

**THE LONG-RANGE DEMOGRAPHIC ASSUMPTIONS  
FOR THE 2012 TRUSTEES REPORT**

OFFICE OF THE CHIEF ACTUARY  
SOCIAL SECURITY ADMINISTRATION

April 23, 2012

# **PRINCIPAL DEMOGRAPHIC ASSUMPTIONS**

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## **OVERVIEW**

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- 1 FERTILITY**
- 2 MORTALITY**
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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. Projections of future cost and income are produced by the Office of the Chief Actuary (OCACT) based on three separate sets of long-range (75-year) assumptions for the 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. The intermediate assumptions are also used as the central tendency for the stochastic projections presented in the OASDI Trustees Report. This memorandum presents the demographic assumptions used in the 2012 annual report of the Board of Trustees.

The key demographic variables are total fertility rates, average annual reductions in total age-sex-adjusted mortality rates, and average annual levels of immigration. The table below lists the assumed values for these key variables used in the 2012 Trustees Report. The ultimate fertility, average annual reductions in mortality rates, and average annual immigration assumptions are essentially unchanged from those used in the 2011 Trustees Report. However, changes in the demographic starting values and revisions in transitioning to ultimate rates, result in a reduction (worsening) of the OASDI actuarial balance of about 0.03 percent of payroll for the intermediate assumptions of the 2012 Trustees Report. Additionally, updated historical data resulted in a decrease in the OASDI actuarial balance of about 0.02 percent of taxable payroll. This brings the total for all demography changes, to a reduction (worsening) of the OASDI actuarial balance of about 0.05 percent of taxable payroll.

Key Demographic Assumptions for the Long-Range (75-year) Projection Period									
2011 Trustees Report and 2012 Trustees Report									
	2011 Trustees Report Alternative			2012 Trustees Report Alternative			2012 Trustees Report Less 2011 Trustees Report		
	I	II	III	I	II	III	I	II	III
Total fertility rate (children per woman), starting in the 25 <sup>th</sup> year	2.3	2.0	1.7	2.3	2.0	1.7	0.0	0.0	0.0
Average annual percentage reduction in total age-sex-adjusted death rates for the 75-year projection period	0.32	0.78	1.31	0.39	0.77	1.18	0.07	-0.01	-0.13
Average annual net immigration (in thousands) for the 75-year projection period	1,385	1,075	785	1,375	1,080	790	-10	5	5

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

# 1. FERTILITY

ASSUMPTIONS FOR THE 2012 TRUSTEES REPORT  
OFFICE OF THE CHIEF ACTUARY, SSA

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## 1.1 Summary

The ultimate total fertility rates for all three alternatives of the 2012 Trustees Report are the same as those used in the 2011 Trustees Report. The ultimate total fertility rates are 2.3, 2.0, and 1.7 children per woman for the respective low cost, intermediate, and high cost alternatives. Final birth data for 2008 from the National Center for Health Statistics (NCHS) resulted in a total fertility rate (TFR) of 2.08. The NCHS also reports a preliminary TFR of 2.01 for 2009 and provisional birth data indicate an even lower TFR in 2010. Although the TFR has dropped sharply from a level of 2.13 in 2007, this was probably largely due to the effects of the recession. Thus, the Trustees assume an increasing TFR from 2010 through 2015 consistent with the projected recovery from the recession. After 2015, the TFR decreases linearly to hit the ultimate TFR of 2.0 in 2036. This path starts lower than the 2011 Trustees Report path in the beginning of the projection period but is similar to the 2011 Trustees Report path from 2015 onward. This new path results in a decrease in the long-range actuarial balance, under the intermediate alternative, of about 0.02 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. The historical trend toward lower birth rates for women below age 30 and higher birth rates for women above age 30 through 2036 is continued. This trend is unchanged from that assumed for the 2011 report. This continued trend results in a somewhat smaller and slightly older population in the future than if the future distribution of birth rates by age of mother were fixed at the current rates.

## 1.2 Historical Experience

Past 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 rates<sup>1</sup> 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 staying 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. In one decade, from 1962 to 1972, the TFR declined from 3.4 to 2.0 children per woman. 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. Since 1989, the TFR has remained fairly stable, fluctuating between 2.0 and 2.1.

The increase in the TFR since 1976 is 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 2006 (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

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<sup>1</sup> The ratio of the number of live births to mothers of a specified age, to estimates of the midyear female population of that age.

years after 1976 were expected. However, birth rates for women in their 30s have continued a rising trend through 2007.

### 1.3 Assumed Future Fertility Rates

The NCHS reports a TFR of 2.08 in 2008. Based on preliminary data, the NCHS estimates a TFR of 2.01 for 2009. Based on the total number of births reported in 2010, which is about 3.0 percent lower than the total number of births reported in 2009, the TFR for 2010 is estimated to have been 1.95. For 2011, the TFR is estimated to have been 2.03, reflecting a partial recovery from the low point of the recession.

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
- an increase in the percent 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, an ultimate TFR assumption of 2.0 is consistent with the 2009 National Population Projections released by Census.<sup>2</sup> In these projections, Census assumes a TFR in 2010 of 2.06 declining to 2.03 at the end of their projection, in 2050.

As shown in Chart 1.2, a continuation of the historical trend for increasing birth rates for women over age 30 and decreasing rates for women below age 30 for another 25 years (through 2036) is assumed, 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 1980-2008 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 2.7 in India to 1.4 in Austria, Germany, Italy, Japan, and Portugal. However, if India is excluded from the comparison, the highest TFR is 2.2 for New Zealand followed by 2.1 for Ireland, Mexico, and the United States. Although the TFR in the industrialized countries has been observed at levels as low as the 1.2 to 1.4 range, the cultural

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<sup>2</sup> See <http://www.census.gov/population/www/projections/2009projections.html>

and economic climate in the U.S. makes it highly unlikely that our TFR will go below the level of 1.7 achieved in 1976 for any sustained period of time. Thus, the Trustees' ultimate TFR assumption for the high cost scenario is 1.7 children per woman. Using the range of past experience for the United States and other nations as a guide, the Trustees' ultimate TFR assumption for the low cost scenario is 2.3 children per woman.

For each alternative, the ultimate TFR assumption is reached in the 25<sup>th</sup> year of the projection period (2036) as has been the practice for previous Trustees Reports. From 2012 – 2015, the intermediate TFRs equal a weighted average of the TFRs from 2006 – 2010, with heavier weights on the most recent data. However, the more recent years are weighted less as time progresses until 2015, where the TFR would be equal to a straight average of the 2006 – 2010 TFRs. This produces an increasing TFR from 2011 through 2015 for the intermediate alternative, which is consistent with a projected economic recovery. Then, the intermediate TFRs linearly grade to the intermediate ultimate TFR from the TFR level estimated for 2015. For the low cost and high cost alternatives, the TFRs gradually grade away from the intermediate alternative path until 2036, when the ultimate TFRs are attained. Chart 1.2 includes the resulting age specific birth rates for five-year age groups projected using the intermediate assumptions.

