THE LONG-RANGE DEMOGRAPHIC ASSUMPTIONS FOR THE 2016 TRUSTEES REPORT

OFFICE OF THE CHIEF ACTUARY
SOCIAL SECURITY ADMINISTRATION

June 22, 2016

PRINCIPAL DEMOGRAPHIC ASSUMPTIONS

OVERVIEW

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Overview

Each year the Board of Trustees of the Federal Old-Age and Survivors Insurance (OASI) and Disability Insurance (DI) Trust Funds provides an annual report to the Congress on the financial and actuarial status of the OASDI program. The Office of the Chief Actuary (OCACT) produces projections of future cost and income based on three separate sets of long-range (75-year) assumptions for key demographic variables. The intermediate (alternative II) set of assumptions represents the Trustees' best estimate for future experience, while the low cost (alternative I) and high cost (alternative III) sets of assumptions are more and less favorable, respectively, from the perspective of program cost. In addition, the intermediate assumptions serve as the central tendency for the stochastic projections presented in the OASDI Trustees Report. This memorandum presents the demographic assumptions used in the 2016 annual report of the Board of Trustees.

Key demographic variables are total fertility rates, average annual reductions in total age-sex-adjusted mortality rates, and average annual levels of net immigration. The following table lists the assumed values of these key variables used in the 2016 Trustees Report. The ultimate total fertility rates, average annual reductions in mortality rates, and average legal annual immigration are essentially unchanged from those used in the 2015 Trustees Report.

New data and transitioning to demographic ultimate values with fertility, mortality, and immigration result in a negligible change in the OASDI actuarial balance. A new mortality method of transitioning to the ultimate rate of improvement starting right after the last data year results in an increase (improvement) of the OASDI actuarial balance of about 0.03 percent of payroll. In addition, changes in immigration methods, including new unauthorized exit rates, a new method of calculating never authorized exits, revisions to smoothing nonimmigrant stocks, and forcing total nonimmigrants to equal the Department of Homeland Security (DHS) historical estimates result in an increase (improvement) of 0.09 percent of taxable payroll. There were other small changes to historical data. The total demographic changes result in an increase (improvement) of the OASDI actuarial balance of about 0.14 percent of payroll.

Key Demographic Variables for the Long-Range (75-year) Projection Period 2015 Trustees Report and 2016 Trustees Report									
	2015 Trustees Report Alternative			2016 Trustees Report Alternative			2016 Trustees Report Less 2015 Trustees Report		
	I	**II**	**III**	**I**	**II**	**III**	**I**	**II**	**III**
Total fertility rate (children per woman), starting in the 25th year	2.2	2.0	1.8	2.2	2.0	1.8	0.0	0.0	0.0
Average annual percentage reduction in total age-sex-adjusted death rates for the 75-year projection period	0.41	0.78	1.18	0.42	0.78	1.16	0.01	0.00	-0.02
Average annual net legal immigration (in thousands) for the 75-year projection period	1,007	795	602	1,008	795	602	1	0	0
Average annual net other-than-legal immigration (in thousands) for the 75-year projection period	457	358	250	621	496	359	164	138	110

The remainder of this paper provides details regarding the historical and future values for each of these demographic variables.

1. FERTILITY

ASSUMPTIONS FOR THE 2016 TRUSTEES REPORT
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1.1 Summary

The ultimate total fertility rates (TFRs) in the 2016 Trustees Report are 2.2, 2.0, and 1.8 children per woman for the respective low-cost, intermediate, and high-cost alternatives. The ultimate TFRs are the same as those used in the 2015 Trustees Report. Final birth data for 2013 and 2014 from the National Center for Health Statistics (NCHS) resulted in TFRs of 1.85 and 1.86, respectively.

The sharp drop in the TFR from a level of 2.12 in 2007 to a level of 2.00 for 2009 and 1.89 for 2011 is largely due to the effects of the economic recession. Thus, for the intermediate alternative, the Trustees assume an increasing TFR from 2015 through 2023 to a level slightly above the ultimate TFR, consistent with the projected recovery from the recession. After 2023, the Trustees assume the TFR decreases linearly, reaching the ultimate TFR of 2.0 in 2027. Compared to the assumed intermediate path of the TFR in the 2015 Trustees Report, this path is lower through 2022 and reaches a lower post-recession peak one year later (2023). For 2023 and later, the path is very similar to the path used in the 2015 Trustees Report. This change in the path of the TFR results in a decrease in the long-range actuarial balance, under the intermediate alternative, of about 0.03 percent of taxable payroll.

In addition to the overall level of the TFR, the distribution of birth rates by age of mother has implications for the size of the population. As in the prior Trustees Report, the Trustees assume a continuation of the historical trend toward lower birth rates for women below age 20 and higher birth rates for women above age 30 through the ultimate years. This continued trend results in a somewhat smaller and slightly older population in the future than if the future relative distribution of birth rates by age of mother were unchanged.

1.2 Historical Experience

Past total fertility rates (TFRs) in the United States are shown in table 1.1 and chart 1.1. The TFR for a given year is defined as the average number of children that would be born to a woman throughout her lifetime if she were to survive the entire childbearing period and were to experience, at each age of her life, the birth rate[1] observed in that year. During the period 1917 through 1924, the TFR was more than 3.0 children per woman. From 1924 through 1933, the TFR declined from 3.1 to 2.2 children per woman, and then remained level at 2.1 to 2.2 children per woman through 1940. After 1940, the TFR once again began to rise, reaching a peak of 3.7 in 1957 and stayed above 2.8 for the "baby boom" years of 1946 through 1965. This period of high fertility was followed by a period of declining fertility. The TFR reached a historical low of 1.7 in 1976. Beginning in 1977, the TFR remained fairly stable at 1.8 children per woman until 1987, when it started to increase, reaching 2.1 in 1990. Between 1990 and the start of the Great Recession, the TFR remained fairly stable, fluctuating between 2.0 and 2.1. The TFR decreased from 2.12 in 2007 to 1.85 in 2013. The 1.86 TFR for 2014 represents the first time the TFR has increased from the prior year since 2007.

[1] The ratio of: (1) the number of live births to mothers of a specified age, to (2) the midyear female population of that age.

The increase in the TFR after 1976 was primarily due to increases in birth rates among women in their 30s. After dropping dramatically between 1960 and 1976, birth rates for women in their 20s remained quite stable between 1976 and 2007 (see chart 1.2). Because much of the decline in birth rates for women in their 20s was understood to represent a desire to defer births until women were in their 30s, the gradual increases in birth rates for women in their 30s for 10 to 15 years after 1976 were expected. However, birth rates for women in their 30s continued a rising trend through 2007, partially due to advancements in infertility treatments.

1.3 Assumed Future Fertility Rates

The Trustees do not expect the TFR to return to the high levels experienced during the baby boom. Several changes in our society have occurred during the past 50 years that have contributed to reducing birth rates. Some of these changes are:

- increased availability and use of birth control methods,
- increased female participation in the labor force,
- increased postponement of marriage and childbearing among young women,
- increased prevalence of divorce,
- decreased death rates among children (requiring fewer births for a desired family size), and
- increased percentage of women choosing to remain childless.

The Trustees do not expect a significant reversal of these changes. In addition, a sharp decline in the TFR to the low levels experienced by certain other industrialized countries is unlikely due to economic, demographic, and cultural differences between the U.S. and those countries.

The Trustees assume an ultimate TFR of 2.0 for alternative II. The 2007 and 2011 Technical Panels both suggested keeping the ultimate alternative II TFR assumption at 2.0. In addition, the Congressional Budget Office assumed an ultimate TFR assumption of 2.0 in their 2015 projections.[2] The 2015 Technical Panel suggested an ultimate alternative II TFR assumption of 1.9. The 2014 National Population Projections released by Census also have a slightly lower TFR path. In those projections, Census assumptions result in a TFR in 2014 of 1.87. Then, Census' TFR stays almost constant throughout their projection through 2060.[3]

As shown in chart 1.2, there is a continuation of the historical trend for, generally, increasing birth rates for women over age 30 and decreasing rates for women below age 20 through the ultimate year, with age-specific rates remaining constant thereafter. This changing distribution of fertility rates by age of woman has significant effects on population size, but these effects essentially stabilize once the age distribution of fertility rates stabilizes.

Examining data from other countries is useful in selecting a range of ultimate assumptions for the low-cost and high-cost alternatives. Historical TFRs during the period 1980-2012 that were reported to the United Nations are shown for 24 nations in table 1.2. The TFRs for the most recent year shown in the table range from 2.4 in India to 1.3 in Greece, Portugal, and Spain. However, if India is excluded from the comparison, the highest TFR is 2.1 for Mexico and New

[2] See https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51047-SSUpdate.pdf
[3] See http://www.census.gov/population/projections/files/methodology/methodstatement14.pdf

Zealand followed by 2.0 for France and Ireland. Although the TFR in the industrialized countries has been observed at levels as low as the 1.2 to 1.5 range, the cultural and economic climate in the U.S. makes it highly unlikely that our TFR will go to the level of 1.7 achieved in 1976 for any sustained period. Thus, the Trustees assume an ultimate TFR for the high-cost scenario of 1.8 children per woman. Using the range of past experience for the United States and other nations as a guide, the Trustees assume an ultimate TFR for the low-cost scenario of 2.2 children per woman.

For the intermediate alternative, the Trustees assume the ultimate TFR is reached in the 4th year from the post-recession peak TFR year of 2023. For the low-cost alternative, the Trustees assume the ultimate TFR is reached in 2024 and for the high-cost alternative, the Trustees assume the ultimate TFR is reached in 2032. In the 2015 Trustees Report, the ultimate TFRs were reached in 2023, 2027, and 2032 for the low-cost, intermediate, and high-cost alternatives, respectively.

For the intermediate assumptions, the Trustees assume the TFR:

- Increases over the period from 2015 through 2023, consistent with the economic recovery;
- Reaches 2.05 in 2023, which is approximately the average TFR from 2000 through 2005, and
- Decreases linearly after 2023, reaching the ultimate TFR of 2.0 in 2027.

For the low-cost and high-cost alternatives, the Trustees assume the paths of the TFRs gradually grade away from the intermediate alternative path until 2023 and then linearly grade to the ultimate TFRs in 2024 and 2032, respectively. Chart 1.3 shows the historical path of the TFR starting in 1941 and the projected paths of the TFRs for all three alternatives.

Examining the TFR by birth cohort is also a useful tool in evaluating an ultimate assumption. As shown in chart 1.4, the cohort TFR varies much less than the annual TFRs shown in chart 1.3. Chart 1.4 also shows that the cohort TFR has been near or greater than 2.0 for all cohorts who have finished their childbearing years. The most recent cohorts that just completed their childbearing years show an upward trend in their TFR. The intermediate path continues that trend before eventually coming back down to the ultimate assumption of 2.0.

Table 1.1: Past and Projected Total Fertility Rates for the United States

Calendar Year	2016 Trustees Report	2015 Trustees Report
1920	3.263	3.263
1930	2.533	2.533
1940	2.229	2.229
1950	3.028	3.028
1960	3.606	3.606
1965	2.882	2.882
1970	2.432	2.432
1975	1.770	1.770
1980	1.820	1.820
1985	1.835	1.835
1990	2.069	2.069
1991	2.057	2.057
1992	2.043	2.043
1993	2.018	2.018
1994	2.002	2.002
1995	1.981	1.981
1996	1.980	1.980
1997	1.974	1.974
1998	2.002	2.002
1999	2.008	2.008
2000	2.054	2.054
2001	2.032	2.032
2002	2.025	2.025
2003	2.055	2.055
2004	2.059	2.059
2005	2.062	2.062
2006	2.112	2.112
2007	2.123	2.123
2008	2.074	2.074
2009	2.002	2.002
2010	1.925	1.926
2011	1.889	1.891
2012	1.874	1.877
2013	1.849	1.870 [1]
2014	1.862	1.884 [2]
Alternative I:		
2015	1.886	1.921
2020	2.091	2.128
2025	2.200	2.200
2030	2.200	2.200
2035	2.200	2.200
2040 +	2.200	2.200
Alternative II:		
2015	1.871	1.906
2020	1.998	2.036
2025	2.025	2.026
2030	2.000	2.000
2035	2.000	2.000
2040 +	2.000	2.000
Alternative III:		
2015	1.855	1.890
2020	1.906	1.943
2025	1.887	1.899
2030	1.825	1.828
2035	1.800	1.800
2040 +	1.800	1.800

[1] Preliminary

[2] Estimated

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Table 1.2: Historical Total Fertility Rates, by Country
1980 - 2012

