertility rate, such as the rising percentages of women never married, of women who are divorced, and of young women in the labor force. After considering these factors, ultimate total fertility rates of 2.3, 2.0, 2.0, and 1.6 children per woman were selected for alternatives I, II-A, II-B, and III, respectively. For each alternative, the total fertility rate was projected to reach its ultimate level in 2008. These ultimate values can be compared with those used by the Bureau of the Census in its latest series of population projections.[1] The Bureau of

[1]U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 922, "Projections of the Population of the United States: 1982-2050 (Advanced Report)," U.S. Government Printing Office, Washington, D.C., October 1982.

the Census used a range of 1.6 to 2.3, with an intermediate assumption of 1.9. A rate of 2.1 would result in a nearly constant population if there were no net immigration and if mortality were constant at levels close to current U.S. experience.

Historically, mortality rates in the United States have declined steadily. The age-adjusted death rate is the crude rate that would occur in the enumerated total population as of April 1, 1970, if that population were to experience the death rates by age for the selected year. The age-adjusted death rate has declined at an average rate of 1.3 percent per year since 1900. The past reductions in mortality rates have resulted from many factors, including increased medical knowledge, increased availability of health-care services, and improvements in personal health-care practices such as diet and exercise. After considering how these and other factors might affect mortality, three alternative sets of annual percentage reductions in central death rates by sex and cause of death were assumed for the year 2008 and later. Of these three sets of assumptions, the second set, which is used for both alternatives II-A and II-B, is considered most likely to be realized. The average percentage reductions used for alternative I are less than those in alternatives II-A and II-B, while the average annual reductions used for alternative III are greater. Prior to 2008, mortality reductions for alternatives II-A and II-B are assumed to change gradually from the average annual reductions by age, sex, and cause of death observed during 1968-80 to the annual reductions by sex and cause of death assumed for 2008 and later. Alternative I mortality reductions are assumed to change gradually from 50 percent of the average annual reductions observed during 1968-80, while alternative III mortality reductions are assumed to change gradually from 150 percent of the average annual reductions observed during 1968-80.

After adjustment for changes in the age distribution of the population, mortality for alternatives II-A and II-B is projected to decline at an average annual rate of about 0.6 percent per year during 1982-2058. This is about half the average rate of decline observed during 1900-1982.

Net immigration was assumed to be 500,000, 400,000, 400,000, and 300,000 persons per year for alternatives I, II-A, II-B, and III, respectively. The assumed net immigration does not include aliens entering the United States illegally, largely because no reliable estimate of their number exists. No significant emigration is assumed for the same reason. Those illegal aliens who were enumerated in the 1980 Census were automatically included in the starting population.

Table A1 shows the projected population by broad age groups for all four alternatives. Because many categories of OASDI benefits depend upon marital status, the population was projected by marital status as well as by age and sex. Marriage rates and divorce rates were based on recent data from the National Center for Health Statistics.

TABLE A1.—SOCIAL SECURITY AREA POPULATION AS OF JULY 1 AND DEPENDENCY RATIOS, BY ALTERNATIVE AND BROAD AGE GROUP, CALENDAR YEARS 1960-2060

Calendar year	Population (in thousands)				Dependency ratio	
	Under 20	20-64	65 and over	Total	Aged[1]	Total[2]
1960	73,108	98,689	17,147	188,944	.174	.915
1965	79,959	104,121	18,952	203,032	.182	.950
1970	80,734	112,609	20,681	214,024	.184	.901
1975	78,862	122,591	23,309	224,762	.190	.833
1980	75,443	134,608	26,364	236,415	.196	.756
Alternative I:						
1985	73,969	144,922	29,264	248,155	.202	.712
1990	75,951	151,821	32,188	259,960	.212	.712
1995	79,059	157,893	34,053	271,005	.216	.716
2000	81,878	164,782	34,695	281,355	.211	.707
2005	83,566	172,796	35,550	291,912	.206	.689
2010	86,005	179,160	38,127	303,292	.213	.693
2015	89,506	181,829	43,501	314,836	.239	.731
2020	93,486	182,671	49,767	325,924	.272	.784
2025	97,001	182,801	56,582	336,384	.310	.840
2030	99,779	185,267	61,416	346,462	.331	.870
2035	102,706	190,685	63,042	356,433	.331	.869
2040	106,218	197,496	62,689	366,403	.317	.855
2045	110,089	204,350	62,058	376,497	.304	.842
2050	113,854	210,222	62,936	387,012	.299	.841
2055	117,368	216,461	64,533	398,362	.298	.840
2060	120,879	223,726	66,150	410,755	.296	.836
Alternatives II-A and II-B:						
1985	73,691	144,800	29,319	247,810	.202	.711
1990	74,732	151,510	32,570	258,812	.215	.708
1995	76,358	157,389	34,970	268,717	.222	.707
2000	77,194	164,072	36,184	277,450	.221	.691
2005	76,428	171,740	37,538	285,706	.219	.664
2010	76,231	177,127	40,574	293,932	.229	.659
2015	77,081	178,178	46,445	301,704	.261	.693
2020	78,370	176,841	53,273	308,484	.301	.744
2025	79,191	174,152	60,768	314,111	.349	.804
2030	79,359	173,052	66,340	318,751	.383	.842
2035	79,505	174,428	68,644	322,577	.394	.849
2040	80,055	176,738	68,847	325,640	.390	.843
2045	80,874	178,575	68,609	328,058	.384	.837
2050	81,586	178,880	69,668	330,134	.389	.846
2055	82,047	179,376	70,889	332,312	.395	.853
2060	82,425	180,750	71,712	334,887	.397	.853
Alternative III:						
1985	73,361	144,677	29,372	247,410	.203	.710
1990	73,151	151,187	32,934	257,272	.218	.702
1995	72,787	156,846	35,824	265,457	.228	.692
2000	71,009	163,293	37,599	271,901	.230	.665
2005	67,097	170,559	39,554	277,210	.232	.625
2010	63,706	174,691	43,263	281,660	.248	.612
2015	61,531	173,670	49,950	285,151	.288	.642
2020	59,934	169,582	57,768	287,284	.341	.694
2025	58,077	163,372	66,485	287,934	.407	.762
2030	55,887	157,862	73,452	287,201	.465	.819
2035	53,655	154,337	77,172	285,164	.500	.848
2040	51,774	151,342	78,708	281,824	.520	.862
2045	50,211	147,443	79,618	277,272	.540	.881
2050	48,709	141,578	81,509	271,796	.576	.920
2055	47,133	136,088	82,641	265,862	.607	.954
2060	45,556	131,688	82,632	259,876	.627	.973

[1] Population aged 65 and over, divided by population aged 20-64.