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

Calendar Year	2012 Trustees Report	2011 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	2.068	2.068
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	2.060	2.060
2005	2.064	2.064
2006	2.116	2.116
2007	2.126	2.126
2008	2.078	2.086 <sup>1</sup>
2009	2.008 <sup>1</sup>	2.032 <sup>2</sup>
2010	1.951 <sup>2</sup>	2.076 <sup>2</sup>
2011	2.026 <sup>2</sup>	2.073 <sup>2</sup>
<b>Alternative I:</b>		
2015	2.104	2.120
2020	2.151	2.165
2025	2.197	2.210
2030	2.244	2.255
2036 +	2.300	2.300
<b>Alternative II:</b>		
2015	2.056	2.060
2020	2.043	2.045
2025	2.029	2.030
2030	2.016	2.015
2036 +	2.000	2.000
<b>Alternative III:</b>		
2015	2.008	2.000
2020	1.935	1.925
2025	1.861	1.850
2030	1.788	1.775
2036+	1.700	1.700

<sup>1</sup> Preliminary

<sup>2</sup> Estimated



**Table 1.2 Historical Total Fertility Rate, by Country  
1980 - 2008**

Country	1980	1985	1990	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Most Recent TFR
Australia	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.8	1.7	1.8	1.7	1.8	1.8	1.8	1.9	2.0	2.0
Austria	1.7	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.4	1.3	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
Belgium	1.7	1.6	1.6	1.6	—	—	—	1.6	—	—	—	—	—	—	—	1.8	—	1.8
Canada	1.7	1.6	1.8	1.6	1.6	1.6	—	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.6	1.7	—	1.7
China	2.2	2.2	2.3	1.8	—	1.8	—	—	—	—	—	—	—	—	—	—	—	1.8
Denmark	1.5	1.4	1.7	1.8	1.7	—	1.7	1.7	1.8	1.7	1.7	1.8	1.8	1.8	1.9	1.8	1.9	1.9
Finland	1.6	1.6	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8	1.8
France	2.0	1.8	1.8	1.7	1.7	1.7	1.8	1.8	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0
Germany	1.5	1.4	1.3	1.2	1.3	1.4	—	1.4	1.4	1.3	1.3	1.3	1.4	1.3	1.3	1.4	1.4	1.4
Greece	2.2	1.5	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5
India	4.4	4.3	3.8	3.5	3.4	3.3	3.2	3.2	3.2	3.1	3.0	3.0	2.9	2.9	2.8	2.7	—	2.7
Ireland	3.2	2.5	2.2	1.9	1.9	1.9	1.9	1.9	1.9	2.0	2.0	2.0	2.0	1.9	1.9	2.0	2.1	2.1
Italy	1.6	1.4	1.4	1.2	—	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4	1.4	1.4
Japan	1.7	1.7	1.5	1.4	1.4	1.4	1.4	1.3	1.4	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.4	1.4
Mexico <sup>1</sup>	3.1	3.3	3.7	3.3	—	—	—	2.9	2.7	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	1.5	1.5	—	1.6	1.6	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.8	1.8
New Zealand	2.0	1.9	2.2	2.0	2.0	2.0	1.9	2.0	2.0	2.0	1.9	1.9	2.0	2.0	2.0	2.2	2.2	2.2
Norway	1.7	1.7	1.9	1.9	1.9	1.9	1.8	1.8	1.9	1.8	1.8	1.8	1.8	1.8	1.9	1.9	2.0	2.0
Portugal	2.1	1.7	1.5	1.4	1.4	1.5	—	1.5	1.6	1.5	1.5	1.4	1.4	1.4	1.4	1.3	1.4	1.4
Spain	1.9	1.6	1.3	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5
Sweden	1.7	1.7	2.1	1.7	1.6	1.5	1.5	1.5	1.6	1.6	1.7	1.7	1.8	1.8	1.9	1.9	1.9	1.9
Switzerland	1.5	1.5	1.6	1.5	1.5	1.8	1.8	1.8	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.5	1.5	1.5
United Kingdom	1.8	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.6	1.6	1.6	1.7	1.8	1.8	1.8	1.9	—	1.9
United States <sup>2</sup>	1.8	1.8	2.1	2.0	2.0	2.0	2.1	2.0	2.1	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.1	2.1

<sup>1</sup> Estimate for Mexico (from INEGI website) for 1999 -- 2.9

<sup>2</sup> Estimate for the U.S. (from NCHS NVSR 59-01) for 1999 - 2008 -- 2.0075, 2.056, 2.034, 2.013, 2.0425, 2.0455, 2.0535, 2.1005, 2.122, 2084.5.

Source: United Nations Demographic Yearbook Historical Supplement 1948-1997

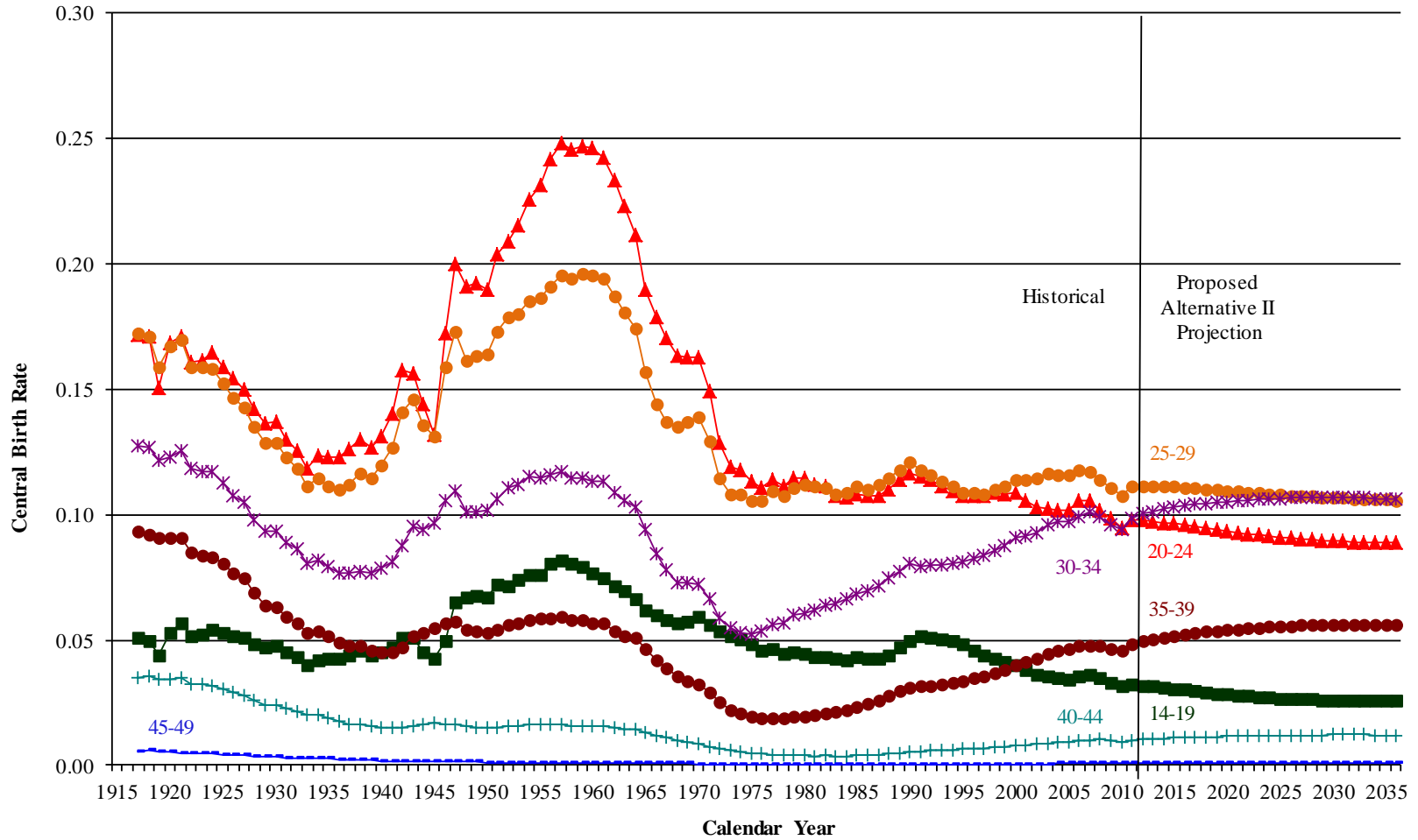
United Nations Demographic Yearbook Fertility Supplement 1980-1999

United Nations Demographic Yearbooks 2000 - 2008

**Chart 1.1: Historical Total Fertility Rate for the United States**



**Chart 1.2: Central Birth Rate for Five Year Age Groups: Historical and Assumed Alternative II Projection**



# 2. MORTALITY

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## 2.1 Summary

The ultimate annual rates of mortality reduction for the 2012 Trustees Report are based on 5 causes of death, reduced from 7 used in the 2011 Trustees Report. Heart and vascular disease are combined, becoming cardiovascular disease, and diabetes mellitus is now included with all other causes. The ultimate rates chosen for the intermediate alternative are cost neutral; there is neither an increase nor a decrease in the actuarial balance. There are no new mortality data for the 2012 Trustees Report, as 2008 data are unavailable. The lack of an additional data year created another preliminary year, 2011, before the projections begin in 2012. Due to the methodology used for transitioning from 2007 through 2011 (as described in section 2.6), this causes a +0.01 change to the actuarial balance.

