Social Security Area Population Projections: 1987

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The following article, first published as Actuarial Study No. 99, describes the population projections that underlie the long-range cost estimates for the Old-Age, Survivors, and Disability Insurance (OASDI) program, which are included in the 1987 Report of the OASDI Board of Trustees. The projections start from a recent estimate of the population in the Social Security Area by age, sex, and marital status and from an estimate of existing marriages by age of husband and age of wife. Three separate projections, denoted Alternatives I, II, and III, are developed by analyzing historical data and making three different sets of assumptions about future net immigration, birth rates, and death rates.

Each year, estimates of future income and expenditures of the Old-Age, Survivors, and Disability Insurance (OASDI) program are presented to the Congress in the Annual Report of the Board of Trustees. These estimates provide fundamental financial guidelines in the policymaking process for the OASDI program.

The initial step in the estimating process is to project the number of people in the geographical areas covered by OASDI for each of the next 75 years. This article provides details about the population projections used in preparing the 1987 Annual Report of the Board of Trustees. The population projections were also used in estimating the future financial status of the Hospital Insurance program as described in the 1987 Annual Report of the Medicare Board of Trustees.

Because eligibility for many categories of OASDI benefits depends on marital status, the population is projected by marital status, as well as by age and sex. The projections start from a recent estimate of the population in the Social Security Area by age, sex, and marital status and from a recent estimate of existing marriages by age of husband and age of wife. Three projections, denoted Alternatives I, II, and III, are developed by analyzing historical data and making three different sets of assumptions about future net immigration, birth rates, and death rates.

Alternative II, also referred to as the intermediate projection, is based on assumptions that are thought to be the most likely to occur among the three sets presented. Alternative I is designated as optimistic because among the three projections the assumptions selected produce the most favorable financial effect for the OASDI program. Conversely, the assumptions chosen for Alternative III, designated pessimistic, produce the most unfavorable financial effect. Alternatives I and III are designed to give policymakers a sense of the variability inherent in the financial projections.

The population projections presented in this article differ from those published by the Bureau of the Census. The projections prepared by the Bureau of the Census are generally for only the United States, including Armed Forces overseas. Those presented here include Puerto Rico, Guam, American Samoa, the Virgin Islands, and other U.S. citizens living abroad. In addition, the assumptions used by the Bureau of the Census in making population projections are generally not the same as the assumptions used by the Office of the Actuary.

The historical populations referenced in this article include geographical regions and population subgroups that vary through time. Therefore, the historical

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populations for one particular year may not be consistent with those for an earlier or later year.

Starting Population

The starting population for the projections was the estimated population in the Social Security Area as of January 1, 1985, by single year of age, sex, and marital status. Table 1 shows this starting population by age group, sex, and marital status.

Since the most complete data were available as of July 1, the population as of January 1, 1985, was interpolated from estimates of the Social Security Area population as of July 1, 1984, and July 1, 1985. The components of the Social Security Area and the total estimated population of each component (in thousands) as of the above July 1 dates are as follows:

Component	July 1 1984	July 1 1985
Total	245,043	247,156
Residents of the 50 States, District of Columbia, and Armed Forces overseas	237,020	239,283
Adjustment for net census undercount	3,447	3,310
Civilian residents of—		
Puerto Rico	3,266	3,277
Virgin Islands	107	111
Guam	112	114
American Samoa	35	36
Federal civilian employees overseas	41	62
Dependents of Armed Forces and Federal employees overseas	500	449
Crew members of merchant vessels	14	13
Other citizens overseas	500	500

The estimates of the number of residents of the 50 States, District of Columbia, and Armed Forces overseas as of the July 1 dates by sex for single years of age through 84, and for the group aged 85 or older were obtained from **Current Population Reports**, Series P-25, No. 985, published by the Bureau of the Census. The numbers of persons in the other components of the Social Security Area as of the July 1 dates were estimated by sex for single years of age through 84, and for the group aged 85 or older from data of varying detail. The adjustment for net census undercount was estimated using data published in **Current Population Reports**, Series P-25, No. 985. The numbers of civilian residents of Puerto Rico, the Virgin Islands, Guam, and American Samoa were estimated from data obtained from the Bureau of the Census. The numbers of Federal civilian employees overseas, dependents of these Federal civilian employees, and dependents of Armed Forces overseas were based on estimates used by the Bureau of the Census. The number of crew members of merchant vessels was estimated from data obtained from the Maritime Administration. The number of other citizens overseas covered by the OASDI program was estimated from data supplied by the Department of State. The overlap among the components, believed to be small, was ignored.

The July 1, 1984, and July 1, 1985, Social Security Area population estimates by sex for single years of age through 84, and for the group aged 85 or older were then interpolated to obtain the starting population as of January 1, 1985. The age distribution of those aged 85 or older in the starting population was assumed to be the same as that in the population enrolled in the Medicare program as of January 1, 1985. To bring some degree of cohort consistency for persons aged 60-85 in the resulting estimates of the Social Security Area population, adjustments were made, when necessary, to the estimated numbers of residents of the 50 States, the District of Columbia, and Armed Forces overseas. The adjustments were required to result in historical population survival rates that did not exceed a varying scale of rates, which ranged from 0.995 at age 60 to 0.970 at age 85. To fulfill this requirement, an iterative process was used to change population estimates, when necessary, by using a moving weighted average graduation formula on the cohort population data.

Table 2 shows the starting married population by age group of husband crossed with age group of wife. The distribution of the starting population by marital status (never married, currently married, currently widowed, and currently divorced) was estimated by age and sex from data published by the Bureau of the Census in **Current Population Reports**, Series P-20, No. 402. A distribution of the starting married population by age of husband crossed with age of wife was estimated from data published by the Bureau of the Census in the 1980 **Census of Population**, "Subject Report on Marital Status," No. PC80-2-4C. The distribution as shown in the 1980 census was adjusted to represent 1985 by an iterative proration method designed to assure consistency with the previously estimated starting married population by age and sex.

Analysis and Projection of Components of Population Change

In attempting to estimate net immigration and numbers of births, deaths, marriages, and divorces in future years, it is instructive to review and analyze historical trends. Since the actual numbers of births, deaths, marriages, and divorces depend on the size of the population, it is better to analyze them as rates rather than as absolute numbers. A rate is defined as

Table 1.—Population in Social Security Area, by age group, sex, and marital status, January 1, 1985

[Numbers in thousands]

Age group	Total	Sex and marital status									
		Male					Female				
		Total	Single	Married	Widowed	Divorced	Total	Single	Married	Widowed	Divorced
Total	246,024	121,045	56,672	55,769	2,472	6,132	124,979	48,855	55,769	12,236	8,118
0-19	73,202	37,430	37,277	150	1	2	35,773	35,131	594	5	44
20-64	144,224	72,062	18,719	46,956	741	5,646	72,162	12,844	48,595	3,394	7,328
65 or older	28,598	11,554	676	8,663	1,730	484	17,044	880	6,580	8,837	746
20-65	146,230	72,991	18,777	47,705	809	5,700	73,239	12,889	49,239	3,706	7,405
20-66	148,153	73,884	18,833	48,423	878	5,750	74,269	12,932	49,836	4,027	7,474
20-67	150,015	74,740	18,885	49,110	950	5,796	75,275	12,974	50,400	4,361	7,539
20-68	151,791	75,544	18,933	49,752	1,021	5,837	76,247	13,016	50,927	4,705	7,599
20-69	153,511	76,306	18,979	50,360	1,093	5,875	77,205	13,058	51,428	5,064	7,654
0-4	18,831	9,637	9,637	0	0	0	9,195	9,195	0	0	0
5-9	17,412	8,912	8,912	0	0	0	8,500	8,500	0	0	0
10-14	17,846	9,132	9,131	1	0	0	8,714	8,709	4	0	1
15-19	19,113	9,749	9,597	149	1	2	9,365	8,728	589	5	43
20-24	22,115	11,264	8,539	2,532	3	189	10,851	6,352	4,091	24	385
25-29	22,683	11,552	4,620	6,187	4	740	11,132	2,941	7,253	59	878
30-34	20,322	10,466	2,321	7,122	12	1,011	9,856	1,370	7,192	100	1,194
35-39	18,285	9,073	1,001	7,081	36	954	9,212	747	7,114	110	1,240
40-44	14,572	7,225	683	5,655	32	856	7,347	411	5,653	226	1,057
45-49	12,076	6,005	430	4,908	61	605	6,071	296	4,649	320	805
50-54	11,342	5,582	389	4,576	96	521	5,761	257	4,337	495	671
55-59	11,669	5,636	390	4,617	197	432	6,033	242	4,348	841	601
60-64	11,160	5,260	347	4,277	300	337	5,900	228	3,958	1,218	496
65-69	9,287	4,245	260	3,404	352	229	5,043	214	2,833	1,670	326
70-74	7,555	3,212	184	2,486	402	140	4,344	209	1,949	1,975	210
75-79	5,475	2,123	122	1,589	362	51	3,352	191	1,038	2,015	108
80-84	3,456	1,183	67	817	271	29	2,273	140	484	1,595	54
85-89	1,851	543	30	290	203	21	1,308	81	208	988	31
90-94	748	194	11	70	103	11	554	34	60	447	13
95 or older	224	54	3	9	38	4	171	11	8	148	4

the ratio of the number of occurrences of an event during a year to the midyear population having the potential to experience the event. Because death rates vary significantly by sex, they are calculated for males and females separately. Because rates of birth, death, marriage, and divorce vary greatly by age, they are calculated on an age-specific basis (each age or age group separately) rather than on a crude basis (all ages combined). Although calculating the rates on an age-specific basis improves accuracy, it also yields an overabundance of figures for any one year. Thus to study the trends through time, it becomes helpful, if not necessary, to use a single statistic that summarizes the age-specific rates for each year.

Table 2.—Existing marriages in the Social Security Area, by age group of husband and wife, January 1, 1985

[Numbers in thousands]

Age group of husband	Age group of wife															
	Total	14-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85 or older
Total	55,769	594	4,091	7,253	7,192	7,114	5,653	4,649	4,337	4,348	3,958	2,833	1,949	1,038	484	276
14-19	150	100	40	4	1	1	1	1	1	1	0	0	0	0	0	0
20-24	2,532	390	1,773	307	40	11	4	2	2	1	1	1	0	0	0	0
25-29	6,187	76	1,788	3,722	483	80	20	7	4	2	2	1	1	0	0	0
30-34	7,122	16	359	2,515	3,599	505	93	22	7	3	2	1	0	0	0	0
35-39	7,081	5	89	520	2,420	3,509	427	77	20	7	3	2	1	1	0	0
40-44	5,655	2	24	118	446	2,236	2,431	304	64	18	6	2	1	1	0	0
45-49	4,908	1	9	38	125	514	1,932	1,902	289	66	21	8	3	1	0	0
50-54	4,576	1	4	15	47	161	512	1,656	1,706	344	91	26	8	3	1	0
55-59	4,617	1	3	7	19	60	155	478	1,587	1,783	398	90	26	7	2	1
60-64	4,277	1	2	3	7	22	52	138	469	1,511	1,626	340	82	19	4	2
65-69	3,404	0	1	2	3	8	17	42	129	439	1,301	1,134	260	54	10	5
70-74	2,486	0	0	1	1	3	7	14	42	127	379	889	818	165	27	14
75-79	1,589	0	0	0	1	1	2	5	13	36	101	266	581	460	80	42
80-84	817	0	0	0	0	0	0	1	3	7	17	46	110	222	256	153
85 or older	368	0	0	0	0	0	0	1	2	4	10	26	58	106	104	59

Fertility

Age-specific birth rates are defined as the number of births during the year to mothers at the specified age divided by the midyear female population at that age. Birth rates for women at each age 14-49 were obtained from the National Center for Health Statistics for each year 1917-84. To summarize the fertility experience for a single year, total fertility rates were used. The total fertility rate is a simple sum of the age-specific birth rates applicable during the year. Thus the total fertility rate can be interpreted as the number of children that would be born to a woman if she were to survive her childbearing years and were to experience those age-specific birth rates throughout her childbearing years. The following tabulation gives total fertility rates (per thousand women) for 1920-86:

Calendar year	Total fertility rate	Calendar year	Total fertility rate
1920	3,263.3	1954	3,461.2
1921	3,326.2	1955	3,498.3
1922	3,109.4	1956	3,604.7
1923	3,101.2	1957	3,682.4
1924	3,120.7	1958	3,628.9
1925	3,011.6	1959	3,638.2
1926	2,900.7	1960	3,605.7
1927	2,824.3	1961	3,563.9
1928	2,659.8	1962	3,423.3
1929	2,532.0	1963	3,297.8
1930	2,532.5	1964	3,170.9
1931	2,401.7	1965	2,881.6
1932	2,318.6	1966	2,670.4
1933	2,172.0	1967	2,525.5
1934	2,232.0	1968	2,431.0
1935	2,188.7	1969	2,422.9
1936	2,145.6	1970	2,431.7
1937	2,173.3	1971	2,245.4
1938	2,221.7	1972	1,993.6
1939	2,171.7	1973	1,862.5
1940	2,229.0	1974	1,824.4
1941	2,331.5	1975	1,770.3
1942	2,554.8	1976	1,744.8
1943	2,640.2	1977	1,795.0
1944	2,494.5	1978	1,764.4
1945	2,421.8	1979	1,816.7
1946	2,857.9	1980	1,849.0
1947	3,181.2	1981	1,825.4
1948	3,026.2	1982	1,834.7
1949	3,036.2	1983	1,805.3
1950	3,028.0	1984	1,796.4
1951	3,199.1	1985	1,843.9
1952	3,286.5	1986	1,840.0
1953	3,349.4		

Table 3 gives projected total fertility rates by alternative. Chart 1 shows past and assumed total fertility rates for 1920-2080.

As a first step in projecting fertility, it is instructive to examine the recent history of fertility in the United States. During the period 1917-25, the total fertility rate was more than three children per woman. During the period 1924-33, the total fertility rate declined from 3.1 children per woman to 2.2, and then remained level at 2.1 to 2.2 children per woman through 1940. During the next 20 years, the total fertility rate increased unevenly to more than 3.6 children per woman. Throughout the 1960's and early 1970's, the total fertility rate declined steadily to a low point of 1.7 in 1976. Since then, the total fertility rate has been about 1.8 children per woman.

It is expected that the total fertility rate will, on the average, ultimately exceed the level of the past decade because such a low level has never been experienced in the United States over a long period and this low level is below the level needed to maintain the size of the population in the absence of increased net immigration. A rate of 2.1 would result in a nearly constant population if net immigration were equal to zero and if mortality rates were constant at levels close to the current U.S. experience. However, it is not believed that the total fertility rate will return to the high levels of the 1940's, the 1950's, and early 1960's. Several changes in our society have occurred during the past 20 years that have contributed to reducing the number of children being born. Some of these changes are increased availability and use of birth control methods, increased female participation in the labor force, increased prevalence of divorce, increased postponement of mar-

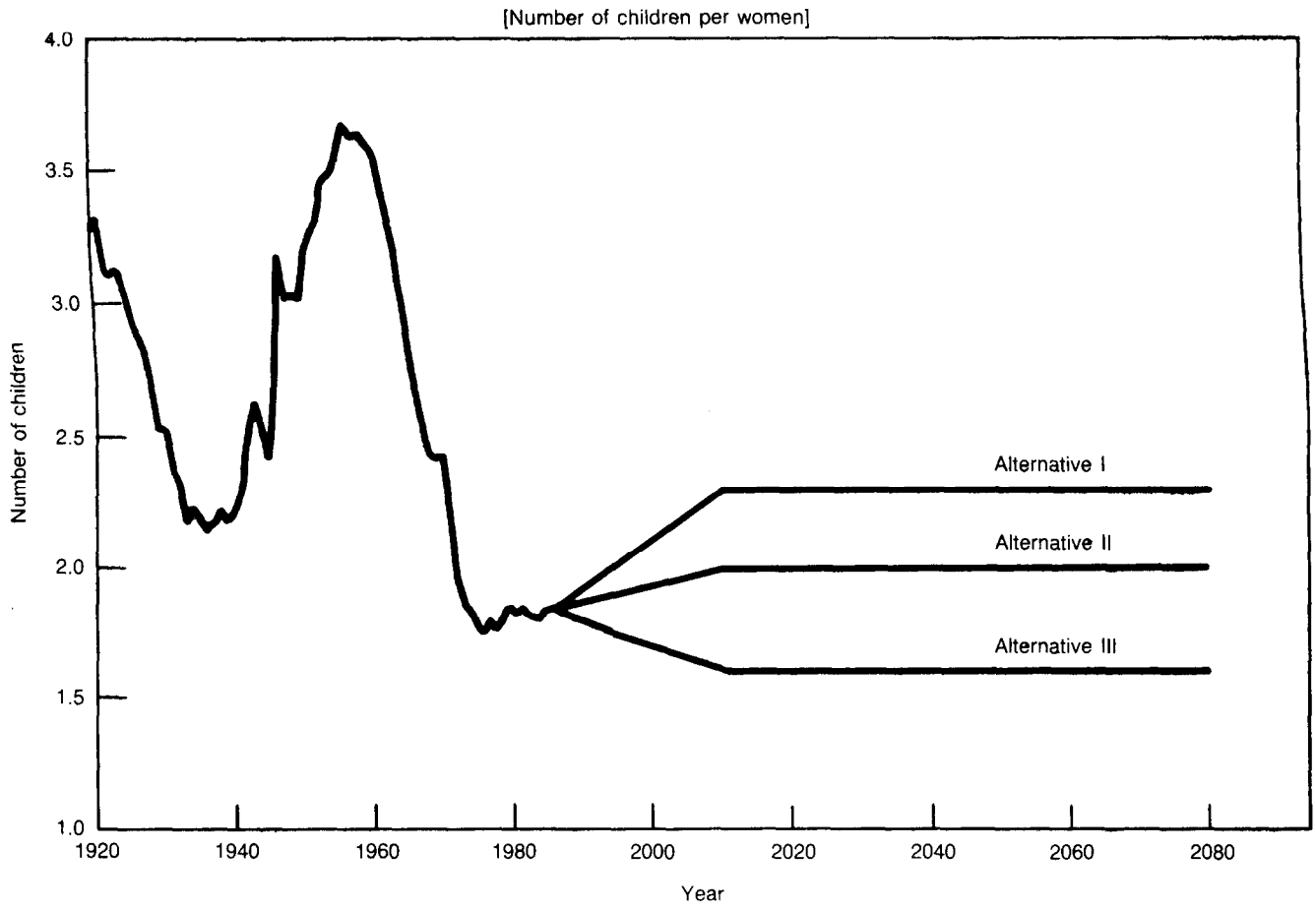
Table 3.—Total fertility rate projections, by alternative for selected years

[Per thousand women]

Calendar year	Total fertility rate		
	Alternative I	Alternative II	Alternative III
1987	1,858.6	1,845.5	1,826.6
1988	1,877.4	1,851.5	1,814.3
1989	1,896.1	1,857.6	1,802.7
1990	1,914.9	1,864.0	1,791.4
1991	1,933.7	1,870.4	1,780.7
1992	1,952.6	1,876.8	1,770.1
1993	1,971.3	1,883.3	1,759.9
1994	1,990.1	1,889.9	1,750.1
1995	2,008.9	1,896.5	1,740.3
1996	2,027.7	1,903.2	1,730.8
1997	2,046.5	1,909.7	1,721.3
1998	2,065.2	1,916.2	1,712.1
1999	2,083.9	1,922.7	1,703.0
2000	2,102.3	1,929.2	1,694.0
2001	2,120.6	1,935.7	1,685.1
2002	2,138.7	1,942.2	1,676.2
2003	2,156.8	1,948.8	1,667.4
2004	2,175.0	1,955.3	1,658.7
2005	2,193.2	1,962.0	1,650.2
2006	2,211.3	1,968.5	1,641.8
2007	2,229.2	1,975.0	1,633.4
2008	2,247.0	1,981.4	1,625.0
2009	2,264.8	1,987.6	1,616.6
2010	2,282.6	1,993.9	1,608.3
2011	2,300.0	2,000.0	1,600.0

Note: The total fertility rate is the average number of children that would be born to a women if she were to survive the childbearing period and were to experience the age-specific central birth rates for the tabulated year throughout the period.