Country	1980	1985	1990	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Most Recent TFR
Australia	1.9	1.9	1.9	1.7	1.8	1.7	1.8	1.8	1.8	1.9	2.0	2.0	2.0	1.9	1.9	1.9
Austria	1.7	1.5	1.5	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Belgium	1.7	1.6	1.6	—	—	—	—	—	—	1.8	—	—	1.8	1.8	—	1.8
Canada [1]	1.7	1.6	1.8	1.5	1.5	1.5	1.5	1.5	1.6	1.7	1.7	1.7	1.6	1.6	—	1.6
China	2.2	2.2	2.3	—	—	—	—	—	—	—	—	—	—	—	—	1.8
Denmark	1.5	1.4	1.7	1.7	1.7	1.8	1.8	1.8	1.9	1.8	1.9	1.8	1.9	1.8	1.7	1.7
Finland	1.6	1.6	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.9	1.9	1.8	1.8	1.8
France	2.0	1.8	1.8	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	—	2.0	2.0	2.0	2.0
Germany	1.5	1.4	1.3	1.3	1.3	1.3	1.4	1.3	1.3	1.4	1.4	—	1.4	1.4	—	1.4
Greece	2.2	1.5	1.4	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.5	1.4	1.3	1.3
India	4.4	4.3	3.8	3.1	3.0	3.0	2.9	2.9	2.8	2.7	2.6	2.6	2.5	2.4	2.4	2.4
Ireland	3.2	2.5	2.2	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.1	2.1	2.1	2.0	2.0	2.0
Italy	1.6	1.4	1.4	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Japan	1.7	1.7	1.5	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4	1.4	1.4
Mexico [2]	3.1	3.3	3.7	2.5	2.3	2.3	2.2	2.2	2.2	2.1	2.1	—	—	—	—	2.1
Netherlands	1.6	1.5	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.7	1.7
New Zealand	2.0	1.9	2.2	2.0	1.9	1.9	2.0	2.0	2.0	2.2	2.2	2.1	2.1	2.1	2.1	2.1
Norway	1.7	1.7	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0	1.9	1.9	1.9
Portugal	2.1	1.7	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.4	1.3	1.4	1.4	1.3	1.3
Spain	1.9	1.6	1.3	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.4	1.4	1.3	1.3	1.3
Sweden	1.7	1.7	2.1	1.6	1.7	1.7	1.8	1.8	1.9	1.9	1.9	1.9	2.0	1.9	1.9	1.9
Switzerland	1.5	1.5	1.6	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.5	1.5	—	1.5	1.5
United Kingdom	1.8	1.8	1.8	1.6	1.6	1.7	1.8	1.8	1.8	1.9	2.0	—	—	1.9	1.9	1.9
United States [3]	1.8	1.8	2.1	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1	2.0	1.9	1.9	1.9	1.9

[1] Estimates for Canada from Statistics Canada website for 2010 and 2011

[2] Estimate for Mexico (from INEGI website) for 1999 -- 2.9

[3] Estimates for the U.S. from NCHS NVSR 64-01

Source: United Nations Demographic Yearbook Historical Supplement 1948-1997
United Nations Demographic Yearbook Fertility Supplement 1980-1999
United Nations Demographic Yearbooks 2000 - 2013

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Chart 1.1: Historical Total Fertility Rates for the United States

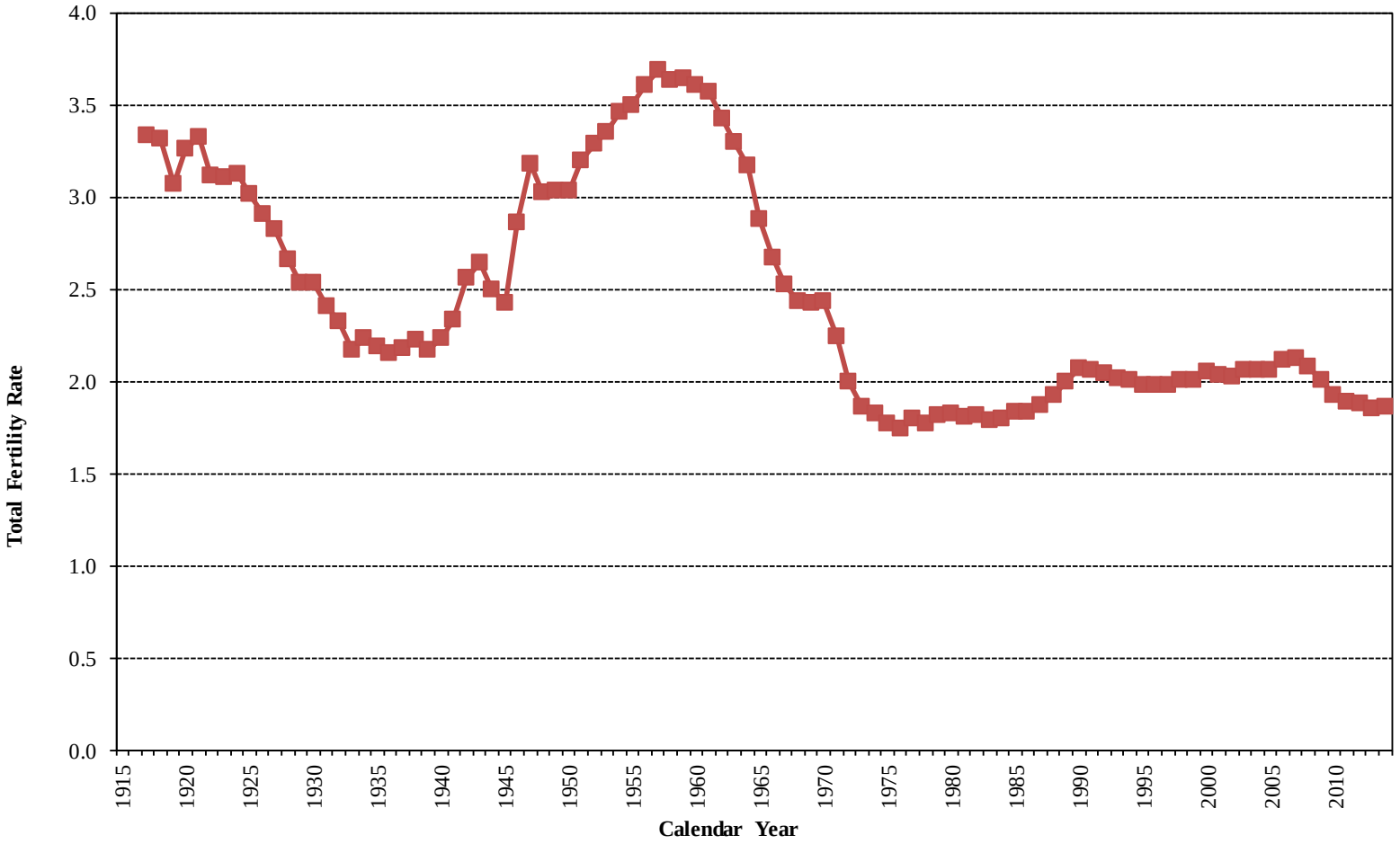

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Chart 1.2: Central Birth Rates for Five Year Age Groups: Historical and Alternative II Projection

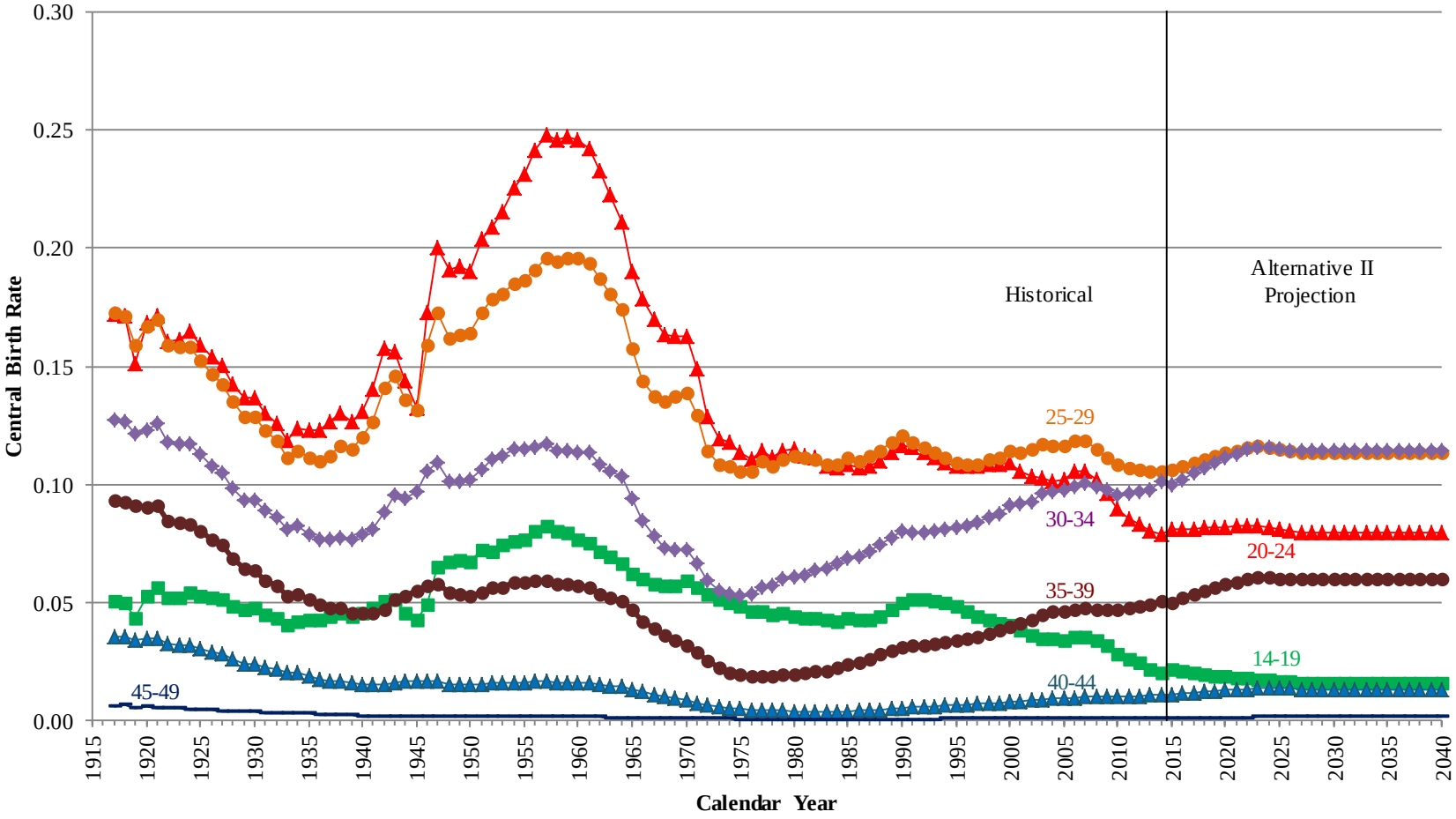

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Chart 1.3: Historical and Projected Total Fertility Rates