[2] Population aged 65 and over plus population under age 20, divided by population aged 20-64.

Note: Totals do not necessarily equal the sum of rounded components.

COVERED POPULATION

The number of covered workers in a year is defined as the number of persons who work in covered employment at any time during that year. Projections of the number of covered workers were made by applying projected coverage rates to the estimated total population. The coverage rates—i.e., the number of workers with covered earnings in the year as a percentage of the total population—were projected by age and sex using projected labor force participation rates and unemployment rates, and their historical relationships to coverage rates. In addition, the coverage rates were adjusted to reflect the increases in covered employment in the nonprofit and Federal government sectors of the economy that will result from the 1983 amendments.

Labor force participation rates were projected by age and sex, taking into account projections of the percentage of the population that is married, the percentage of the population that is disabled, the number of children in the population, and the state of the economy. In addition, recent trends in the labor force participation rates that cannot be fully explained by the above factors (such as much of the recent increase in the rate for women) were assumed to continue through the year 2003. All of these factors vary by alternative. For men, the projected age-adjusted labor force participation rates for alternatives I, II-A, and II-B for 2060 are, respectively, 2.0, 0.8, and 0.2 percentage points higher than the 1983 level of 76.5 percent, while the rate for alternative III is 1.2 percentage points lower. For women, the projected age-adjusted labor force participation rates increase for all of the alternatives. The assumed rates for 2060 are 9.0, 8.1, 6.3, and 5.6 percentage points, respectively, above the 1983 level of 53.1 percent.

The total age-sex-adjusted unemployment rate has averaged 5.8 percent over the 30 years 1954-83 and 7.2 percent over the 10 years 1974-83. The ultimate total age-sex-adjusted unemployment rate was assumed to be 5.0, 5.5, 6.0, and 7.0 percent for alternatives I, II-A, II-B, and III, respectively. In each case, the unemployment rate was assumed to decline gradually, reaching its ultimate level by the year 2000.

The projected age-adjusted coverage rate for men increases from its 1983 level of 73.7 percent to 78.2, 76.7, 76.0, and 74.1 percent in 2060 on the basis of alternatives I, II-A, II-B, and III, respectively. Correspondingly, for women, it increases from its 1983 level of 53.3 percent to 66.2, 64.9, 63.0, and 61.1 percent, respectively.

TAXABLE PAYROLL

The taxable payroll is that amount which, when multiplied by the combined employee-employer tax rate, yields the total amount of taxes paid by employees, employers, and the self-employed. Taxes paid by employers include, in 1983 and later, government contributions for deemed wage credits for military service. The taxable payroll is important not just in projecting OASDI income but also in defining cost rate, income rate, and actuarial balance. The cost rate is the cost of the OASDI program, including net transfers to the Railroad Retirement Account, expressed as a percentage of taxable payroll. The income rate is the combined OASDI employee-employer tax rate, plus the income from the taxation of benefits, expressed as a percentage of taxable

payroll. When both the cost rate and the income rate are defined in this way, they can be compared directly to determine whether the actuarial balance is positive or negative.

In practice, the taxable payroll is calculated as a weighted average of the earnings on which employees, employers, and self-employed persons are taxed. The weighting takes into account the lower tax rates on tips, multiple-employer "excess wages," and net earnings from self-employment through 1983, as compared with the combined employee-employer rate. For 1984-93, the amounts of earnings for employees, employers, and the self-employed were projected separately. For 1994 and later, the amounts of taxable earnings for employees, employers, and the self-employed were each assumed to increase at the compounded growth rates for numbers of covered workers and average wages in covered employment.

The cost of the OASDI program can also be expressed as a percentage of the Gross National Product (GNP). Such percentages (which are shown in table 30) are based on the estimated cost rates and on the assumed ratios of taxable payroll to GNP, which are presented in table A2. The projections of GNP were developed by applying a series of factors to the assumed ratio of total employee compensation in the economy to GNP, which was used as the starting point because it is a measure of the share of output going to workers. This ratio is also a convenient starting point because it has changed slowly over time and can be expected to remain fairly constant. Total employee compensation in the economy was related to taxable payroll by means of factors which adjust for various differences in the two measures. The factors adjust total employee compensation by removing supplements to wages and salaries; removing wages and salaries earned in noncovered employment; removing wages, salaries, and net earnings from self-employment above the taxable earnings base; and adjusting for the lower tax rates on tips, multiple-employer "excess wages," and net earnings from self-employment through 1983.

The ratio of taxable payroll to GNP has risen since 1960, in part, because of ad hoc increases in the contribution and benefit base. The increase in the ratio for 1983 is largely the result of reflecting in the taxable payroll the lump-sum transfers made on May 20, 1983, related to noncontributory military-service wage credits. The ratio is projected to increase significantly in 1984, as compared to the value shown for 1982, as a result of the expanded coverage provided by the 1983 amendments. The long-range trend, however, is more likely to be downward because of a continuation of increases in the ratio of non-wage employee compensation to total compensation. The ratio of wages to total employee compensation is assumed to decline ultimately by 0.1, 0.2, 0.3, and 0.4 percent per year for alternatives I, II-A, II-B, and III, respectively. This ratio has declined at average annual rates of 0.42 percent over the 30-year period 1953-83 and 0.48 percent over the 10-year period 1973-83.

TABLE A2.—RATIO OF TAXABLE PAYROLL TO GNP BY ALTERNATIVE, CALENDAR YEARS 1960-2060

Calendar year	Past experience
1960	0.391
1965	.343
1970	.417
1975	.419
1980	.433
1981	.432
1982	.433
1983	.449

	Projected, by alternative			
	I	II-A	II-B	III
1984	.441	.442	.441	.441
1985	.440	.440	.439	.440
1990	.434	.436	.435	.432
1995	.438	.434	.432	.430
2000	.439	.433	.428	.424
2005	.439	.430	.424	.418
2010	.438	.427	.419	.411
2015	.436	.424	.413	.404
2020	.434	.420	.408	.396
2025	.432	.416	.402	.389
2030	.430	.412	.396	.382
2035	.428	.408	.390	.374
2040	.426	.404	.385	.367
2045	.424	.400	.379	.360
2050	.422	.396	.374	.354
2055	.420	.393	.369	.347
2060	.418	.389	.364	.341

INSURED POPULATION

There are three types of insured status under the OASDI program: fully, currently, and disability insured. Fully insured status is required of an aged worker for eligibility for a primary retirement benefit and for the eligibility of other persons to auxiliary benefits based on the worker's earnings. Fully insured status is also required of a deceased worker for survivors' eligibility for benefits (with the exception of child survivors and parents of eligible child survivors, in which cases the deceased worker is required to have had either currently insured status or fully insured status). Disability insured status, which is more restrictive than fully insured status, is required of a disabled worker for eligibility for a primary benefit and for the eligibility of other persons to auxiliary benefits based on the disabled worker's earnings.