Chart 1.—Actual and projected total fertility rate, by alternative, 1920-2080



riage and childbearing among young women, and the shift in the perception of the status of children within their families from economic assets to economic liabilities. No significant reversal of these changes is anticipated. Recent birth expectation surveys, such as that published by the Bureau of the Census in **Current Population Reports**, Series P-20, No. 406, are consistent with a long-range assumption for the total fertility rate of about 2.0 to 2.1 children per woman. Thus, an ultimate total fertility rate of 2.0 children per woman was selected as the intermediate (Alternative II) assumption for the 1987 Annual Report of the Board of Trustees.

To help in selecting ultimate rates for Alternatives I and III, an examination of the recent total fertility rates in other nations is useful. A comparison of the most recent total fertility rates listed in the **Demographic Yearbook, 1981**, for the United States, Canada, and 15 countries in Western Europe revealed a range of 3.3 in Ireland to 1.5 in West Germany, Switzerland, and Denmark. The United States ranked sixth with 1.8. Two of these countries had a total fertility rate equal to or more than 2.3 and five countries had a total fertility rate equal to or less than 1.6. For reasons already cited, it is not believed that the total fertility rate for the United States will return to a level as high as 3.3 for any sustained period, and thus 2.3 was selected as the optimistic (Alternative I) assumption. It is plausible that the total fertility rate could be as low as 1.6 children per woman over a long period. Thus, 1.6 was selected as the pessimistic (Alternative III) assumption. The ultimate total fertility rate for each alternative was assumed to be reached first in calendar year 2011. The ultimate values selected for the 1987 Trustees Report compare closely with those used by the Bureau of the Census in its latest series of population projections, published in **Current Population Reports**, Series P-25, No. 952. The Bureau of the Census used a range of 1.6 to 2.3, with an intermediate assumption of 1.9.

Total fertility rates for 1985 and 1986 were estimated from provisional data published by the National Center for Health Statistics in **Monthly Vital Statistics Reports**, Volume 34, No. 13, and Volume 35, No. 6. From 1986 to 2011, the age-specific birth rates were projected separately for each cohort of women so that the completed cohort fertility rate would gradually approach the assumed ultimate total fertility rate. Table 4 gives the assumed age-specific birth rates by alternative for selected calendar years.

Table 4.—Central birth rate projections, by age and alternative for selected years

[Per thousand women]

Alternative and age	Calendar year									
	1985	1986	1987	1988	1989	1990	1995	2000	2005	2011
Alternative I:										
14	6.4	6.4	6.5	6.6	6.7	6.8	7.3	7.8	8.3	8.5
15	17.1	17.1	17.3	17.5	17.7	17.9	18.9	19.9	20.9	21.5
16	32.2	32.2	32.5	32.8	33.1	33.4	34.9	36.4	37.9	39.4
17	51.7	51.6	52.1	52.6	53.1	53.6	56.1	58.6	61.1	63.6
18	72.0	71.8	72.5	73.2	73.9	74.6	78.1	81.6	85.1	88.8
19	88.1	87.9	88.8	89.7	90.5	91.3	95.3	99.3	103.3	107.9
20	99.9	99.7	100.7	101.7	102.7	103.7	108.4	112.9	117.4	122.7
21	106.5	106.3	107.4	108.5	109.6	110.6	115.6	120.6	125.6	131.5
22	111.3	111.0	112.1	113.2	114.3	115.4	120.9	126.3	131.5	138.0
23	114.8	114.5	115.7	116.9	118.1	119.3	125.0	130.5	136.0	142.6
24	116.7	116.5	117.7	118.9	120.1	121.3	127.3	132.9	138.4	145.1
25	116.8	116.6	117.8	119.0	120.2	121.4	127.4	133.3	138.8	145.7
26	115.1	114.8	115.9	117.1	118.3	119.5	125.5	131.4	136.9	143.6
27	111.8	111.5	112.6	113.7	114.8	116.0	122.0	127.7	133.2	139.8
28	106.6	106.4	107.5	108.6	109.7	110.8	116.3	121.8	127.3	133.9
29	99.4	99.1	100.1	101.1	102.1	103.1	108.5	113.9	118.9	124.9
30	89.8	89.6	90.5	91.4	92.3	93.2	98.0	103.0	107.6	113.0
31	79.0	78.9	79.7	80.5	81.3	82.1	86.3	90.8	94.9	99.7
32	67.8	67.7	68.4	69.1	69.8	70.5	74.0	77.9	81.4	85.6
33	57.1	56.9	57.5	58.1	58.7	59.3	62.3	65.3	68.3	71.9
34	46.8	46.7	47.2	47.7	48.2	48.7	51.2	53.7	56.2	59.2
35	37.1	37.0	37.4	37.8	38.2	38.6	40.6	42.6	44.6	47.0
36	28.7	28.7	29.0	29.3	29.6	29.9	31.4	32.9	34.4	36.2
37	22.0	21.9	22.1	22.4	22.7	23.0	24.2	25.3	26.8	28.5
38	16.3	16.3	16.5	16.7	16.9	17.1	18.1	19.1	20.1	21.3
39	11.8	11.8	11.9	12.0	12.1	12.2	12.7	13.2	13.7	14.3
40	8.1	8.1	8.2	8.3	8.4	8.5	9.0	9.5	10.0	10.6
41	5.3	5.3	5.3	5.3	5.3	5.4	5.9	6.4	6.9	7.5
42	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
43	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
44	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
45	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
46	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
47	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
48	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
49	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Alternative II:										
14	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
15	17.1	17.1	17.2	17.3	17.4	17.5	18.0	18.5	19.0	19.3
16	32.2	32.2	32.3	32.4	32.5	32.6	33.1	33.6	34.1	34.7
17	51.7	51.6	51.8	52.0	52.2	52.4	53.4	54.4	55.4	56.4
18	72.0	71.8	72.1	72.4	72.7	73.0	74.4	75.4	76.6	77.8
19	88.1	87.9	88.2	88.5	88.8	89.1	90.6	92.1	93.6	95.3
20	99.9	99.7	100.1	100.5	100.9	101.3	103.3	104.9	106.5	108.4
21	106.5	106.3	106.7	107.1	107.5	107.9	109.9	111.9	113.9	116.2
22	111.3	111.0	111.4	111.8	112.2	112.6	114.6	116.6	118.6	121.0
23	114.8	114.5	114.9	115.3	115.7	116.1	118.1	120.1	122.1	124.5
24	116.7	116.5	116.9	117.3	117.7	118.1	120.1	122.1	124.1	126.5
25	116.8	116.6	117.0	117.4	117.8	118.3	120.3	122.3	124.3	126.7
26	115.1	114.8	115.2	115.6	116.0	116.4	118.4	120.4	122.4	124.8
27	111.8	111.5	111.9	112.3	112.7	113.1	115.1	117.1	119.1	121.5
28	106.6	106.4	106.7	107.0	107.4	107.8	109.8	111.8	113.8	116.2
29	99.4	99.1	99.4	99.7	100.0	100.3	102.3	104.3	106.3	108.7
30	89.8	89.6	89.9	90.2	90.5	90.8	92.5	94.1	95.6	94.1
31	79.0	78.9	79.1	79.3	79.5	79.8	81.3	82.8	84.3	86.1
32	67.8	67.7	67.9	68.1	68.3	68.5	69.6	71.1	72.6	74.0
33	57.1	56.9	57.1	57.3	57.5	57.7	58.7	59.7	60.7	61.9
34	46.8	46.7	46.8	46.9	47.0	47.1	47.9	48.9	49.9	51.1
35	37.1	37.0	37.1	37.2	37.3	37.4	37.9	38.4	38.9	39.5
36	28.7	28.7	28.7	28.8	28.9	29.0	29.5	30.0	30.5	31.1
37	22.0	21.9	21.9	21.9	21.9	22.0	22.5	23.0	23.5	24.1
38	16.3	16.3	16.3	16.3	16.3	16.3	16.3	16.8	17.3	17.9
39	11.8	11.8	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7
40	8.1	8.1	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
41	5.3	5.3	5.2	5.2	5.2	5.2	5.2	5.2	5.2	5.2

Table 4.—Central birth rate projections, by age and alternative for selected years—Continued

[Per thousand women]

Alternative and age	Calendar year									
	1985	1986	1987	1988	1989	1990	1995	2000	2005	2011
Alternative II—Continued:										
42	3.5	3.5	3.4	3.4	3.4	3.4	3.4	3.4	3.4	3.4
43	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3	2.3
44	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2
45	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
46	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
47	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
48	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
49	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
Alternative III:										
14	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4	6.4
15	17.1	17.1	17.0	16.9	16.8	16.7	16.2	15.7	15.2	14.6
16	32.2	32.2	32.0	31.8	31.6	31.4	30.4	29.4	28.4	27.7
17	51.7	51.6	51.3	51.0	50.7	50.4	48.9	47.4	46.1	44.9
18	72.0	71.8	71.4	71.0	70.6	70.2	68.2	66.4	64.7	62.9
19	88.1	87.9	87.4	86.9	86.4	85.9	83.6	81.6	79.6	77.2
20	99.9	99.7	99.2	98.7	98.2	97.7	95.2	92.7	90.2	87.3
21	106.5	106.3	105.7	105.1	104.5	103.9	101.1	98.6	96.1	93.1
22	111.3	111.0	110.4	109.8	109.2	108.6	105.6	102.9	100.4	97.4
23	114.8	114.5	113.9	113.3	112.7	112.1	109.1	106.1	103.5	100.5
24	116.7	116.5	115.9	115.3	114.7	114.1	111.1	108.1	105.1	101.6
25	116.8	116.6	115.9	115.3	114.7	114.1	111.1	108.1	105.2	102.0
26	115.1	114.8	114.1	113.5	112.9	112.3	109.3	106.3	103.5	100.5
27	111.8	111.5	110.8	110.1	109.5	108.9	105.9	102.9	100.4	97.4
28	106.6	106.4	105.7	105.0	104.4	103.8	100.8	98.3	95.8	92.8
29	99.4	99.1	98.4	97.8	97.2	96.6	94.1	91.6	89.1	86.1
30	89.8	89.6	88.9	88.3	87.7	87.2	84.7	82.3	80.3	77.9
31	79.0	78.9	78.3	77.7	77.2	76.7	74.5	72.5	70.5	68.1
32	67.8	67.7	67.1	66.6	66.1	65.6	63.6	62.1	60.6	58.8
33	57.1	56.9	56.4	55.9	55.5	55.1	53.4	51.9	50.4	48.6
34	46.8	46.7	46.2	45.8	45.4	45.0	43.5	42.5	41.5	40.3
35	37.1	37.0	36.5	36.1	35.8	35.5	34.3	33.3	32.3	31.1
36	28.7	28.7	28.3	27.9	27.6	27.3	26.3	25.6	25.1	24.5
37	22.0	21.9	21.5	21.2	20.9	20.7	19.9	19.4	18.9	18.3
38	16.3	16.3	16.0	15.7	15.5	15.3	14.7	14.2	13.7	13.1
39	11.8	11.8	11.5	11.3	11.1	10.9	10.4	9.9	9.4	9.1
40	8.1	8.1	7.9	7.7	7.5	7.4	6.9	6.7	6.7	6.7
41	5.3	5.3	5.1	5.0	4.9	4.8	4.5	4.5	4.5	4.5
42	3.5	3.5	3.4	3.3	3.2	3.1	2.9	2.9	2.9	2.9
43	2.3	2.3	2.2	2.1	2.0	1.9	1.9	1.9	1.9	1.9
44	1.2	1.2	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
45	.6	.6	.6	.6	.6	.6	.6	.6	.6	.6
46	.1	.1	.1	.1	.1	.1	.1	.1	.1	.1
47	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
48	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0
49	.0	.0	.0	.0	.0	.0	.0	.0	.0	.0

Note: The central birth rate is the ratio of the number of births during the year for mothers at the tabulated age to the midyear female population at that age.

Mortality

Death rates (generally referred to as **central** death rates) are defined as the number of deaths during the year divided by the midyear population. These rates were calculated by sex on an age-specific basis for each year 1900-83. To summarize the mortality experience of a single year and to control for changes in the age distribution of the population from year to year, age-adjusted death rates (as shown in tables 5 and 6) were calculated as a weighted average of the age-specific death rates. The weights used were the numbers of people in the corresponding age groups of the 1980 U.S. census population. Thus, if the age-adjusted death rate for a particular year and sex is multiplied by the 1980 census population, the result gives the number of deaths that would have occurred in 1980 for the census population if the age-specific death rates for that particular year and sex had been experienced. The age-adjusted death rate is, therefore, equivalent to the crude death rate that would have been experienced in the 1980 census population.

Table 5.—Age-adjusted central death rates, by sex, 1900-86

[Per hundred thousand]

Calendar year	Male	Female	Calendar year	Male	Female
1900	2,446.6	2,228.3	1944	1,638.7	1,262.3
1901	2,410.5	2,162.8	1945	1,613.0	1,214.7
1902	2,268.7	1,997.0	1946	1,545.6	1,184.0
1903	2,323.5	2,070.3	1947	1,552.2	1,167.9
1904	2,453.2	2,171.5	1948	1,531.0	1,133.8
1905	2,367.8	2,102.4	1949	1,492.0	1,094.8
1906	2,365.7	2,065.8	1950	1,480.4	1,070.2
1907	2,455.2	2,133.2	1951	1,471.1	1,056.1
1908	2,241.9	1,982.3	1952	1,446.6	1,033.0
1909	2,193.4	1,931.2	1953	1,444.0	1,018.2
1910	2,279.2	2,004.8	1954	1,374.4	962.6
1911	2,195.7	1,944.6	1955	1,393.5	970.9
1912	2,169.5	1,898.9	1956	1,401.8	965.5
1913	2,176.0	1,892.0	1957	1,429.2	980.0
1914	2,117.6	1,850.9	1958	1,417.5	967.3
1915	2,125.6	1,875.0	1959	1,398.4	943.9
1916	2,203.1	1,930.2	1960	1,420.8	945.0
1917	2,224.0	1,929.6	1961	1,389.6	919.6
1918	2,534.9	2,202.2	1962	1,418.7	933.5
1919	1,973.6	1,810.1	1963	1,452.3	941.2
1920	2,026.7	1,895.5	1964	1,412.2	909.5
1921	1,845.5	1,710.4	1965	1,425.2	903.0
1922	1,938.3	1,772.4	1966	1,434.6	901.5
1923	2,023.5	1,846.0	1967	1,406.3	872.3
1924	1,948.6	1,735.7	1968	1,446.9	876.7
1925	1,974.3	1,759.8	1969	1,409.9	846.4
1926	2,045.4	1,822.5	1970	1,382.8	823.5
1927	1,912.4	1,674.8	1971	1,373.4	817.1
1928	2,037.8	1,784.1	1972	1,375.9	808.7
1929	2,008.2	1,743.1	1973	1,358.4	794.7
1930	1,893.3	1,619.1	1974	1,302.3	762.3
1931	1,852.0	1,567.3	1975	1,259.0	727.0
1932	1,835.5	1,573.8	1976	1,245.4	720.4
1933	1,808.0	1,521.3	1977	1,216.1	697.3
1934	1,855.8	1,539.9	1978	1,207.2	694.7
1935	1,827.8	1,508.7	1979	1,171.8	670.2
1936	1,927.0	1,583.7	1980	1,186.8	685.6
1937	1,860.0	1,508.9	1981	1,152.9	667.1
1938	1,734.3	1,422.8	1982	1,116.2	648.2
1939	1,734.9	1,417.6	1983	1,125.7	656.7
1940	1,757.0	1,405.9	1984	1,115.9	654.5
1941	1,699.5	1,332.4	1985	1,107.9	655.5
1942	1,647.6	1,280.5	1986	1,092.5	645.0
1943	1,710.0	1,330.0			

Table 6.—Age-adjusted central death rate projections, by sex and alternative for selected years

[Per hundred thousand]

Calendar year	Alternative I		Alternative II		Alternative III	
	Male	Female	Male	Female	Male	Female
1987	1,086.7	641.0	1,076.9	634.5	1,067.0	628.1
1988	1,081.1	637.1	1,061.8	624.5	1,042.8	612.0
1989	1,075.7	633.3	1,047.4	614.8	1,019.8	596.9
1990	1,070.5	629.7	1,033.5	605.5	998.0	582.6
1991	1,065.5	626.1	1,020.1	596.7	977.3	569.0
1992	1,060.6	622.7	1,007.3	588.2	957.7	556.3
1993	1,055.9	619.5	995.0	580.1	939.2	544.3
1994	1,051.4	616.3	983.3	572.4	921.7	533.0
1995	1,047.0	613.3	972.2	565.1	905.3	522.6
1996	1,042.8	610.4	961.8	558.4	890.1	512.9
1997	1,038.8	607.6	952.1	552.1	876.2	504.0
1998	1,034.9	604.9	943.3	546.4	863.4	496.0
1999	1,031.2	602.4	935.3	541.2	851.9	488.7
2000	1,027.6	600.0	928.2	536.7	841.5	482.1
2005	1,011.7	589.8	902.2	519.8	799.0	454.7
2010	998.0	581.4	882.2	506.5	762.5	430.8
2015	985.1	573.6	863.4	493.9	728.2	408.3
2020	972.6	566.0	845.2	481.8	695.6	387.3
2025	960.5	558.6	827.6	470.1	664.8	367.5
2030	948.6	551.4	810.5	458.8	635.5	348.9
2035	937.1	544.4	794.0	447.8	607.6	331.3
2040	925.8	537.6	777.9	437.2	581.2	314.9
2045	914.8	530.9	762.3	426.9	556.1	299.3
2050	904.1	524.5	747.1	416.9	532.2	284.7
2055	893.7	518.2	732.4	407.3	509.5	270.9
2060	883.6	512.1	718.1	397.9	487.9	258.0
2065	873.7	506.2	704.2	388.8	467.4	245.7
2070	864.0	500.4	690.7	380.0	447.9	234.2
2075	854.6	494.8	677.6	371.5	429.3	223.2
2080	845.5	489.3	664.8	363.2	411.6	213.0

Note: The age-adjusted central death rate is the weighted average of the age-specific central death rates for a particular sex and year. The weights are the number of people in the corresponding age groups in the 1980 U.S. census population.