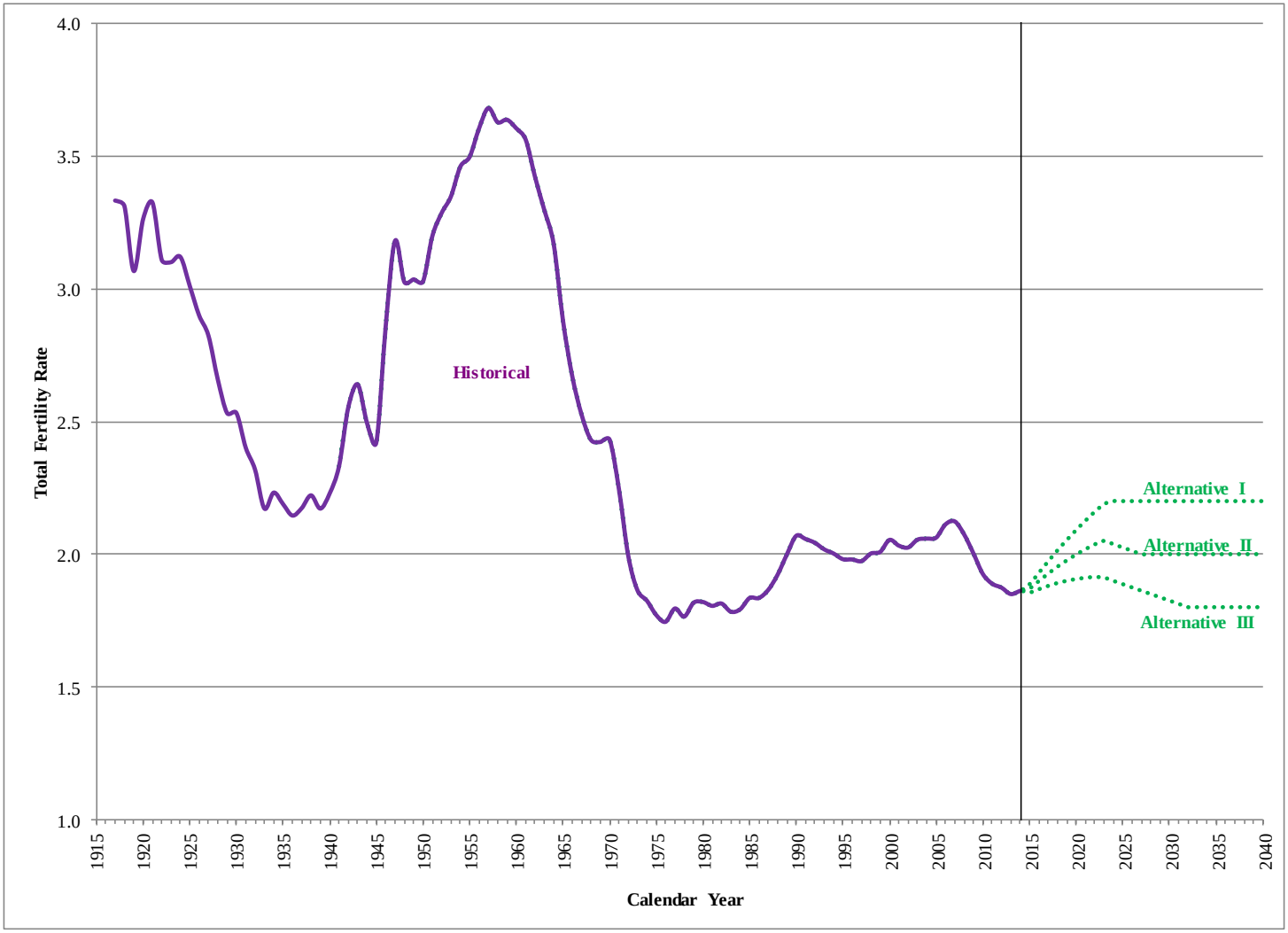

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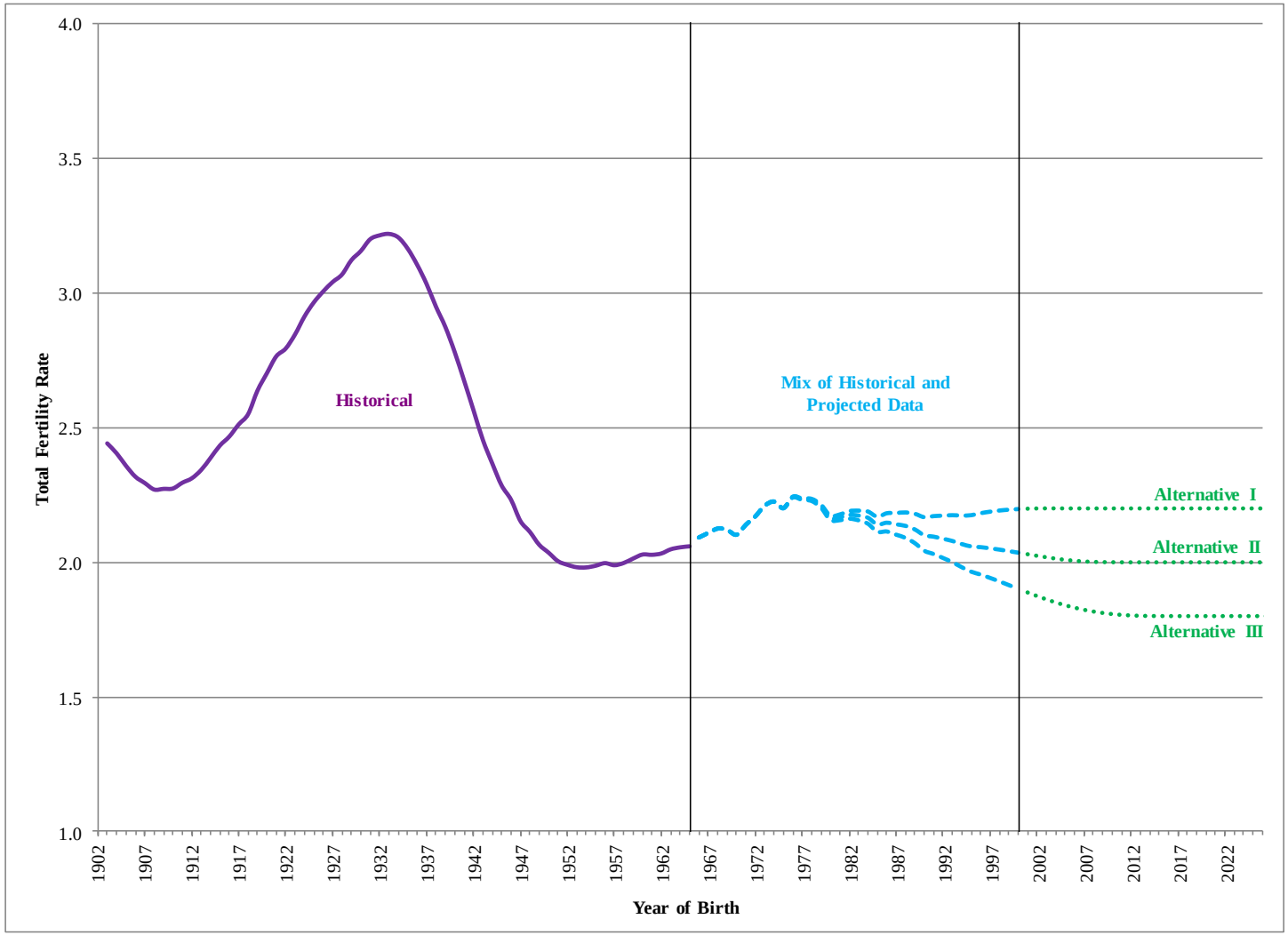
Chart 1.4: Historical and Projected Total Fertility Rates by Birth Cohort



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2. MORTALITY

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2.1 Summary

For the 2016 Trustees Report, the ultimate annual rates of mortality reduction by age and cause of death remain the same as those used in the 2015 Trustees Report. The ultimate rates of reduction apply fully for years after 2039 in the projection.

Under the intermediate assumptions, projected age-sex-adjusted death rates are, in general, slightly higher than the death rates in last year's report due to the addition of final data for 2012 (both NCHS and Medicare), NCHS final data for 2013, and preliminary Medicare data for 2013. The additional data result in lower projected death rates for the younger age groups (i.e., under age 50), and higher projected death rates for the older age groups (i.e., age 50 and older).

This year, we changed the years over which we grade in from the starting rate of improvement (i.e., the average over the last 10 years) to the ultimate rate of improvement. For prior Trustees Reports, we began the grade in from the Trustees Report year until the ultimate was reached in the 25th projection year. However, the starting rate of improvement was used for all years after the last data year and before the Trustees Report year. For the 2016 Trustees Report, we have started the grade in to the ultimate in the year after the last data year, and still reach the ultimate in the 25th year of the projection period.

The new method of grading in to the ultimate rates of improvement results in an increase (improvement) in the long-range actuarial balance, under the intermediate set of assumptions, of about 0.04 percent of taxable payroll. Incorporating the new data results in an additional increase (improvement) in the long-range actuarial balance, under the intermediate set of assumptions, of about 0.03 percent of taxable payroll.

The low-cost and high-cost alternative ultimate rates of improvement are set as percentages of the intermediate alternative rates and, as such, are not displayed separately in the tables. Male and female ultimate rates of improvement have been set equal to each other, but are displayed separately for comparing to historical values.

2.2 Considerations in Selecting Mortality Assumptions

Projections of mortality improvement are subject to uncertainty that is possibly greater than any other variable used in Trustees' assumptions. Some demographers argue that life expectancy is potentially limitless and that rates of mortality reduction will increase substantially in the future. Others believe that mortality improvement will be substantially more difficult to achieve in the future, and that rates of reduction will diminish rapidly.

Lee and Carter have suggested that, in the face of such uncertainty, a prudent choice for future rates of mortality improvement might be to assume a continuation of the average trends experienced over a long historical period. Key to this approach is the selection of the "appropriate" historical period to be used in determining the annual projected levels of mortality reduction. For many years, Lee and Carter suggested using the period starting with 1900. More recently, Lee and Carter have suggested a period about half as long, starting with 1950, which would result in somewhat faster projected rates of mortality improvement. If a period twice as

long were to be used (1800-2000), then the rates of reduction would be substantially less. Relative to the entire period of existence of humankind, the twentieth century was a time of exceptionally rapid mortality decline.

Using extrapolation of the average trends experienced for the past century (or for any other period) to project future mortality presumes that there will be constancy to these rates of change in the future that has not occurred in the past. We believe it is crucial to study not only the differing historical rates of decline for various periods, but also the conditions that contributed to these variations. Only after considering how future conditions will differ from the past can we speculate about future mortality improvement.

A number of extremely important developments have contributed to the generally rapid overall rate of mortality improvement during the past century. These developments include:

- Access to primary medical care for the general population (in particular, the access due to Medicare and Medicaid health coverage for the elderly, disabled, and poor),
- Discovery of and general availability of antibiotics and immunizations,
- Clean water supply and waste removal, and
- The rapid rate of growth in the general standard of living.

Each of these developments is expected to make a substantially smaller contribution to annual rates of mortality improvement in the future.

Future reductions in mortality will depend upon such factors as:

- The development and application of new diagnostic, surgical, and life-sustaining techniques,
- The rate of future increase in health spending and the efficiency of that spending relative to mortality improvement,
- The presence of environmental pollutants,
- Changes in amount and type of physical activity,
- Improvements in nutrition,
- The incidence of violence and suicide,
- The isolation and treatment of causes of disease,
- The emergence of new forms of disease,
- The evolution of existing forms of disease,
- Improvements in prenatal care,
- The prevalence of obesity,
- The prevalence of cigarette smoking,
- The misuse of drugs (including alcohol),
- The extent to which people assume responsibility for their own health,
- Education regarding health, and
- Changes in our perception of the value of life.

In reviewing the above list, future progress for some factors seems questionable when recent statistics are considered. Recent National Center for Health Statistics (NCHS) releases have reported a substantial increase in the prevalence of obesity and diabetes, decreased environmental air quality, and an increase in negative side effects from invasive surgical

procedures. On the other hand, there is good basis for speculation that there will be substantial breakthroughs in advancing medical technology and treatment in the future. The extent to which such new technologies will have purely positive effects (like improved sanitation) versus mixed effects (as in the case of chemotherapy) will determine their potential for improving mortality. A fundamental consideration, however, is the ability and willingness of our society to pay for the development of new treatments and technologies, and to provide these to the population as a whole.

Can we expect future economic growth to continue to have as much impact on medical advances and mortality improvement as it had during 1900-2013? For the intermediate assumptions, economic projections for productivity and real wage growth are similar to the historical experience during 1900-2013. However, the rate of future increases in medical spending as a percent of GDP is assumed to be slower than in recent decades. Thus, a slower real rate of increase in medical spending projected for the future would be consistent with assuming that the rate of future improvement in mortality will be somewhat lower than the average rate during 1900-2013.

Education and income are factors that are well correlated with mortality differences in the population. More education and higher income are associated with lower mortality. It is not entirely clear whether this correlation is largely due to the benefits of higher income and education, or to the "selection" of more advantaged (and thus healthier) individuals in gaining access to the best education and job opportunities. If the former factor is important, then increasing education and income for the population as a whole may provide some further benefits, but substantially less than in the past.

Future progress in treatment of currently predominant diseases is contingent on the availability of funding, research outcomes, society's views on moral issues, and education about lifestyle choices that affect one's health. Quality of life and years of healthy living are improving on a continual basis. Once fatal diseases are being controlled or cured. Education and awareness of healthy living allows persons to continue enjoying low morbidity far longer than previous generations. As this trend continues, the rates of mortality improvement for older ages will gradually approach the rates of improvements for younger ages. Future medical breakthroughs will cause today's predominant causes of death to become less dominant through continued research and education. This rapid reduction of today's most common causes of death will result in other causes, which have slower rates of improvement or have not yet emerged, becoming the predominant causes. Due to this, many causes of death that have recently had rapid rates of reduction will have slower rates in the future. Similarly, causes that have recently had slower rates of improvement will likely have more rapid rates in the future.

Finally, we must consider that improvements in mortality and extension of longevity through the last century were relatively unconstrained by limitations of senescence and gradual deterioration of body systems. While we do not subscribe to the notion that there is a fixed limit for human longevity, it is true that average human lifespan has improved more than the maximum observed lifespan. This suggests that even with continued technological advances, the inherent limitations of the physical body and the mind to endure successfully past 110 years will gradually result in a

decelerating force of mortality improvement. This maximum observed lifespan can be expected to continue increasing, but only at a very modest pace.

2.3 Trustees' Assumptions versus Historical Trends and Other Assumptions

Table 2.1 shows average rates of reduction in mortality for three broad age groups over two historical periods. In addition, the table includes the following ultimate rates of reductions (the rate of reduction in mortality averaged over the last 50 years of the 75-year long-range period):

- Those for the intermediate ultimate assumptions for various Trustees reports (choosing those reports that included changes in the ultimate assumptions or in the methodology),
- Those recommended by various Technical Panels, and
- Those resulting from a survey taken at a Society of Actuaries (SOA) seminar.

Rates of improvement shown on the first page of table 2.1 reflect age-sex adjustment to the distribution of the 1990 U.S. population; those on the second page use the distribution of the 2000 U.S. population; and those on the third page use the distribution of the 2010 U.S. population. As seen by comparing the rates on the first and second pages in table 2.1 under the intermediate assumptions of the 2002 and the 2004 Trustees Reports (for which ultimate rates of improvement were the same), the difference in using the different populations for age-sex adjusting makes little difference in the *ultimate average rates* by the broad age groups. This conclusion is further supported by comparing the rates from the 2013 Trustees Report using two different populations for age-sex adjusting, as shown on the second and third pages in table 2.1. For presentations other than table 2.1 of this memorandum, rates of improvement are presented with age-sex adjustment to the distribution of the 2010 U.S. population.