Projections of the percentage of the population that is fully insured were made by age and sex based on past and projected coverage rates, the requirement for fully insured status, and the historical relationship between these factors. Currently insured status was disregarded in the cost projection, because the number of cases in which eligibility for benefits is based solely on currently insured status is relatively small. Projections of the percentage of the population that is disability insured were developed from the percentages of those who are fully insured by using projections of historical trends relating the two. Finally, the fully insured and disability insured populations were developed from the projected total population by applying the appropriate percentages.

The fully insured population by age and sex was further subdivided by marital status, in a manner consistent with the division of the total population by marital status. Married men were assumed to be more likely to be fully insured than were widowers who, in turn, were

assumed to be more likely to be fully insured than were single and divorced men. By contrast, single and divorced women were assumed to be more likely to be fully insured than were widows who, in turn, were assumed to be more likely to be fully insured than were married women. The relative difference between a widowed woman's probability of being fully insured and a married woman's was assumed to decrease through time, reflecting the projected large increase in labor-force participation among married women.

OLD-AGE AND SURVIVORS INSURANCE BENEFICIARIES

Several types of benefits, at different benefit levels, are payable under the OASI program. Hence, the numbers of beneficiaries were projected by type of benefit.

The projected numbers of retired-worker beneficiaries were based on the projected aged fully insured population. The numbers of beneficiaries, by age and sex, as percentages of the insured population, were projected to increase slightly until 1990 on the basis of past trends. In 1990 the percentages for ages 65 through 69 increase because of the change in the retirement earnings test included in the 1983 amendments. Beginning in the year 2000, the percentages decline for ages 62 through 69 because of the change in the normal retirement age included in the 1983 amendments. Ultimate percentages are reached in the year 2030.

The number of wife beneficiaries aged 62 and over of retired-worker beneficiaries was estimated from the population projection by marital and insured status. All uninsured wives aged 62 and over—excluding those whose husbands do not receive retired-worker benefits, those whose benefits are withheld according to the retirement earnings test, and those affected by eligibility for a governmental pension from earnings in noncovered employment—were assumed to receive benefits. Beginning in 1985, an increase in the number of aged wife beneficiaries is projected because, as a result of the 1983 amendments, eligible divorced wives will no longer be required to wait to receive benefits until their former husbands are receiving benefits. The number of husband beneficiaries aged 62 and over of retired-worker beneficiaries was estimated in an analogous manner.

The projected numbers of eligible children (including disabled adult children and certain students aged 18 or over) of retired-worker beneficiaries were based on projected ratios of the number of such child beneficiaries to the number of retired workers by sex of worker, adjusted to reflect the fertility assumptions.

The number of young-wife beneficiaries was estimated by extrapolating the historial ratios of the number of such beneficiaries to the estimated number of child beneficiaries who are children of male retired-worker beneficiaries and are either under age 16 or disabled with onset of disability before age 22. The estimating procedure takes into account projected changes in fertility and female labor-force participation. The number of young-husband beneficiaries was not projected because of the negligible cost attributable to them.

The number of widow beneficiaries aged 60 and over was estimated from the population by marital and insured status. Virtually all uninsured widows aged 60 and over—excluding those whose deceased husbands

were not fully insured, those whose benefits are withheld according to the retirement earnings test, and those affected by eligibility for a governmental pension from earnings in noncovered employment—were assumed to receive benefits. In addition, some insured widows who had not applied for retired-worker benefits were assumed to receive widow benefits. The number of widower beneficiaries was estimated in an analogous manner.

The numbers of paternal, maternal, and full orphans under age 18 in the Social Security coverage area were estimated from the projected population by applying age-specific probabilities of being an orphan. These probabilities were derived by using distributions of the age of the mother crossed with the age of the father at the birth of the child and the death rates used in the population projections. To estimate the number of child-survivor beneficiaries, the number of orphans was adjusted to include eligible disabled orphans and certain students aged 18 and over, and to eliminate orphans of uninsured deceased parents.

The number of mother beneficiaries was estimated by a method similar to the one used to estimate the number of young-wife beneficiaries—i.e., extrapolating the present ratio of such beneficiaries to child-survivor beneficiaries who are either under age 16 or disabled with onset of disability before age 22. The number of father beneficiaries was estimated in an analogous manner.

The number of parent beneficiaries (of deceased workers) was projected on the basis of the past trend in the number of such beneficiaries. A decrease was assumed from the actual figure of 12,000 in the middle of 1983 to an ultimate level of 7,000 in 1995.

Table A3 shows the estimated numbers of beneficiaries under the OASI program. Included among the beneficiaries who receive retired-worker benefits are some persons who also receive residual benefits consisting of the excess of any potential auxiliary benefits over their retired-worker benefits. Estimates of the number of such residual payments were made separately for wives, widows, husbands, and widowers. Residual payments to other beneficiaries were not taken into account, because of the negligible cost involved.

TABLE A3.—OASI BENEFICIARIES WITH MONTHLY BENEFITS IN CURRENT-PAYMENT STATUS AS OF JUNE 30 BY ALTERNATIVE, CALENDAR YEARS 1960-2060
[In thousands]

	Retired workers and auxiliaries			Survivors				
Calendar year	Worker	Wife-husband	Child	Widow-widower	Mother-father	Child	Parent	Total
1960	7,813	2,224	260	1,471	388	1,549	35	13,740
1965	10,843	2,601	429	2,228	472	1,900	36	18,509
1970	13,066	2,651	535	3,151	514	2,673	29	22,618
1975	16,210	2,836	633	3,823	568	2,905	22	26,998
1976	16,789	2,867	638	3,939	576	2,911	21	27,740
1977	17,380	2,899	670	4,042	573	2,843	19	28,428
1978	17,924	2,942	662	4,147	569	2,800	18	29,062
1979	18,590	2,966	651	4,260	567	2,739	17	29,789
1980	19,167	2,987	633	4,354	560	2,668	15	30,385
1981	19,792	3,010	639	4,446	549	2,624	14	31,074
1982	20,392	3,019	522	4,540	520	2,201	13	31,207
1983	21,060	3,051	491	4,632	494	2,093	12	31,833
Alternative I:								
1984	21,648	3,027	482	4,725	398	2,029	11	32,320
1985	22,271	3,047	474	4,798	394	1,993	10	32,925
1990	24,935	3,019	492	5,024	394	1,885	7	35,854
1995	26,791	3,232	476	5,128	465	2,025	7	38,124
2000	27,690	3,073	481	5,045	495	2,122	7	38,913

TABLE A3.—OASI BENEFICIARIES WITH MONTHLY BENEFITS IN CURRENT-PAYMENT STATUS AS OF JUNE 30 BY ALTERNATIVE, CALENDAR YEARS 1960-2060 (Cont.)