An examination of the age-adjusted death rates since 1900 reveals four distinct periods of mortality reduction. During the period 1900-36, annual mortality reduction averaged about 0.8 percent for males and 0.9 percent for females. Following this was a period of rapid reduction, 1936-54, in which mortality decreased an average of 1.6 percent per year for males and 2.5 percent for females. The period 1954-68 saw an actual increase for males of 0.2 percent per year and a much slower reduction of 0.8 percent per year for females. From 1968 through 1983 rapid reduction in mortality resumed, averaging 1.8 percent for males and 2.0 percent for females, annually. However, final statistics for 1983 and provisional statistics for 1984 and 1985 show a stabilization of the age-adjusted death rates.

Age-sex-adjusted death rates are often calculated when one is interested in summarizing death rates for both sexes combined. Age-sex-adjusted death rates (as shown in table 7) were calculated as a weighted average of the age-sex-specific death rates, where each weight was the number of people in the corresponding age and sex group of the 1980 U.S. census population. The tabulation that follows gives the age-sex-adjusted central death rates (per hundred thousand) for 1900-86.

Past reduction in mortality has varied greatly by cause of death. Because it is expected that future reduction in mortality rates will also vary greatly by cause of death, death rates for 1968-83 were calculated and analyzed by age group and sex for 10 groups of causes of death (based on the Ninth Revision of the International List of Diseases and Causes of Death code numbers). These groups of causes of death are:

I. Diseases of the heart (390-398, 402, 404-429)
II. Malignant neoplasms (140-208)
III. Vascular diseases (400-401, 403, 430-459, 582-583, 587)
IV. Accidents, suicide, and homicide (E800-E989)
V. Diseases of the respiratory system (460-519)
VI. Congenital malformations and diseases of early infancy (740-779)
VII. Diseases of the digestive system (520-570, 572-579)

Calendar year	Age-sex-adjusted death rate	Calendar year	Age-sex-adjusted death rate
1900	2,339.6	1944	1,454.0
1901	2,290.2	1945	1,417.6
1902	2,133.7	1946	1,367.7
1903	2,199.6	1947	1,361.3
1904	2,314.4	1948	1,333.4
1905	2,238.0	1949	1,294.6
1906	2,222.2	1950	1,275.5
1907	2,303.0	1951	1,265.3
1908	2,118.9	1952	1,243.2
1909	2,067.2	1953	1,234.0
1910	2,149.1	1954	1,171.5
1911	2,076.9	1955	1,185.1
1912	2,041.2	1956	1,185.6
1913	2,041.7	1957	1,206.4
1914	1,990.3	1958	1,193.5
1915	2,005.1	1959	1,172.2
1916	2,073.6	1960	1,182.8
1917	2,083.8	1961	1,153.7
1918	2,378.7	1962	1,174.2
1919	1,893.5	1963	1,193.6
1920	1,961.8	1964	1,158.9
1921	1,780.5	1965	1,160.8
1922	1,859.4	1966	1,165.0
1923	1,939.7	1967	1,135.8
1924	1,845.8	1968	1,156.3
1925	1,870.5	1969	1,122.9
1926	1,937.8	1970	1,097.2
1927	1,795.9	1971	1,088.6
1928	1,914.3	1972	1,085.4
1929	1,878.5	1973	1,069.2
1930	1,758.1	1974	1,025.4
1931	1,710.2	1975	985.4
1932	1,705.5	1976	974.5
1933	1,665.1	1977	948.0
1934	1,699.3	1978	942.3
1935	1,669.6	1979	912.4
1936	1,757.8	1980	926.8
1937	1,686.5	1981	900.6
1938	1,580.4	1982	872.9
1939	1,577.8	1983	880.7
1940	1,583.2	1984	874.6
1941	1,516.4	1985	872.7
1942	1,466.1	1986	859.4
1943	1,521.3		

VIII. Diabetes mellitus (250)
IX. Cirrhosis of the liver (571)
X. All other causes

For 1968-83, the death rates for persons younger than age 65 by age group, sex, and cause of death were calculated using the numbers of deaths as tabulated in **Vital Statistics of the United States** and using the latest census estimates of the resident population as published in the P-25 Series of **Current Population Reports**. For 1968-78, an adjustment was made to the distribution of the numbers of deaths among the 10 causes. This adjustment was needed to reflect the revision in the cause-of-death coding that occurred in 1979, thereby making coding of the data for 1968-78 more comparable with the coding used for the years 1979 and later. The adjustments were based on comparability ratios published by the National Center for Health Statistics in **Monthly Vital Statistics Reports**, Volume 28, No. 11. For the group aged 65 or older, records of the Medicare program were used to determine rates by age and sex. The numbers of deaths by cause in **Vital Statistics of the United States** were used to distribute the age-sex-specific death rates for persons aged 65 or older into age-sex-cause-specific death rates.[1]

Table 7.—Age-sex-adjusted central death rate projections, by alternative for selected years

[Per hundred thousand]

Calendar year	Alternative I	Alternative II	Alternative III
1987	854.3	846.1	837.9
1988	849.0	833.0	817.3
1989	843.9	820.5	797.8
1990	838.9	808.4	779.2
1991	834.1	796.8	761.7
1992	829.5	785.7	745.1
1993	825.0	775.0	729.4
1994	820.6	764.9	714.6
1995	816.4	755.3	700.8
1996	812.3	746.2	688.0
1997	808.5	737.8	676.2
1998	804.8	730.1	665.6
1999	801.2	723.3	655.9
2000	797.9	717.1	647.2
2005	783.9	695.0	612.0
2010	772.8	678.4	582.1
2015	762.6	663.0	554.3
2020	752.6	648.0	528.0
2025	742.9	633.6	503.1
2030	733.5	619.5	479.6
2035	724.3	606.0	457.3
2040	715.4	592.8	436.3
2045	706.6	580.0	416.3
2050	698.2	567.6	397.5
2055	689.9	555.6	379.6
2060	681.9	544.0	362.7
2065	674.0	532.7	346.6
2070	666.4	521.7	331.4
2075	659.0	511.0	317.0
2080	651.7	500.6	303.3

Note: The age-sex-adjusted central death rate is the weighted average of the age-sex-specific central death rates for a particular year. The weights are the number of people in the corresponding age and sex groups of the U.S. census population.

Average annual reductions in mortality were determined for 1968-83 by age group, sex, and cause of death. The values, shown in table 8, were calculated as the complement of the exponential of the slope of the least-squares line through the logarithms of the death rates. The sharpest reductions in mortality by cause of death were in the category of congenital malformations and diseases of early infancy and in the category of vascular disease, averaging 4.7-5.1 percent per year. Deaths caused by diabetes mellitus averaged about a 3-percent reduction per year. Deaths because of heart

[1] For a detailed analysis of Medicare mortality statistics and a comparison with the statistics provided by the National Center for Health Statistics, see John C. Wilkin, "Recent Trends in the Mortality of the Aged," **Transactions of the Society of Actuaries**, vol. XXXIII, 1981, pages 11-44.

Table 8.—Average annual percentage reductions in central death rates, by age group, sex, and cause of death, 1968-83

Sex and age group	Cause of death										
	Total	Heart disease	Cancer	Vascular disease	Violence	Respiratory disease	Infancy disease	Digestive disease	Diabetes mellitus	Cirrhosis (liver)	Other
Male											
Total	1.76	2.19	-0.72	4.70	1.92	0.92	5.35	2.29	2.48	1.84	-0.20
0	4.90	-4.62	2.36	.65	6.05	13.26	5.71	6.55	7.70	1.87	-4.24
1-4	2.90	-2.85	3.86	6.81	2.15	9.13	1.93	1.41	8.22	4.47	2.25
5-9	3.49	-.13	3.56	6.63	3.13	7.81	4.77	4.92	8.00	7.88	2.94
10-14	2.95	.49	2.61	9.04	2.69	6.23	3.05	4.51	6.28	4.76	2.81
15-19	1.83	.64	2.98	7.87	1.34	7.09	3.19	7.81	7.73	9.54	3.32
20-24	1.72	1.20	3.18	7.56	1.17	7.01	3.06	7.14	5.31	5.07	3.51
25-29	1.04	1.50	2.42	6.40	.49	5.52	3.26	6.37	4.89	1.21	.35
30-34	1.71	3.08	2.16	6.61	.91	5.26	3.17	5.10	4.05	2.38	.66
35-39	2.64	3.76	1.98	6.49	1.58	6.16	3.10	4.55	3.48	3.17	1.80
40-44	2.86	3.60	1.32	6.18	1.93	5.84	3.49	4.23	2.73	3.28	1.99
45-49	2.64	3.33	.39	5.42	2.28	5.20	4.34	3.82	2.52	2.92	1.81
50-54	2.27	3.03	-.23	5.40	2.41	4.28	4.45	3.31	2.57	2.30	1.29
55-59	2.33	3.03	-.12	5.57	3.14	3.55	3.59	3.49	2.33	2.45	1.37
60-64	2.22	2.90	-.25	5.48	3.41	2.88	2.04	3.34	2.63	2.10	1.10
65-69	1.63	2.29	-.84	5.01	3.03	1.33	.70	2.82	2.60	.78	.30
70-74	1.42	2.05	-1.09	4.69	2.64	.56	-.07	2.37	2.54	-.23	-.44
75-79	1.29	1.87	-1.22	4.33	2.25	-.24	.11	2.04	2.38	-.06	-1.11
80-84	1.32	1.81	-1.31	4.40	2.54	-1.05	-1.33	1.36	2.40	-.26	-1.50
85-89	1.39	1.75	-1.54	4.46	2.72	-1.37	2.04	.33	2.44	.82	-1.45
90-94	1.42	1.59	-1.90	4.41	3.08	-.86	-2.10	-.48	.78	1.27	-1.39
Female											
Total	2.03	2.34	-.32	4.74	2.67	1.01	4.81	1.50	3.28	2.05	-.29
0	4.54	-3.79	3.62	1.19	6.07	13.42	5.11	6.22	10.00	3.29	-3.98
1-4	3.28	-2.94	4.07	6.23	2.43	9.39	2.63	.38	4.08	10.62	2.96
5-9	3.45	-.17	3.80	5.64	2.89	7.81	4.93	3.94	6.14	8.79	2.69
10-14	2.85	.69	3.07	7.63	1.89	6.83	2.16	7.13	6.70	10.77	2.92
15-19	1.95	1.72	2.39	7.63	.75	6.11	3.76	7.02	6.02	10.26	3.61
20-24	2.00	1.45	2.37	7.80	.43	6.88	3.09	8.42	6.59	5.32	3.55
25-29	2.40	2.49	2.15	7.57	.70	6.46	3.10	6.90	4.84	3.21	3.22
30-34	3.43	4.17	2.03	8.59	1.80	6.94	3.62	6.81	4.51	4.98	3.83
35-39	3.79	4.56	2.09	7.69	2.56	6.55	1.93	6.10	3.65	5.65	4.44
40-44	3.32	3.58	1.72	6.58	2.70	6.02	3.69	4.75	3.37	5.40	3.61
45-49	2.69	2.93	1.27	5.67	2.75	4.43	4.29	3.85	3.38	4.38	2.66
50-54	2.00	2.68	.34	5.32	2.92	2.70	3.23	3.05	3.15	3.16	1.96
55-59	1.75	2.77	-.15	5.25	2.99	1.17	3.50	2.89	3.41	2.24	1.39
60-64	1.37	2.51	-.88	5.03	3.37	-.69	2.46	2.37	3.39	.89	.34
65-69	1.16	2.29	-1.44	4.86	2.93	-2.03	1.01	1.66	3.40	-.94	-.61
70-74	1.70	2.58	-1.01	5.04	3.09	-1.74	-.35	1.47	3.83	-1.43	-1.10
75-79	2.14	2.64	-.42	5.02	3.87	-.61	-1.55	1.34	3.97	-1.26	-1.62
80-84	2.24	2.46	-.28	4.72	4.55	.28	-.87	.65	3.21	-.68	-1.90
85-89	2.10	2.12	-.27	4.38	5.09	.55	-1.03	-.28	2.13	.06	-2.18
90-94	1.75	1.58	-.78	3.93	5.58	.78	-3.13	-1.28	.07	1.25	-2.20

Note: The average annual percentage reduction is the complement of the exponential of the least-squares line through the logarithms of the central death rates.

disease and violence averaged a 2.0-2.5 percent reduction per year. At about 1.5-2.0 percent average reduction per year were digestive diseases and cirrhosis of the liver, while respiratory diseases averaged about a 1 percent reduction per year. Malignant neoplasms and the residual group of other causes were the only causes from the above group for which mortality increased during this period—about 0.5 percent to 0.25 percent per year, respectively.

Future improvements in mortality will depend on such factors as the development and application of new diagnostic, surgical, and life-sustaining techniques, the presence of environmental pollutants, improvements in exercise and nutrition, the incidence of violence, the isolation and treatment of causes of disease, the emergence of new forms of disease, improvements in prenatal care, the prevalence of cigarette smoking, the misuse of drugs (including alcohol), the extent to which people assume responsibility for their own health, and changes in our conception of the value of life. After considering how these and other factors might affect mortality, three alternative sets of ultimate annual percentage reductions in death rates by sex and cause of death for the years 2011 and later were postulated. These ultimate annual percentage reductions are shown in table 9.

Table 9.—Assumed ultimate annual percentage reductions in death rates, by alternative, sex, and cause

Alternative and sex	Cause									
	I	II	III	IV	V	VI	VII	VIII	IX	X
Alternative I:										
Male	0.5	0.0	0.8	0.2	0.1	0.8	0.5	0.2	0.1	0.0
Female	.5	.0	.8	.2	.1	.8	.5	.2	.1	.0
Alternative II:										
Male	.7	2	1.1	.3	.2	1.5	.7	.4	.2	.2
Female	.7	.3	1.2	.4	.3	1.5	.7	.5	.2	.2
Alternative III:										
Male	1.0	1.2	1.5	.6	.4	2.0	1.0	.8	.4	.4
Female	1.0	1.5	1.7	.8	.5	2.0	1.0	1.0	.4	.4

Rapid reductions in infant mortality are expected to continue. However, for the total group younger than age 65, future reductions are projected to be relatively small compared with past reductions because very little additional improvement in the treatment infectious diseases (such as poliomyelitis and influenza) is possible and because only a small reduction in mortality from violent causes (accidents, suicide, and homicide) is expected. Reductions in mortality rates for the aged are expected to continue at a relatively rapid pace, as further advances are made in the prevention of degenerative diseases (such as heart and vascular disease). The gap between the rates of male and female mortality is expected to stablize as women become increasingly subject to many of the same environmental hazards and social pressures as men. After adjustment for changes in the age and sex distribution of the population, Alternative II mortality is projected to decrease at an average rate of about 0.6 percent per year during the period 1985-2061. This rate is about half the average annual reduction observed during 1900-85. During the period 1985-2061, Alternative I mortality is projected to decrease at a rate about one-fourth the average rate observed during 1900-85, while for Alternative III mortality, the average annual reductions during these two periods are almost the same.

Death rates for persons younger than age 65 by age group, sex, and cause of death for 1984 were estimated from provisional data published by the National Center for Health Statistics in **Monthly Vital Statistics Reports**, Volume 33, No. 13. For the group aged 65 or older, 1984 Medicare data was used. Death rates for 1985 were assumed to change from 1984 by amounts estimated from data published in **Monthly Vital Statistics Reports**, Volume 34, No. 13. Death rates were projected by age group, sex, and cause of death from their estimated 1985 levels by applying annual percentage reductions. For all three alternatives, the annual reductions that were applied to obtain the 1986 levels were the average annual reductions observed for 1968-83.[2] The annual reductions that were applied to obtain the 1987 levels were 50 percent, 100 percent, and 150 percent of the average annual reductions during 1968-83 for Alternatives I, II, and III, respectively. The annual reductions that were assumed to apply during 1987-2010 were calculated by a logarithmic formula designed to gradually transform the reductions applied to obtain the 1987 levels into the postulated ultimate annual reductions. The ultimate reductions were assumed to apply during 2011-80. Table 10 gives the resulting death rates by age group, sex, and alternative for selected years.

Tables 11-14 give the resulting life expectancies for males and females at birth and at age 65 for historical years and by alternative for selected future years. Life expectancy for any year is the number of years of life remaining for a person who is assumed to experience the death rates by age observed in or assumed for the selected year. Thus, the life expectancies at birth shown in tables 11 and 12 are summary statistics of the overall mortality for the applicable calendar year. Similarly, the life expectancies at age 65 in tables 13 and 14 summarize the mortality at ages 65 or older for the applicable calendar year.

Chart 2 shows past and projected life expectancies at birth of males and females from 1900 to 2080, by alternative. Rapid gains in life expectancy at birth occurred from 1900 through the mid-1950's for both sexes. From the mid-1950's through the late 1960's, male life expectancy at birth remained level, while female life expectancy at birth increased moderately. During the 1970's, rapid gains resulted for both males and females. During this century, life expectancy at birth for males increased 24.5 years from 46.4 in 1900 to 70.9 years in 1983. During the same period, life expectancy at birth for females increased 29.1 years from 49.0 to 78.1 years. Thus the difference in male and female life expectancies, the sex gap, at birth increased from 2.6 years in 1900 to 7.2 years in 1983. For 1970, the sex gap in life expectancy at birth was 7.8 years. It stablized during the 1970's and has decreased slightly since 1979. Under all three alternatives, the life expectancy at birth is projected to increase. For males, the life expectancy at birth increases from 71.1 years in 1985 to 75.0 years, 78.1 years, and 84.1 years in 2080 under Alternatives I, II, and III, respectively. This change represents an increase ranging from 3.9 years to 13.0 years. For females the increase ranges from 3.5 years to 12.8 years. The female life expectancy is projected to increase from 78.3 years in 1985, to 81.8 years, 85.3 years, and 91.1 years in 2080 under Alternatives I, II,

[2] The average annual reductions for the all other category for age 0 were calculated using the period 1974-83, rather than 1968-83. This change was made because a distinct shift occurred in 1974, making the earlier data inappropriate for this category.