Table 2.1 provides the ultimate average annual percent reductions in mortality for the intermediate assumptions of the 1999, 2000, 2002, 2004, 2008, 2009, 2011, 2013, and 2016 Trustees Reports. The 1999 and 2000 Trustees Reports are included because ultimate annual percent reductions were increased substantially in the 2000 Trustees Report. The 2002 Trustees Report is included because changes in methodology were made that resulted in increased ultimate annual percent reductions. The 2004 Trustees Report is included to provide comparability in the results using a different population for the purpose of age-sex adjustment. The 2008 and 2009 Trustees Reports are included because ultimate annual percent reductions were revised. The 2011 Trustees Report is included because changes in methodology were made that put more emphasis on the recent historical data. The 2013 Trustees Report values are shown on both the second and third pages of the table to compare results using different populations for age-sex adjustment.

Also included in table 2.1 are the ultimate annual percent reductions in mortality recommended by the 1994-96, 1999, 2003, 2007, 2011, and 2015 Technical Panels and the median response from actuaries, demographers, biologists, and economists who participated in the 1997 Society of Actuaries Seminar. Focusing on mortality for ages 65 and over, it should be noted that since 2000, the Trustees' intermediate assumptions have provided for an ultimate rate of reduction that is somewhat less than the average experienced since 1900. While the 1999 Technical Panel recommended significantly faster ultimate rates of reduction, the 2003 Panel suggested rates of reduction closer to the Trustees' assumptions. In addition, the improvement suggested by the 2003 Panel would be even closer to the Trustees' assumptions if the deceleration they envisioned

were assumed to occur more uniformly in the future, rather than just starting after 75 years. The 2007 Technical Panel recommended faster improvement than what has been assumed by the Trustees, and recommended using the experience since 1950 as the primary basis for setting the rates of improvement. The 2011 Technical Panel recommended targeting 88.7 years of life expectancy at birth in 2085, which implied a considerably faster ultimate rate of improvement. The 2015 Technical panel recommended an overall rate of improvement of 1.0 percent. A further analysis of the recommendations of previous technical panels is presented later in this report.

Comparisons of historical and projected rates of improvement are included in table 2.2. All rates of improvement shown in this table reflect age-sex adjustment[1] to the distribution of the 2010 United States population. For the age group 65 and over (where mortality is concentrated), the rate of improvement experienced during 1900-2013 averaged 0.81 percent. In the most recent two sub-periods, there has been both a period of fast improvement (1.78 percent per year for 1999 through 2009) and a period of slow improvement (0.48 percent per year for 2009 through 2013). In fact, mortality at ages 65 and over generally improved at about 0.51 percent per year, or less, during 1900-2013 with the exception of three notable periods. The first was for the World War II period and subsequent years, 1936-1954. During this time frame, dramatic advances in the standard of living were achieved due to expanded medical practice including the introduction of antibiotics. The second period was from 1968-1982, during which additional dramatic advancements in medicine were made and access to medical services was greatly expanded through Medicare and Medicaid for the old, frail, and disadvantaged, those who account for the vast majority of deaths in the population. During the third period, 1999-2009, advances in medicines and surgical treatments led to rapid improvements. Cancer and cardiovascular patients especially benefitted from these advancements.

Chart 2.1 displays the annual age-sex-adjusted central death rates experienced since 1900. An examination of these rates reveals a sequence of distinct periods of mortality reduction. Table 2.2 provides average annual rates of reduction[2] for these periods. During the period 1900-1936, annual mortality reduction averaged about 0.7 percent for males and 0.8 percent for females. During the following period, 1936-1954, there was more rapid reduction (with the help of antibiotics and other medical advances), averaging 1.5 percent per year for males and 2.3 percent per year for females. The period 1954-1968 saw a much slower reduction of 0.7 percent per year for females and an increase of 0.3 percent per year for males. From 1968 through 1982, the rate of reduction in mortality surged (with the help of Medicare and Medicaid), averaging 1.8 percent for males and 2.1 percent for females, annually. From 1982 to 1999, moderately slow reduction in mortality returned, averaging 0.9 percent per year for males and 0.4 percent per year for females. From 1999 to 2009, another more rapid period occurred, averaging 1.8 percent per year for males and 1.4 percent per year for females, annually. The latest period, 2009-2013, has

[1] The age-sex-adjusted death rate is the crude rate that would occur in the enumerated total population as of April 1, 2010, if that population were to experience the death rates by age and sex observed in, or projected for, the selected year.

[2] Average annual reductions were calculated as the complement of the exponential of the slope of the least-square line through the logarithms of the central death rates. The rates for the period 1900-2013 are a weighted average of the rates shown for the seven distinct periods of change.

mortality reduction slowing with average mortality improvement of 0.6 percent per year for males and 0.3 percent per year for females.

For the first four periods mentioned above, spanning 1900 through 1982, the average annual rate of improvement for males was less than that for females. For the last three periods, spanning 1982 through 2013, the opposite was true, i.e., the average annual rate of improvement for females was less than that for males. Chart 2.2 shows differences between male and female annual rates of mortality improvement for the age group 65 and older for each year of the period 1969 through 2013. Differences are shown for rates based on Medicare data. Even with normal year-to-year variation, improvement was generally greater for females until about 1980, as had been the case since the beginning of the past century. However, female improvement was generally less than or equal to that for males beginning about 1980.

2.4 Past Experience by Cause of Death

In the past, the reduction of mortality rates has varied greatly by cause of death. In assessing experience and future possible improvement in mortality, we believe it is useful to understand the variations in mortality by cause of death. For the period 1979-2013, we analyzed average annual reductions in central death rates by age group and sex for four major groups of causes of death, and a residual group (Other) that contains all other causes (see table 2.3). For all ages combined, the largest rate of reduction was in the category of Cardiovascular Disease, which has been about 2.7 percent for males and about 2.4 percent for females. The rate of reduction for Cancer has been about 0.9 percent per year for males and about 0.5 percent per year for females. The category of Violence, which includes accidents, averaged about 0.6 percent reduction for males, but an *increase* in mortality of about 0.1 percent for females. The Respiratory Diseases category averaged about 0.3 percent reduction for males and about 1.6 percent *increase* for females. The Other Causes category averaged *increases* in mortality of about 0.8 and 1.6 percent per year for males and females, respectively.

2.5 Recommendations of the Previous Technical Panels and Other Projections

The 2015 Technical Panel appointed by the Social Security Advisory Board recommended substantially larger rates of decline than those assumed under the 2015 Trustees Report. Their recommendation was for an assumption of an overall 1.00 percent annual reduction in death rates compared to 0.71 percent for the 2015 Trustees Report. However, they supported having an age gradient (i.e., having the rates of improvement at younger ages be greater than rates of improvement at the older ages) and using cause-specific assumptions. Their 1.00 percent annual reduction recommendation was based on the average rate of reduction in the total population (all ages and causes combined) observed for the period since 1950.

The 2011 Technical Panel recommended an increase in life expectancy at birth that was consistent with generally larger rates of mortality reduction than those assumed under the 2011 Trustees Report. Their recommendation was for reductions in mortality that would result in a life expectancy at birth of 88.7 in 2085. This is consistent with having an annual 1.26 percent reduction in death rates for all ages and both sexes. This is a large increase over the recommendation of the 2007 Technical Panel.

The 2007 Technical Panel recommended generally larger rates of decline than those assumed under the 2007 Trustees Report. Their recommendation was for an assumption of 1.0 percent annual reduction in death rates for all ages and both sexes. Their recommendation was based on the average rate of reduction in the total population (all ages combined) observed for the period 1953-2003.

We feel that the approach of the 2007 and 2011 Technical Panels fails to take into account significant deviations in the rates of reduction by age groups as evidenced by the data shown in tables 2.2 and 2.3. The rates of reduction at younger ages have been much larger than the rates experienced at older ages. While we agree that differences by age will diminish in the future, we do not believe they will vanish.

The 2007 and 2011 Technical Panels' recommendations stand in stark contrast to that of the 2003 Technical Panel, which recommended using the rates of reduction by age and year as indicated in the table below. For rates of reduction for years between 2002 and 2012, the given rates of reduction are interpolated between these two years. Similarly, for each year, age-specific rates are interpolated between the ages given in the table. The 2003 Technical Panel also recommended that there be no differentiation between males and females.

2003 Technical Panel Assumed Ranges of Mortality Decline By Age		
Exact Age	**Initial 2000-2002**	**Ultimate 2012-2077**
0	2.84	2.50
20	1.16	1.11
75	1.16	1.11
95	-0.48	0.64
122.5	-0.48	0.00

A key finding of the 2003 Technical Panel was their recognition of the likelihood that mortality improvement will decelerate in the future. This general concept is entirely consistent with the assumptions used in the Trustees Reports for decades. However, the panel's approach was somewhat awkward. While they assumed deceleration for ages up to about 80 through 2012, they assumed no deceleration between 2012 and 2077. After 2077 though, the 2003 Panel assumed all rates of decline would decelerate to the point of having *no* further decline in mortality after around 2200. We believe that the Trustees' assumptions present a superior approach compared to the approach recommended by the 2003 Technical Panel. Through the use of different death rates by cause, the Trustees' assumptions resulted in a steady deceleration at a very slow pace, which continued throughout the 75-year period and indefinitely thereafter, and approached rates of decline that are about one-third the rates assumed for the earlier portion of the projection period (rather than reaching zero decline by 2200).

The Congressional Budget Office assumed mortality rates will decrease by 1.17 percent per year for all ages and both sexes in their 2014 publication. This results in a life expectancy at birth of

85.2 years in 2060.[3] Comparing with Census, the assumed mortality rates in the 2014 National Population Projections result in a life expectancy at birth of 85.6 in 2060.[4]

2.6 Assumed Future Rates of Reduction

Table 2.4 provides age-sex-adjusted mortality rates for historical years and projected years. For the 2016 Trustees Report, the base year for the mortality projections is 2013. The age-sex-adjusted mortality rates presented in table 2.4 use the 2010 Census resident population as the standard population for the age-sex adjustment.

Instead of using the measured mortality rates for the last single year of data (calendar year 2013) as the starting point of the mortality projections, we use mortality rates calculated to be consistent with the trend inherent in the last 12 years of available data. The last 12 years of data are 2002-2013 for all ages. This approach reduces the impact of wide fluctuations that tend to occur in annual data on the starting levels used for the mortality projection.

Because reductions in mortality have differed widely by age in the past, the ultimate reductions in death rates vary by age group. Historically, reductions have been very rapid at the youngest ages. However, reductions at the highest ages, ages 85 and over, have been very slow. The Trustees' assumptions, for many years, have reflected the belief that neither of these extremes will persist indefinitely into the future. The Trustees' have assumed slower improvement at the youngest ages than evidenced since 1900 and faster improvement at the highest ages (85 and over) than experienced historically. While this "compression" of rates of mortality improvement is in conflict with a literal interpretation of the Lee and Carter method, it was nevertheless endorsed explicitly by the 1999 Technical Panel, where Ron Lee was the principal demographer on the panel.

Rates of improvement in mortality by cause of death have long played a role in the projection of ultimate mortality improvement for the Trustees Reports. These rates of improvement by cause of death (see table 2.3) serve as an important basis for analysis relative to past trends and for an initial assessment of potential future mortality improvement. Rates of improvement by cause provide a useful, even if sometimes indirect, basis for analysis of past effects for specific behavioral and health trends, like the evolution of heart disease and cancer over time. Data specific to behavioral aspects like diet, exercise, stress, and smoking, for example, are not directly applicable death rate trends. Trends in death rates by cause serve as proxy for linking these behaviors to death rates.

The averaging period for determining starting levels of annual mortality reduction is 10 years. Average annual reductions observed for the period 2003-2013 are calculated by age group, sex, and cause. These average annual reductions are set to be the starting level. For the 2015 Trustees Report, mortality rates for years prior to 2015 were estimated by using the starting level of the rate of improvement. Beginning in 2015, the rate of improvement graded in to the ultimate. For the 2016 report, the rate of improvement begins grading in immediately after the last year of data. The reductions in mortality are assumed to change rapidly from the starting

[3] See http://www.cbo.gov/sites/default/files/45471-Long-TermBudgetOutlook_7-29.pdf
[4] See Table 17 at http://www.census.gov/population/projections/data/national/2014/summarytables.html

levels[5] of average annual reductions to the ultimate rates of reduction for years 2040 and later. Under the low-cost and high-cost scenarios, the starting levels of average annual reduction are 50 percent and 150 percent,[6] respectively, of the starting levels for the intermediate assumptions.

The ultimate rates of improvement in the low-cost and high-cost alternatives are a ratio of the intermediate alternative, with low-cost being 1/2 of the intermediate rates of improvement and the high-cost being 5/3 of the intermediate rates. The ultimate average annual percentage reductions by age group and cause of death for the intermediate alternative of the 2016 Trustees Report are presented in table 2.3, along with the intermediate assumptions from the 2015 Trustees Report, and the average rates experienced during the periods 1979-2013 and 2003-2013.

Table 2.2 shows historical rates of improvement and the projected rates of improvement by alternative for the 2016 Trustees Report, summarized by age group and sex. For the intermediate alternative, projected rates of improvement for ages under 50 are generally lower than those experienced over the period 1900-2013, consistent with our expectation of continued generally slower improvement in the future for these age groups. For males age 50 and older, the average projected rates of improvement for years after 2013 are slightly higher than those experienced since 1900. The projected rates of improvement for women age 50 and older are slightly lower than those for men and generally lower than the rates experienced by this group of women over the period 1900-2013. This is consistent with our long-held belief that average rates of mortality improvement for women, which had been faster than for men until around 1980, would ultimately converge with male improvement rates. Evidence that improvement for females will not always be faster than for males is apparent in data for years since 1980. The rate of improvement in mortality for women age 65 and older averaged only 0.48 percent per year during the period 1979-2013. This amount was a little less than half the average rate of improvement for aged men during this period (1.10 percent).