[In thousands]

Calendar year	Retired workers and auxiliaries			Survivors				Total
	Worker	Wife-husband	Child	Widow-widower	Mother-father	Child	Parent	
Alternative I:								
(Cont.)								
2005	28,970	2,915	504	4,930	540	2,225	7	40,091
2010	31,781	2,893	571	4,839	538	2,320	7	42,949
2015	36,943	3,026	686	4,792	548	2,394	7	48,396
2020	42,879	3,149	789	4,846	548	2,461	7	54,679
2025	48,490	3,192	867	4,955	542	2,520	7	60,573
2030	52,354	3,128	883	5,054	543	2,570	7	64,539
2035	54,326	2,971	871	5,105	557	2,627	7	66,464
2040	54,326	2,793	841	5,079	578	2,697	7	66,321
2045	54,416	2,699	849	5,009	593	2,767	7	66,340
2050	55,336	2,725	886	4,932	606	2,845	7	67,337
2055	56,761	2,817	927	4,887	623	2,924	7	68,946
2060	58,206	2,906	947	4,899	640	2,999	7	70,604
Alternative II-A:								
1984	21,673	3,029	481	4,726	397	2,026	11	32,343
1985	22,277	3,056	472	4,800	392	1,984	10	32,991
1990	25,322	3,099	486	5,126	382	1,828	7	36,250
1995	27,476	3,363	483	5,166	418	1,805	7	38,718
2000	28,819	3,272	484	5,112	425	1,796	7	39,915
2005	30,495	3,168	502	5,016	427	1,773	7	41,388
2010	33,663	3,186	556	4,939	425	1,762	7	44,538
2015	39,222	3,358	654	4,904	427	1,753	7	50,325
2020	45,641	3,524	748	4,943	417	1,743	7	57,023
2025	51,814	3,616	814	5,043	406	1,732	7	63,432
2030	56,325	3,578	825	5,149	395	1,715	7	67,994
2035	58,912	3,443	814	5,225	394	1,698	7	70,493
2040	59,429	3,262	784	5,226	397	1,684	7	70,789
2045	59,918	3,151	788	5,170	395	1,677	7	71,106
2050	60,928	3,160	817	5,087	389	1,669	7	72,057
2055	62,025	3,219	837	4,995	387	1,660	7	73,130
2060	62,771	3,271	840	4,939	386	1,650	7	73,864
Alternative II-B:								
1984	21,673	3,029	481	4,726	397	2,026	11	32,343
1985	22,277	3,056	472	4,800	392	1,984	10	32,991
1990	25,319	3,100	486	5,126	382	1,828	7	36,248
1995	27,465	3,372	483	5,169	418	1,805	7	38,719
2000	28,803	3,282	484	5,119	425	1,795	7	39,915
2005	30,460	3,181	502	5,027	425	1,771	7	41,373
2010	33,610	3,210	556	4,954	425	1,759	7	44,521
2015	39,138	3,397	654	4,926	427	1,750	7	50,299
2020	45,511	3,583	747	4,975	417	1,741	7	56,981
2025	51,654	3,689	812	5,089	406	1,732	7	63,389
2030	56,143	3,661	825	5,203	395	1,715	7	67,949
2035	58,693	3,536	814	5,297	394	1,696	7	70,437
2040	59,196	3,361	783	5,305	397	1,683	7	70,732
2045	59,652	3,257	787	5,260	395	1,676	7	71,034
2050	60,635	3,283	817	5,188	389	1,668	7	71,987
2055	61,718	3,346	837	5,103	387	1,658	7	73,056
2060	62,450	3,403	840	5,052	386	1,646	7	73,784
Alternative III:								
1984	21,685	3,031	480	4,727	397	2,024	11	32,365
1985	22,337	3,065	471	4,800	391	1,975	10	33,049
1990	25,654	3,176	479	5,126	372	1,773	7	34,587
1995	28,098	3,498	490	5,202	387	1,643	7	39,325
2000	29,863	3,483	487	5,173	372	1,530	7	40,915
2005	31,995	3,454	492	5,098	352	1,403	7	42,801
2010	35,676	3,554	532	5,038	338	1,305	7	46,450
2015	41,861	3,829	605	5,011	328	1,223	7	52,864
2020	49,068	4,111	676	5,043	308	1,148	7	60,361
2025	56,255	4,313	723	5,127	290	1,081	7	67,796
2030	61,944	4,379	738	5,226	273	1,016	7	73,583
2035	65,781	4,324	727	5,319	260	953	7	77,371
2040	67,490	4,197	704	5,361	249	894	7	78,902
2045	68,994	4,111	705	5,350	234	844	7	80,245
2050	70,638	4,126	722	5,269	220	795	7	81,777
2055	71,618	4,164	725	5,153	205	750	7	82,622
2060	71,656	4,162	709	5,023	194	703	7	82,454

Note: The numbers of beneficiaries do not included certain uninsured persons, most of whom both attained age 72 before 1968 and have less than 3 quarters of coverage, in which cases the costs are reimbursed by the general fund of the Treasury. The number of such uninsured persons was 56,068 as of June 30, 1983, and is estimated to be less than 500 by the turn of the century. Totals do not necessarily equal the sum of rounded components.

DISABILITY INSURANCE BENEFICIARIES

The number of disabled-worker beneficiaries was projected from the population exposed to disability, which was developed from the disability insured population by removing those persons already entitled to disabled-worker benefits. The number of newly entitled beneficiaries was developed from the exposed population by applying assumed disability incidence rates by age and sex. The number of currently entitled beneficiaries was projected forward each year by adding the newly entitled beneficiaries to the previous year's currently entitled and subtracting the terminations, which were determined by applying assumed termination rates to the currently entitled disabled-worker population below the normal retirement age (currently, age 65). At the normal retirement age, disabled-worker benefits are automatically converted to retired-worker benefits.

The disability incidence rates, which declined during 1975-82, are assumed to increase steadily from 1983 through 2000, when they reach ultimate levels which, for alternatives II-A and II-B, are about 25 percent higher than the corresponding average rates for 1979-83. For alternatives I and III, the disability incidence rates follow patterns similar to the one in alternatives II-A and II-B except that the ultimate levels are the same as the average for 1979-83 and 50 percent higher, respectively.