Table 10.—Central death rate projections, by age group, sex, and alternative for selected years

[Per hundred thousand]

Alternative, sex, and age group	Calendar year										
	1985	1990	2000	2010	2020	2030	2040	2050	2060	2070	2080
Alternative I :											
Male:											
0	1,177.6	1,042.1	890.7	834.4	795.5	759.5	726.2	695.4	666.8	640.4	615.8
1-4	56.8	53.0	48.1	46.1	44.9	43.9	42.9	41.9	41.0	40.1	39.3
5-9	31.3	28.3	24.4	23.3	22.8	22.4	22.0	21.7	21.3	21.0	20.6
10-14	35.2	32.4	28.4	27.2	26.7	26.2	25.8	25.3	24.9	24.4	24.0
15-19	116.4	110.5	102.1	98.3	96.4	94.6	92.8	91.0	89.3	87.6	86.0
20-24	163.6	156.1	145.1	140.0	137.2	134.6	132.0	129.5	127.0	124.7	122.3
25-29	172.5	168.0	161.4	157.3	154.3	151.5	148.7	146.0	143.3	140.8	138.3
30-34	185.6	177.3	165.3	159.7	156.7	153.8	151.0	148.2	145.6	143.0	140.5
35-39	236.5	219.6	196.2	187.7	183.8	180.1	176.5	173.0	169.7	166.5	163.4
40-44	348.1	321.2	284.1	270.9	264.9	259.1	253.6	248.4	243.3	238.4	233.8
45-49	509.0	473.1	423.7	404.9	395.5	386.7	378.2	370.2	362.5	355.1	348.1
50-54	844.7	796.2	730.7	704.6	688.7	673.5	659.1	645.4	632.3	619.8	608.0
55-59	1,316.2	1,238.8	1,134.0	1,092.9	1,068.3	1,045.0	1,022.8	1,001.7	981.6	962.5	944.4
60-64	2,078.4	1,965.1	1,813.3	1,750.8	1,710.6	1,672.5	1,636.3	1,601.9	1,569.2	1,538.2	1,508.6
65-69	3,186.6	3,081.1	2,953.8	2,872.9	2,806.5	2,743.5	2,683.7	2,626.9	2,572.9	2,521.6	2,472.9
70-74	4,792.8	4,674.9	4,550.5	4,437.7	4,330.8	4,229.4	4,133.2	4,041.9	3,955.3	3,873.1	3,795.0
75-79	7,308.7	7,172.3	7,057.8	6,895.1	6,720.3	6,554.6	6,397.6	6,248.7	6,107.5	5,973.6	5,846.5
80-84	10,935.3	10,761.4	10,666.1	10,416.8	10,135.6	9,869.1	9,616.6	9,377.3	9,150.4	8,935.3	8,731.3
85-89	15,749.1	15,506.5	15,402.8	15,024.7	14,594.9	14,187.7	13,802.0	13,436.5	13,090.1	12,761.8	12,450.3
90-94	22,547.1	22,142.2	21,867.5	21,261.9	20,605.5	19,984.0	19,395.6	18,838.3	18,310.4	17,810.1	17,335.9
Alternative II :											
Male:											
0	1,177.6	955.9	714.1	644.5	593.7	549.0	509.7	474.9	444.1	416.7	392.3
1-4	56.8	50.3	41.3	38.4	36.7	35.1	33.7	32.3	31.1	29.9	28.8
5-9	31.3	26.5	19.9	18.6	17.9	17.4	16.8	16.3	15.8	15.3	14.8
10-14	35.2	30.6	24.0	22.4	21.6	20.9	20.3	19.6	19.0	18.4	17.9
15-19	116.4	106.8	91.9	86.7	84.0	81.4	78.9	76.5	74.2	72.0	69.8
20-24	163.6	151.3	131.8	124.6	120.7	117.1	113.5	110.1	106.8	103.6	100.5
25-29	172.5	165.1	153.2	146.8	142.3	138.0	133.8	129.8	125.9	122.1	118.5
30-34	185.6	172.0	150.9	142.9	138.4	134.1	130.0	126.1	122.2	118.6	115.0
35-39	236.5	209.0	169.3	158.3	152.8	147.7	142.7	138.0	133.5	129.2	125.1
40-44	348.1	304.4	242.1	225.3	216.9	209.0	201.5	194.4	187.5	181.1	174.9
45-49	509.0	450.8	368.0	343.8	330.5	317.9	306.1	294.8	284.1	274.0	264.3
50-54	844.7	763.7	648.9	613.3	589.6	567.3	546.1	526.0	506.9	488.9	471.7
55-59	1,316.2	1,188.8	1,009.5	954.5	917.5	882.6	849.6	818.3	788.6	760.5	733.8
60-64	2,078.4	1,887.9	1,618.8	1,532.1	1,471.8	1,414.9	1,361.1	1,310.3	1,262.2	1,216.5	1,173.3
65-69	3,186.6	2,980.5	2,680.3	2,551.5	2,449.7	2,353.8	2,263.2	2,177.6	2,096.7	2,020.1	1,947.5
70-74	4,792.8	4,532.9	4,155.2	3,965.0	3,803.0	3,650.4	3,506.5	3,370.8	3,242.6	3,121.5	3,006.9
75-79	7,308.7	6,960.9	6,461.3	6,177.6	5,917.8	5,673.5	5,443.6	5,227.0	5,022.9	4,830.3	4,648.4
80-84	10,935.3	10,419.9	9,699.7	9,264.7	8,860.3	8,480.8	8,124.3	7,789.1	7,473.7	7,176.6	6,896.6
85-89	15,749.1	14,995.6	13,961.2	13,316.9	12,714.6	12,150.1	11,620.6	11,123.5	10,656.4	10,217.2	9,803.8
90-94	22,547.1	21,433.4	19,867.4	18,878.2	17,978.1	17,136.1	16,347.8	15,609.3	14,916.7	14,266.7	13,656.2
Alternative III:											
Male:											
0	1,177.6	877.8	593.9	525.4	473.6	429.2	391.1	358.1	329.5	304.4	282.4
1-4	56.8	47.7	35.6	31.8	29.4	27.2	25.3	23.5	21.9	20.4	19.0
5-9	31.3	24.7	16.4	14.6	13.6	12.7	11.8	11.1	10.3	9.7	9.1
10-14	35.2	28.9	20.2	18.1	16.8	15.7	14.7	13.7	12.8	12.0	11.2
15-19	116.4	103.2	82.8	75.4	70.7	66.4	62.3	58.5	55.0	51.7	48.6
20-24	163.6	146.6	119.9	109.4	102.7	96.5	90.7	85.2	80.1	75.3	70.8
25-29	172.5	162.3	145.8	135.5	127.3	119.7	112.5	105.8	99.6	93.7	88.2
30-34	185.6	166.9	138.2	126.3	118.5	111.1	104.3	98.0	92.0	86.5	81.3
35-39	236.5	199.0	146.7	131.5	122.4	114.0	106.3	99.2	92.6	86.6	80.9
40-44	348.1	288.5	207.3	184.0	169.6	156.6	144.7	133.8	123.9	114.8	106.5
45-49	509.0	429.6	322.5	287.8	262.5	239.7	219.1	200.5	183.6	168.4	154.6
50-54	844.7	732.9	580.1	519.9	471.8	428.6	389.7	354.6	323.1	294.7	269.0
55-59	1,316.2	1,141.3	905.4	810.7	733.5	664.2	602.0	546.2	496.0	450.8	410.2
60-64	2,078.4	1,814.6	1,454.6	1,302.8	1,178.1	1,066.3	966.0	876.0	795.1	722.4	657.0
65-69	3,186.6	2,883.8	2,436.7	2,194.7	1,988.9	1,804.2	1,638.3	1,489.2	1,355.1	1,234.4	1,125.7
70-74	4,792.8	4,396.1	3,798.6	3,438.3	3,123.6	2,840.8	2,586.5	2,357.5	2,151.4	1,965.5	1,797.9
75-79	7,308.7	6,757.2	5,922.5	5,392.9	4,915.1	4,484.8	4,097.1	3,747.6	3,432.2	3,147.2	2,889.7
80-84	10,935.3	10,091.0	8,833.9	8,060.1	7,365.4	6,738.9	6,173.4	5,662.7	5,200.9	4,783.0	4,404.4
85-89	15,749.1	14,504.1	12,679.2	11,589.3	10,613.2	9,731.5	8,934.5	8,213.3	7,560.2	6,968.0	6,430.5
90-94	22,547.1	20,751.7	18,096.4	16,522.4	15,139.5	13,889.7	12,759.1	11,735.3	10,807.3	9,965.3	9,200.6

Table 10.—Central death rate projections, by age group, sex, and alternative for selected years—Continued

[Per hundred thousand]

Alternative, sex, and age group	Calendar year										
	1985	1990	2000	2010	2020	2030	2040	2050	2060	2070	2080
Alternative I:											
Female:											
0	927.0	763.5	575.3	516.3	473.3	435.5	402.4	373.1	347.3	324.4	304.1
1-4	45.1	39.3	31.4	29.0	27.5	26.1	24.9	23.7	22.6	21.6	20.6
5-9	23.0	19.6	14.9	13.8	13.2	12.7	12.2	11.7	11.2	10.8	10.4
10-14	21.4	18.8	15.0	13.9	13.3	12.8	12.3	11.8	11.3	10.9	10.4
15-19	43.0	39.5	34.4	32.4	31.1	29.9	28.7	27.6	26.5	25.5	24.5
20-24	51.4	47.6	42.3	40.1	38.5	37.0	35.6	34.2	32.8	31.6	30.4
25-29	60.2	54.4	46.2	43.4	41.7	40.1	38.6	37.1	35.7	34.3	33.1
30-34	72.1	61.9	48.2	44.8	43.1	41.5	39.9	38.5	37.1	35.7	34.4
35-39	107.5	90.3	67.9	62.8	60.4	58.1	55.9	53.8	51.8	49.9	48.1
40-44	175.7	150.6	116.5	107.9	103.6	99.5	95.7	92.0	88.6	85.2	82.1
45-49	281.8	248.6	200.8	186.6	179.1	172.0	165.3	158.9	152.8	147.0	141.5
50-54	465.8	426.5	368.4	347.2	333.3	320.1	307.6	295.8	284.5	273.8	263.5
55-59	713.2	663.8	592.8	564.7	542.1	520.6	500.2	480.9	462.4	444.9	428.2
60-64	1,146.3	1,090.1	1,014.2	973.3	933.2	895.3	859.3	825.2	792.9	762.1	732.9
65-69	1,700.4	1,640.3	1,568.4	1,510.5	1,446.3	1,385.7	1,328.2	1,273.9	1,222.4	1,173.6	1,127.3
70-74	2,610.8	2,457.8	2,259.4	2,158.2	2,060.7	1,968.9	1,882.4	1,800.9	1,723.9	1,651.1	1,582.3
75-79	4,057.2	3,729.8	3,285.1	3,103.4	2,951.7	2,809.7	2,676.5	2,551.5	2,434.1	2,323.8	2,219.9
80-84	6,644.2	6,060.2	5,241.0	4,906.9	4,647.1	4,405.0	4,179.0	3,967.9	3,770.5	3,585.8	3,412.7
85-89	11,545.8	10,592.4	9,218.3	8,596.0	8,116.3	7,670.7	7,256.1	6,869.9	6,509.8	6,173.8	5,860.0
90-94	18,288.9	17,052.4	15,203.3	14,172.1	13,346.3	12,580.7	11,869.6	11,208.4	10,593.3	10,020.4	9,486.4
Alternative II :											
Female:											
0	927.0	827.5	712.3	666.4	634.2	604.3	576.8	551.2	527.6	505.6	485.4
1-4	45.1	41.7	37.4	35.8	34.8	34.0	33.2	32.4	31.6	30.9	30.3
5-9	23.0	20.9	18.1	17.3	17.0	16.7	16.4	16.1	15.8	15.6	15.4
10-14	21.4	19.8	17.6	16.9	16.5	16.2	16.0	15.7	15.4	15.2	14.9
15-19	43.0	40.9	37.9	36.7	36.0	35.3	34.7	34.0	33.4	32.9	32.3
20-24	51.4	49.0	45.9	44.6	43.8	43.0	42.2	41.4	40.7	40.0	39.3
25-29	60.2	56.6	51.8	50.0	49.1	48.3	47.4	46.6	45.8	45.1	44.4
30-34	72.1	65.8	57.5	55.1	54.2	53.4	52.6	51.8	51.1	50.3	49.6
35-39	107.5	96.8	83.0	79.4	78.2	77.0	75.9	74.8	73.8	72.8	71.9
40-44	175.7	160.1	139.6	133.6	131.4	129.4	127.5	125.6	123.9	122.2	120.6
45-49	281.8	261.3	233.2	223.9	220.2	216.7	213.5	210.3	207.4	204.5	201.9
50-54	465.8	441.6	407.7	394.1	387.6	381.5	375.8	370.3	365.1	360.2	355.5
55-59	713.2	684.0	644.7	628.6	618.2	608.4	599.0	590.1	581.6	573.6	565.9
60-64	1,146.3	1,123.2	1,104.5	1,087.3	1,068.0	1,049.7	1,032.3	1,015.7	1,000.0	985.1	970.9
65-69	1,700.4	1,694.7	1,723.7	1,704.8	1,671.8	1,640.5	1,610.7	1,582.5	1,555.6	1,530.2	1,505.9
70-74	2,610.8	2,551.0	2,510.0	2,459.9	2,403.3	2,349.7	2,298.8	2,250.5	2,204.8	2,161.4	2,120.2
75-79	4,057.2	3,884.3	3,682.2	3,565.8	3,467.0	3,373.6	3,285.2	3,201.5	3,122.2	3,047.2	2,976.1
80-84	6,644.2	6,320.2	5,913.5	5,679.2	5,497.0	5,325.0	5,162.5	5,008.9	4,863.6	4,726.2	4,596.2
85-89	11,545.8	11,029.6	10,382.5	9,946.2	9,598.7	9,271.1	8,961.7	8,669.3	8,393.1	8,132.0	7,885.2
90-94	18,288.9	17,673.7	16,939.1	16,249.2	15,644.9	15,075.2	14,537.2	14,029.0	13,548.9	13,095.2	12,666.3
Alternative III:											
Female:											
0	927.0	705.0	479.6	420.2	376.1	338.5	306.4	278.9	255.1	234.4	216.4
1-4	45.1	37.0	26.5	23.4	21.3	19.5	17.8	16.4	15.0	13.8	12.8
5-9	23.0	18.3	12.3	10.8	9.9	9.1	8.4	7.7	7.1	6.6	6.1
10-14	21.4	17.8	12.9	11.3	10.4	9.5	8.7	8.0	7.4	6.8	6.3
15-19	43.0	38.3	31.4	28.3	26.1	24.0	22.1	20.4	18.8	17.3	16.0
20-24	51.4	46.2	39.3	36.0	33.1	30.4	28.0	25.8	23.8	22.0	20.3
25-29	60.2	52.3	41.6	37.3	34.2	31.4	28.9	26.6	24.5	22.6	20.9
30-34	72.1	58.3	40.6	35.5	32.3	29.4	26.9	24.6	22.5	20.6	18.9
35-39	107.5	84.2	55.7	47.9	43.1	38.8	34.9	31.6	28.6	25.9	23.5
40-44	175.7	141.6	97.3	83.6	74.6	66.7	59.7	53.6	48.2	43.4	39.2
45-49	281.8	236.5	173.2	149.3	132.8	118.3	105.6	94.4	84.6	75.9	68.3
50-54	465.8	412.0	334.6	294.9	261.2	231.7	206.0	183.4	163.6	146.2	131.0
55-59	713.2	644.6	546.0	483.7	428.5	380.2	338.0	301.0	268.6	240.2	215.2
60-64	1,146.3	1,058.3	930.8	832.4	741.0	660.9	590.6	528.8	474.4	426.5	384.2
65-69	1,700.4	1,587.9	1,424.1	1,282.5	1,146.8	1,027.4	922.3	829.5	747.6	675.2	611.0
70-74	2,610.8	2,368.8	2,037.8	1,832.6	1,644.7	1,478.8	1,332.2	1,202.6	1,087.7	985.7	895.1
75-79	4,057.2	3,582.9	2,949.1	2,645.8	2,384.8	2,153.6	1,948.6	1,766.4	1,604.3	1,459.8	1,330.9
80-84	6,644.2	5,812.8	4,676.8	4,180.5	3,776.0	3,416.8	3,097.2	2,812.6	2,558.7	2,331.7	2,128.7
85-89	11,545.8	10,174.8	8,232.7	7,355.4	6,659.0	6,039.2	5,486.4	4,992.6	4,550.8	4,155.0	3,799.8
90-94	18,288.9	16,455.4	13,697.0	12,255.8	11,106.3	10,081.2	9,165.1	8,345.2	7,610.4	6,950.8	6,357.9

Note: The central death rate is the ratio of the number of deaths during the year for persons at the tabulated age to the midyear population at that age.

Table 11.—Life expectancy at birth, by sex, 1900-86

[In years]

Calendar year	Male	Female	Calendar year	Male	Female
1900	46.4	49.0	1944	62.7	67.8
1901	47.9	50.9	1945	62.9	68.4
1902	49.0	52.1	1946	64.3	69.2
1903	49.2	52.1	1947	64.6	69.7
1904	48.1	51.1	1948	64.8	70.2
1905	48.7	51.9	1949	65.3	70.7
1906	48.3	52.0	1950	65.6	71.1
1907	48.3	52.2	1951	65.7	71.4
1908	50.2	53.6	1952	65.8	71.6
1909	51.1	54.5	1953	66.0	72.0
1910	50.1	53.6	1954	66.7	72.7
1911	51.8	55.0	1955	66.7	72.8
1912	52.3	55.9	1956	66.7	72.9
1913	51.7	55.4	1957	66.5	72.7
1914	52.9	56.3	1958	66.6	72.9
1915	53.5	56.8	1959	66.8	73.2
1916	52.4	56.0	1960	66.7	73.2
1917	52.2	55.9	1961	67.1	73.6
1918	45.3	49.1	1962	66.9	73.5
1919	54.2	56.5	1963	66.6	73.4
1920	54.5	56.3	1964	66.8	73.7
1921	57.3	59.3	1965	66.8	73.8
1922	57.0	59.3	1966	66.7	73.9
1923	56.3	58.7	1967	67.0	74.3
1924	57.2	59.9	1968	66.6	74.2
1925	57.2	59.9	1969	66.9	74.6
1926	56.6	59.3	1970	67.1	74.9
1927	57.9	60.9	1971	67.4	75.1
1928	56.8	59.8	1972	67.4	75.2
1929	57.0	60.2	1973	67.6	75.5
1930	58.0	61.3	1974	68.3	76.0
1931	58.6	62.0	1975	68.7	76.6
1932	59.4	62.6	1976	69.1	76.8
1933	59.6	63.0	1977	69.4	77.2
1934	58.8	62.7	1978	69.6	77.3
1935	59.4	63.3	1979	70.0	77.7
1936	58.7	62.9	1980	69.9	77.5
1937	59.4	63.6	1981	70.4	77.9
1938	60.8	64.7	1982	70.8	78.2
1939	61.4	65.4	1983	70.9	78.1
1940	61.4	65.7	1984	71.1	78.2
1941	61.9	66.5	1985	71.1	78.3
1942	62.6	67.4	1986	71.4	78.5
1943	62.2	67.1			

Table 12.—Life expectancy at birth, by sex and alternative for selected years

[In years]

Calendar year	Alternative I		Alternative II		Alternative III	
	Male	Female	Male	Female	Male	Female
1987	71.5	78.6	71.6	78.7	71.8	78.8
1988	71.6	78.6	71.8	78.9	72.1	79.1
1989	71.7	78.7	72.1	79.1	72.4	79.5
1990	71.8	78.8	72.3	79.3	72.8	79.7
1991	71.9	78.9	72.5	79.5	73.1	80.0
1992	72.0	79.0	72.7	79.6	73.4	80.3
1993	72.0	79.0	72.9	79.8	73.7	80.6
1994	72.1	79.1	73.1	80.0	73.9	80.8
1995	72.2	79.2	73.2	80.1	74.2	81.1
1996	72.3	79.2	73.4	80.3	74.5	81.3
1997	72.4	79.3	73.6	80.4	74.7	81.5
1998	72.4	79.3	73.7	80.6	74.9	81.7
1999	72.5	79.4	73.8	80.7	75.1	81.9
2000	72.6	79.4	73.9	80.8	75.2	82.0
2005	72.8	79.6	74.3	81.1	75.9	82.7
2010	73.0	79.8	74.6	81.4	76.5	83.3
2015	73.1	80.0	74.9	81.7	77.0	83.9
2020	73.3	80.1	75.1	82.0	77.6	84.5
2025	73.4	80.3	75.4	82.3	78.1	85.1
2030	73.6	80.4	75.7	82.6	78.7	85.7
2035	73.7	80.6	75.9	82.9	79.2	86.2
2040	73.9	80.7	76.2	83.1	79.8	86.8
2045	74.0	80.8	76.4	83.4	80.3	87.3
2050	74.2	81.0	76.7	83.7	80.9	87.9
2055	74.3	81.1	76.9	84.0	81.4	88.5
2060	74.5	81.3	77.1	84.2	82.0	89.0
2065	74.6	81.4	77.4	84.5	82.5	89.5
2070	74.7	81.5	77.6	84.8	83.0	90.1
2075	74.9	81.7	77.9	85.1	83.6	90.6
2080	75.0	81.8	78.1	85.3	84.1	91.1

Note: The life expectancy is the average number of years of life remaining to a person if he or she were to experience the age-specific mortality rates for the tabulated year throughout the remainder of his or her life.

and III, respectively. The sex gap at birth is projected to change from 7.2 years in 1985 to 6.8 years in 2080 under Alternative I, to 7.2 years under Alternative II, and to 7.0 years under Alternative III.