The high cost and low cost alternatives are now a percent of the intermediate alternative and, as such, are no longer 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 last year's ultimate 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 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. The average rate of mortality improvement for the group aged 65 and older during this period is close to the ultimate intermediate assumption for the 2012 Trustees Report. 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. The diminishing effect of these factors has already been in evidence since 1982.

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 1900-2007? For the intermediate assumptions,

economic projections for productivity and real wage growth are similar to the historical experience during 1900-2007. 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 1900-2007.

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.

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 assumed 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 United States population; those on the second page use the distribution of the 2000 United States population as the basis for the age-sex adjustment. As seen by comparing the rates 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. However, it should be noted that if age-sex adjustment were made to a year later than 1990, then average assumed future rates of improvement would generally be higher in relation to the *historical rates* for the aged. For presentations other than table 2.1 of this memorandum, rates of improvement are presented with age-sex adjustment to the distribution of the 2000 United States population.

Table 2.1 provides the assumed ultimate average annual percent reductions in mortality for the intermediate assumptions of the 1999, 2000, 2002, 2004, 2008, 2009, 2011, and 2012 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.

Also included in table 2.1 are the assumed ultimate annual percent reductions in mortality recommended by the 1994-96, 1999, 2003, 2007, and 2011 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 only a little less than the average experience of the last century. 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 envision 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 Trustees in the past 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. A further analysis of the recommendations of previous technical panels is presented later in this report.

Comparisons of historical and assumed rates of improvement for the age group 65 and over (where mortality is concentrated) are included in table 2.2. All rates of improvement shown in table 2.2 reflect age-sex adjustment<sup>1</sup> to the distribution of the 2000 United States population. For the age group 65 and over, the rate of improvement experienced during 1900-2007 averaged 0.77 percent, while the rate of improvement during 1982-2007 averaged 0.69 percent. Thus, the average rate of improvement for the most recent 25 years was about 90 percent of the average rate of improvement for the entire 1900-2007 period. In fact, mortality at ages 65 and over generally improved at about this slower rate (or less) during 1900-2007 with the exception of two 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.

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<sup>1</sup> The age-sex-adjusted death rate is the crude rate that would occur in the enumerated total population as of April 1, 2000, if that population were to experience the death rates by age and sex observed in, or assumed for, the selected year.



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<sup>2</sup> 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 advances in medicine), averaging 1.6 percent per year for males and 2.4 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 0.2 percent per year for males. From 1968 through 1982, rapid reduction in mortality surged (with the help of Medicare and Medicaid), averaging 1.8 percent for males and 2.2 percent for females, annually. From 1982 to 2007, more moderate reduction in mortality returned, averaging 1.2 percent per year for males and 0.5 percent for females.

For the period 1982-2007, the average annual rate of improvement for females was considerably less than that for males. For all other periods mentioned above, the opposite is true, i.e., the average annual rate of improvement for males is less than that for females. 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 2007. Differences are shown for rates based on Medicare data. Even with normal year-to-year variation, it is clear that improvement was generally greater for females until about 1980, as had been the case since the beginning of the past century. However, it is also clear that 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 past 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 1979-2007, we have analyzed average annual reductions in central death rates by age group and sex for four major groups of causes of death (see table 2.3). The residual causes of death (Other Causes) were combined and analyzed as one group. When all ages are combined, the largest rate of reduction was in the category of Cardiovascular Disease, which has been about 2.5 percent for males and about 2.1 percent for females. The category of Violence, which includes accidents, has averaged about a 0.8 percent reduction for males and about a 0.2 percent reduction for females. For males, the rate of improvement for Cancer has been about 0.6 percent per year, and for females about 0.2 percent per year. The categories of Respiratory Diseases and Other Causes averaged increases ranging from about 0.1 percent to 2.3 percent per year.

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<sup>2</sup> 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 1900-2007 are a weighted average of the rates shown for the five separate distinct periods of change.

## 2.5 Recommendations of the Previous Technical Panels

The 2011 Technical Panel appointed by the Advisory Board recommended generally larger rates of decline than those assumed under the 2011 Trustees Report. Their recommendation was for an assumption which would result in a life expectancy at birth of 88.7 in 2085. This is achieved by having a 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 appointed by the Advisory Board recommended generally larger rates of decline than those assumed under the 2007 Trustees Report. Their recommendation was for an assumption of a 1.0 percent 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, where through the use of different death rates by cause, a steady deceleration is assumed at a very slow pace, continuing throughout the 75-year period and indefinitely thereafter, and approaching 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).

## 2.6 Assumed Future Rates of Reduction

Table 2.4 provides age-sex-adjusted mortality rates for historical years and the assumed future rates of reduction. For the 2012 Trustees Report, the base year for the mortality projections is 2007. The age-sex adjusted mortality rates presented in table 2.4 use the 2000 Census 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 2007) as the starting point from which mortality projections are made, we use a set of mortality rates calculated to be consistent with the trend inherent in the last 12 years of available data, 1996 through 2007. This procedure 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 have been selected to 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 have reflected for many years the belief that neither of these extremes will persist indefinitely into the future. The Trustees' assumptions have reflected 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.

Assumed 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 1997-2007 are calculated by age, sex, and cause. These annual reductions are also used to estimate death rates for preliminary years, years between the year of final data (2007) and the year of the Trustees Report (2012). For years after 2011, the reductions in mortality under Alternative II are assumed to change rapidly from initial levels of 100 percent<sup>3</sup> of the average annual reductions observed for the period 1997-2007 to the

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<sup>3</sup> If the average rate of reduction for a particular cause age-sex group during the period 1997-2007 is negative, then 75 percent of that average rate is assumed after 2007 for the intermediate alternative.

assumed ultimate rates of reduction for years 2036 and later. Similarly, changes in the rate of mortality reduction from 2012 to 2036 are assumed under the low and high cost scenarios, but the initial levels of reduction are assumed to be 50 percent and 150 percent,<sup>4</sup> respectively, of the average annual reductions observed for the 1997-2007 period.

For the 2012 Trustees Report, the number of causes of death is reduced from 7 to 5. The ultimate rates of improvement in the low and high cost scenarios are a ratio to 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 sex, age group, and cause of death for the intermediate alternative in the 2012 Trustees Report are presented in table 2.3, along with the intermediate assumptions from the 2011 Trustees Report, and the average rates experienced during the period 1979-2007 and 1997-2007.