The termination rates were estimated by age, sex, and duration of entitlement. For alternatives II-A and II-B, the mortality rates used throughout the projection period were assumed to be the same as those experienced by disabled-worker beneficiaries during 1977-80, while the recovery rates were assumed to be 20 percent higher than those of the same period, thereby allowing for the assumed effect of the periodic reviews required by the Social Security Disability Amendments of 1980. For alternative I, the termination rates were assumed to be 20 percent higher than the rates used for alternatives II-A and II-B, while for alternative III, the rates were assumed to be 20 percent lower.

The number of eligible children (including disabled adult children and certain students aged 18 or over) was projected as a proportion of the number of disabled-worker beneficiaries, by sex, based on recent experience and allowing for projected changes in fertility.

The number of young-wife beneficiaries was estimated by extrapolating the historical ratios of the number of such beneficiaries to the estimated number of child beneficiaries who are children of male disabled-worker beneficiaries and are either under age 16 or disabled with onset of disability before age 22. The estimating procedure takes into account projected changes in fertility and female labor force participation. The number of young-husband beneficiaries was projected in an analogous manner.

The number of aged-wife beneficiaries was projected as a proportion of the number of male disabled-worker beneficiaries. The number of aged-husband beneficiaries was projected in an analogous manner.

Table A4 shows the projected number of beneficiaries under the DI program.

TABLE A4.—DI BENEFICIARIES WITH MONTHLY BENEFITS IN CURRENT-PAYMENT STATUS AS
OF JUNE 30 BY ALTERNATIVE, CALENDAR YEARS 1960-2060

[In thousands]

Calendar year	Disabled workers	Auxiliaries		Total
		Wives and husbands	Children	
1960	371	56	94	522
1965	944	187	518	1,648
1970	1,436	271	861	2,568
1975	2,363	429	1,333	4,125
1976	2,602	468	1,462	4,533
1977	2,755	482	1,496	4,733
1978	2,858	491	1,512	4,861
1979	2,877	483	1,466	4,826
1980	2,863	468	1,403	4,734
1981	2,835	450	1,350	4,636
1982	2,713	399	1,071	4,184
1983	2,591	357	944	3,893
Alternative I:				
1984	2,555	311	911	3,777
1985	2,531	311	900	3,742
1990	2,553	313	870	3,736
1995	2,287	255	777	3,319
2000	2,532	276	844	3,652
2005	2,985	314	960	4,259
2010	3,518	364	1,117	4,998
2015	3,782	395	1,226	5,403
2020	3,876	415	1,303	5,593
2025	4,044	444	1,408	5,895
2030	3,992	442	1,409	5,842
2035	3,934	434	1,387	5,755
2040	4,043	445	1,422	5,910
2045	4,241	468	1,495	6,205
2050	4,394	486	1,557	6,437
2055	4,475	496	1,587	6,558
2060	4,578	505	1,618	6,702
Alternative II-A:				
1984	2,562	313	915	3,790
1985	2,555	316	914	3,785
1990	2,677	335	926	3,938
1995	2,843	312	940	4,094
2000	3,318	349	1,053	4,720
2005	4,036	401	1,201	5,638
2010	4,819	463	1,379	6,661
2015	5,208	498	1,491	7,197
2020	5,339	517	1,562	7,419
2025	5,556	547	1,666	7,769
2030	5,449	538	1,646	7,633
2035	5,323	522	1,597	7,442
2040	5,405	528	1,611	7,544
2045	5,577	545	1,662	7,784
2050	5,637	554	1,692	7,883
2055	5,581	549	1,680	7,811
2060	5,557	545	1,668	7,769
Alternative II-B:				
1984	2,562	313	915	3,790
1985	2,555	316	914	3,785
1990	2,676	335	926	3,937
1995	2,842	312	940	4,093
2000	3,316	349	1,052	4,717
2005	4,030	401	1,200	5,631
2010	4,810	463	1,377	6,650
2015	5,196	498	1,489	7,183
2020	5,325	517	1,560	7,402
2025	5,541	546	1,664	7,751
2030	5,432	538	1,643	7,613
2035	5,305	522	1,594	7,421
2040	5,388	528	1,608	7,523
2045	5,558	545	1,659	7,762
2050	5,619	553	1,689	7,861
2055	5,563	549	1,677	7,789
2060	5,539	545	1,664	7,748

TABLE A4.—DI BENEFICIARIES WITH MONTHLY BENEFITS IN CURRENT-PAYMENT STATUS AS OF JUNE 30 BY ALTERNATIVE, CALENDAR YEARS 1960-2060 (Cont.)

[In thousands]

Calendar year	Disabled workers	Auxiliaries		Total
		Wives and husbands	Children	
Alternative III:				
1984	2,570	315	920	3,805
1985	2,583	323	929	3,835
1990	2,774	352	969	4,095
1995	3,255	348	1,035	4,639
2000	4,031	404	1,189	5,624
2005	5,104	469	1,351	6,925
2010	6,204	536	1,514	8,254
2015	6,754	568	1,595	8,917
2020	6,936	579	1,630	9,145
2025	7,200	602	1,700	9,503
2030	7,009	584	1,647	9,239
2035	6,767	556	1,560	8,884
2040	6,762	549	1,534	8,845
2045	6,807	552	1,538	8,897
2050	6,629	541	1,513	8,684
2055	6,276	515	1,442	8,233
2060	5,982	490	1,373	7,845

Note: Totals do not necessarily equal the sum of rounded components.

AVERAGE WAGES AND INFLATION

Future increases in the Consumer Price Index and in average wages will directly affect the OASDI program. In addition to the direct effect of higher wages on taxable payroll and on benefits subsequently based on that higher payroll, the automatic-adjustment provisions in the law require that the benefit formula, the taxable earnings base, the exempt amounts under the retirement earnings test, and the amount of earnings required for a quarter of coverage be adjusted to reflect increases in average wages, and that benefit payments be adjusted to reflect increases in the CPI or, under certain circumstances, to reflect increases in average wages.

The assumed ultimate real-wage differentials were based primarily on projections of historical trends. Both the analysis of these trends and the projections took into account productivity gains and the factors linking productivity gains with the real-wage differential. Over the 30 years 1953-83, annual increases in productivity have averaged 2.1 percent, the result of average increases of 0.9, 2.7, and 2.8 percent in each of the 10-year periods 1973-83, 1963-73, and 1953-63, respectively. Meanwhile, the real-wage differential has averaged 1.1 percent over the 30 years 1954-83, the result of an average decrease of 0.8 percent and average increases of 1.8 and 2.2 percent, respectively, in the aforementioned periods. The change in the linkage between annual increases in productivity and the real-wage differential has averaged 1.0 percent over the 30 years 1954-83 and 1.8 percent over the 10 years 1974-83. The change in the linkage reflects changes in such factors as the average number of hours worked per year, the extent to which employees share in the returns of production, and the proportion of employee compensation paid as wages.