Life expectancy at age 65 for males increased from 11.3 years in 1900 to 14.3 years in 1983, while life expectancy at age 65 for females increased from 12.0 years to 18.6 years. The life expectancy for males at age 65 is projected to increase from 14.5 years in 1985 to 16.4 years, 18.5 years, and 22.9 years in 2080 under Alternatives I, II, and III, respectively. This represents an increase ranging from 1.9 years to 8.4 years. For females the increase ranges from 2.5 years to 9.6 years. The female age-65 life expectancy is projected to increase from 18.6 years in 1985 to 21.1 years, 23.7 years, and 28.2 years under Alternatives I, II, and III, respectively. It is interesting to note that the sex gap at age 65 has increased from 0.7 years in 1900 to 4.3 years in 1983, and that it is projected to increase to 4.7, 5.2, and 5.3 years by 2080 under Alternatives I, II, and III, respectively.

Although a complete projection of age-sex-specific death rates was not done for each marital status, historical data indicated that the differential in mortality by marital status is significant. To reflect this finding, future relative differences in death rates by marital status were projected to be the same as for calender years 1980 and 1981. Death rates for this period are shown in table 15. These rates were calculated using deaths as tabulated from the 1980 and 1981 Mortality Cause-of-Death Summary Public Use Data Tapes available from the National Center for Health Statistics and population distributions as published in **Current Population Reports**, Series P-20 and P-25, by the Bureau of the Census.

Net Immigration

Immigration was once a very important element in the growth of the U.S. population. During 1904-13, for example, immigration averaged nearly 1 million persons per year, which represented quite sizeable percentage increases in the U.S. population. Immigration decreased

Table 13.—Life expectancy at age 65, by sex, 1900-86

[In years]

Calendar year	Male	Female	Calendar year	Male	Female
1900	11.3	12.0	1944	12.5	14.1
1901	11.3	12.0	1945	12.6	14.4
1902	11.7	12.6	1946	12.9	14.6
1903	11.4	12.2	1947	12.6	14.5
1904	11.1	11.9	1948	12.7	14.7
1905	11.4	12.0	1949	12.8	14.9
1906	11.4	12.2	1950	12.8	15.1
1907	11.0	11.8	1951	12.8	15.2
1908	11.6	12.3	1952	13.0	15.3
1909	11.6	12.4	1953	12.9	15.3
1910	11.4	12.1	1954	13.2	15.7
1911	11.5	12.2	1955	13.1	15.6
1912	11.5	12.3	1956	13.0	15.7
1913	11.6	12.4	1957	12.9	15.6
1914	11.6	12.4	1958	12.9	15.7
1915	11.4	12.2	1959	13.1	15.9
1916	11.3	12.0	1960	12.9	15.9
1917	11.2	12.1	1961	13.1	16.1
1918	11.6	12.5	1962	12.9	16.0
1919	12.3	12.8	1963	12.7	16.0
1920	11.8	12.3	1964	13.0	16.3
1921	12.2	12.8	1965	12.9	16.3
1922	11.8	12.4	1966	12.9	16.3
1923	11.5	12.2	1967	13.0	16.6
1924	11.8	12.6	1968	12.8	16.6
1925	11.6	12.5	1969	13.0	16.9
1926	11.4	12.2	1970	13.1	17.1
1927	11.7	12.7	1971	13.1	17.1
1928	11.3	12.3	1972	13.1	17.2
1929	11.4	12.4	1973	13.2	17.4
1930	11.8	12.9	1974	13.5	17.7
1931	12.0	13.1	1975	13.7	18.0
1932	11.9	13.0	1976	13.7	18.1
1933	12.0	13.2	1977	13.9	18.3
1934	11.9	13.1	1978	13.9	18.3
1935	11.9	13.2	1979	14.2	18.6
1936	11.6	12.8	1980	14.0	18.4
1937	11.8	13.1	1981	14.2	18.6
1938	12.1	13.5	1982	14.5	18.8
1939	12.0	13.4	1983	14.3	18.6
1940	11.9	13.4	1984	14.4	18.7
1941	12.2	13.8	1985	14.5	18.6
1942	12.4	14.1	1986	14.6	18.7
1943	12.1	13.7			

greatly during World War I and following the adoption of quotas based on national origin in 1921. The economic depression in the 1930's caused an additional but temporary decrease, which resulted in more emigration than immigration. Annual immigration increased after World War II to about 300,000 persons per year and stayed at that level through the 1950's and into the 1960's. With the Immigration Act of 1965 and other related changes, annual legal immigration increased to about 400,000. During the last 8 years of available data (1978-85), however, legal immigration has averaged approximately 555,000 per year. Although statistics on emigration are sparse and largely estimated, it has been suggested that annual emigration of legal residents has exceeded 100,000.[3]

For the 1987 Report of the Board of Trustees, legal immigration is assumed to be 750,000, 500,000, and

[3]See Robert Warren and Jennifer Peck, "Foreign-Born Emigration From the United States: 1960 to 1970," **Demography**, February 1980, pages 71-81.

Table 14.—Life expectancy at age 65, by sex and alternative for selected years

[In years]

Calendar year	Alternative I		Alternative II		Alternative III	
	Male	Female	Male	Female	Male	Female
1987	14.6	18.8	14.7	18.9	14.7	18.9
1988	14.6	18.8	14.7	19.0	14.9	19.1
1989	14.6	18.9	14.8	19.1	15.0	19.3
1990	14.7	18.9	14.9	19.2	15.2	19.5
1991	14.7	18.9	15.0	19.3	15.3	19.7
1992	14.7	19.0	15.1	19.4	15.4	19.9
1993	14.7	19.0	15.1	19.5	15.6	20.0
1994	14.7	19.0	15.2	19.6	15.7	20.2
1995	14.8	19.0	15.3	19.7	15.8	20.3
1996	14.8	19.1	15.4	19.8	15.9	20.5
1997	14.8	19.1	15.4	19.9	16.0	20.6
1998	14.8	19.1	15.5	19.9	16.1	20.7
1999	14.8	19.2	15.5	20.0	16.2	20.9
2000	14.8	19.2	15.6	20.1	16.3	21.0
2005	14.9	19.3	15.8	20.3	16.7	21.5
2010	15.0	19.4	16.0	20.6	17.1	21.9
2015	15.1	19.5	16.1	20.8	17.5	22.4
2020	15.2	19.7	16.3	21.0	17.9	22.8
2025	15.3	19.8	16.5	21.2	18.3	23.3
2030	15.4	19.9	16.7	21.5	18.7	23.7
2035	15.5	20.0	16.9	21.7	19.1	24.2
2040	15.6	20.1	17.0	21.9	19.6	24.6
2045	15.7	20.3	17.2	22.1	20.0	25.1
2050	15.8	20.4	17.4	22.4	20.4	25.5
2055	15.9	20.5	17.6	22.6	20.8	26.0
2060	16.0	20.6	17.7	22.8	21.2	26.4
2065	16.1	20.7	17.9	23.0	21.6	26.9
2070	16.2	20.8	18.1	23.3	22.0	27.3
2075	16.3	20.9	18.3	23.5	22.5	27.7
2080	16.4	21.1	18.5	23.7	22.9	28.2

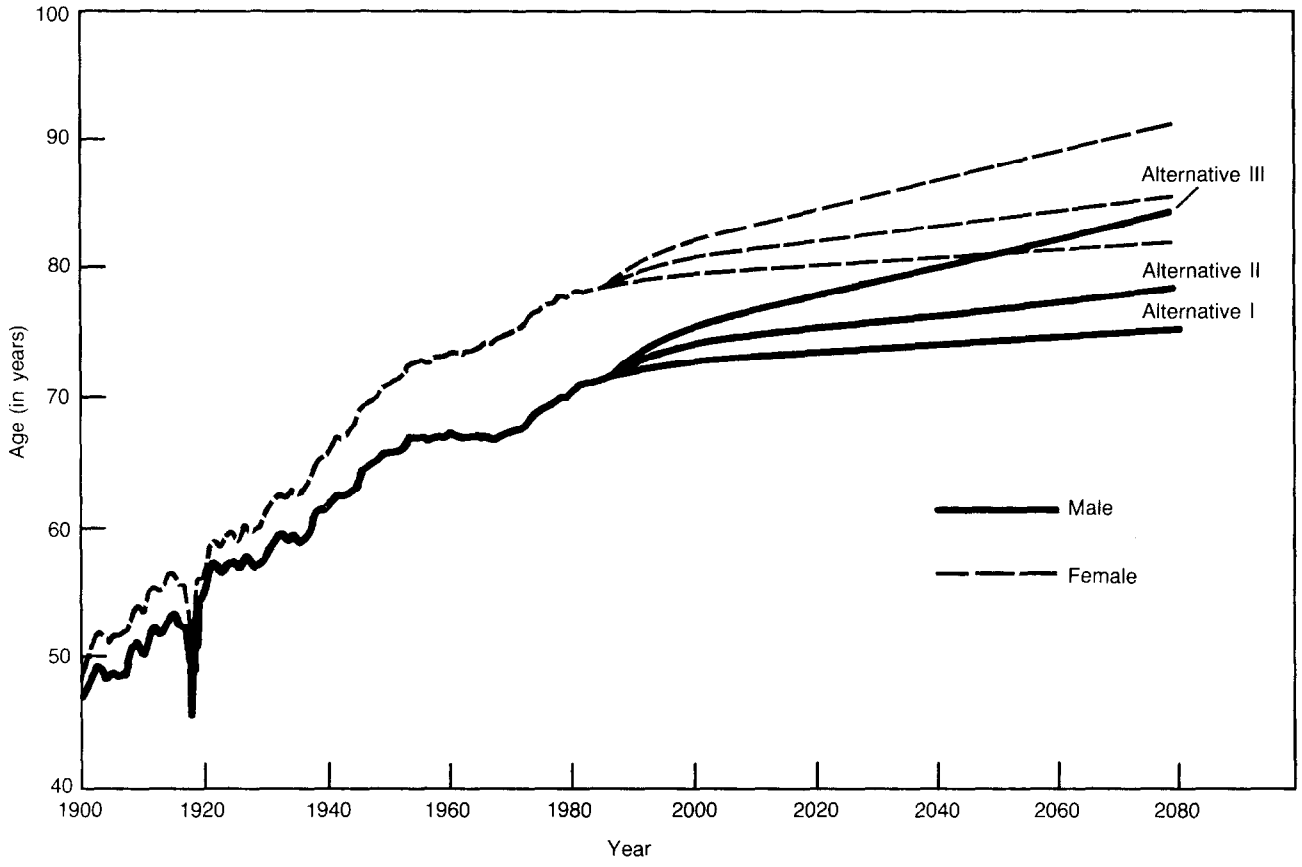
Note: The life expectancy is the average number of years of life remaining to a person if he or she were to experience the age-specific mortality rates for the tabulated year throughout the remainder of his or her life.

250,000 persons per year for Alternatives I, II, and III, respectively. For the same period, legal emigration is assumed to be 150,000, 100,000, and 50,000 persons per year for Alternative I, Alternative II, and Alternative III, respectively. The age-sex distribution of the assumed legal immigration was based on data supplied by the Immigration and Naturalization Service on immigration during 1975-84. The age-sex distribution of the assumed legal emigration was also based on estimates of foreign-born emigration for 1960 to 1970.[4] Table 16 shows the age-sex distributions of the assumed net legal immigration for the three alternatives.

In deciding on the annual net immigration (excess of immigration over emigration) to be assumed for future years, the question arises of making some provision for persons entering the United States illegally. Estimates of illegal aliens are included in the starting population, in accordance with the official policy of the Bureau of the Census to enumerate or to include in the estimated undercount all persons residing in the United States, whether legally or illegally. In addition, consistent with the Bureau of the Census estimates of illegal immigration since the 1980 census, net illegal immigration is assumed to be 200,000 persons per year during 1985

[4]**Ibid.**

Chart 2.—Actual and projected life expectancy at birth by sex and alternative, 1900–2080



and 1986. However, for years after 1986, no additional allowance is made for aliens who may enter or leave the United States illegally. After 1986, the net illegal immigration is highly uncertain due to recent legislation. The age-sex distribution of the illegal aliens used for 1985 and 1986 was based on Bureau of the Census unpublished estimates of the undocumented population counted in the 1980 census. The age-sex distribution of the net illegal immigrants assumed for 1985 and 1986 is shown in table 17.

Table 15.—Central death rates, by age group, sex, and marital status, 1980-81

[Per hundred thousand]

Sex and age group	Total	Single	Married	Widowed	Divorced	Sex and age group	Total	Single	Married	Widowed	Divorced
Male:						Female:					
15-19	135.9	134.8	169.4	933.0	400.0	15-19	51.8	51.5	50.7	270.0	75.0
20-24	193.9	211.7	135.9	1,100.0	430.3	20-24	60.3	71.9	40.5	274.2	105.0
25-29	192.5	276.2	123.0	1,120.0	458.5	25-29	67.5	110.7	46.5	282.3	120.3
30-34	192.1	355.3	128.5	1,145.0	500.0	30-34	82.6	178.7	60.6	285.0	137.6
35-39	241.8	592.5	171.7	1,186.5	562.7	35-39	122.4	277.9	95.0	300.0	205.7
40-44	357.6	746.4	275.8	1,200.0	773.6	40-44	195.3	408.8	157.9	381.0	333.1
45-49	581.0	1,238.6	459.1	1,266.6	1,342.0	45-49	319.0	544.0	265.3	587.3	508.1
50-54	932.8	1.991.2	754.8	1,748.4	2,146.9	50-54	496.5	754.0	421.5	776.0	734.8
55-59	1,444.5	2,556.0	1,225.6	2,414.0	3,044.8	55-59	746.3	1,160.7	634.6	1,006.8	1,084.3
60-64	2,195.9	3,398.1	1,926.0	3,473.3	4,154.8	60-64	1,131.5	1,606.3	939.0	1,478.7	1,573.9
65-69	3,338.9	4,756.3	2,945.4	5,559.8	5,736.1	65-69	1,705.2	2,114.4	1,426.6	1,982.9	2,475.8
70-74	4,991.0	7,147.0	4,436.2	7,160.9	7,860.3	70-74	2,621.7	3,176.6	2,137.3	2,921.4	3,719.3
75-79	7,323.9	12,872.2	6,235.5	10,567.0	13,034.5	75-79	4,132.5	4,960.0	3,409.5	4,314.0	6,340.0
80-84	11,027.0	19,506.0	9,317.1	14,027.2	17,258.6	80-84	7,095.9	8,324.6	5,179.4	7,463.0	9,920.4
85-89	16,433.6	26,107.9	14,240.1	18,432.6	19,259.8	85-89	11,797.1	14,681.1	7,894.2	12,717.1	12,620.6
90-94	21,981.3	32,226.8	19,333.7	23,250.2	23,000.0	90-94	17,983.4	23,584.7	12,717.5	19,202.2	17,000.0

Table 16.—Assumed annual net legal immigration, by age group, sex, and alternative

Alternative and age group	Total	Male	Female
Alternative I			
Total	600,000	297,494	302,506
0-19	191,470	96,207	95,263
20-64	382,758	190,991	191,767
65 or older	25,772	10,296	15,476
0-4	46,242	22,810	23,432
5-9	40,113	20,363	19,750
10-14	49,379	25,290	24,089
15-19	55,736	27,744	27,992
20-24	85,478	42,361	43,117
25-29	95,932	50,997	44,935
30-34	63,560	33,232	30,328
35-39	39,975	20,263	19,712
40-44	27,045	13,300	13,745
45-49	21,360	10,372	10,988
50-54	18,705	8,113	10,592
55-59	16,223	6,575	9,648
60-64	14,480	5,778	8,702
65-69	11,279	4,563	6,716
70-74	7,994	3,237	4,757
75-79	3,938	1,546	2,392
80-84	2,561	950	1,611
85 or older	0	0	0
Alternative II			
Total	400,000	198,333	201,667
0-19	127,644	64,137	63,507
20-64	255,174	127,331	127,843
65 or older	17,182	6,865	10,317
0-4	30,823	15,205	15,618
5-9	26,743	13,577	13,166
10-14	32,919	16,859	16,060
15-19	37,159	18,496	18,663
20-24	56,984	28,241	28,743
25-29	63,955	33,998	29,957
30-34	42,372	22,153	20,219
35-39	26,651	13,510	13,141
40-44	18,029	8,866	9,163
45-49	14,240	6,915	7,325
50-54	12,472	5,409	7,063
55-59	10,819	4,387	6,432
60-64	9,652	3,852	5,800
65-69	7,518	3,041	4,477
70-74	5,329	2,159	3,170
75-79	2,626	1,032	1,594
80-84	1,709	633	1,076
85 or older	0	0	0
Alternative III			
Total	200,000	99,165	100,835
0-19	63,829	32,074	31,755
20-64	127,583	63,662	63,921
65 or older	8,588	3,429	5,159
0-4	15,424	7,610	7,814
5-9	13,371	6,788	6,583
10-14	16,456	8,428	8,028
15-19	18,578	9,248	9,330
20-24	28,491	14,119	14,372
25-29	31,975	16,998	14,977
30-34	21,185	11,076	10,109
35-39	13,325	6,755	6,570
40-44	9,014	4,433	4,581
45-49	7,122	3,459	3,663
50-54	6,235	2,704	3,531
55-59	5,407	2,191	3,216
60-64	4,829	1,927	2,902
65-69	3,758	1,520	2,238
70-74	2,665	1,079	1,586
75-79	1,311	514	797
80-84	854	316	538
85 or older	0	0	0

Table 17.—Annual net illegal immigarion assumed for 1985 and 1986, by age group and sex

Age group	Total	Male	Female
Total	200,000	109,479	90,521
0-19	80,941	43,240	37,701
20-64	116,453	65,626	50,827
65 or older	2,606	613	1,993
0-4	18,324	9,375	8,949
5-9	20,445	10,861	9,584
10-14	14,058	7,030	7,028
15-19	28,114	15,974	12,140
20-24	52,609	31,310	21,299
25-29	30,458	17,252	13,206
30-34	12,992	6,816	6,176
35-39	6,390	3,194	3,196
40-44	5,111	2,769	2,342
45-49	3,621	1,917	1,704
50-54	2,555	1,278	1,277
55-59	1,704	852	852
60-64	1,013	238	775
65-69	869	205	664
70-74	724	170	554
75-79	579	136	443
80-84	434	102	332
85 or older	0	0	0

Marriage

Because marriage is the combination of a male and female into a couple, marriage rates can be computed as a ratio of the number of marriages to (1) the number of nonmarried males (not taking into account the number of nonmarried females), (2) the number of nonmarried females (not taking into account the number of nonmarried males), or (3) a theoretical number of nonmarried couples that takes into account both the number of nonmarried males and nonmarried females. The marriage rates referred to in this article are computed using the third concept of a theoretical number of nonmarried couples as the denominator. The rates were computed as the number of marriages for given ages of husband and wife divided by the square root of the product (geometric mean) of the midyear nonmarried males and nonmarried females of the given ages.