Table 2.2 also shows that, for all ages combined, the rate of improvement under the intermediate alternative for the period 2040-2090 is 0.74 percent per year for men and 0.69 percent per year for women. The ultimate rates of improvement in the 2015 Trustees Report were 0.73 and 0.68 percent per year for males and females, respectively.

A comparison of the basis for past improvement in mortality with the expected basis for future improvement suggests that future improvement is likely to continue, but at a generally slower rate than experienced during the extraordinary 1900-2013 period for ages under 65. It seems more reasonable to expect the rate of mortality improvement for the age group 65 and older for the next 75 years to be slightly slower compared to that experienced during 1900-2013 (0.81 percent as shown in table 2.2). The trustees believe the average annual rate of decline of 0.69 percent (as shown in table 2.2) over the period 2013-2090 for the intermediate assumption is reasonable in this context.

[5] If the starting level of annual reductions for a particular cause age-sex group is negative, then 75 percent of that starting level is assumed for the intermediate alternative.

[6] If the starting level of annual reductions for a particular cause age-sex group is negative, then 100 percent of that starting level is assumed for the low-cost alternative and 50 percent is assumed for the high-cost alternative.

Table 2.1: Historical and Projected Rates of Reduction in Mortality[1]

(Using the 1990 Census Resident population as the standard population for age-sex adjusting)

	Historical average annual percent reductions in age-sex-adjusted death rates		Assumed ultimate annual percent reductions in age-sex-adjusted death rates						
	1900-2000	1982-2000	1999 Trustees Alternative 2[2]	1994-96 Technical Panel[3]	October-97 SOA Seminar[4]	1999 Technical Panel[5]	2000 Trustees Alternative 2[6]	2002 Trustees Alternative 2[7]	2003 Technical Panel[8]
0 - 14	3.30	2.74	1.20	3.30	0.95	2.20	1.35	1.55	2.33
15 - 64	1.44	1.15	0.57	1.40	0.75	1.12	0.75	0.78	1.11
65 & Over	0.73	0.49	0.50	0.75	0.60	0.98	0.65	0.70	0.92

[1]Rates of reduction are the average of male and female annual rates of decline in age-adjusted central death rates. The rates for the period 1900-2000 are a weighted average of rates for five separate distinct periods of change.

[2]The 1999 Trustees ultimate intermediate assumptions are for the period 2023-2073.

[3]The 1994-96 Technical Panel (appointed by the Advisory Council) recommended assuming reduction at the average rate experienced during the century.

[4]The Society of Actuaries Seminar included 60 actuaries, demographers, economists, and other experts on Social Security financing. Values shown are the median responses of the participants.

[5]The 1999 Technical Panel (appointed by the Advisory Board) recommended that ultimate rate of reduction in mortality be increased at all ages (over the 1999 TR assumptions) by enough to increase the projected life expectancy at birth for 2070 by 3.7 years (to the level assumed for the high-cost alternative).

[6]The 2000 Trustees ultimate intermediate assumptions are for the period 2024-2074. Ultimate rates of mortality reduction increased.

[7]The 2002 Trustees ultimate intermediate assumptions are for the period 2026-2076. Changes to projection methodology increased rates of mortality reduction.

[8]The 2003 Technical Panel ultimate assumptions are for the period 2027-2077.

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Table 2.1 (Continued): Historical and Projected Rates of Reduction in Mortality[1]

(Using the 2000 Census Resident population as the standard population for age-sex adjusting)

	Historical average annual percent reductions in age-sex-adjusted death rates		Assumed ultimate annual percent reductions in age-sex-adjusted death rates						
	1900-2009	1982-2009	2004 Trustees Alternative 2[2]	2007 Technical Panel[3]	2008 Trustees Alternative 2[4]	2009 Trustees Alternative 2[5]	2011 Trustees Alternative 2[6]	2011 Technical Panel[7]	2013 Trustees Alternative 2[8]
0 - 14	3.15	2.34	1.55	1.00	1.57	1.55	1.56	1.26	1.57
15 - 64	1.38	1.25	0.78	1.00	1.00	0.99	0.96	1.26	0.98
65 & Over	0.79	0.77	0.69	1.00	0.65	0.71	0.66	1.26	0.64

[1]Rates of reduction are the average of male and female annual rates of decline in age-adjusted central death rates. The rates for the period 1900-2009 are a weighted average of rates for five separate distinct periods of change.

[2]The 2004 Trustees ultimate intermediate assumptions are for the period 2028-2078.

[3]The 2007 Technical Panel ultimate assumptions are for the period 2031-2081.

[4]The 2008 Trustees ultimate intermediate assumptions are for the period 2032-2082.

[5]The 2009 Trustees ultimate intermediate assumptions are for the period 2033-2083.

[6]The 2011 Trustees ultimate intermediate assumptions are for the period 2035-2085.

[7]The 2011 Technical Panel ultimate assumptions are for the period 2035-2085.

[8]The 2013 Trustees ultimate intermediate assumptions are for the period 2037-2087.

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Table 2.1 (Continued): Historical and Projected Rates of Reduction in Mortality[1]

(Using the 2010 Census Resident population as the standard population for age-sex adjusting)

	Historical average annual percent reductions in age-sex-adjusted death rates		Assumed ultimate annual percent reductions in age-sex-adjusted death rates		
	1900-2013	1982-2013	2013 Trustees Alternative 2[2]	2015 Technical Panel[3]	2016 Trustees Alternative 2[4]
0 - 14	3.09	2.28	1.57	2.44	1.56
15 - 64	1.27	1.23	1.00	1.47	1.01
65 & Over	0.81	0.84	0.63	0.86	0.62

[1]Rates of reduction are the average of male and female annual rates of decline in age-adjusted central death rates. The rates for the period 1900-2013 are a weighted average of rates for five separate distinct periods of change.

[2]The 2013 Trustees ultimate intermediate assumptions are for the period 2037-2087.

[3]The 2015 Technical Panel ultimate assumptions are for the period 2039-2089.

[4]The 2016 Trustees ultimate intermediate assumptions are for the period 2040-2090.

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Table 2.2: Average Annual Percent Reductions in Age-Adjusted Central Death Rates: for the 2016 Trustees Report [1]

		Historical Period (last year of final data is 2013)								Intermediate Alternative		
Sex	Age	1900-1936	1936-1954	1954-1968	1968-1982	1982-1999	1999-2009	2009-2013	1900-2013	2013-2040	2013-2090	2040-2090
Male	0-14	2.91	4.79	1.65	4.33	2.91	1.29	2.14	3.07	1.66	1.58	1.54
	15-49	1.46	3.01	-0.25	2.21	0.65	0.80	1.14	1.40	1.00	0.92	0.88
	50-64	0.42	0.96	-0.13	2.28	1.92	1.15	0.02	0.95	1.20	1.12	1.07
	65-84	0.20	1.16	-0.11	1.46	1.25	2.45	1.06	0.86	1.06	0.87	0.77
	85+	0.22	1.21	-0.89	1.56	-0.29	1.53	0.17	0.45	0.63	0.55	0.51
	65+	0.21	1.17	-0.37	1.50	0.70	2.08	0.69	0.71	0.87	0.73	0.65
	Total	0.67	1.49	-0.25	1.78	0.94	1.80	0.63	0.97	0.95	0.81	0.74
Female	0-14	3.14	5.06	1.72	4.15	2.63	1.12	2.15	3.11	1.65	1.60	1.58
	15-49	1.53	4.68	0.28	2.91	0.59	0.26	0.92	1.79	1.00	0.96	0.95
	50-64	0.71	2.57	0.76	1.72	1.09	1.46	0.09	1.24	1.19	1.11	1.07
	65-84	0.35	2.05	1.06	2.03	0.47	1.72	0.76	1.07	0.95	0.80	0.72
	85+	0.23	1.21	0.13	2.06	-0.14	1.13	-0.28	0.61	0.58	0.52	0.48
	65+	0.31	1.74	0.69	2.04	0.22	1.46	0.29	0.89	0.77	0.66	0.60
	Total	0.79	2.31	0.70	2.11	0.43	1.38	0.34	1.17	0.86	0.75	0.69
Total	0-14	3.01	4.90	1.68	4.26	2.79	1.22	2.14	3.09	1.65	1.59	1.56
	15-49	1.49	3.69	-0.06	2.44	0.63	0.61	1.06	1.55	1.00	0.94	0.90
	50-64	0.55	1.62	0.19	2.08	1.61	1.27	0.05	1.07	1.19	1.11	1.07
	65-84	0.28	1.60	0.42	1.72	0.92	2.11	0.91	0.97	1.00	0.84	0.74
	85+	0.23	1.21	-0.22	1.86	-0.18	1.30	-0.11	0.55	0.60	0.53	0.49
	65+	0.26	1.46	0.19	1.77	0.51	1.78	0.48	0.81	0.82	0.69	0.62
	Total	0.73	1.88	0.22	1.95	0.75	1.59	0.48	1.07	0.91	0.79	0.72

[1] Using the 2010 Census Resident population as the standard population for age adjusting

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Table 2.2 (Continued): Average Annual Percent Reductions in Age-Adjusted Central Death Rates: for the 2016 Trustees Report [1]

		Low-Cost Alternative			High-Cost Alternative		
Sex	Age	2013-2040	2013-2090	2040-2090	2013-2040	2013-2090	2040-2090
Male	0-14	0.83	0.80	0.78	2.71	2.58	2.51
	15-49	0.50	0.47	0.46	1.62	1.48	1.41
	50-64	0.59	0.59	0.59	1.95	1.71	1.59
	65-84	0.55	0.49	0.45	1.64	1.27	1.07
	85+	0.29	0.28	0.28	1.04	0.85	0.75
	65+	0.44	0.40	0.37	1.38	1.08	0.91
	Total	0.47	0.44	0.42	1.51	1.22	1.06
Female	0-14	0.82	0.81	0.80	2.71	2.62	2.57
	15-49	0.49	0.49	0.49	1.64	1.55	1.51
	50-64	0.59	0.58	0.58	1.93	1.72	1.60
	65-84	0.49	0.44	0.42	1.48	1.17	1.00
	85+	0.24	0.26	0.27	0.97	0.80	0.71
	65+	0.37	0.36	0.35	1.24	0.99	0.85
	Total	0.42	0.40	0.39	1.38	1.13	0.99
Total	0-14	0.83	0.80	0.79	2.71	2.60	2.54
	15-49	0.50	0.48	0.47	1.62	1.51	1.45
	50-64	0.59	0.59	0.59	1.94	1.71	1.59
	65-84	0.52	0.47	0.44	1.56	1.22	1.04
	85+	0.26	0.27	0.27	1.00	0.82	0.72
	65+	0.40	0.38	0.36	1.31	1.03	0.88
	Total	0.45	0.42	0.41	1.45	1.18	1.03

[1]Using the 2010 Census Resident population as the standard population for age adjusting

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Table 2.3: Average Annual Rates of Reduction in Central Death Rates by Age Group, Sex, and Cause

	Historical		Alternative II*		Historical		Alternative II*	
			2015 TR	2016 TR			2015 TR	2016 TR
	1979 to 2013	2003 to 2013	2039 to 2089	2040 to 2090	1979 to 2013	2003 to 2013	2039 to 2089	2040 to 2090
Under Age 15	**Male**				**Female**			
Cardiovascular Disease	2.73	2.08	2.3	2.3	2.63	2.16	2.3	2.3
Cancer	2.37	1.90	1.5	1.5	1.93	1.46	1.5	1.5
Violence	2.84	2.44	1.0	1.0	2.37	2.67	1.0	1.0
Respiratory Disease	2.59	1.50	2.0	2.0	2.62	1.25	2.0	2.0
Other	2.34	2.36	1.7	1.7	2.22	1.98	1.7	1.7
Resulting Total **	2.46	2.32	1.56	1.54	2.26	2.04	1.58	1.58
Ages 15 - 49	**Male**				**Female**			
Cardiovascular Disease	1.99	1.84	1.5	1.5	1.22	1.71	1.5	1.5
Cancer	1.87	2.36	1.5	1.5	1.66	1.80	1.5	1.5
Violence	0.83	0.89	0.7	0.7	0.05	-0.11	0.7	0.7
Respiratory Disease	0.84	0.71	0.5	0.5	-0.21	-0.44	0.5	0.5
Other	0.53	3.08	0.8	0.8	-0.37	1.42	0.8	0.8
Resulting Total **	1.15	1.71	0.88	0.88	0.58	1.04	0.94	0.95
Ages 50 - 64	**Male**				**Female**			
Cardiovascular Disease	3.07	2.09	2.2	2.2	2.65	2.44	2.2	2.2
Cancer	1.64	1.58	1.5	1.5	1.39	1.80	1.5	1.5
Violence	0.09	-2.21	0.5	0.5	-0.57	-3.07	0.5	0.5
Respiratory Disease	1.09	0.11	0.7	0.7	-0.47	-0.13	0.7	0.7
Other	-0.43	-0.42	0.6	0.6	-0.45	-0.14	0.6	0.6
Resulting Total **	1.64	0.83	1.06	1.07	1.15	1.03	1.06	1.07
Ages 65 - 84	**Male**				**Female**			
Cardiovascular Disease	3.25	3.84	2.2	2.2	2.90	4.01	2.2	2.2
Cancer	0.88	1.94	0.9	0.9	-0.02	1.31	0.9	0.9
Violence	0.60	-0.03	0.5	0.5	-0.08	-0.25	0.5	0.5
Respiratory Disease	0.64	1.55	0.3	0.3	-1.95	0.51	0.3	0.3
Other	-0.78	-0.43	0.3	0.3	-1.50	-0.59	0.3	0.3
Resulting Total **	1.59	1.98	0.76	0.77	0.76	1.57	0.71	0.72
Ages 85 and older	**Male**				**Female**			
Cardiovascular Disease	1.71	3.15	1.2	1.2	1.88	3.54	1.2	1.2
Cancer	-0.23	1.22	0.5	0.5	-0.50	0.55	0.5	0.5
Violence	-0.64	-0.43	0.3	0.3	-1.21	-1.83	0.3	0.3
Respiratory Disease	-0.56	2.03	0.2	0.2	-1.76	1.33	0.2	0.2
Other	-2.31	-2.04	0.2	0.2	-3.20	-2.27	0.2	0.2
Resulting Total **	0.30	1.23	0.49	0.51	0.10	0.99	0.47	0.48
Total	**Male**				**Female**			
Cardiovascular Disease	2.65	3.22			2.39	3.56		
Cancer	0.93	1.74			0.47	1.36		
Violence	0.60	0.04			-0.12	-0.83		
Respiratory Disease	0.31	1.57			-1.58	0.69		
Other	-0.84	-0.56			-1.58	-0.96		
Resulting Total **	1.22	1.54	0.73	0.74	0.63	1.26	0.68	0.69

* Alternative 1 is 1/2 times Alternative 2; Alternative 3 is 5/3 times Alternative 2.