Table 2.2 shows historical rates of improvement and the rates of improvement by alternative for the 2012 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 1900-2007, 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 2007 are slightly higher than those experienced since 1900. The projected rates of improvement for women age 50 and older are slightly lower than those assumed for men and generally lower than the rates experienced by this group of women over the period 1900-2007. 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 0.31 percent per year during the period 1982-2007. This amount was just under one third the average rate of improvement for aged men during this period (1.03 percent).

Table 2.2 also shows that, for all ages combined, the rate of improvement under the intermediate alternative for the period 2036-86 is 0.75 percent per year for men and 0.71 percent per year for women. While the summarized ultimate rate for males is the same as used in the 2011 Trustees Report, there is a small decrease in the rate for females, which was 0.73.

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 1900-2007 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 close to that experienced during 1900-2007 (0.77 percent as shown in table 2.2). While more recent experience indicates that mortality of the aged declined at only 0.69 percent per year over the 1982-2007 period, the Trustees believe the average annual rate of

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<sup>4</sup> If the average rate of reduction for a particular cause age-sex group during the period 1997-2007 is negative, then 100 percent of that average rate is assumed for the low cost alternative and 50 percent is assumed for the high cost alternative.

decline of 0.71 percent (as shown in table 2.2) over the period 2007-2086 for the intermediate assumption is reasonable in this context.

**Table 2.1 Historical and Assumed Rates of Reduction in Mortality<sup>1</sup>**

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

	Historical average annual percent reductions in age-adjusted death rates		Assumed ultimate (after 2020) annual percent reductions in age-adjusted death rates						
			1999 Trustees	1994-96 Technical Panel <sup>3</sup>	October-97 SOA Seminar <sup>4</sup>	1999 Technical Panel <sup>5</sup>	2000 Trustees Alternative 2 <sup>6</sup>	2002 Trustees Alternative 2 <sup>7</sup>	2003 Technical Panel <sup>8</sup>
	1900-2000	1982-2000	Alternative 2 <sup>2</sup>	Panel <sup>3</sup>	Seminar <sup>4</sup>	Panel <sup>5</sup>	Alternative 2 <sup>6</sup>	Alternative 2 <sup>7</sup>	Panel <sup>8</sup>
	<b>0 - 14</b>	3.30	2.74	1.20	3.30	0.95	2.20	1.35	1.55
<b>15 - 64</b>	1.44	1.15	0.57	1.40	0.75	1.12	0.75	0.78	1.11
<b>65 &amp; Over</b>	0.73	0.49	0.50	0.75	0.60	0.98	0.65	0.70	0.92

<sup>1</sup>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.

<sup>2</sup>The 1999 Trustees ultimate intermediate assumptions are for the period 2023-2073.

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

<sup>4</sup>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.

<sup>5</sup>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).

<sup>6</sup>The 2000 Trustees ultimate intermediate assumptions are for the period 2024-2074. Ultimate rates of mortality reduction increased.

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

<sup>8</sup>The 2003 Technical Panel ultimate assumptions are for the period 2027-2077.

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**Table 2.1 (Continued) Historical and Assumed Rates of Reduction in Mortality<sup>1</sup>**

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

	Historical average annual percent reductions in age-adjusted death rates		Assumed ultimate (after 2030) annual percent reductions in age-adjusted death rates						
			2004	2007	2008	2009	2011	2011	2012
	1900-2007	1982-2007	Trustees	Technical	Trustees	Trustees	Trustees	Technical	Trustees
			Alternative 2 <sup>2</sup>	Panel <sup>3</sup>	Alternative 2 <sup>4</sup>	Alternative 2 <sup>5</sup>	Alternative 2 <sup>6</sup>	Panel <sup>7</sup>	Alternative 2 <sup>8</sup>
<b>0 - 14</b>	3.20	2.50	1.55	1.00	1.57	1.55	1.56	1.26	1.56
<b>15 - 64</b>	1.38	1.23	0.78	1.00	1.00	0.99	0.96	1.26	0.98
<b>65 &amp; Over</b>	0.77	0.69	0.69	1.00	0.65	0.71	0.66	1.26	0.65

<sup>1</sup>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 1900-2005 are a weighted average of rates for five separate distinct periods of change.

<sup>2</sup>The 2004 Trustees ultimate intermediate assumptions are for the period 2028-2078.

<sup>3</sup>The 2007 Technical Panel ultimate assumptions are for the period 2031-2081.

<sup>4</sup>The 2008 Trustees ultimate intermediate assumptions are for the period 2032-2082.

<sup>5</sup>The 2009 Trustees ultimate intermediate assumptions are for the period 2033-2083.

<sup>6</sup>The 2011 Trustees ultimate intermediate assumptions are for the period 2035-2085.

<sup>7</sup>The 2011 Technical Panel ultimate assumptions are for the period 2035-2085.

<sup>8</sup>The 2012 Trustees ultimate intermediate assumptions are for the period 2036-2086.

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**Table 2.2 Average Annual Percent Reductions in Age-Adjusted Central Death Rates for the 2012 Trustees Report <sup>1</sup>**

		Historical Period (last final year of data is 2007)						Alternative II		
Sex	Age	1900-1936	1936-1954	1954-1968	1968-1982	1982-2007	1900-2007	2007-2036	2007-2086	2036-2086
Male	0-14	2.90	4.78	1.65	4.33	2.60	3.18	1.54	1.55	1.55
	15-49	1.47	3.05	-0.26	2.23	1.03	1.51	0.77	0.84	0.87
	50-64	0.42	0.98	-0.11	2.28	1.74	1.00	1.07	1.06	1.05
	65-84	0.19	1.17	-0.12	1.46	1.52	0.79	1.19	0.93	0.78
	85+	0.22	1.21	-0.89	1.56	0.05	0.38	0.62	0.56	0.53
	65+	0.20	1.18	-0.35	1.49	1.03	0.66	0.96	0.78	0.67
	Total	0.72	1.57	-0.23	1.77	1.16	0.98	0.96	0.83	0.75
Female	0-14	3.13	5.06	1.72	4.15	2.37	3.23	1.55	1.56	1.57
	15-49	1.54	4.68	0.28	2.96	0.37	1.83	0.67	0.84	0.94
	50-64	0.71	2.58	0.76	1.74	1.15	1.27	1.11	1.08	1.06
	65-84	0.35	2.05	1.06	2.05	0.59	1.01	0.88	0.79	0.73
	85+	0.23	1.21	0.13	2.06	-0.14	0.54	0.42	0.47	0.50
	65+	0.31	1.77	0.72	2.05	0.31	0.84	0.69	0.65	0.63
	Total	0.84	2.37	0.73	2.16	0.47	1.17	0.75	0.72	0.71
Total	0-14	3.00	4.90	1.68	4.25	2.50	3.20	1.54	1.55	1.56
	15-49	1.50	3.72	-0.07	2.47	0.81	1.64	0.73	0.84	0.90
	50-64	0.55	1.64	0.20	2.09	1.52	1.12	1.08	1.06	1.05
	65-84	0.28	1.62	0.44	1.74	1.09	0.91	1.03	0.86	0.75
	85+	0.23	1.21	-0.18	1.88	-0.06	0.49	0.49	0.50	0.51
	65+	0.26	1.49	0.24	1.78	0.69	0.77	0.81	0.71	0.65
	Total	0.78	1.96	0.25	1.97	0.86	1.09	0.85	0.77	0.73

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<sup>1</sup>Using the 2000 Census Resident population as the standard population for age-adjusting



**Table 2.2 (Continued) Average Annual Percent Reductions in Age-Adjusted Central Death Rates for the 2012 Trustees Report <sup>1</sup>**