To calculate these rates, data on new marriages in the Marriage Registration Area (which in 1983 consisted of 42 States and the District of Columbia, and accounted for 80 percent of all marriages in the United States) were obtained from the National Center for Health Statistics for calendar years 1957-83, by age of husband crossed with age of wife. Estimates of the nonmarried population in the Marriage Registration Area were obtained from the National Center for Health Statistics and from the Bureau of the Census, by age group and sex.

The number of marriages depends upon the age distribution of both the nonmarried male population and the nonmarried female population. Thus, an acceptable summary statistic could be calculated by age adjustment to a set of standard nonmarried populations.

When only one population is involved (as in calculating death rates), equal results are obtained by viewing the age-adjusting concept as the weighted average of the age-specific rates or as the crude rate that would occur in the standard population. When two populations are involved (as in calculating marriage rates), these two concepts do not produce the same results.

Using either concept, the first step in calculating the age-adjusted statistic is to determine the number of marriages that would occur in the standard population. This number—the expected number of marriages—is determined by applying the age-of-husband-age-of-wife-specific marriage rates to the geometric mean of the corresponding standard age-specific populations. To age adjust using the weighted average concept, the expected number of marriages is divided by the sum of all of the factors to which the marriage rates were applied—that is, the sum of the geometric means of the corresponding age-specific populations. To age adjust using the crude rate concept, the expected number of marriages is divided by the geometric mean of the total male nonmarried population and the total female nonmarried population. In this article, the rates were calculated under the latter concept—that is, the crude rate that would be experienced in the standard population, which is expressed per hundred thousand nonmarried of each sex. The next tabulation gives the age-adjusted central marriage rates in the Marriage Registration Area for 1957-83 and in the Social Security Area for 1984-86. Table 18 shows the age-adjusted rates for the Social Security Area by alternative.

Calendar year and area	Age-adjusted rate
Marriage Registration Area	
1957	9,975
1958	9,775
1959	10,024
1960	10,015
1961	9,519
1962	9,465
1963	9,716
1964	9,812
1965	9,851
1966	10,158
1967	9,929
1968	10,168
1969	10,129
1970	9,680
1971	9,302
1972	9,412
1973	9,077
1974	8,332
1975	7,687
1976	7,303
1977	6,982
1978	6,784
1979	6,661
1980	6,256
1981	6,120
1982	5,967
1983	5,743
Social Security Area	
1984	6,250
1985	5,962
1986	6,106

Note: The first step in calculating the total age-adjusted central marriage rate for a particular year is to determine an expected number of marriages by applying the age-of-husband-age-of-wife-specific central marriage rates for that year to the square root of the product of the corresponding age groupings of unmarried males and unmarried females in the Marriage Registration Area as of July 1, 1982. The total age-adjusted central marriage rate is then obtained by dividing the expected number of marriages by the square root of the product of the number of unmarried males (aged 15 or older) and unmarried females (aged 15 or older) in the Marriage Registration Area as of July 1, 1982.

Table 18.—Age-adjusted marriage rates assumed for the Social Security Area, by calendar year and alternative

[Per hundred thousand unmarried of each sex]

Calendar year	Alternative I	Alternative II	Alternative III
1987	6,004	6,106	6,201
1988	5,903	6,106	6,298
1989	5,804	6,106	6,397
1990	5,706	6,106	6,497
1991	5,611	6,106	6,599
1992	5,517	6,106	6,702
1993	5,424	6,106	6,807
1994	5,333	6,106	6,913
1995	5,244	6,106	7,021
1996	5,156	6,106	7,131
1997	5,069	6,106	7,243
1998	4,984	6,106	7,356
1999	4,900	6,106	7,471
2000	4,818	6,106	7,588
2001	4,737	6,106	7,706
2002	4,658	6,106	7,827
2003	4,580	6,106	7,949
2004	4,503	6,106	8,074
2005	4,427	6,106	8,200
2006	4,353	6,106	8,328
2007	4,280	6,106	8,458
2008	4,208	6,106	8,591
2009	4,138	6,106	8,725
2010	4,068	6,106	8,861
2011	4,000	6,106	9,000

An examination of the age-adjusted marriage rates since 1957 shows that the rates remained relatively stable during the late 1950's and throughout the 1960's. A major decrease in the age-adjusted rate was experienced during the 1970's and continued into the 1980's. The total rates shown in the tabulation range from a high in 1968 of 10,168 per hundred thousand nonmarried persons of each sex to a low in 1983 of 5,743. At first glance, the provisional statistics for 1984 and 1985 indicate a reversal of the declining trend. However, the provisional age-adjusted marriage rates are based on U.S. data, which historically produce higher rates than the Marriage Registration Area data because the Marriage Registration Area does not include the State of Nevada. To compare the rates determined from the two sources of data, a factor of about 0.9 should be applied to the age-adjusted marriage rates based on U.S. data. Once this factor is applied,

the provisional age-adjusted marriage rates for 1984 and 1985 indicate a continuation of the declining trend.

Because it is uncertain whether marriage rates will increase or decrease, it was assumed, for Alternative II, that future age-adjusted rates of marriage for the Social Security Area would remain at the same level as the average of the 1984 and 1985 age-adjusted rates of marriage for the United States. The use of constant age-adjusted rates does not imply that the crude rate of marriage in the projected population remains constant.

It is possible that marriage rates will continue to decline. However, it is not likely that the rate of decline over the past 10 years will continue indefinitely. Taking this into account, for Alternative I, it is assumed that the ultimate age-adjusted marriage rate will decline to 4,000 in the year 2011 and stay at this level for the remainder of the projection period. This ultimate rate is 67 percent of the 1985 rate of 5,962.

It is also possible that marriage rates will, on average, rise above their present low level. However, it is believed that the rates will not, on average, return to the high levels found in the 1950's and 1960's. To reflect this in Alternative III, it is assumed that the ultimate age-adjusted marriage rate will increase to 9,000 in the year 2011 and stay at the level for the remainder of the projection period.

To obtain the age-of-husband-age-of-wife-specific rates for a particular year from the age-adjusted rate projected for that year, the age-of-husband-age-of-wife-specific rates for 1978-79 and 1981-83 were averaged, graduated, and proportionally ratioed to produce the age-adjusted rate for the particular year. Data for 1980 were not available. The rates assumed for years after 1985 for Alternative II are shown in table 19, grouped by 5-year age groups based on 1986 population data.

Although a complete projection of age-of-husband-age-of-wife-specific marriage rates was not done separately for each previous marital status, experience data indicated that the differential in marriage rates by previous marital status is significant. Future relative differences in marriage rates by previous marital status were assumed to be the same as the average of those experienced during 1979 and 1981-83. Data for 1980 were not available. The marriage rates for 1979 and 1981-83 were obtained from unpublished National Center for Health Statistics data. The averages of these marriage rates, with slight modifications, are given in table 20.

Divorce

It was assumed that future age-of-husband-age-of-wife-specific rates of divorce would remain at about the same level as those recently observed. This assumption does not imply that the crude rate of divorce in the projected population remains constant.

Data on divorces (including annulments) in the Divorce Registration Area during calendar years 1979 and 1981 by age group of husband crossed with age group of wife were obtained from the National Center for Health Statistics. For each of these years, the divorces occurring in the Divorce Registration Area (which in 1984 consisted of 31 States and accounted for 48 percent of all divorces in the United States) were inflated to represent the Social Security Area, based on the total number of divorces during the corresponding year in the 50 States, the District of Columbia, Puerto Rico, and the Virgin Islands. Divorce rates for each age group of husband crossed with each age group of wife were then calculated as the ratio of the number of divorces in the Social Security Area for couples within

Table 19.—Assumed central marriage rates for Alternative II, by age of husband and wife

[Per hundred thousand]

Age group of husband	Age group of wife															
	14-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89	90-94
14-19	1,556.3	396.9	71.3	23.5	8.1	2.3	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20-24	2,700.3	6,044.8	1,347.4	333.5	103.0	26.5	7.5	3.0	1.6	.2	.0	.0	.0	.0	.0	.0
25-29	671.0	4,494.5	4,512.9	1,394.4	375.5	108.0	29.2	9.4	2.1	.1	.0	.0	.0	.0	.0	.0
30-34	231.7	1,696.9	3,496.4	2,857.6	1,026.2	311.5	95.9	21.2	5.9	1.4	.4	.0	.1	.0	.0	.0
35-39	88.2	696.2	1,744.3	2,425.2	1,893.5	721.0	231.8	60.2	14.8	3.3	1.5	.5	.1	.0	.0	.0
40-44	33.6	247.8	770.2	1,359.2	1,760.5	1,301.2	517.7	140.5	38.4	9.8	3.8	1.2	.4	.2	.0	.0
45-49	19.6	92.4	328.9	706.5	1,108.9	1,300.4	957.5	333.0	95.9	27.0	7.1	2.3	.5	.0	.0	.0
50-54	10.3	39.0	127.6	321.4	588.2	839.7	972.0	662.0	224.4	68.1	19.5	6.0	1.8	.1	.0	.0
55-59	4.2	18.5	55.0	132.2	261.5	445.4	655.0	699.9	476.2	176.9	44.2	13.2	3.9	1.2	.6	.0
60-64	2.5	7.8	21.7	48.3	100.1	189.7	325.2	444.2	484.1	375.3	116.3	30.5	6.5	1.8	.0	.0
65-69	1.8	3.3	8.5	16.7	35.6	66.0	125.1	194.8	288.5	363.9	264.2	77.2	15.4	3.3	.0	.0
70-74	1.4	2.8	3.3	6.5	14.5	27.7	47.1	72.8	125.1	204.0	244.9	163.2	40.7	5.9	.7	.0
75-79	.1	2.3	1.7	3.1	5.9	10.0	19.2	30.8	50.6	89.2	130.6	138.7	87.0	15.9	2.1	.0
80-84	.0	.3	.5	.7	3.0	3.2	7.6	13.3	20.1	31.3	49.0	62.9	46.4	23.9	4.1	.0
85-89	.0	.0	.0	.0	.3	.0	1.8	5.4	6.7	8.6	13.0	17.6	20.9	16.2	4.4	.3
90-94	.0	.0	.0	.0	.0	.0	.0	2.1	1.8	1.4	2.5	5.4	5.0	1.0	2.2	5.2

Note: The central marriage rate is the ratio of the number of marriages during the year in the tabulated age cell to the square root of the product of the midyear number of unmarried males in the age group of husband and the midyear number of unmarried females in the age group of wife.

the given ages of husband and wife to the number of existing marriages in the Social Security Area within the given ages of husband and wife. The resulting rates for 1979 and 1981 were averaged and then adjusted to the level observed during 1985. The final rates, grouped by 5-year age groups based on 1985 population data, are shown in table 21.

Table 20.—Average central marriage rates, by age group, sex, and marital status, 1979, and 1981-83

[Per thousand]

Sex and age group	Marital status			
	Total	Single	Widowed	Divorced
Male:				
14-19	19.1	18.9	368.0	160.3
20-24	88.0	83.8	474.4	245.9
25-29	123.0	103.6	319.9	256.3
30-34	117.2	74.1	231.6	223.9
35-39	102.5	39.9	112.9	176.7
40-44	107.7	34.1	98.5	166.9
45-49	71.3	16.0	64.1	112.8
50-54	64.4	13.5	60.7	102.9
55-59	42.4	8.7	54.6	63.2
60-64	38.4	7.8	50.3	56.1
65-69	17.0	3.6	19.9	29.0
70-74	15.0	3.2	16.9	25.4
75-79	15.9	3.2	17.0	25.6
80-84	16.4	3.2	17.0	25.6
85-89	16.6	3.2	17.0	25.6
90-94	16.7	3.2	17.0	25.6
Female:				
14-19	42.1	41.5	353.8	228.9
20-24	114.4	105.9	153.7	245.0
25-29	127.4	103.9	100.7	206.1
30-34	98.2	63.4	65.3	144.0
35-39	68.9	33.2	36.5	94.4
40-44	63.7	28.4	32.6	86.0
45-49	34.4	13.1	20.4	49.6
50-54	27.2	10.8	18.2	43.2
55-59	12.5	5.4	10.1	20.7
60-64	9.8	4.5	8.7	17.3
65-69	3.1	1.2	2.7	7.2

Note: The central marriage rate is the ratio of the number of marriages during the year in the tabulated age group and marital status to the midyear population in that age group and marital status.

Methods

Future numbers of births, deaths, net immigration, marriages, and divorces are obtained by applying the following methods to the projected data described in the preceding section. End-of-year population data is determined from the beginning-of-year population data.

The single (never married) population at the end of the year for each age and sex is calculated from the single population at the beginning of the year by subtracting the deaths and marriages during the year, and adding the number of net immigration of single persons. The married population at the end of the year is calculated from that at the beginning of the year by subtracting the number of deaths, widowings, and divorces, and adding the number of marriages. The widowed population at the end of the year is calculated by subtracting the number of deaths and marriages and adding the number of widowings and the net immigration of widowed persons. The divorced population at the end of the year is calculated by subtracting the number of deaths and marriages, and adding the number of divorces and the number of net immigration of divorced persons.

Deaths

Probabilities of survival. Earlier in this article, death rates (generally referred to as **central** death rates) were presented that were calculated as the number of deaths occurring in a given year divided by the midyear population in that year. This concept is a useful one in the context of analyzing historical trends, but is not so readily applicable to the actual projection of population. What is more suitable is the concept of probability of death (or of survival). This concept involves dividing the number of deaths occurring in a group in

Table 21.—Assumed central divorce rates, by age of husband and wife

[Per hundred thousand]

Age group of husband	Age group of wife														
	14-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	85-89
14-19	3,037.1	3,600.1	3,007.4	2,734.4	1,343.9	370.2	40.0	34.4	90.1	95.7	98.0	87.0	87.3	59.4	43.7
20-24	5,004.3	5,199.9	4,264.4	4,436.5	3,955.9	2,647.6	1,555.6	658.8	171.2	159.2	220.9	285.4	413.1	345.6	294.5
25-29	3,933.0	5,344.0	4,763.8	3,314.7	3,556.9	3,345.5	3,080.1	2,216.6	1,023.9	765.7	675.1	587.4	790.8	659.7	646.2
30-34	5,767.8	5,263.3	4,094.8	3,535.5	2,841.4	3,395.5	3,736.0	3,091.9	1,704.6	1,219.5	838.8	685.4	798.9	779.1	972.1
35-39	6,258.1	6,843.3	4,065.8	2,802.4	2,829.9	2,253.9	3,004.3	2,937.3	1,982.7	1,678.9	1,412.7	1,256.6	1,293.3	1,297.2	1,466.3
40-44	5,686.3	7,426.1	5,286.5	2,940.6	2,220.7	2,155.7	1,799.7	2,027.7	1,558.6	1,402.1	1,280.3	1,299.5	1,288.9	1,342.6	1,306.6
45-49	3,103.7	6,181.9	5,348.0	3,587.4	2,241.0	1,614.3	1,415.4	1,120.3	1,116.4	1,084.5	1,077.4	1,036.3	1,092.4	1,132.3	1,114.0
50-54	1,528.1	5,089.6	5,297.9	4,282.6	2,796.4	1,489.0	1,021.4	849.0	672.8	733.1	736.0	733.4	734.9	792.0	819.3
55-59	821.2	3,724.4	4,268.1	4,146.6	3,083.5	1,765.4	980.7	601.4	299.9	245.0	290.7	325.3	336.9	341.9	370.7
60-64	954.1	2,936.1	3,765.8	3,946.7	3,153.3	1,883.0	1,049.8	540.2	254.6	249.4	228.2	243.6	250.3	247.6	291.3
65-69	1,151.4	2,550.2	3,630.4	3,941.3	3,162.6	1,909.9	1,067.9	556.5	259.1	246.3	253.5	227.8	228.6	221.2	255.2
70-74	1,313.6	2,389.5	3,526.8	3,934.2	3,112.1	1,961.0	1,091.3	576.2	266.2	236.0	248.8	256.2	226.2	221.7	251.9
75-79	1,351.9	2,591.0	3,714.8	3,804.2	3,121.5	1,936.6	1,123.9	600.4	271.1	234.1	242.0	248.0	253.2	229.4	267.9
80-84	1,367.5	2,934.9	3,395.8	3,587.2	2,843.2	1,809.3	1,083.0	577.7	260.4	211.4	216.7	222.6	239.5	270.0	258.6
85-89	1,456.0	3,268.0	3,897.6	4,084.7	3,294.5	2,141.8	1,299.5	715.9	331.2	260.4	257.7	268.5	260.1	230.4	205.9

Note: The central divorce rate is the ratio of the number of divorces during the year in the tabulated age cell to the midyear number of married couples in that cell.

a given year by the number of persons in that group at the beginning of the year (rather than the population at the middle of the year). As one would expect, these two concepts are closely related, although the mathematics of their relationship is not trivial.