**Resulting total represents average annual percent reduction in age-adjusted death rates for the last 50 years of the 75 year projection period.

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Table 2.4: Age-Sex-Adjusted Central Death Rates

(per 100,000 population)

Year	2015 TR	2016TR
1900	2,684.3	2,684.3
1910	2,495.9	2,495.9
1920	2,304.5	2,304.5
1930	2,094.9	2,094.9
1940	1,919.8	1,919.8
1945	1,716.6	1,716.6
1950	1,561.9	1,561.9
1955	1,453.8	1,453.8
1960	1,454.3	1,454.3
1965	1,428.8	1,428.8
1970	1,340.0	1,340.0
1975	1,204.8	1,204.8
1980	1,136.9	1,136.9
1985	1,081.0	1,081.0
1990	1,021.3	1,021.3
1991	1,007.7	1,007.7
1992	992.7	992.7
1993	1,016.4	1,016.4
1994	1,004.1	1,004.1
1995	1,001.5	1,001.5
1996	987.8	987.8
1997	971.9	971.9
1998	963.8	963.8
1999	970.6	970.6
2000	960.7	960.7
2001	951.1	951.1
2002	947.0	947.0
2003	933.4	933.4
2004	898.9	898.9
2005	901.3	901.3
2006	876.1	876.1
2007	856.8	856.8
2008	857.0	857.0
2009	827.1	827.1
2010	821.3	821.3
2011	819.4	819.3
2012	810.0 [1]	811.9
2013	792.7 [1]	812.2
2014	781.8 [1]	790.4 [2]
2015	771.3 [2]	781.4 [2]

	Alternative I		Alternative II		Alternative III	
	2015 TR	2016TR	2015 TR	2016TR	2015 TR	2016TR
2020	763.3	777.4	730.1	742.8	696.4	706.0
2025	747.3	760.5	697.1	709.5	645.5	655.1
2030	731.4	743.8	667.6	679.1	602.4	610.9
2040	700.5	711.7	615.0	624.5	530.1	536.5
2050	671.5	681.7	568.9	576.8	471.4	476.0
2060	644.4	653.6	528.2	534.8	422.8	426.3
2070	619.0	627.3	492.2	497.6	382.2	384.7
2080	595.2	602.7	460.1	464.6	347.8	349.6
2090	572.9	579.7	431.4	435.1	318.3	319.6
2100	551.9	558.0	405.6	408.7	292.8	293.7

[1] Estimated

[2] Estimate, Intermediate Alternative

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Chart 2.1: Historical United States Age-Sex-Adjusted Central Death Rates from 1900-2013

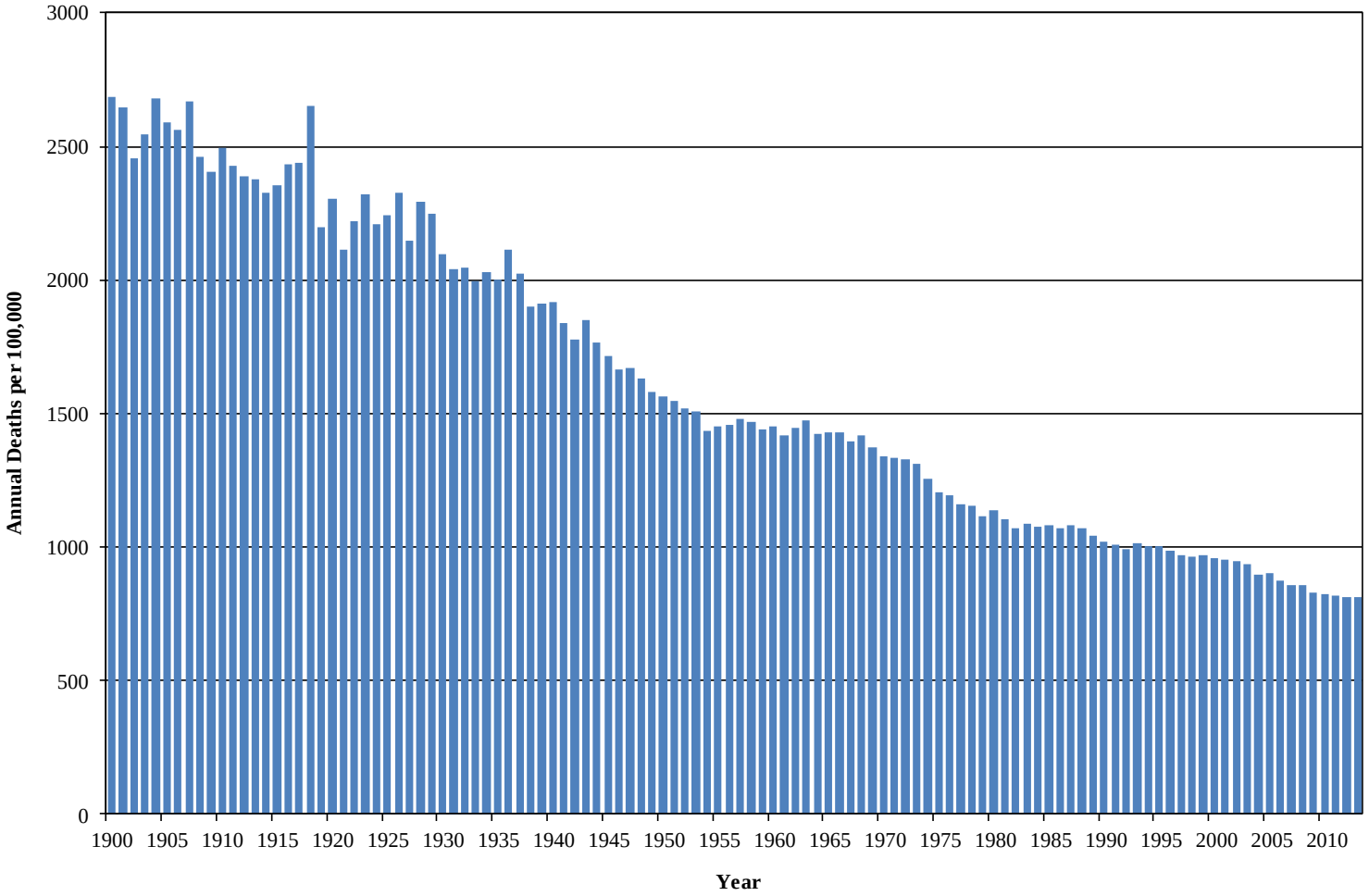

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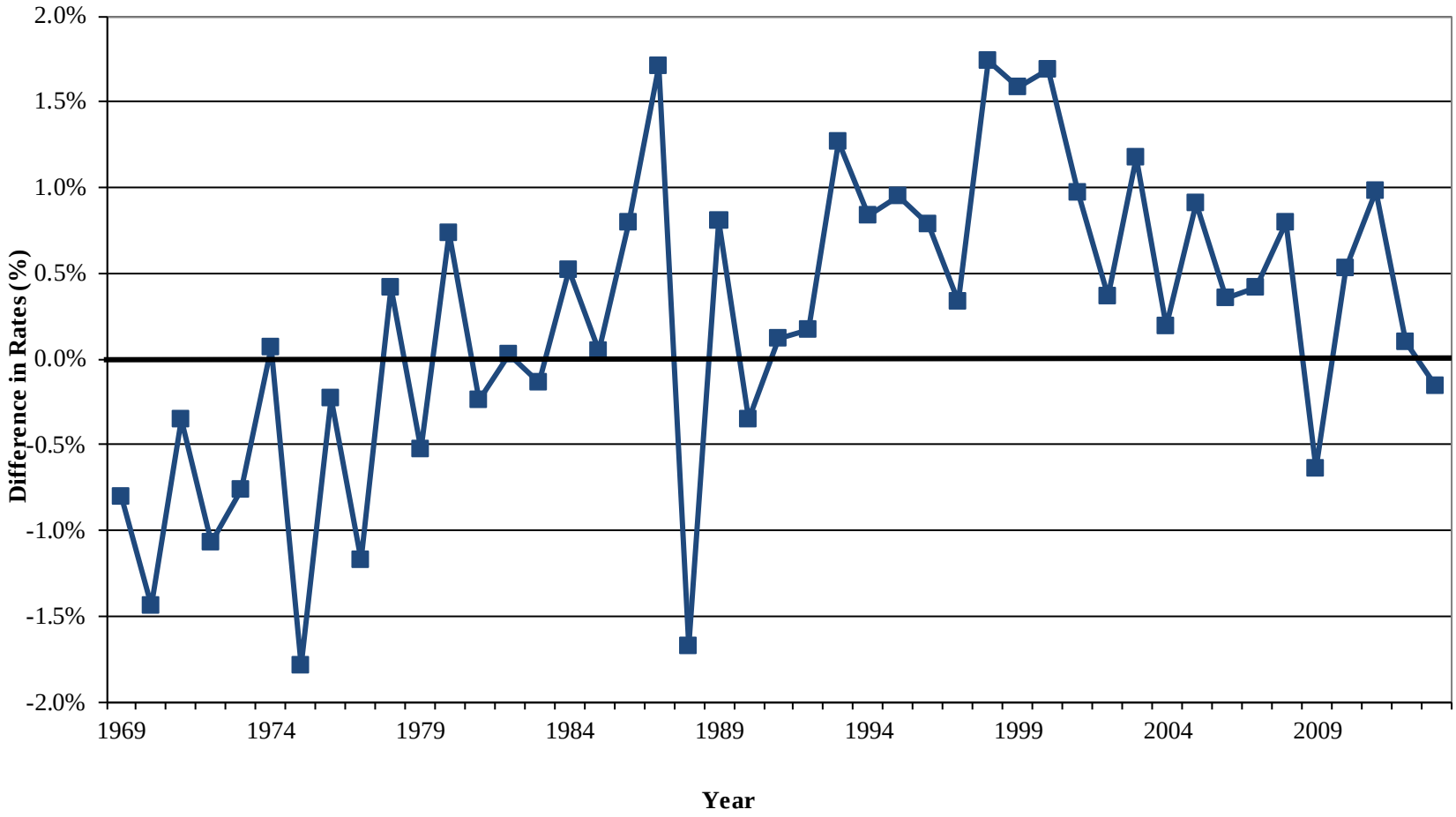
Chart 2.2: Difference between Male and Female Annual Percent Reduction in Age-Adjusted Death Rates for Population 65+

(based on Medicare data)



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3. IMMIGRATION

ASSUMPTIONS FOR THE 2016 TRUSTEES REPORT
OFFICE OF THE CHIEF ACTUARY, SSA

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3.1 Summary

For the 2016 Trustees Report, there are no changes to the ultimate immigration assumptions from those used in the 2015 Trustees Report. Table 3.1 displays the annual immigration levels assumed for the 2016 Trustees Report as well as those assumed in the 2015 Trustees Report. Historical data updates result in a decrease (worsening) on the long-range OASDI actuarial balance of about 0.01 percent of taxable payroll. In addition, changes in immigration methods, including new unauthorized exit rates, a new method of calculating never authorized exits, revisions to smoothing nonimmigrant stocks, and forcing total nonimmigrants to equal the Department of Homeland Security (DHS) historical estimates result in an increase (improvement) of 0.09 percent of taxable payroll.

Historically, the annual number of legal immigrants (persons becoming legal permanent residents) has risen substantially, averaging around 1.1 million persons per year since 2005. Based on this experience and the belief that the number of future legal immigrants in the category of *immediate relatives of U.S. citizens* will be close to current levels, the Trustees intermediate ultimate assumption is 1.06 million new legal permanent residents per year for the 2016 Trustees Report. There was no change to the assumption that legal emigration out of the Social Security area will be 25 percent of the number of the legal immigrants, or 265,000 per year, ultimately.