The ultimate annual increases in productivity are assumed to be 2.7, 2.4, 2.1, and 1.8 percent for alternatives I, II-A, II-B, and III, respectively. The corresponding ultimate annual declines in the linkage were assumed to be 0.2, 0.4, 0.6, and 0.8 percent. The resulting ultimate real-wage differentials were 2.5, 2.0, 1.5, and 1.0 percent.

For alternative II-A, the CPI was assumed to increase ultimately at an annual rate of 3.0 percent. For alternative II-B, the CPI was assumed to increase ultimately at an annual rate of 4.0 percent, which is slightly lower than the average annual increase of 4.4 percent experienced over the 30 years 1953-83. The ultimate increases in the average annual CPI for alternatives I and III of 2.0 percent and 5.0 percent, respectively, were chosen to include a reasonable range of possible values.

The ultimate increases in average annual wages in covered employment were assumed to be 4.5, 5.0, 5.5, and 6.0 percent, for alternatives I, II-A, II-B, and III, respectively. These were obtained by adding the corresponding annual percentage increases in the CPI to the assumed real-wage differentials for each alternative.

AVERAGE BENEFITS

Future increases in the average primary insurance amount (PIA) for newly awarded benefits were projected by simulating the automatic-adjustment provisions and calculating future PIA's for workers, by sex, at various earnings levels. Separate projections by sex of worker were made for retired-worker and disabled-worker beneficiaries and auxiliaries and for young, aged, and disabled survivor beneficiaries.

Future increases in the average PIA for beneficiaries in current-payment status were projected by sex of worker and type of benefit on the basis of the distribution of current beneficiaries by year of award, their average awarded PIA, and the increase in their average PIA since the year of award.

For several types of benefits, the percentage of PIA that is payable depends upon the age at which entitlement to benefits began. Included are retired-worker, aged-spouse, and aged-widow(er) benefits. Projected changes in the average benefit level as a percentage of PIA for each of these beneficiary types were based on projections of the age distribution at initial entitlement.

BENEFIT PAYMENTS

For each category of beneficiary, monthly benefit payments were calculated as the product of the number of beneficiaries and the corresponding average benefit. These amounts were then adjusted to include retroactive payments to newly awarded beneficiaries.

Lump-sum death payments were calculated as the product of (1) the number of such payments, which was projected on the basis of the assumed mortality rates, the projected fully insured population, and the estimated percentage of the fully insured population that would qualify for benefits, and (2) the amount of the lump-sum death payment, which is $255 in all cases.

ADMINISTRATIVE EXPENSES

The projection of administrative expenses through 1993 was based on assumed increases in average wages, increases in the CPI, and increases in the number of beneficiaries. For years after 1993, administrative expenses were assumed to increase at approximately the compounded rates of increase in the number of beneficiaries and in average wages in covered employment.

RAILROAD RETIREMENT FINANCIAL INTERCHANGE

The effect of the financial interchange with the Railroad Retirement program was evaluated on the basis of trends similar to those used in estimating the cost of OASDI benefits. The resulting effect was an average annual long-range cost to the OASDI program of 0.01 percent of taxable payroll.

BENEFITS TO UNINSURED PERSONS

The law provides for monthly benefit payments to certain uninsured persons who attained age 72 before 1968 or who have 3 quarters of coverage for each year after 1966 and before the year of attainment of age 72. These benefits are paid from the OASI Trust Fund, which is then reimbursed in full (including interest and administrative expenses) from the general fund of the Treasury for the costs associated with providing benefits to those persons with fewer than 3 quarters of coverage. Neither the benefit payments nor the reimbursements are reflected in the cost rates or the income rates. However, these amounts are reflected in tables which show trust fund operations.

APPENDIX B.—SENSITIVITY ANALYSIS

This appendix illustrates the sensitivity of the medium-range and long-range estimates to changes in selected individual assumptions. Although the estimates based on the four alternative sets of assumptions illustrate the variations in the projected actuarial balances resulting from different combinations of assumptions, they do not show the variations resulting from changes in any single assumption. In this sensitivity analysis, alternative II-B is used as the reference point, and one assumption at a time within that alternative is varied. Similar variations in the selected assumptions within the other alternatives would result in similar variations in the actuarial balances.

Each table which follows shows the effects of changing the particular assumption under consideration on the average OASDI cost rates, total income rates, and balances. Because the total income rates consist mostly of the tax rates, which are specified in the law, the total income rates themselves vary only slightly with changes in assumptions. Consequently, they are not considered in the discussion of the tables. The change in each of the balances is approximately equal to the change in the corresponding cost rate—but in the opposite direction.

TOTAL FERTILITY RATE

Table B1 shows the estimated average OASDI cost rates, total income rates, and balances, on the basis of alternative II-B with various assumed ultimate total fertility rates. These assumptions are that the ultimate total fertility rates will be 1.6 children per woman (as assumed for alternative III), 2.0 (as assumed for alternatives II-A and II-B), and 2.3 (as assumed for alternative I). The rates are assumed to change gradually from their current levels and to reach their ultimate values in 2008.

TABLE B1.—ESTIMATED AVERAGE OASDI COST RATES, TOTAL INCOME RATES, AND BALANCES, BASED ON ALTERNATIVE II-B WITH VARIOUS FERTILITY ASSUMPTIONS
[As a percentage of taxable payroll]

Calendar years	Ultimate total fertility rate[1]		
	1.6	2.0	2.3
Average cost rate:			
1984-2008	10.53	10.54	10.58
2009-2033	13.62	13.02	12.72
2034-2058	18.14	15.29	13.75
1984-2058	14.10	12.95	12.35
Average total income rate:			
1984-2008	12.56	12.56	12.56
2009-2033	13.00	12.97	12.96
2034-2058	13.30	13.16	13.08
1984-2058	12.95	12.90	12.87
Balance:			
1984-2008	+2.02	+2.01	+1.98
2009-2033	-.62	-.05	+.24
2034-2058	-4.84	-2.14	-.67
1984-2058	-1.15	-.06	+.51

[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 2008.

Over the first 25 years, the average cost rate for the three fertility assumptions varies by only 0.05 percent of taxable payroll. In contrast, the average long-range cost rate varies over a wide range, decreasing from 14.10 to 12.35 percent as the assumed ultimate total fertility rates are increased from 1.6 to 2.3. Similarly, while the medium-range

actuarial balance varies by only 0.04 percent of taxable payroll, the long-range actuarial balance varies over a much wider range, from -1.15 to +0.51 percent.