Sex	Age	Alternative I			Alternative III		
		2007-2036	2007-2086	2036-2086	2007-2036	2007-2086	2036-2086
Male	0-14	0.80	0.79	0.79	2.47	2.52	2.55
	15-49	0.33	0.41	0.45	1.32	1.37	1.40
	50-64	0.46	0.53	0.57	1.80	1.64	1.55
	65-84	0.65	0.53	0.45	1.79	1.35	1.09
	85+	0.24	0.27	0.29	1.06	0.89	0.79
	65+	0.49	0.42	0.39	1.50	1.15	0.95
	Total	0.47	0.44	0.42	1.53	1.25	1.09
Female	0-14	0.81	0.80	0.79	2.48	2.54	2.57
	15-49	0.19	0.38	0.48	1.25	1.41	1.51
	50-64	0.51	0.55	0.57	1.82	1.68	1.59
	65-84	0.42	0.42	0.42	1.41	1.17	1.03
	85+	0.05	0.19	0.28	0.85	0.78	0.74
	65+	0.26	0.32	0.36	1.17	1.00	0.89
	Total	0.29	0.36	0.40	1.27	1.11	1.02
Total	0-14	0.80	0.79	0.79	2.48	2.53	2.55
	15-49	0.28	0.40	0.46	1.29	1.39	1.44
	50-64	0.48	0.54	0.57	1.81	1.66	1.57
	65-84	0.53	0.47	0.44	1.59	1.25	1.06
	85+	0.11	0.22	0.28	0.92	0.82	0.76
	65+	0.36	0.37	0.37	1.32	1.07	0.92
	Total	0.38	0.40	0.41	1.40	1.18	1.06

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<sup>1</sup>Using the 2000 Census Resident population as the standard population for age-adjusting

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

2011 TR	2012 TR	Historical		Alternative II*		Historical		Alternative II*	
		1979 to 2007	1997 to 2007	2035-2085	2036-2086	1979 to 2007	1997 to 2007	2035-2085	2036-2086
<b>Under Age 15</b>	<b>Under Age 15</b>	<b>Male</b>				<b>Female</b>			
Heart Disease	Cardiovascular Disease	2.74	4.41	2.2	2.3	2.59	4.12	2.2	2.3
Cancer	Cancer	2.61	1.29	1.5	1.5	2.15	1.09	1.5	1.5
Vascular Disease				2.5				2.5	
Violence	Violence	2.95	2.64	1.0	1.0	2.33	1.97	1.0	1.0
Respiratory Disease	Respiratory Disease	3.02	1.59	2.0	2.0	3.11	2.27	2.0	2.0
Diabetes Mellitus				1.0				1.0	
Other	Other	2.56	1.15	1.7	1.7	2.46	1.25	1.7	1.7
Resulting Total **	Resulting Total **	2.66	1.56	1.55	1.55	2.45	1.49	1.57	1.57
<b>Ages 15 - 49</b>	<b>Ages 15 - 49</b>	<b>Male</b>				<b>Female</b>			
Heart Disease	Cardiovascular Disease	2.13	1.14	1.5	1.5	1.23	0.53	1.5	1.5
Cancer	Cancer	1.78	2.28	1.5	1.5	1.59	1.64	1.5	1.5
Vascular Disease				1.8				1.8	
Violence	Violence	0.93	-0.83	0.7	0.7	0.21	-2.01	0.6	0.7
Respiratory Disease	Respiratory Disease	0.94	1.07	0.5	0.5	-0.11	0.43	0.5	0.5
Diabetes Mellitus				0.3				0.3	
Other	Other	-0.37	1.71	0.8	0.8	-0.73	-0.45	0.8	0.8
Resulting Total **	Resulting Total **	1.02	0.54	0.86	0.87	0.54	-0.13	0.89	0.94
<b>Ages 50 - 64</b>	<b>Ages 50 - 64</b>	<b>Male</b>				<b>Female</b>			
Heart Disease	Cardiovascular Disease	3.17	2.95	2.2	2.2	2.56	3.10	2.2	2.2
Cancer	Cancer	1.51	1.90	1.5	1.5	1.18	1.90	1.5	1.5
Vascular Disease				2.0				2.0	
Violence	Violence	0.72	-2.75	0.5	0.5	0.15	-3.81	0.5	0.5
Respiratory Disease	Respiratory Disease	1.22	0.97	0.7	0.7	-0.72	1.03	0.7	0.7
Diabetes Mellitus				0.3				0.3	
Other	Other	-0.38	-2.02	0.6	0.6	-0.45	-1.24	0.6	0.6
Resulting Total **	Resulting Total **	1.75	1.04	1.03	1.05	1.10	1.19	1.05	1.06
<b>Ages 65 - 84</b>	<b>Ages 65 - 84</b>	<b>Male</b>				<b>Female</b>			
Heart Disease	Cardiovascular Disease	3.02	4.38	2.2	2.2	2.62	3.79	2.2	2.2
Cancer	Cancer	0.55	1.71	0.8	0.9	-0.40	0.68	1.0	0.9
Vascular Disease				2.0				2.0	
Violence	Violence	0.76	0.12	0.5	0.5	0.07	-0.85	0.5	0.5
Respiratory Disease	Respiratory Disease	0.33	2.08	0.3	0.3	-2.69	0.28	0.3	0.3
Diabetes Mellitus				0.3				0.3	
Other	Other	-0.83	-0.87	0.3	0.3	-1.65	-1.70	0.3	0.3
Resulting Total **	Resulting Total **	1.44	2.27	0.76	0.78	0.57	1.25	0.76	0.73
<b>Ages 85 and older</b>	<b>Ages 85 and older</b>	<b>Male</b>				<b>Female</b>			
Heart Disease	Cardiovascular Disease	1.37	2.58	1.2	1.2	1.52	2.65	1.2	1.2
Cancer	Cancer	-0.67	0.91	0.5	0.5	-0.75	0.05	0.5	0.5
Vascular Disease				1.8				1.8	
Violence	Violence	-0.70	-0.31	0.3	0.3	-0.95	-1.88	0.3	0.3
Respiratory Disease	Respiratory Disease	-1.32	1.81	0.2	0.2	-2.57	0.30	0.2	0.2
Diabetes Mellitus				0.2				0.2	
Other	Other	-2.39	-2.33	0.2	0.2	-3.35	-3.42	0.2	0.2
Resulting Total **	Resulting Total **	0.04	1.06	0.55	0.53	-0.08	0.43	0.53	0.50
<b>Total</b>	<b>Total</b>	<b>Male</b>				<b>Female</b>			
Heart Disease	Cardiovascular Disease	2.49	3.44			2.14	3.15		
Cancer	Cancer	0.64	1.64			0.16	0.96		
Vascular Disease									
Violence	Violence	0.84	-0.77			0.20	-1.75		
Respiratory Disease	Respiratory Disease	-0.06	1.87			-2.27	0.38		
Diabetes Mellitus									
Other	Other	-0.85	-1.04			-1.57	-1.96		
Resulting Total **	Resulting Total **	1.12	1.59	0.75	0.75	0.49	0.88	0.73	0.71

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\* 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.