Future probabilities of survival by age at last birthday were calculated for each sex and each single year of age from the projected central death rates by sex and age group. The probability of death at age 0 (q_0) was calculated from the population central death rate for age 0 and the relationship between the probability of death and the central death rate that existed in 1983. For each single year of age 1 through 4, the probability of death was calculated from the population central death rate for the group aged 1 through 4 ($_4m_1$) and the relationships that existed in 1983. Probabilities of death at age 5 or older were calculated by an iterative method. As a first approximation, the probability of death for each 5-year age group from ages 5-9 through 90-94 was calculated from the corresponding central death rate assuming that, on average, deaths occurred at the middle of the age interval. As part of the iterative process, the probability of death for each single age in each 5-year age group was determined by interpolating the logarithms of the complements of the surrounding 5-year probabilities of death with Beer's minimized fifth-difference formula. The probability of death for each age 95 or older was calculated to produce a rapid decline in the ratio of succeeding probabilities of death to a minimum ratio of 1.05 for females and 1.04 for males.[5] An initial life table for each sex was then constructed using these probabilities of death. On subsequent iterations, the life table probability of death for each age 5-94 was adjusted so that the central death rates for the 5-year age groups obtained by weighting the single-age life table central death rates by the population would equal the corresponding population 5-year age group central death rates. This adjustment corrects for the fact that the distribution within each quinquennial age group in the life table population generally differs from that in the actual population.[6]

Number of deaths. The number of deaths occurring at each age and by sex was calculated as the difference between the number of people alive at the beginning of the year and the product of the number of people alive at the beginning of the year and the probability of survival. Deaths to newborn babies were computed using a similar formula. However, deaths to immigrants newly arriving in the year were disregarded. The numbers of deaths were then distributed by marital status in the same proportions as would have been produced by applying the marital-status-specific probabilities of survival to the population by marital status at the beginning of the year. Projected numbers of deaths are given in table 22, by alternative.

Number of widowings. The number of marriages dissolved by death at each age of husband crossed with each age of wife was calculated by applying joint-life probabilities of death to the existing marriages by age of husband crossed with age of wife at the beginning of the year. (The joint-life probabilities were developed to be consistent with the projected death rates and the assumed mortality differential by marital status, and assumed independence of the partners.) The number of widowings for a particular age and sex was calculated as the difference between the marriages of individuals of that particular age and sex dissolved by death of either partner and the number of deaths to married persons of that age and sex.

Net Immigration

The assumed net immigration for each age and sex was distributed among the single (never married), widowed, and divorced populations in the same proportions as existed in the nonmarried population at the beginning of the year. None of the net change in population due to net immigration during the year was assigned to the married population because of the relatively small numbers involved and because of the lack of information on age of spouse.

Divorce

Probabilities of divorce. The probabilities of divorce were calculated for each age of husband crossed with each age of wife from the average of the divorce rates for calendar years 1979 and 1981 so that the resulting number of divorces would equal a provisional estimate of the number of divorces in the Social Security Area for 1985. The provisional estimates of marriages and divorces were developed from data published by the National Center for Health Statistics in **Monthly Vital Statistics Reports**, Volume 34, No. 13.

Number of divorces. The number of marriages dissolved by divorce at each age of husband crossed with each age of wife was calculated by applying probabilities of divorce to the existing marriages by age of husband crossed with age of wife at the beginning of the year. The projected numbers of divorces are given in table 22, by alternative.

[5] For the analysis on which these ratios are based, see Francisco R. Bayo and Joseph F. Faber, "Mortality Experience Around Age 100," **Transactions of the Society of Actuaries**, vol. XXXV, 1983, pages 37-54.

[6] For more detail on the method used to produce the life tables for these population projections, see Joseph F. Faber and Alice H. Wade, "Life Tables for the United States: 1900-2050," (Actuarial Study No. 89), December 1983.

Table 22.—Selected vital events in the Social Security Area, by alternative for selected years

[Numbers in thousands]

Alternative and calendar year	Births	Deaths	Marriages	Divorces
Alternative I:				
1985	3,857	2,161	2,499	1,230
1986	3,849	2,167	2,607	1,251
1987	3,879	2,194	2,606	1,269
1988	3,902	2,222	2,599	1,272
1989	3,915	2,250	2,587	1,262
1990	3,920	2,278	2,568	1,250
1991	3,917	2,306	2,546	1,255
1992	3,911	2,334	2,521	1,257
1993	3,901	2,362	2,495	1,252
1994	3,893	2,390	2,470	1,242
1995	3,887	2,419	2,444	1,231
1996	3,887	2,447	2,421	1,223
1997	3,893	2,476	2,402	1,215
1998	3,905	2,505	2,387	1,204
1999	3,923	2,533	2,374	1,193
2000	3,948	2,562	2,364	1,181
2005	4,155	2,713	2,324	1,131
2010	4,449	2,880	2,275	1,088
2015	4,582	3,068	2,345	1,057
2020	4,647	3,285	2,411	1,050
2025	4,744	3,539	2,478	1,060
2030	4,920	3,813	2,568	1,081
2035	5,129	4,063	2,663	1,112
2040	5,311	4,242	2,743	1,146
2045	5,450	4,335	2,814	1,179
2050	5,586	4,353	2,890	1,212
2055	5,753	4,330	2,979	1,248
2060	5,947	4,315	3,076	1,286
2065	6,140	4,344	3,170	1,327
2070	6,318	4,420	3,260	1,367
2075	6,489	4,524	3,351	1,407
2080	6,672	4,637	3,447	1,449
Alternative II:				
1985	3,857	2,161	2,499	1,230
1986	3,849	2,167	2,607	1,251
1987	3,850	2,174	2,645	1,269
1988	3,841	2,181	2,671	1,274
1989	3,824	2,190	2,689	1,267
1990	3,799	2,201	2,698	1,258
1991	3,768	2,212	2,701	1,268
1992	3,733	2,225	2,700	1,277
1993	3,697	2,239	2,696	1,278
1994	3,662	2,255	2,691	1,275
1995	3,631	2,271	2,686	1,270
1996	3,605	2,289	2,683	1,270
1997	3,586	2,309	2,683	1,268
1998	3,573	2,331	2,688	1,266
1999	3,566	2,354	2,696	1,262
2000	3,566	2,380	2,707	1,258
2005	3,642	2,529	2,772	1,251
2010	3,768	2,696	2,811	1,253
2015	3,787	2,871	2,804	1,253
2020	3,736	3,066	2,777	1,249
2025	3,700	3,289	2,768	1,245
2030	3,721	3,533	2,788	1,246
2035	3,772	3,765	2,813	1,253
2040	3,803	3,941	2,820	1,259
2045	3,801	4,036	2,816	1,262
2050	3,791	4,049	2,815	1,264
2055	3,798	4,003	2,826	1,268
2060	3,822	3,937	2,843	1,273
2065	3,846	3,890	2,855	1,279
2070	3,858	3,877	2,862	1,285
2075	3,862	3,885	2,867	1,289
2080	3,870	3,893	2,876	1,294
Alternative III:				
1985	3,857	2,161	2,499	1,230
1986	3,849	2,167	2,607	1,251
1987	3,808	2,153	2,681	1,269
1988	3,757	2,141	2,739	1,275
1989	3,700	2,132	2,785	1,271
1990	3,636	2,127	2,820	1,267
1991	3,567	2,124	2,847	1,282
1992	3,496	2,123	2,868	1,295
1993	3,426	2,125	2,885	1,302
1994	3,359	2,130	2,899	1,305
1995	3,296	2,137	2,912	1,307
1996	3,239	2,147	2,926	1,313
1997	3,189	2,160	2,944	1,319
1998	3,147	2,176	2,966	1,323
1999	3,111	2,194	2,992	1,326
2000	3,081	2,215	3,021	1,330
2005	2,999	2,340	3,172	1,361
2010	2,933	2,474	3,254	1,402
2015	2,842	2,612	3,077	1,417
2020	2,691	2,761	2,901	1,390
2025	2,541	2,933	2,773	1,349
2030	2,433	3,131	2,678	1,306
2035	2,354	3,336	2,590	1,263
2040	2,274	3,511	2,492	1,219
2045	2,180	3,623	2,386	1,174
2050	2,081	3,655	2,285	1,129
2055	1,993	3,612	2,197	1,087
2060	1,919	3,520	2,118	1,047
2065	1,851	3,419	2,040	1,010
2070	1,781	3,333	1,961	973
2075	1,711	3,264	1,884	937
2080	1,644	3,191	1,813	903

Marriage

The number of marriages occurring at each age of husband crossed with each age of wife would be obtained by multiplying the age-of-husband-age-of-wife-specific marriage rates by the geometric mean of the midyear male population exposed to marriage and the midyear female population exposed to marriage. Thus, the midyear populations exposed to marriage must be estimated from the beginning-of-the year nonmarried populations. Since the midyear populations exposed to marriage depend on the number of marriages during the first half of the year, the process of obtaining the number of marriages is performed iteratively. As a first approximation, the midyear male population exposed to marriage was calculated as the number of the nonmarried male population of the given age at the beginning of the year less one-half of the number of deaths during the year to nonmarried males at the given age plus one-half of the number of net immigration and divorces during the year to nonmarried males at the given age. The female population exposed to marriage was approximated similarly. As a second approximation, the total male population exposed to marriage was calculated in the same manner as the previously calculated number of the male population of the given age exposed to marriage less one-half the number of all marriages involving men of the given age. (The number of marriages was obtained by using the first midyear nonmarried population approximations.) The total female population exposed to marriage was similarly approximated. The difference between the number of marriages obtained by using the two population ap-

proximations was calculated. The iterative process was continued until the difference between the number of marriages was small. The numbers of marriages were then distributed by previous marital status in the same proportions as would have been produced by applying the previous marital-status-specific marriage rates to the population by marital status at the beginning of the year. The projected numbers of marriages are given in table 22, by alternative.

Births

To determine the number of births during a year, birth rates for that year were applied to the average of the beginning-of-year and end-of-year female population. The projected numbers of births are given in table 22, by alternative.

Results

Total Population

Table 23 displays the resulting Social Security Area population by age group, marital status, and alternative as of July 1 for selected years. Because the population was projected as of January 1, estimates as of July 1 were made by interpolation. As a result, small discrepancies, such as the total male married population not equaling the total female married population, may arise in the July 1 populations. Under Alternative I (with greater-than-replacement fertility), the total population increases rapidly from 247 million persons in 1985 to 443 million in 2080. Under Alternative II, the total population increases gradually to 327 million persons in 2080, as a 2.0 total fertility rate plus 400,000 annual net immigrants are slightly more than enough to replenish the population. Under Alternative III, the total population increases to 283 million persons in 2023 and then decreases to 220 million in 2080. The decline in population size after 2023 is due to the compounding effect of below-replacement fertility that is only partially offset by the positive net immigration.

Marital Status

In 1985, 43 percent of the population was estimated to be single (never married). The proportion of the population that is projected to be single in 2080 is 51 percent under Alternative I, 39 percent under Alternative II, and 25 percent under Alternative III, reflecting differences in the projected marriage rates and in the age distribution of the population among the three alternatives. The proportion married is projected to change from 45 percent in 1985 to 36 percent, 46 percent, and 57 percent in 2080, under Alternatives I, II, and III, respectively. The proportion widowed in 2080 is projected to increase from 6 percent in 1985 to 7 percent and 10 percent, under Alternatives II and III, respectively, and to decrease to 5 percent under Alternative I. The current high incidence of divorce, which is assumed to continue, causes the proportion divorced to increase from 6 percent in 1985 to 8 percent under all three alternatives in 2080. Chart 3 compares the distribution of the population by marital status in 1985 with the projected distribution in 2080.

The disunity ratio given in table 23 is the ratio of the number of divorced persons to the sum of the numbers of married and widowed persons. Assuming a continuation of the current high incidence of divorce, this ratio will increase from 0.116 in 1985 to 0.176, 0.158, and 0.142 in 2000 under Alternatives I, II, and III, respectively.

Aged Population

A rough estimate of the growth in the number of persons receiving retired-worker benefits under the OASDI program can be obtained from examining the age 65-or-older population given in table 23. The growth in the number of persons aged 65 or older slows down around the year 2000 due to the low fertility experience during the 1930's. This slowing down is not as great under Alternatives II and III because assumed mortality reductions are greater than under Alternative I. The high fertility of the 1950's and 1960's results in sharp steady growth in the age 65-or-older population for the period 2010-30 under all of the alternatives. By 2080, the age 65-or-older population as a percentage of total population increases significantly—from 12 percent in 1985 to 17 percent under Alternative I, 22 percent under Alternative II, and 34 percent under Alternative III.

Demographic Indicators

The projected population is summarized in table 23 by broad age groups and alternatives for selected years. The age groups are 0-19 years, 20-64 years, and 65 years or older.

The aged dependency ratio given in table 23 is the ratio of the number of persons aged 65 or older to the number of persons aged 20-64. The aged dependency ratio is also shown in chart 4. This ratio is closely related to the ratio of retirees to workers and, thus, provides an index of possible future demographic pressures that may be faced by the OASDI program. Under Alternative I, the aged dependency ratio is projected to increase from 0.199 in 1985 to 0.348 in the year 2032 and then to decrease to an ultimate level of about

Table 23.—Population in Social Security Area as of July 1, by selected ratios, years, and alternative

[Population in thousands]

Alternative and calendar year	Marital status				Age				Dependency ratio		Disunity ratio
	Single	Married	Widowed	Divorced	Total	0-19	20-64	65 or older	Total	Aged	
1940	66,736	63,947	8,490	1,586	140,759	48,490	82,707	9,562	0.702	0.116	0.022
1950	67,917	79,190	10,005	2,275	159,386	53,895	92,739	12,752	.719	.138	.026
1960	86,443	89,377	11,196	3,065	190,081	72,989	99,842	17,250	.904	.173	.030
1970	97,562	99,894	12,557	4,882	214,895	80,881	113,187	20,827	.899	.184	.043
1980	101,400	108,694	13,940	11,271	235,305	74,964	134,239	26,102	.753	.194	.092
1981	102,234	109,476	13,897	12,179	237,785	74,471	136,667	26,647	.740	.195	.099
1982	103,499	110,231	13,917	12,612	240,259	74,036	138,999	27,225	.728	.196	.102
1983	104,678	110,728	14,203	13,038	242,647	73,655	141,206	27,786	.718	.197	.104
1984	105,297	111,251	14,555	13,816	244,918	73,338	143,249	28,331	.710	.198	.110
1985	105,898	111,881	14,730	14,662	247,170	73,191	145,077	28,902	.704	.199	.116
1986	106,580	112,650	14,777	15,452	249,459	73,240	146,700	29,520	.700	.201	.121
Alternative I :											
1987	107,222	113,472	14,832	16,217	251,743	73,418	148,183	30,142	.699	.203	.126
1988	107,915	114,242	14,897	16,971	254,025	73,663	149,632	30,730	.698	.205	.131
1989	108,669	114,982	14,963	17,684	256,297	73,887	151,109	31,302	.696	.207	.136
1990	109,478	115,695	15,030	18,348	258,551	74,041	152,668	31,841	.694	.209	.140
1991	110,339	116,357	15,096	18,985	260,777	74,215	154,237	32,325	.691	.210	.144
1992	111,247	116,948	15,161	19,615	262,971	74,566	155,629	32,777	.690	.211	.148
1993	112,200	117,476	15,224	20,229	265,129	75,097	156,830	33,202	.691	.212	.152
1994	113,192	117,952	15,284	20,820	267,249	75,682	157,988	33,579	.692	.213	.156
1995	114,224	118,385	15,343	21,383	269,335	76,252	159,177	33,906	.692	.213	.160
1996	115,290	118,774	15,399	21,925	271,389	76,790	160,423	34,176	.692	.213	.163
1997	116,389	119,124	15,452	22,451	273,417	77,264	161,781	34,372	.690	.212	.167
1998	117,518	119,444	15,504	22,960	275,425	77,671	163,246	34,508	.687	.211	.170
1999	118,673	119,744	15,553	23,450	277,420	78,005	164,784	34,631	.684	.210	.173
2000	119,854	120,033	15,600	23,921	279,408	78,258	166,377	34,773	.679	.209	.176
2010	133,787	122,270	16,098	27,798	299,953	81,581	179,700	38,671	.669	.215	.201
2020	149,910	124,232	17,168	29,657	320,967	88,266	182,280	50,422	.761	.277	.210
2030	164,110	126,124	19,025	29,864	339,124	94,119	182,062	62,942	.863	.346	.206
2040	177,228	128,722	20,167	29,739	355,856	99,607	191,882	64,367	.855	.335	.200
2050	189,909	133,331	19,838	30,046	373,124	106,490	202,606	64,027	.842	.316	.196
2060	202,404	140,560	19,319	31,102	393,385	112,804	214,663	65,917	.833	.307	.195
2070	215,168	149,518	19,757	32,796	417,239	119,664	228,820	68,755	.823	.300	.194
2080	228,198	159,115	20,768	34,815	442,895	126,975	241,816	74,105	.832	.306	.194
Alternative II :											
1987	107,113	113,519	14,823	16,184	251,639	73,374	148,121	30,144	.699	.204	.126
1988	107,550	114,424	14,869	16,865	253,707	73,518	149,446	30,743	.698	.206	.130
1989	107,979	115,369	14,915	17,490	255,753	73,616	150,800	31,337	.696	.208	.134
1990	108,402	116,350	14,962	18,055	257,769	73,619	152,239	31,911	.693	.210	.137
1991	108,819	117,335	15,008	18,584	259,745	73,616	153,691	32,438	.690	.211	.140
1992	109,230	118,297	15,053	19,097	261,677	73,767	154,965	32,945	.689	.213	.143
1993	109,636	119,237	15,096	19,590	263,559	74,074	156,051	33,434	.689	.214	.146
1994	110,038	120,161	15,139	20,053	265,391	74,413	157,094	33,884	.689	.216	.148
1995	110,435	121,075	15,180	20,485	267,175	74,715	158,169	34,290	.689	.217	.150
1996	110,827	121,974	15,220	20,891	268,912	74,963	159,302	34,647	.688	.217	.152
1997	111,209	122,862	15,259	21,278	270,608	75,125	160,548	34,935	.686	.218	.154
1998	111,578	123,746	15,298	21,646	272,267	75,200	161,902	35,166	.682	.217	.156
1999	111,930	124,634	15,336	21,993	273,894	75,177	163,331	35,386	.677	.217	.157
2000	112,265	125,534	15,375	22,320	275,493	75,053	164,814	35,626	.672	.216	.158
2010	115,211	134,802	15,894	24,772	290,681	73,488	176,764	40,429	.644	.229	.164
2020	118,611	141,870	17,193	26,025	303,698	74,816	175,784	53,099	.728	.302	.164
2030	121,066	144,822	19,607	26,381	311,875	75,442	169,712	66,722	.838	.393	.160
2040	122,313	145,635	21,681	26,377	316,005	75,404	171,551	69,051	.842	.403	.158
2050	123,286	146,023	22,139	26,328	317,776	76,327	172,285	69,163	.844	.401	.157
2060	124,161	147,385	21,752	26,487	319,785	76,678	172,726	70,381	.851	.407	.157
2070	125,155	149,480	21,771	26,857	323,264	77,143	174,975	71,146	.847	.407	.157
2080	126,217	151,535	22,014	27,275	327,041	77,781	175,776	73,484	.861	.418	.157
Alternative III:											
1987	106,999	113,564	14,814	16,152	251,529	73,324	148,059	30,146	0.699	0.204	0.126
1988	107,168	114,594	14,841	16,762	253,365	73,349	149,260	30,755	.697	.206	.130
1989	107,253	115,733	14,868	17,302	255,156	73,293	150,491	31,372	.695	.208	.132
1990	107,260	116,967	14,895	17,772	256,894	73,106	151,810	31,978	.692	.211	.135
1991	107,195	118,257	14,920	18,197	258,570	72,880	153,141	32,548	.688	.213	.137
1992	107,066	119,568	14,945	18,599	260,178	72,775	154,297	33,106	.686	.215	.138
1993	106,877	120,895	14,969	18,973	261,714	72,795	155,264	33,655	.686	.217	.140
1994	106,634	122,241	14,993	19,311	263,178	72,818	156,189	34,171	.685	.219	.141
1995	106,340	123,604	15,016	19,611	264,572	72,775	157,145	34,651	.684	.221	.141
1996	105,996	124,979	15,040	19,882	265,897	72,650	158,161	35,086	.681	.222	.142
1997	105,599	126,365	15,063	20,129	267,157	72,412	159,288	35,457	.677	.223	.142
1998	105,146	127,770	15,088	20,353	268,358	72,059	160,525	35,774	.672	.223	.142
1999	104,634	129,201	15,114	20,553	269,501	71,582	161,836	36,083	.665	.223	.142
2000	104,060	130,663	15,141	20,730	270,593	70,977	163,202	36,415	.658	.223	.142