For other-than-legal ("other") immigration, the Trustees assume no changes to the immigration projection model introduced during the 2014 Trustees Report. The model still projects the annual other immigration flows by splitting them into three main components: (1) the other immigrants entering the Social Security area each year, (2) those who leave the stock of other immigrants and move outside the Social Security area, and (3) the other immigrants that adjust status to become legal permanent residents, thereby leaving other immigrant status. The net other immigration is equal to the gross level of other immigration, less other emigration out of the Social Security area, and less those who adjust status to become legal permanent residents.

The model continues to project these annual other immigrant flows and further separates the other immigrants into three specific categories: (1) those immigrants who have temporary legal status ("nonimmigrant"), (2) those who never had legal status ("never-authorized"), and (3) those who originally entered legally as a nonimmigrant but overstayed their visa ("visa-overstayers").

The assumed exit rates for the unauthorized population have been reduced by almost 40% from what was used in the 2015 Trustees Report. The original rates developed for the 2014 Trustees Report used data largely reflecting experience during the recent recession (2008-2010), and it is likely that the exits of the unauthorized stock were abnormally high during this period. In addition, the exits of the never authorized stock are now separated into recent arrivals and the remaining stock, similar to the approach used for the 2008 through 2013 Trustees Reports. The Trustees believe that the exit rates of those that recently entered are considerably higher than the exit rates of those that have been in the U.S. for an extended period of time.

Using this model of other immigration, the level of net other immigration, under the intermediate alternative, is assumed to be about 784,000 persons for 2016, 713,000 persons for 2020, 464,000

persons for 2050, and 433,000 persons for 2090. The average level of net other immigration during the 75-year projection period is approximately 496,000 persons per year. The following table presents the projected net numbers of immigrants for the intermediate alternative.

Annual Net Immigration: Alternative II Levels for the 2016 Trustees Report

Year	Legal	Other	Total
2016	795,000	784,000	1,579,000
2020	795,000	713,000	1,508,000
2030	795,000	537,000	1,332,000
2040	795,000	489,000	1,284,000
2050	795,000	464,000	1,259,000
2060	795,000	449,000	1,244,000
2070	795,000	440,000	1,235,000
2080	795,000	435,000	1,230,000
2090	795,000	433,000	1,228,000

Notes: Totals do not necessarily equal the sums of rounded components.
Levels rounded to the nearest 1,000.

3.2 Legal Immigration

The term legal immigration refers to the number of persons granted authorization to live and work in the United States on a permanent basis. These individuals are referred to as legal permanent residents (LPRs). Many individuals are admitted to the country legally but on a temporary basis. These individuals are included as other immigrants and are discussed in the following sections of this paper.

Legal immigration has been a very important element in the growth of the United States population. For the period 1870 through 1930, the population averaged about 13 percent foreign born. The Census Bureau estimates that the percentage of the civilian non-institutionalized population that is foreign born declined to a low of about 5 percent in the 1970 Census, rose to about 8 percent in the 1990 Census, and was estimated to be approximately 13.3 percent in the 2014 American Community Survey.

Data on the number of legal immigrants admitted to the U.S., which include U.S. possessions and territories and Armed Service posts abroad, are obtained from the Office of Immigration Statistics (OIS), a component of the Department of Homeland Security (DHS). Legal immigration averaged nearly one million per year for the period 1904 through 1914. Legal immigration decreased 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 that resulted in more emigration than immigration. Annual legal immigration increased after World War II to around 200,000 to 300,000 persons 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 and remained fairly stable until 1977. Between 1977 and 1990, legal immigration (excluding aliens admitted under the

Immigration Reform and Control Act of 1986 [IRCA]) averaged approximately 580,000 per year. This increase was due to the increase in the numbers of relatives admitted and to the large numbers of refugees and political asylees admitted during this period. Table 3.2 lists legal U.S. immigration for fiscal years 1966 through 1991, reflecting the immigration categories established in the 1965 Act.

The Immigration Act of 1990, which took effect in fiscal year 1992, restructured the immigration categories and substantially increased the number of immigrants that may legally enter the United States each year. For fiscal years 1995 and later, the 1990 law specified an annual limit that could range between 421,000 and 675,000 for certain categories of immigrants. These categories and their limits include those admitted based on: family-sponsored preference (226,000 to 480,000), employment-based preference (140,000) and diversity (55,000). Other categories of immigrants, such as refugees, are subject to separate limits. The Real ID Act of 2005 eliminated the numerical limit on asylees and no numerical limitation exists for immediate relatives of U.S. citizens. For each of the numerically limited categories, the limits may be adjusted annually based on unused amounts from prior years or other categories. Table 3.3 displays these unadjusted limits and the adjusted limits for each fiscal year 1995-2013.

The annual level of total legal immigration and the levels by category can vary considerably from year to year as shown in table 3.4. For fiscal years 1998 and 1999, annual immigration was about 650,000, the lowest level since the 1990 Act went into effect. This drop is attributed to a backlog in the process caused mainly by the longer time required to process the affidavit of support and the shifting of responsibilities from the Department of State to the Department of Homeland Security. Legal immigration was 841,000 in 2000 and over 1,000,000 in 2001 and 2002. These levels in 2000 – 2002 were also significantly above the low levels in 1998 and 1999, mainly due to the efforts to reduce the backlog of pending immigration applications. In 2003, legal immigration declined to a level of 704,000 due to a slowdown in processing because of increased security checks. Since then, the level increased dramatically and peaked at a level of 1,266,000 persons in 2006 before declining 16.9 percent to 1,052,000 in 2007. However, the decline in 2007 is attributed to an unanticipated spike in naturalization applications that temporarily shifted resources away from processing immigration applications. In 2008, the level increased slightly from the 2007 level, to 1,107,000. In 2009, there was another slight increase, to 1,131,000. From 2010 through 2013, total legal immigration declined from 1,043,000 in 2010 to 991,000 in 2013. For the intermediate assumptions, the Trustees assume that the future legal immigration levels will average approximately 1.06 million persons per year.

It is possible that future global economic conditions assumed under the high-cost alternative and/or less favorable attitudes toward immigration could result in generally lower immigration. Therefore, the Trustees assume an ultimate level of 860,000 legal immigrants per year for the high-cost (low immigration) alternative. On the other hand, the significant increase in the number of immediate relatives admitted in recent years and the uncertainty of the number of refugees and asylees permits the possibility of annual immigration substantially higher than 1,060,000 persons per year. Therefore, the ultimate level for the low-cost (high immigration) alternative is 1,260,000 persons per year.

3.3 Legal Emigration

Statistics on emigration are sparse and most analysis is based largely on estimates. Research done by the Census Bureau, the OIS, and other experts suggests that annual emigration may generally be in the range of 20-40 percent of annual legal immigration. Expected emigration from the Social Security area should be less than emigration from the United States, especially at the older ages. This is primarily because most individuals who leave the United States having achieved fully insured status are still eligible to receive OASDI benefits and thus are still considered to be in the Social Security area population. For the 2015 Trustees Report, the assumed ratio of emigration to immigration was 20, 25, and 30 percent for the low-cost, intermediate, and high-cost alternatives, respectively. The same ratios of emigration to immigration are assumed for the 2016 Trustees Report.

3.4 Net Legal Immigration

Combining the levels of legal immigration with the ratios for legal emigration yields ultimate levels of net legal immigration of 1,008,000, 795,000, and 602,000 per year for the low-cost, intermediate, and high-cost alternatives, respectively.

3.5 Other Immigration

The term "other immigration" refers to persons entering the United States in a manner other than lawfully admitted for permanent residence. This population consists of three components:

1) Nonimmigrants who are defined, according to the OIS, as foreign nationals that enter the U.S. with authorization to stay for a temporary period of time and for a specific purpose such as students and exchange visitors, temporary workers, and diplomats and other representatives.

2) Those who are unauthorized on entry and were never previously legally authorized to be residing in the United States ("never-authorized").

3) Those who at one point had temporary legal authorization to be residing in the United States but have overstayed their visas ("visa-overstayers").

The stock of the other immigrant population is included in the starting year population level for our projections, in accordance with the official policy of the Census Bureau to enumerate all persons residing in the U.S., as well as to provide a basis for estimating the total labor force in the United States and total births in the Social Security area.

During the 1990s there was rapid growth in the size of the other immigrant population. In a joint project, the OIS and the Census Bureau examined the size of the unauthorized immigrant population between October 1988 and October 1992. In 1988 there were over 4 million unauthorized immigrants residing in the United States. Not counting those who would be subsequently legalized under the Immigration Reform and Control Act (IRCA) program, it is estimated that there were 2.2 million unauthorized immigrants in the population as of October

1988. At the time of the 1990 Census, 2.6 million persons were estimated to be unauthorized, again excluding those who would subsequently be legalized under the IRCA. (The total unauthorized population in 1990 was, roughly, 5.3 million.) Subsequent estimates suggest an increase to 3.4 million for October 1992 and approximately 5.0 million for October 1996. The rapid rise in the other immigrant population between 1990 and 1996 reflected the continued inflow of other immigrants combined with a decreased number leaving this status, due to the reduced stock of other immigrants that resulted from the IRCA.

The 2000 Census gave evidence that other immigration since 1990 had been consistently underestimated. In producing intercensal estimates of the U.S. population between the 1990 and 2000 Census, the Census Bureau estimated the average level of annual net other immigration to be approximately 550,000. For 2000, DHS estimated a total other stock of 9.9 million. Based on DHS estimates, the total stock was 12.2 million in 2005, then increased to a peak of 14.1 million in 2008, and then decreased to 13.3 million by 2012.

The other immigration model makes explicit estimates of the following categories:

- The annual numbers of new-arrival other immigrants who enter as never-authorized and who enter legally as nonimmigrants;
- The annual number of non-immigrants who become visa-overstayers;
- The annual numbers of other emigrants (those leaving the Social Security area) who were never-authorized, nonimmigrants, or visa-overstayers; and
- The annual numbers of adjustments of status who were never-authorized, nonimmigrants, or visa-overstayers.

For the 2016 Trustees Report, the Trustees assume no change to the ultimate number of new other immigrants per year. Thus, the Trustees assume an ultimate level of 1,350,000 per year under the intermediate projections. Due to the projected economic recovery, the Trustees assume a slow increase in the number of new other immigrants from current levels to 1,550,000 in 2018 and 2019 before gradually decreasing to the ultimate level of 1,350,000 in 2022. It is possible that the ultimate level will be higher than 1,350,000 in the future, as other immigrants already in the U.S. may help family members or additional other immigrants enter the country and the demand for other immigrant labor in the economy may increase. Thus, the Trustees assume an ultimate level of 1,650,000 per year under the low-cost (high immigration) scenario. Due to the possibility of an increased willingness of the government to pursue deportation of unauthorized immigrants or withhold services from them and to crack down on those who employ them, the Trustees assume an ultimate level of 1,050,000 under the high-cost (low immigration) scenario.

While we estimate the average annual other emigration level (departures from the Social Security area) during 2008 through 2010 to be around 439,000, we believe this number will rise throughout the projection period. As the stock of the other immigrant population rises, more emigration is likely to occur. Thus, we estimate the other emigration as a function of the population at risk. We developed rates of emigration by age and sex for the never-authorized, the nonimmigrants, and the overstayers based on the number of exits from each of these categories estimated to have occurred during the period 2008 through 2011. Ideally, these rates would be developed by age, sex, and duration of stay in the country. Unfortunately, at this time,

data are too sparse to develop accurate estimates of the current stock by duration of stay. However, for the 2016 Trustees Report, the Trustees assume separate (higher) exit rates for recent unauthorized arrivals. This serves as a proxy for modeling the other immigrants by duration of stay.

Applying the method described above results in increasing levels of emigration[1] throughout the projection period. Under the intermediate alternative, the gross emigration rate (number of other emigrants divided by the midyear other population) is about 1.4 percent at the start of the projection period, increasing to a maximum of about 1.6 percent by 2025, but declines to about 1.3 percent at the end of the 75-year projection period.

Another component of the immigration model takes into account the following two ways immigrants attain legal permanent resident status:

1) New-arrival LPRs are persons who file an application to become an LPR with the Department of State while living outside of the United States and become an LPR upon entry.

2) Adjustments of Status[2] are persons who are already living in the United States as temporary workers, students, or unauthorized immigrants and apply and receive an adjustment of status to an LPR.

Historically, the adjustment of status category has been a substantial portion of all new LPRs. In the past, approximately 50 percent of all new LPRs were people that had already been in the country as a temporary worker, foreign student, or unauthorized immigrant and who filed an application for adjustment to LPR status. However, the recent trend shows this percentage decreasing to under 50 percent. Thus, the Trustees assume a little over 40 percent of future individuals becoming LPRs will be adjustments of status from the other immigrant population.