**Table 2.4 Age-Sex Adjusted Central Death Rates**

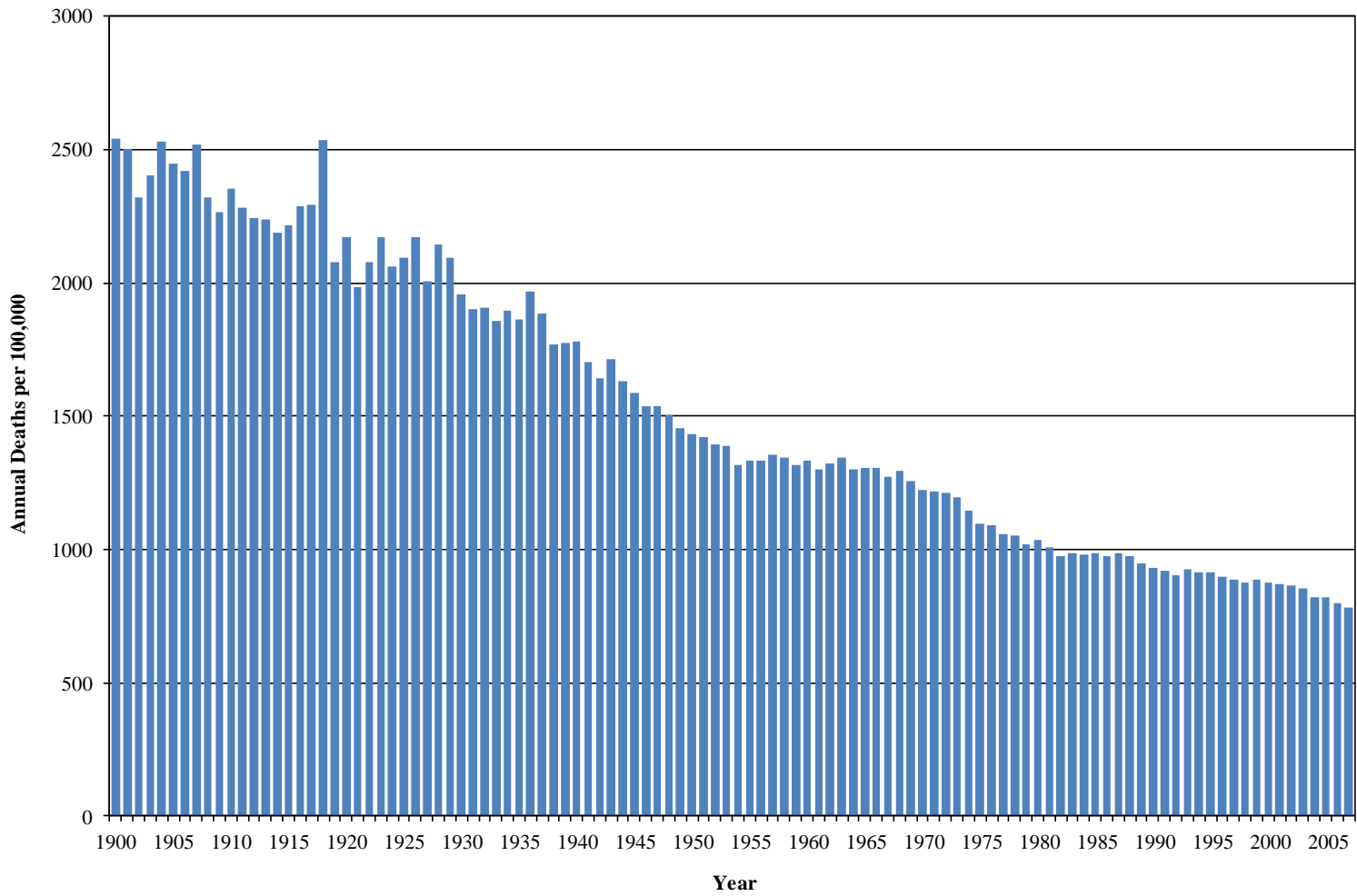
(per 100,000 population)

Year	2011 TR		2012 TR			
1900			2,544.1		2,544.1	
1910			2,354.9		2,354.9	
1920			2,171.0		2,171.0	
1930			1,954.8		1,954.8	
1940			1,779.1		1,779.1	
1945			1,586.6		1,586.6	
1950			1,435.6		1,435.6	
1955			1,334.2		1,334.2	
1960			1,330.9		1,330.9	
1965			1,304.6		1,304.6	
1970			1,224.3		1,224.3	
1975			1,099.0		1,099.0	
1980			1,035.9		1,035.9	
1985			984.2		984.2	
1990			931.2		931.2	
1991			918.8		918.8	
1992			905.4		905.4	
1993			927.2		927.2	
1994			916.2		916.2	
1995			913.9		913.9	
1996			900.4		900.4	
1997			885.1		885.1	
1998			878.3		878.3	
1999			884.4		884.4	
2000			875.7		875.7	
2001			867.5		867.5	
2002			863.9		863.9	
2003			851.8		851.8	
2004			820.4		820.4	
2005			822.6		822.6	
2006			799.8		799.8	
2007			782.1		782.1	
2008			789.6 <sup>1</sup>		789.5 <sup>1</sup>	
2009			781.5 <sup>1</sup>		781.3 <sup>1</sup>	
2010			773.8 <sup>1</sup>		773.5 <sup>1</sup>	
2011			766.5 <sup>2</sup>		766.2 <sup>1</sup>	
	Alternative I		Alternative II		Alternative III	
	2011 TR	2012 TR	2011 TR	2012 TR	2011 TR	2012 TR
2015	769.0	762.6	739.6	739.8	709.8	716.5
2020	758.3	750.8	707.8	708.6	655.7	664.9
2025	745.4	735.9	677.4	678.7	607.3	619.4
2030	732.1	720.2	648.7	650.4	563.8	578.7
2040	705.9	689.4	596.6	598.8	489.5	509.1
2050	681.3	660.4	550.8	553.3	428.8	452.2
2060	658.2	633.3	510.5	513.2	378.9	405.0
2070	636.5	607.9	474.9	477.7	337.5	365.5
2080	616.1	584.1	443.2	446.0	302.6	332.1
2090	596.9	561.8	414.9	417.7	273.1	303.4
2100	578.8	540.9	389.6	392.2	247.8	278.5

<sup>1</sup> Estimated

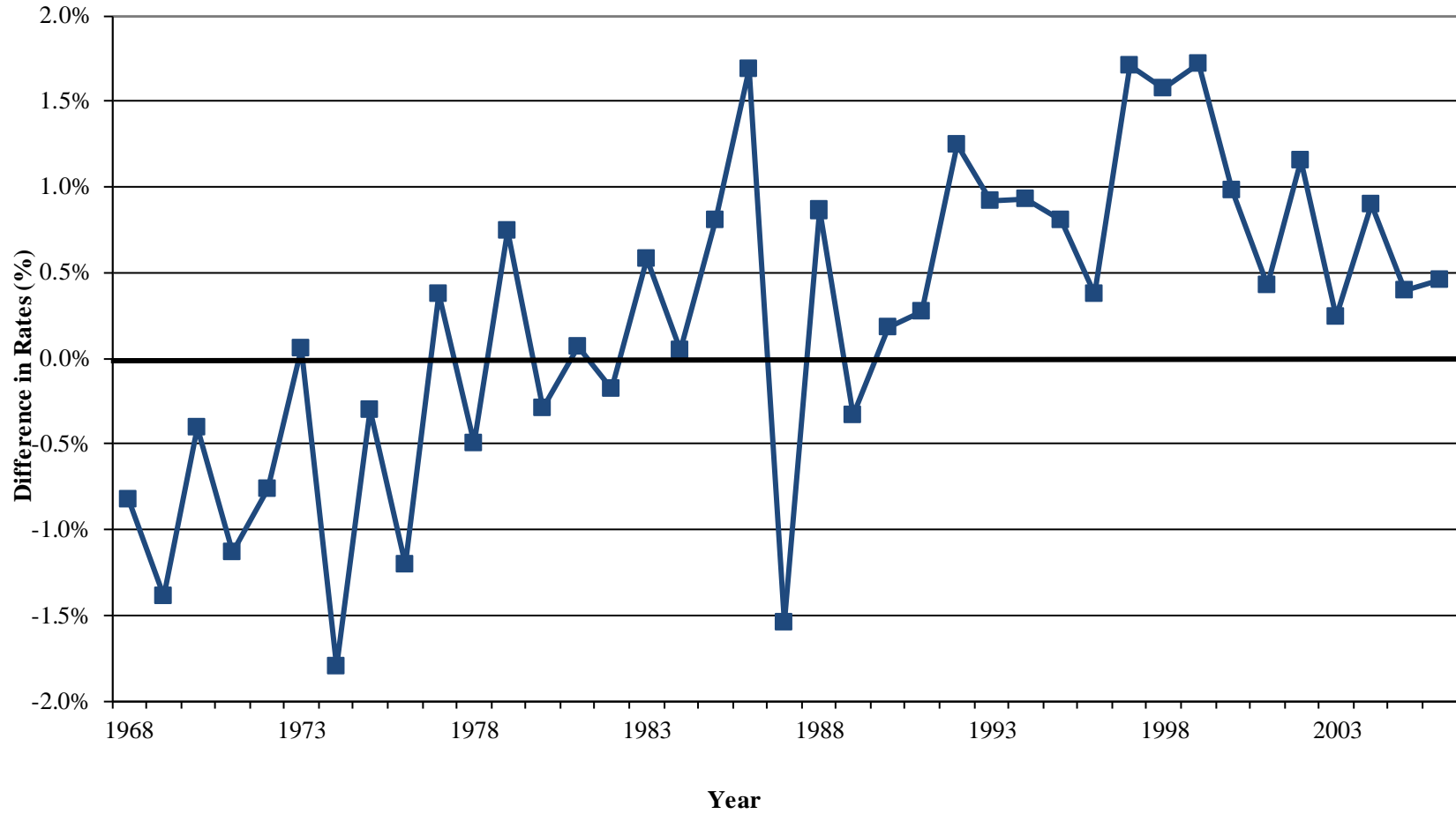
<sup>2</sup> Estimate, Intermediate Alternative