During the medium-range 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. Later in the 75-year period, however, changes in fertility have a relatively greater impact on the labor force than on the beneficiary population, thereby resulting in significant changes in cost. Each increase of 0.1 in the ultimate total fertility rate increases the long-range actuarial balance by about 0.20 percent of taxable payroll.

MORTALITY

Table B2 shows the estimated average OASDI cost rates, total income rates, and balances, on the basis of alternative II-B with various assumptions about future reductions in mortality rates. The analysis was developed by varying the percentage decreases assumed to occur in the age-sex-adjusted death rates during 1982-2060. The decreases assumed over this period are about 22 percent (as assumed for alternative I), 39 percent (as assumed for alternatives II-A and II-B), and 60 percent (as assumed for alternative III).

TABLE B2.—ESTIMATED AVERAGE OASDI COST RATES, TOTAL INCOME RATES, AND BALANCES, BASED ON ALTERNATIVE II-B WITH VARIOUS MORTALITY ASSUMPTIONS
[As a percentage of taxable payroll]

Calendar years	Reduction in mortality rates[1]		
	22 percent	39 percent	60 percent
Average cost rate:			
1984-2008	10.34	10.54	10.76
2009-2033	12.43	13.02	13.92
2034-2058	14.14	15.29	17.36
1984-2058	12.30	12.95	14.01
Average total income rate:			
1984-2008	12.55	12.56	12.56
2009-2033	12.95	12.97	13.01
2034-2058	13.10	13.16	13.26
1984-2058	12.87	12.90	12.95
Balance:			
1984-2008	+2.20	+2.01	+1.81
2009-2033	+.52	-.05	-.91
2034-2058	-1.04	-2.14	-4.10
1984-2058	+.56	-.06	-1.07

[1]The measure of the reduction in mortality rates is the percentage decrease from 1982 to 2060 in the age-sex-adjusted death rate.

Because the decreases in death rates for the three mortality assumptions are assumed to occur gradually, the variation in program cost over the medium-range period is less pronounced than the variation over the long-range period. The medium-range cost rate increases from 10.34 (for 22-percent lower ultimate mortality rates) to 10.76 percent (for 60-percent lower ultimate rates). The long-range cost rate increases from 12.30 to 14.01 percent. The actuarial balance decreases from +2.20 to +1.81 percent over the medium-range period and from +0.56 to -1.07 percent over the long-range period.

Lower mortality rates cause both the income and outgo of the OASDI system to increase. However, the outgo will increase at a faster rate than the income over the medium- and long-range periods. Reductions in the mortality rates for people over age 65 (whose mortality rates are the

highest) extend the length of time that retirement benefits are paid. Although lower mortality rates at ages 50-64 result in an increase in taxable payroll, this is more than offset by the resulting additional benefits payable to the additional retirees at age 65. At ages 20-49, mortality rates are so low that even substantial reductions would not result in significant increases in the numbers of covered workers or beneficiaries. Lower mortality rates at ages below 20 have relatively little long-term effect on the relationship between outgo and taxable payroll. Consequently, the net effect of lower mortality rates is to cause outgo to increase at a rate greater than the rate of growth in payrolls, thereby resulting in higher cost rates. Each additional 10-percent reduction in the age-sex-adjusted mortality rate assumed to occur in 1982-2060, relative to the 39-percent reduction assumed for alternative II-B, decreases the long-range actuarial balance by about 0.45 percent of taxable payroll.

DISABILITY INCIDENCE RATES

Table B3 shows the estimated average OASDI cost rates, total income rates, and balances, on the basis of alternative II-B with various assumptions about future disability incidence rates. These assumptions are that the ultimate annual age-sex-adjusted disability incidence rate will be about the same as the average of the corresponding rates experienced during 1979-83 (as assumed for alternative I), about 25 percent higher than the 1979-83 experience (as assumed for alternatives II-A and II-B), and about 50 percent higher than the 1979-83 experience (as assumed for alternative III). The rates are assumed to change gradually from their current levels and to reach their ultimate values in the year 2000.

TABLE B3.—ESTIMATED AVERAGE OASDI COST RATES, TOTAL INCOME RATES, AND BAL-ANCES, BASED ON ALTERNATIVE II-B WITH VARIOUS DISABILITY INCIDENCE ASSUMPTIONS
[As a percentage of taxable payroll]

Calendar years	Increase in disability incidence rates[1]		
	None	25 percent	50 percent
Average cost rate:			
1984-2008	10.42	10.54	10.64
2009-2033	12.72	13.02	13.31
2034-2058	14.98	15.29	15.60
1984-2058	12.71	12.95	13.18
Average total income rate:			
1984-2008	12.55	12.56	12.56
2009-2033	12.96	12.97	12.99
2034-2058	13.14	13.16	13.17
1984-2058	12.88	12.90	12.91
Balance:			
1984-2008	+2.14	+2.01	+1.92
2009-2033	+.24	-.05	-.32
2034-2058	-1.84	-2.14	-2.42
1984-2058	+.18	-.06	-.28

[1]The increase in disability incidence rates is based on the ratio of the ultimate annual age-sex-adjusted incidence rate (reached in the year 2000) to the average of the corresponding annual rates experienced during 1979-83.

Over the medium-range period, the average cost rate increases with increasing disability incidence rates from 10.42 (for no increase) to 10.64 percent (for 50-percent increase). Over the long-range period, it increases from 12.71 to 13.18 percent. The actuarial balance decreases from +2.14 to +1.92 percent over the medium-range period and from +0.18 to -0.28 percent over the long-range period. Each 10-percent increase in the assumed ultimate disability incidence rates decreases the

long-range actuarial balance by about 0.10 percent of taxable payroll.

DISABILITY TERMINATION RATES

Table B4 shows the estimated average OASDI cost rates, total income rates, and balances, on the basis of alternative II-B with various assumptions about future disability termination rates. The death-termination assumptions are that the ultimate rates by age and sex will be about 20 percent lower than the average rates by age and sex experienced during 1977-80 (as assumed for alternative III), about the same as the 1977-80 experience (as assumed for alternatives II-A and II-B), and about 20 percent higher than the 1977-80 experience (as assumed for alternative I).

The recovery assumptions are that the ultimate rates by age and sex will be about 4 percent lower than the average rates by age and sex experienced during 1977-80 (as assumed for alternative III), about 20 percent higher than the 1977-80 experience (as assumed for alternatives II-A and II-B), and about 44 percent higher than the 1977-80 experience (as assumed for alternative I). Recovery rates under the alternative II-B assumptions are 20 percent higher than the 1977-80 base-period rates in order to reflect the effects of the 1980 amendments. The recovery rates assumed for alternatives I and III are 20 percent above and 20 percent below the alternative II-B rates, respectively.