3.6 Recommendations of Previous Technical Panels and Other Projections

The levels of immigration recommended by recent Technical Panels (2003, 2007, 2011 and 2015) appointed by the Social Security Advisory Board are higher than the levels assumed for the 2016 Trustees Report. For the intermediate assumptions, the 2003 Technical Panel recommended a continuing annual growth rate in net total immigration equal to approximately 1/2 the annual growth rate in the total population through the next 75 years. Under this

[1] As the population begins to mature, we expect to see higher numbers of other immigrants in the population and thus higher levels of emigration, particularly at the ages 35 and over. The current other immigrant population is centered very heavily at the younger ages. We believe this concentration at the younger ages is due to (1) the relatively high levels of other immigration that began in the late 1990's (entering at relatively young ages) and (2) the effects of the IRCA legislation in the late 1980's (which removed largely older individuals with required substantial durations of residence in the country). These reasons result in a population of other immigrants that is relatively young of age and low in duration of stay in the country.

[2] The Department of Homeland Security also considers refugees and asylees to be adjustments of status, but for the purposes of our model, we treat these categories as new arrivals.

specification, total net immigration would have been projected to reach 1.5 million by 2065, with continuing increases thereafter.[3]

The 2007 Technical Panel recommended setting net total immigration equal to 1.35 million for 2007, with increases of 1.0 percent per year for the first 25 years of the projection period and increases of 0.5 percent per year increases thereafter. This would have resulted in a net immigration flow of nearly 2.2 million by the end of the projection period.

The 2011 Technical Panel recommended setting net immigration equal to 0.32 percent of the total population for all years after 2025. This would have resulted in a net immigration flow of nearly 1.63 million by the end of the projection period.

The 2015 Technical Panel recommended setting net total immigration to equal the average between that assumed in the 2015 Trustees Report and that projected by the Census Bureau, while maintaining the proportion of net legal and net other the same as assumed in the 2015 Trustees Report. This would have resulted in a net immigration flow of nearly 1.32 million by the end of the projection period.

This increase in the level of total net immigration recommended by these panels reflects a number of factors. One factor is that each panel includes the assumption of continuing changes in immigration law to allow more immigrants as the population increases. Historically, the Trustees, as well as other Federal Government entities, have assumed that future immigration will be consistent with current law and that changes based on potential future legislation should not be reflected until enactment. Reflecting the possibility of future changes in immigration law is not unreasonable if there is a conviction that such changes are truly expected to occur and this change in the basis for projecting is fully disclosed. On the other hand, presuming such changes could result in the peculiar situation where the Trustees would need to change assumptions in the future because immigration law had *not* been modified. On balance, the Trustees retained the practice of reflecting changes in the immigration law only upon enactment. Another factor is the potential number of immigrants entering the U.S. The Trustees recognized that birth rates have dropped in several countries that supply significant numbers of immigrants to the U.S. Most of those countries, particularly Mexico, have seen drops in birth rates since 1990 and will likely average less emigration in the future.

In their 2015 projections, the Congressional Budget Office (CBO) assumes an ultimate annual net immigration of 3.2 immigrants per 1,000 members of the U.S. population.[4] This is the same assumption recommended by the 2011 Technical Panel. Specifically, CBO reports that this assumption results in net immigration of 1.2 million people in 2026 and 1.3 million people in 2040. Comparing with Census, the middle series of the 2014 National Population Projections results in net immigration of 1.4 million people in 2040.[5] The Trustees assumptions for the intermediate alternative of the 2016 Trustees Report result in net immigration of 1.4 million people in 2026 and 1.3 million people in 2040.

[3] All results displayed in this section are based on that current year's Trustees Report model. For example, the result using the 2003 Technical Panel recommendation is based on the 2003 Trustees Report model.
[4] See https://www.cbo.gov/sites/default/files/114th-congress-2015-2016/reports/51047-SSUpdate-2.pdf
[5] See http://www.census.gov/population/projections/files/methodology/methodstatement14.pdf

Table 3.1: Annual Immigration Assumptions for the Social Security Area Population

(All values rounded to the nearest 1,000 immigrants)

Values Used for 2015 Trustees Report					
Alternative	**Year**	**Gross Legal**	**Net Legal**	**Gross Other**	**Net Other**
Low Cost:	2016	1,260,000	1,008,000	1,650,000	784,000
	2030	1,260,000	1,008,000	1,650,000	532,000
	2040	1,260,000	1,008,000	1,650,000	441,000
	2050	1,260,000	1,008,000	1,650,000	399,000
	2060	1,260,000	1,008,000	1,650,000	376,000
	2070	1,260,000	1,008,000	1,650,000	364,000
	2080	1,260,000	1,008,000	1,650,000	359,000
	2090	1,260,000	1,008,000	1,650,000	356,000
Intermediate:	2016	1,060,000	795,000	1,450,000	685,000
	2030	1,060,000	795,000	1,350,000	396,000
	2040	1,060,000	795,000	1,350,000	338,000
	2050	1,060,000	795,000	1,350,000	313,000
	2060	1,060,000	795,000	1,350,000	299,000
	2070	1,060,000	795,000	1,350,000	292,000
	2080	1,060,000	795,000	1,350,000	288,000
	2090	1,060,000	795,000	1,350,000	286,000
High Cost:	2016	860,000	602,000	950,000	290,000
	2030	860,000	602,000	1,050,000	310,000
	2040	860,000	602,000	1,050,000	267,000
	2050	860,000	602,000	1,050,000	245,000
	2060	860,000	602,000	1,050,000	233,000
	2070	860,000	602,000	1,050,000	226,000
	2080	860,000	602,000	1,050,000	221,000
	2090	860,000	602,000	1,050,000	219,000

Values Used for 2016 Trustees Report					
Alternative	**Year**	**Gross Legal**	**Net Legal**	**Gross Other**	**Net Other**
Low Cost:	2016	1,260,000	1,008,000	1,650,000	883,000
	2030	1,260,000	1,008,000	1,650,000	691,000
	2040	1,260,000	1,008,000	1,650,000	620,000
	2050	1,260,000	1,008,000	1,650,000	581,000
	2060	1,260,000	1,008,000	1,650,000	557,000
	2070	1,260,000	1,008,000	1,650,000	544,000
	2080	1,260,000	1,008,000	1,650,000	538,000
	2090	1,260,000	1,008,000	1,650,000	535,000
Intermediate:	2016	1,060,000	795,000	1,450,000	784,000
	2030	1,060,000	795,000	1,350,000	537,000
	2040	1,060,000	795,000	1,350,000	489,000
	2050	1,060,000	795,000	1,350,000	464,000
	2060	1,060,000	795,000	1,350,000	449,000
	2070	1,060,000	795,000	1,350,000	440,000
	2080	1,060,000	795,000	1,350,000	435,000
	2090	1,060,000	795,000	1,350,000	433,000
High Cost:	2016	860,000	602,000	950,000	389,000
	2030	860,000	602,000	1,050,000	418,000
	2040	860,000	602,000	1,050,000	382,000
	2050	860,000	602,000	1,050,000	361,000
	2060	860,000	602,000	1,050,000	349,000
	2070	860,000	602,000	1,050,000	341,000
	2080	860,000	602,000	1,050,000	336,000
	2090	860,000	602,000	1,050,000	334,000

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Table 3.2: Legal Immigrants Admitted to the United States: Fiscal Years 1966-1991

(in thousands)

Reflecting Categories Established in the 1965 Immigration Act

Fiscal Year	IRCA[1]	Total non IRCA	Numerically Limited [2]	Western Hemisphere [3]	Immediate Relatives of Citizens	Refugees & Asylees	Other Specially Legislated Immigrants [4]
1966	—	323	126	148	39	4	6
1967	—	362	153	125	47	30	7
1968	—	454	156	154	44	95	6
1969	—	359	291	—	60	1	7
1970	—	373	287	—	79	—	7
1971	—	370	281	—	81	—	8
1972	—	385	284	—	86	—	15
1973	—	400	283	—	101	—	16
1974	—	395	274	—	105	—	16
1975	—	386	282	—	92	—	13
1976	—	399	285	—	102	—	12
1976	—	104	73	—	28	—	3
1977	—	462	277	—	106	68	12
1978	—	601	341	—	126	122	12
1979	—	460	279	—	138	32	11
1980	—	531	289	—	158	76	8
1981	—	597	330	—	152	107	7
1982	—	594	260	—	168	157	9
1983	—	560	269	—	178	103	10
1984	—	544	262	—	183	92	7
1985	—	570	264	—	204	95	6
1986	—	602	267	—	223	104	7
1987	—	602	271	—	219	92	20
1988	—	643	264	—	219	82	78
1989	479	612	280	—	218	84	30
1990	880	656	298	—	232	97	29
1991	1,123	704	294	—	237	139	34

[1] This category includes those aliens admitted under the Immigration Reform and Control Act of 1986.

[2] Legal limits on immigration visas were 170,000 per fiscal year before 1969, 290,000 per fiscal year for 1969 through 1979, 280,000 for fiscal year 1980, and 270,000 for fiscal years 1981 and later. Includes additional visas starting 1989.

[3] Natives of Western Hemisphere countries, their children and spouses, Act of October 3, 1965. This category became numerically limited to 120,000 starting fiscal year 1969.

[4] This category consists mainly of children born abroad to alien residents, ministers and their families, beginning 1971, spouses of U.S. citizens who entered as fiances and their children, and beginning 1988 Amerasians, special Cuban / Haitian entrants, and aliens in the U.S. since 1972.

Source: Annual Reports of the Immigration and Naturalization Service, Department of Justice

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Table 3.3: Legal Immigration Limits for Fiscal Years Beginning 1995

	Unadjusted Limit	Limit for Fiscal Year																		
		1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
Family Sponsored Preference	226,000 to 480,000 [1]	253,721	311,819	226,000	226,000	226,000	294,601	226,000	226,000	226,000	226,000	226,000	226,000	226,000	226,000	226,000	226,000	226,000	226,000	226,000
Immediate Relatives of U.S. Citizens	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited
Employment Based	140,000 [2]	146,503	140,000	140,000	140,000	160,906	142,299	192,074	142,632	171,532	204,422	148,449	143,949	147,148	162,704	140,000	150,657	140,000	144,951	158,466
Diversity	55,000 [3]	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	55,000	50,000
Refugees	Set Annually	111,000	90,000	78,000	83,000	91,000	90,000	80,000	70,000	70,000	70,000	70,000	70,000	70,000	80,000	80,000	80,000	80,000	76,000	70,000
Asylees	Not Limited [4]	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited	Not Limited

[1] The family preference limit is given as a range because it is equal to the larger of: 226,000 or 480,000 minus the previous year's immediate relatives of U.S. citizens minus certain other small categories of children minus certain categories of aliens paroled into the U.S. in the second preceding fiscal year plus unused employment preferences from the previous year.

[2] The employment-based preference can be higher than 140,000 if certain other preferences go unused in the previous year.

[3] The Diversity category includes those immigrating through the Nicaraguan Adjustment and Central American Relief Act (NACARA).

[4] The REAL ID Act of 2005 eliminated the numerical limit for Asylees.

Sources:
Family sponsored, Employment based, and Diversity: Table A1 of
http://www.dhs.gov/sites/default/files/publications/ois_lpr_fr_2013.pdf

Immediate Relatives: all "not limited" unless legislation changes

Refugees: Table 1 of
http://www.dhs.gov/sites/default/files/publications/ois_rfa_fr_2013.pdf

Asylees: Historical years: text on page 6 of
http://www.dhs.gov/xlibrary/assets/statistics/yearbook/2003/2003Yearbook.pdf

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Table 3.4: Legal Immigrants Admitted to the United States: Fiscal Years Beginning 1985

(in thousands)

Reflecting Revised Categories in the 1990 Immigration Act, Subject to limitation under the Overall Flexible Cap

Fiscal Year	IRCA[1]	Total non IRCA[2]	Family Sponsored	Employment Based	Immediate Relatives	Refugees & Asylees	Diversity	Other Specially Legislated Immigrants
1985	—	570	213	53	204	95	—	4
1986	—	602	213	57	223	104	—	4
1987	—	602	212	58	219	92	3	19
1988	—	643	201	59	219	82	6	76
1989	479	612	217	58	218	84	7	28
1990	880	656	215	58	232	97	29	25
1991	1,123	704	216	60	237	139	22	30
1992	163	811	213	116	235	117	89	40
1993	24	880	227	147	255	127	89	35
1994	6	798	212	123	250	121	75	17
1995	4	716	238	85	220	115	48	10
1996	—	916	294	117	300	128	58	17
1997	—	798	213	90	321	112	49	12
1998	—	653	191	77	283	52	45	4
1999	—	645	217	57	258	43	48	24
2000	—	841	235	107	346	63	51	39
2001	—	1,059	232	179	440	108	42	59
2002	—	1,059	187	174	484	126	43	46
2003	—	704	159	82	331	45	46	41
2004	—	958	214	155	418	71	50	49
2005	—	1,122	213	247	436	143	46	37
2006	—	1,266	222	159	580	216	44	44
2007	—	1,052	195	162	495	136	42	23
2008	—	1,107	228	165	488	166	42	18
2009	—	1,131	212	141	536	177	48	17
2010	—	1,043	215	148	476	136	50	17
2011	—	1,062	235	139	453	168	50	16
2012	—	1,032	202	144	479	151	40	16
2013	—	991	210	161	439	120	46	14

[1] This category includes those aliens admitted under the Immigration Reform and Control Act of 1986.

[2] Comprehensive immigration legislation increased total immigration under an overall flexible cap of 675,000 immigrants beginning in fiscal year 1995, preceded by a 700,000 level during fiscal years 1992 through 1994.

Source: Table 6 of Annual Reports of the Office of Immigration Statistics, Department of Homeland Security

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