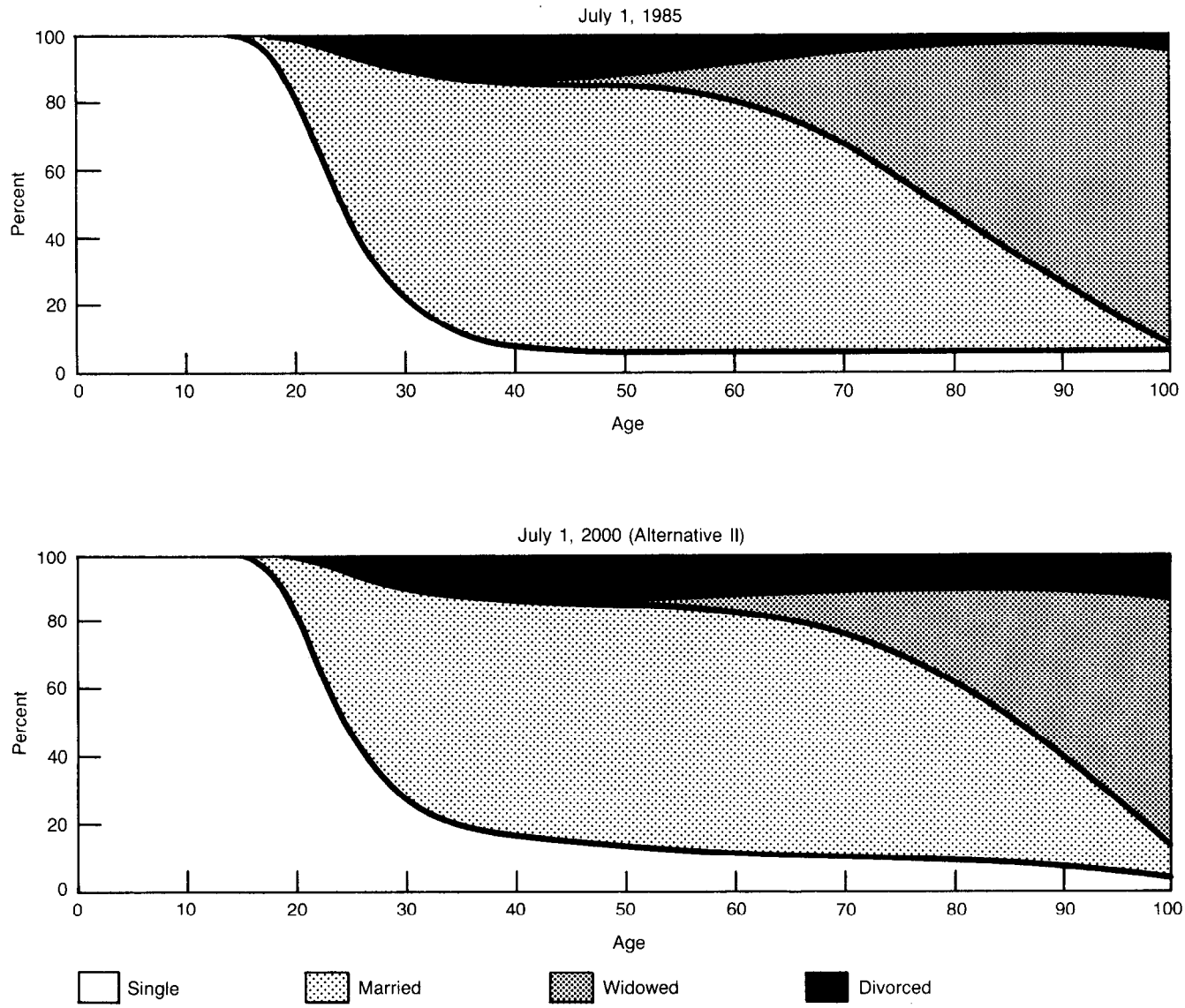
Table 23.—Population in Social Security Area as of July 1, by selected ratios, years, and alternative—**Continued**

[Population in thousands]

Alternative and calendar year	Marital status				Age				Dependency ratio		Disunity ratio
	Single	Married	Widowed	Divorced	Total	0-19	20-64	65 or older	Total	Aged	
2010	95,627	146,366	15,585	21,621	279,198	63,283	173,665	42,250	.608	.243	.134
2020	87,791	156,588	16,868	22,101	283,348	58,497	168,433	56,419	.682	.335	.127
2030	81,448	158,215	19,441	22,352	281,455	54,026	155,251	72,179	.813	.465	.126
2040	74,810	154,660	22,107	22,106	273,683	49,324	147,630	76,729	.854	.520	.125
2050	68,686	148,067	23,219	21,404	261,376	45,671	137,170	78,534	.905	.573	.125
2060	63,232	140,698	22,813	20,554	247,298	42,127	125,578	79,592	.969	.634	.126
2070	58,466	133,317	22,118	19,692	233,593	38,870	116,953	77,769	.997	.665	.127
2080	54,315	125,669	21,315	18,773	220,072	36,051	108,177	75,844	1.034	.701	.128

Note: The aged dependency ratio is the ratio of the number of persons aged 65 or older to the number of persons aged 20-64. The total dependency ratio is the same as the aged dependency ratio except that the number of persons younger than age 20 is also included in the numerator of the ratio. The disunity ratio is the ratio of the number of divorced persons to the number of married and widowed persons.

Chart 3.—Distribution of the population, by marital status and age, July 1, 1985 and July 1, 2000



0.306. Under Alternative II, the aged dependency ratio is projected to increase to 0.400 in 2033 and then to stay at about that level until 2071 when the ratio starts increasing again, obtaining a value of 0.418 in 2080. Under Alternative III, the aged dependency ratio is projected to increase throughout the entire projection period to 0.701 in 2080. A sharp increase in the aged dependency ratio shortly after the turn of the century appears certain as the baby boom generation attains age 65 while the baby bust generation attains age 20. The magnitude of the increase, however, will depend on future mortality reductions among the aged and future fertility rates. Even under optimistic assumptions, however, the aged dependency ratio will increase about 70 percent by 2030.

Because not everyone retires at age 65 and the minimum age at which unreduced benefits are payable is scheduled to increase, it is interesting to observe the aged dependency ratio using cutoff ages other than age 65. Table 24 displays these ratios at age 62 when retired-worker benefits are first available, at age 67; which will be the normal retirement age—that is, the minimum age at which unreduced retired-worker benefits are payble—after 2026; and at age 70, after

Table 24.—Aged dependency ratios, at selected retirement ages, by alternative for selected years

Alternative and calendar year	Age			
	62	65	67	70
1940	0.156	0.116	0.093	0.064
1950	.187	.138	.111	.077
1960	.228	.173	.141	.101
1970	.241	.184	.153	.114
1980	.250	.194	.162	.121
1981	.251	.195	.163	.122
1982	.252	.196	.164	.123
1983	.253	.197	.165	.124
1984	.255	.198	.166	.125
1985	.256	.199	.167	.126
1986	.258	.201	.169	.128
Alternative I:				
1987	.260	.203	.170	.129
1988	.261	.205	.172	.130
1989	.262	.207	.174	.131
1990	.263	.209	.176	.133
1991	.263	.210	.177	.134
1992	.263	.211	.179	.136
1993	.263	.212	.180	.138
1994	.263	.213	.181	.139
1995	.262	.213	.182	.141
1996	.261	.213	.183	.142
1997	.260	.212	.183	.143
1998	.259	.211	.183	.143
1999	.258	.210	.182	.144
2000	.257	.209	.181	.144
2010	.285	.215	.180	.137
2020	.369	.277	.227	.167
2030	.430	.346	.293	.220

Chart 4.—Actual and projected ratio of population aged 65 or older to population aged 20–64, by alternative, 1960–2080

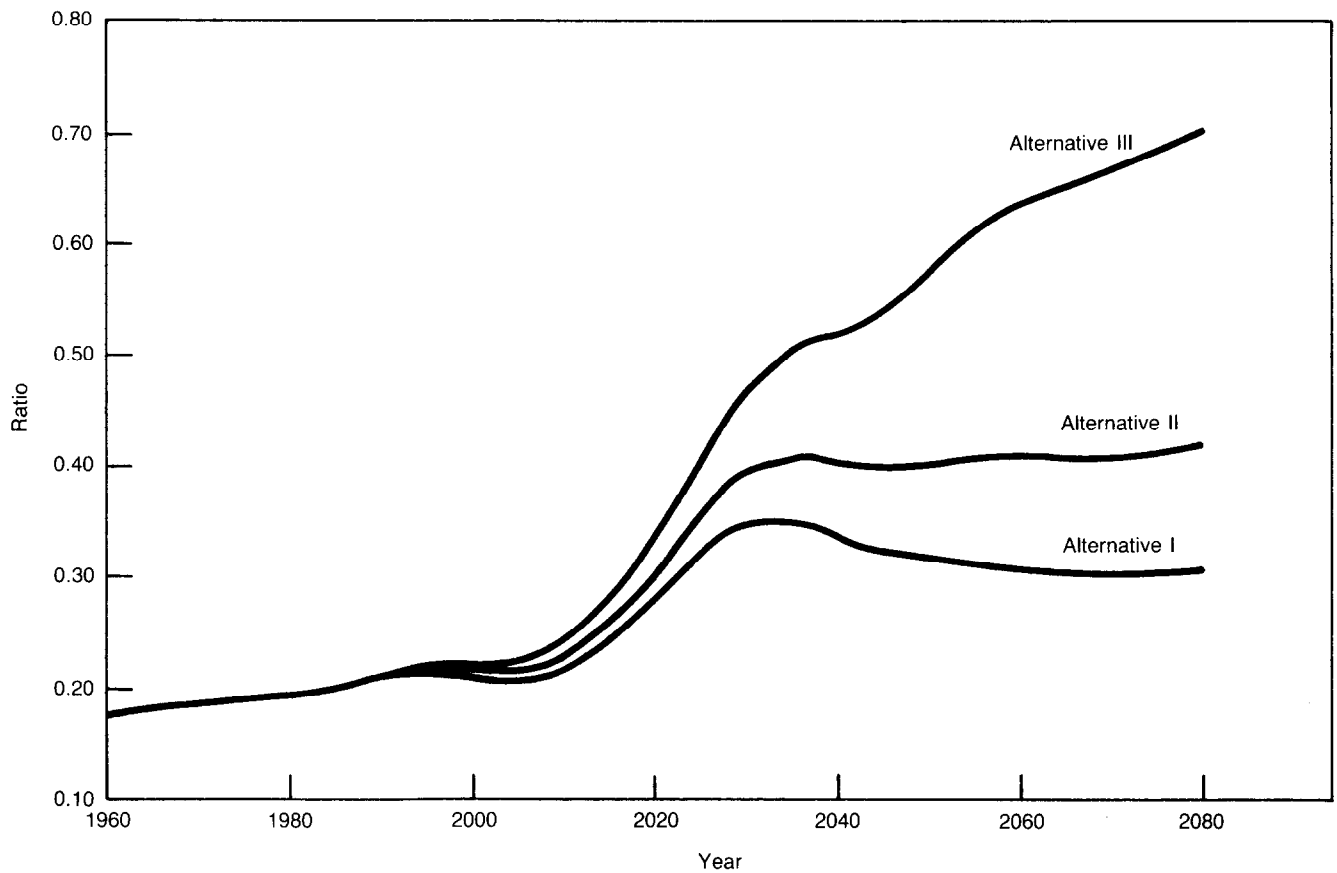


Table 24.—Aged dependency ratios, at selected retirement ages, by alternative for selected years—**Continued**

Alternative and calendar year	Age			
	62	65	67	70
2040	.409	.335	.293	.234
2050	.393	.316	.271	.213
2060	.380	.307	.264	.207
2070	.374	.300	.258	.204
2080	.382	.306	.262	.205
Alternative II :				
1987	0.260	0.204	0.170	0.129
1988	.261	.206	.173	.130
1989	.263	.208	.175	.132
1990	.264	.210	.177	.134
1991	.265	.211	.179	.136
1992	.266	.213	.181	.138
1993	.266	.214	.183	.140
1994	.266	.216	.184	.142
1995	.266	.217	.186	.144
1996	.266	.217	.187	.145
1997	.266	.218	.188	.147
1998	.265	.217	.188	.148
1999	.265	.217	.188	.149
2000	.265	.216	.188	.149
2010	.301	.229	.192	.148
2020	.400	.302	.249	.185
2030	.487	.393	.334	.254
2040	.488	.403	.354	.285
2050	.497	.401	.346	.275
2060	.498	.407	.354	.282
2070	.498	.407	.354	.285
2080	.513	.418	.363	.290
Alternative III:				
1987	.260	.204	.170	.129
1988	.262	.206	.173	.131
1989	.264	.208	.175	.132
1990	.265	.211	.178	.134
1991	.266	.213	.180	.137
1992	.268	.215	.183	.139
1993	.269	.217	.185	.142
1994	.270	.219	.187	.144
1995	.270	.221	.189	.147
1996	.271	.222	.191	.149
1997	.271	.223	.193	.151
1998	.272	.223	.194	.153
1999	.272	.223	.194	.154
2000	.273	.223	.194	.155
2010	.318	.243	.205	.159
2020	.441	.335	.277	.208
2030	.573	.465	.397	.304
2040	.628	.520	.459	.373
2050	.707	.573	.496	.397
2060	.765	.634	.555	.449
2070	.800	.665	.587	.484
2080	.843	.701	.618	.508

Note: The aged dependency ratio calculated at a selected age is the ratio of the number of persons in the population as of July 1 who are as old or older than the selected age to the number of persons in the population as of July 1 who are between age 19 and the selected age.

which delayed retirement credits can no longer be earned. In table 25, the ages necessary to maintain an aged dependency ratio of 0.20, 0.25, and 0.30 are given. To maintain an aged dependency ratio of 0.20 (the approximate age 65 dependency ratio in 1985) the aged dependency ratio in 2080 must be calculated at ages 70, 75, and 82 under Alternatives I, II, and III, respectively. Under all three alternatives, the age necessary to maintain a selected aged dependency ratio increases rapidly from 2010 to 2040.

Table 25.—Retirement age at selected aged dependency ratios, by selected years and alternative

Alternative and calendar year	Dependency ratio		
	0.20	0.25	0.30
1940	59	57	55
1950	61	59	57
1960	63	61	59
1970	64	62	60
1980	65	62	60
1981	65	62	60
1982	65	62	60
1983	65	62	60
1984	65	62	60
1985	65	62	60
1986	65	62	60
Alternative I :			
1987	65	62	60
1988	65	63	60
1989	65	63	60
1990	66	63	60
1991	66	63	60
1992	66	63	60
1993	66	63	60
1994	66	63	60
1995	66	63	60
1996	66	63	60
1997	66	63	60
1998	66	63	60
1999	66	62	60
2000	66	62	60
2010	66	63	61
2020	68	66	64
2030	71	69	67
2040	72	69	67
2050	71	68	66
2060	70	68	65
2070	70	67	65
2080	70	68	65
Alternative II :			
1987	65	63	60
1988	65	63	60
1989	65	63	60
1990	66	63	60
1991	66	63	60
1992	66	63	60
1993	66	63	60
1994	66	63	60
1995	66	63	60
1996	66	63	60
1997	66	63	60
1998	66	63	60
1999	66	63	60
2000	66	63	60
2010	67	64	62
2020	69	67	65
2030	72	70	68
2040	74	72	69
2050	74	71	69
2060	74	72	69
2070	75	72	69
2080	75	72	70
Alternative III:			
1987	65	63	60
1988	65	63	60
1989	65	63	60
1990	66	63	60
1991	66	63	60
1992	66	63	60
1993	66	63	60
1994	66	63	60
1995	66	63	60
1996	66	63	60
1997	67	63	60
1998	67	63	60
1999	67	63	61
2000	67	63	61
2010	67	65	63
2020	70	68	66
2030	74	72	70
2040	78	75	73
2050	79	76	74

Table 25.—Retirement age at selected aged dependency ratios, by selected years and alternative—**Continued**

Alternative and calendar year	Dependency ratio		
	0.20	0.25	0.30
2060	80	77	75
2070	81	79	77
2080	82	80	77

Note: The aged dependency ratio calculated at a selected age is the ratio of the number of persons in the population as of July 1 who are as old or older than the selected age to the number of persons in the population as of July 1 who are between age 19 and the selected aged.

The total dependency ratio given in table 24 is the ratio of the number of persons who are younger than age 20 or older than age 64 to the number of persons aged 20-64. This ratio views the possible future financial burdens to be borne by workers from a somewhat broader perspective. Under all three alternatives, the total dependency ratio is projected to decrease from 0.704 in 1985 until shortly after the turn of the century, reflecting the small number of children resulting from the low fertility rates experienced since 1970 and projected to be experienced in the near future, and the slow growth of the aged population resulting from the low fertility rates experienced during the 1930's. Starting around 2010, the total dependency ratios begin to rise, largely reflecting the same effects that influence the aged dependency ratios. Projected values of the total dependency ratio in 2080 range from 0.832 under Alternative I to 1.034 under Alternative III, or roughly from 18 percent to 46 percent higher than the 1985 value.