**Chart 2.1: Historical United States Age-Sex-Adjusted Central Death Rates from 1900-2007**



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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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Office of the Chief Actuary  
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# 3. IMMIGRATION

ASSUMPTIONS FOR THE 2012 TRUSTEES REPORT  
OFFICE OF THE CHIEF ACTUARY, SSA

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### 3.1 Summary

For the 2012 Trustees Report, there were no changes to the ultimate immigration assumptions from those used in the 2011 Trustees Report. There were, however, small changes to the estimated levels of immigration during the first few years of the projection period, reflecting recent experience. Table 3.1 displays the annual immigration levels assumed for the 2012 Trustees Report as well as those assumed in the 2011 Trustees Report. These changes resulted in a worsening (decrease) in the long-range OASDI actuarial balance, under the intermediate alternative, of about 0.02 percent of taxable payroll.

Since 2000, the annual number of legal immigrants (persons becoming legal permanent residents) has risen substantially and has averaged slightly over 1.0 million persons per year. Based on this experience, no change was made to the intermediate ultimate assumption of 1.0 million new legal permanent residents per year for the 2012 Trustees Report. Also, no change was made to the assumption that legal emigration out of the Social Security area is approximately 25 percent of the number of the legal immigrants, or 250,000 per year.

For other-than-legal (“other”) immigration, the model used in the 2011 Trustees Report is continued.<sup>1</sup> This model incorporates an intermediate ultimate assumption of 1.5 million other immigrants entering the Social Security area each year either on a temporary legal or undocumented basis. A second component accounts for the significant number of other immigrants that adjust status to become legal permanent residents (legal immigrants), thereby leaving other immigrant status. The third component reflects those who leave the stock of other immigrants and move outside the Social Security area. Therefore, the Trustees’ current methodology projects net other immigration as being 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.

Using this model of other immigration, the level of net other immigration, under the intermediate alternative, is estimated to be about 208,000 persons for 2012, 453,000 persons for 2020, 323,000 persons for 2040, and 279,000 persons by 2080. The average level of net other immigration during the 75-year projection period is approximately 329,000 persons per year. The following table presents the projected levels of the number of immigrants for the intermediate alternative.

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<sup>1</sup> This model was first introduced in the 2008 Trustees Report.

<b>Annual Net Immigration: Alternative II Levels for the 2012 Trustees Report</b>			
<b>Year</b>	<b>Legal</b>	<b>Other</b>	<b>Total</b>
2012	750,000	208,000	958,000
2020	750,000	453,000	1,203,000
2030	750,000	374,000	1,124,000
2040	750,000	323,000	1,073,000
2050	750,000	299,000	1,049,000
2060	750,000	289,000	1,039,000
2070	750,000	283,000	1,033,000
2080	750,000	279,000	1,029,000

### 3.2 Legal Immigration

The term legal immigration refers to persons lawfully admitted for permanent residence in the United States. 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 12.9 percent in the 2010 American Community Survey.

Data on the number of legal immigrants admitted to the U.S., which includes 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 200,000-300,000 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 1995-2010.

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, over 1,000,000 in 2001, and 2002 was 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, a considerable backlog of pending applications still exists and part of 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, followed by a decrease in 2010 to 1,043,000. Therefore, for the intermediate assumptions, the Trustees assume that the future legal immigration levels will average approximately 1.0 million persons per year.

It is possible that future economic conditions assumed under the high cost alternative and/or less favorable attitudes toward immigration could result in generally lower immigration. Therefore, an ultimate assumption of 800,000 legal immigrants per year for the high cost (low immigration) alternative is used. 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 1,000,000 persons per year. Therefore, the ultimate level for the low cost (high immigration) alternative is 1,200,000 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, OIS, and other experts suggests that annual emigration may generally be in the range of 20-40 percent of annual legal immigration. We expect emigration from the Social Security area to 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 2011 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 relative rates of emigration are assumed for the 2012 Trustees Report.

### 3.4 Net Legal Immigration

Combining the levels of legal immigration with the rates of legal emigration yields ultimate levels of net legal immigration of 960,000, 750,000, and 560,000 per year for the low cost, intermediate, and high cost alternatives, respectively. These are the same levels assumed for the 2011 Trustees Report.

### 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 two components:

- 1) Unauthorized immigrants who are persons who do not currently have legal authorization to be residing in the United States.
- 2) Non immigrants who, according to OIS, are 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.

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 still 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 stock of 9.9 million. It was

estimated that by 2005, the total stock was 11.9 million, it increased to a peak of 13.5 million in 2007, and decreased thereafter to the most recent estimate of 12.6 million in 2010.

The current OCACT other immigration model makes explicit estimates of the following categories: (1) the annual number of new-arrival other immigrants, (2) the annual number of other emigrants (those leaving the Social Security area), and (3) the other immigrants who adjust status to LPR status (adjustments of status). Analysis was done to estimate the average annual number in each of these categories over the period 2000-05. This analysis begins with a Census estimate of the 2000 population of unauthorized immigrants adjusted to take into account non-immigrants (those currently admitted with only temporary authorization). The three components of other immigration flow are modeled based on the period 2000-05. The table below shows the average estimated flow for each component during the period 2000-05:

<b>Estimated Average Annual Levels of Immigration During the Period 2000-2005</b>			
<b>Other Immigration (1)</b>	<b>Other Emigration (2)</b>	<b>Adjustment to LPR Status (3)</b>	<b>Net Other Immigration (1-2-3)</b>
1,500,000	460,000	490,000	550,000

There is very little data on the number of other immigrants that enter the country each year. The number of new other immigrants, for the intermediate alternative of the 2012 Trustees Report, is assumed to be at a level of 1,500,000 for each year after 2014. It is possible that this level will be higher in the future as the other immigrants already present may help family members or other immigrants enter the country and the demand for other immigrant labor in the economy may increase. Thus, the assumed ultimate level is set at 1,800,000 per year under the low cost (high immigration) scenario. Due to the possibility of an increased willingness of governments to pursue deportation of unauthorized immigrants or withhold services from them and to crack down on those who employ them, the ultimate level is set at 1,200,000 under the high cost (low immigration) scenario.