TABLE B4.—ESTIMATED AVERAGE OASDI COST RATES, TOTAL INCOME RATES, AND BALANCES, BASED ON ALTERNATIVE II-B WITH VARIOUS DISABILITY TERMINATION ASSUMPTIONS

[As a percentage of taxable payroll]

Calendar years	Ultimate disability termination rates[1]		
	20 percent less than standard	Same as standard	20 percent more than standard
Average cost rate:			
1984-2008	10.63	10.54	10.47
2009-2033	13.18	13.02	12.88
2034-2058	15.46	15.29	15.15
1984-2058	13.09	12.95	12.83
Average total income rate:			
1984-2008	12.56	12.56	12.55
2009-2033	12.98	12.97	12.97
2034-2058	13.16	13.16	13.15
1984-2058	12.90	12.90	12.89
Balance:			
1984-2008	+1.93	+2.01	+2.08
2009-2033	-.20	-.05	+.08
2034-2058	-2.29	-2.14	-2.00
1984-2058	-.19	-.06	+.06

[1]The standard disability termination rates are the death-termination and recovery rates assumed for alternative II-B.

Over the medium-range period, the average cost rate decreases with increasing disability termination rates from 10.63 (for rates which are 20 percent less than standard) to 10.47 percent (for rates which are 20 percent more than standard). Over the long-range period, it decreases from 13.09 to 12.83 percent. The actuarial balance increases from +1.93 to +2.08 percent over the medium-range period and from -0.19 percent to +0.06 percent over the long-range period. Each 10-percent increase in the disability termination rates increases the long-range actuarial balance by about 0.06 percent of taxable payroll.

CONSUMER PRICE INDEX

Table B5 shows the estimated average OASDI cost rates, total income rates, and balances, on the basis of alternative II-B with various assumptions about the rate of increase for the CPI. These assumptions are that the ultimate annual increase in the CPI will be 2.0 percent (as assumed for alternative I), 3.0 percent (as assumed for alternative II-A), 4.0 percent (as assumed for alternative II-B), 5.0 percent (as assumed for alternative III), and 6.0 percent. In each case, the ultimate real-wage differential is assumed to be 1.5 percentage points (as assumed for alternative II-B), yielding ultimate percentage increases in average annual wages in covered employment of 3.5, 4.5, 5.5, 6.5, and 7.5 percent, respectively.

TABLE B5.—ESTIMATED AVERAGE OASDI COST RATES, TOTAL INCOME RATES, AND BALANCES, BASED ON ALTERNATIVE II-B WITH VARIOUS CPI-INCREASE ASSUMPTIONS
[As a percentage of taxable payroll]

Calendar years	Ultimate percentage increases in wages-CPI[1]				
	3.5-2.0	4.5-3.0	5.5-4.0	6.5-5.0	7.5-6.0
Average cost rate:					
1984-2008.........................	10.76	10.65	10.54	10.44	10.34
2009-2033.........................	13.46	13.24	13.02	12.81	12.61
2034-2058.........................	15.82	15.55	15.29	15.04	14.80
1984-2058.........................	13.35	13.15	12.95	12.77	12.58
Average total income rate:					
1984-2008.........................	12.56	12.56	12.56	12.55	12.55
2009-2033.........................	12.99	12.98	12.97	12.96	12.96
2034-2058.........................	13.18	13.17	13.16	13.14	13.13
1984-2058.........................	12.91	12.90	12.90	12.89	12.88
Balance:					
1984-2008.........................	+1.80	+1.91	+2.01	+2.11	+2.21
2009-2033.........................	-.47	-.25	-.05	+.15	+.35
2034-2058.........................	-2.64	-2.38	-2.14	-1.90	-1.67
1984-2058.........................	-.44	-.24	-.06	+.12	+.30

[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 CPI.

Over both the medium-range and long-range periods, the average cost rate decreases as the assumed rate of change in the CPI increases. Over the medium range, the average cost rate decreases from 10.76 (for CPI increases of 2.0 percent) to 10.34 percent (for CPI increases of 6.0 percent). Over the long range, it decreases from 13.35 to 12.58 percent. The actuarial balance increases from +1.80 to +2.21 percent over the medium-range period and from -0.44 to +0.30 percent over the long-range 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 higher rate of increase in the CPI (in conjunction with a constant real-wage differential), the effect on taxable payroll of the implied higher rate of increase in average wages is experienced immediately, while the effect on benefits of the higher rate of increase in the CPI is experienced with a lag of about one year. In addition, the effect on benefits of the higher rate of increase in average wages is experienced no earlier 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 0.18 percent of taxable payroll.

REAL-WAGE DIFFERENTIAL

Table B6 shows the estimated average OASDI cost rates, total income rates, and balances, on the basis of alternative II-B with various real-wage assumptions. These assumptions are that the ultimate real-wage differential will be 1.0 percentage point (as assumed for alternative III), 1.5 percentage points (as assumed for alternative II-B), 2.0 percentage points (as assumed for alternative II-A), and 2.5 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-B), yielding ultimate percentage increases in average annual wages in covered employment of 5.0, 5.5, 6.0, and 6.5 percent, respectively.

TABLE B6.—ESTIMATED AVERAGE OASDI COST RATES, TOTAL INCOME RATES, AND BAL-
ANCES, BASED ON ALTERNATIVE II-B WITH VARIOUS REAL-WAGE ASSUMPTIONS

[As a percentage of taxable payroll]

Calendar years	Ultimate percentage increase in wages-CPI[1]			
	5.0-4.0	5.5-4.0	6.0-4.0	6.5-4.0
Average cost rate:				
1984-2008	10.91	10.54	10.20	9.88
2009-2033	13.87	13.02	12.24	11.53
2034-2058	16.40	15.29	14.28	13.37
1984-2058	13.72	12.95	12.24	11.59
Average total income rate:				
1984-2008	12.57	12.56	12.54	12.53
2009-2033	13.01	12.97	12.94	12.91
2034-2058	13.21	13.16	13.11	13.06
1984-2058	12.93	12.90	12.86	12.83
Balance:				
1984-2008	+1.66	+2.01	+2.34	+2.66
2009-2033	-.86	-.05	+.70	+1.38
2034-2058	-3.18	-2.14	-1.17	-.31
1984-2058	-.79	-.06	+.62	+1.24

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

Over the medium-range period, the average cost rate decreases from 10.91 (for a real-wage differential of 1.0 percent) to 9.88 percent (for a differential of 2.5 percent). Over the long-range period, it decreases from 13.72 to 11.59 percent. The actuarial balance increases from +1.66 to +2.66 percent over the medium-range period and from -0.79 to +1.24 percent over the long-range period.

The average 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 earnings, 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 0.70 percent of taxable payroll.