While our analysis estimated the average annual other emigration level (departures from the Social Security coverage area) during 2000 through 2005 to be around 460,000, we believe this number will rise throughout the projection period. As the stock of the other population rises, more emigration is likely to occur. Thus, we are estimating the other emigration largely as a function of the population at risk. We developed rates of emigration by age and sex based on the number of exits estimated to have occurred during the period 2000 through 2005. Ideally, these rates would be developed by age, sex, and duration of stay in the country. Unfortunately, at this time, data is too sparse to develop accurate estimates of the current stock by duration of stay. However, to take into account that the rates of emigration are likely to decrease as the duration of the stock increases, we disaggregated the total emigration for years 2000 through 2005 into two pieces:

- 1) A fixed annual level of emigrants equal to ten percent of recent new arrivals; and

- 2) A set of annual rates of emigration by age and sex, determined from the emigrants remaining.

Applying the method described above results in increasing levels of emigration<sup>2</sup> throughout the period. However, the overall gross rate of emigration (number of other emigrants divided by the stock of other) decreases, consistent with a population that is increasing in average age and duration of stay in the country. Under the intermediate alternative, the gross emigration rate is about 3.9 percent at the start of the projection period, but declines to about 2.8 percent at the end of the 75-year projection period.

The methodology also takes into account the fact that there are 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<sup>3</sup> 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. Since 2000, 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. It seems reasonable to assume that this trend will continue and the Trustees assume that 50 percent of all future LPRs will be adjustments of status from the other immigrant population.

### 3.6 Recommendations of Previous Technical Panels

The levels of immigration recommended by recent Technical Panels (2003, 2007, and 2011) appointed by the Social Security Advisory Board are substantially higher than the levels used in the 2012 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 specification, total net immigration would be projected to reach 1.5 million by 2068, with continuing increases thereafter.

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<sup>2</sup> As the stock 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 stock of other immigrants 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 current stock of other population that is relatively young of age and low in duration of stay in the country.

<sup>3</sup> The Department of Homeland Security considers refugees and asylees to also be adjustments of status, but for the purposes of our model we treat these categories as new arrivals.

The 2007 Technical Panel recommended setting net total immigration equal to 1.35 million in 2007 with increases of 1.0 percent per year for the first 25 years of the projection period and 0.5 percent increases thereafter. This would result in a net immigration flow of nearly 2.26 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 result in a net immigration flow of nearly 1.63 million by the end of the projection period.

This increase in the level of total net immigration recommended by all panels reflects a number of factors, including each panel's 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, we retained the practice of reflecting changes in the immigration law only upon enactment.

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

Values Used for 2011 Trustees Report					
Alternative	Year	Gross Legal	Net Legal	Gross Other	Net Other
Low Cost:	2011	1,150,000	920,000	1,400,000	357,000
	2020	1,200,000	960,000	1,800,000	570,000
	2030	1,200,000	960,000	1,800,000	467,000
	2040	1,200,000	960,000	1,800,000	408,000
	2050	1,200,000	960,000	1,800,000	376,000
	2060	1,200,000	960,000	1,800,000	360,000
	2070	1,200,000	960,000	1,800,000	352,000
	2080	1,200,000	960,000	1,800,000	348,000
Intermediate:	2011	1,050,000	788,000	1,100,000	105,000
	2020	1,000,000	750,000	1,500,000	447,000
	2030	1,000,000	750,000	1,500,000	365,000
	2040	1,000,000	750,000	1,500,000	320,000
	2050	1,000,000	750,000	1,500,000	298,000
	2060	1,000,000	750,000	1,500,000	288,000
	2070	1,000,000	750,000	1,500,000	281,000
	2080	1,000,000	750,000	1,500,000	278,000
High Cost:	2011	950,000	665,000	900,000	-46,000
	2020	800,000	560,000	1,200,000	329,000
	2030	800,000	560,000	1,200,000	266,000
	2040	800,000	560,000	1,200,000	234,000
	2050	800,000	560,000	1,200,000	223,000
	2060	800,000	560,000	1,200,000	219,000
	2070	800,000	560,000	1,200,000	215,000
	2080	800,000	560,000	1,200,000	212,000

Values Used for the 2012 Trustees Report					
Alternative	Year	Gross Legal	Net Legal	Gross Other	Net Other
Low Cost:	2011	1,000,000	750,000	1,100,000	151,000
	2020	1,200,000	960,000	1,800,000	636,000
	2030	1,200,000	960,000	1,800,000	503,000
	2040	1,200,000	960,000	1,800,000	429,000
	2050	1,200,000	960,000	1,800,000	390,000
	2060	1,200,000	960,000	1,800,000	367,000
	2070	1,200,000	960,000	1,800,000	354,000
	2080	1,200,000	960,000	1,800,000	349,000
Intermediate:	2011	1,000,000	750,000	1,100,000	151,000
	2020	1,000,000	750,000	1,500,000	453,000
	2030	1,000,000	750,000	1,500,000	374,000
	2040	1,000,000	750,000	1,500,000	323,000
	2050	1,000,000	750,000	1,500,000	299,000
	2060	1,000,000	750,000	1,500,000	289,000
	2070	1,000,000	750,000	1,500,000	283,000
	2080	1,000,000	750,000	1,500,000	279,000
High Cost:	2011	1,000,000	750,000	1,100,000	151,000
	2020	800,000	560,000	1,200,000	338,000
	2030	800,000	560,000	1,200,000	274,000
	2040	800,000	560,000	1,200,000	237,000
	2050	800,000	560,000	1,200,000	225,000
	2060	800,000	560,000	1,200,000	220,000
	2070	800,000	560,000	1,200,000	216,000
	2080	800,000	560,000	1,200,000	213,000

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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 <sup>1</sup>	Total non IRCA	Numerically Limited <sup>2</sup>	Western Hemisphere <sup>3</sup>	Immediate Relatives of Citizens	Refugees & Asylees	Other Specially Legislated Immigrants <sup>4</sup>
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

<sup>1</sup> This category includes those aliens admitted under the Immigration Reform and Control Act of 1986.

<sup>2</sup> 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.

<sup>3</sup> 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.

<sup>4</sup> 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

Social Security Administration  
Office of the Chief Actuary  
April 23, 2012

**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
Family Sponsored Preference	226,000 to 480,000 <sup>1</sup>	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
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
Employment Based	140,000 <sup>2</sup>	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
Diversity	55,000	55,000	55,000	55,000	55,000	55,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	50,000	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
Asylees <sup>3</sup>	10,000	10,000	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

<sup>1</sup> 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.

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

<sup>3</sup> 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/xlibrary/assets/statistics/publications/lpr\\_fr\\_2010.pdf](http://www.dhs.gov/xlibrary/assets/statistics/publications/lpr_fr_2010.pdf)

Immediate Relatives: all "not limited" unless legislation changes

Refugees: Table 1 of [http://www.dhs.gov/xlibrary/assets/statistics/publications/ois\\_rfa\\_fr\\_2010.pdf](http://www.dhs.gov/xlibrary/assets/statistics/publications/ois_rfa_fr_2010.pdf)

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



**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 <sup>1</sup>	Total non IRCA <sup>2</sup>	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

<sup>1</sup> This category includes those aliens admitted under the Immigration Reform and Control Act of 1986.

<sup>2</sup> 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

Social Security Administration  
Office of the Chief Actuary  
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