

Age Dependency Ratios and Social Security Solvency

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Summary

The aging of the population of the United States, hastened by the impending retirement of the huge baby-boom generation, has caused some policy-makers to question whether the U.S. Social Security system can meet the demands for retirement benefits in the future. The financial health of the system, which is largely financed through payroll taxes paid by current workers in a pay-as-you-go manner, is sensitive to the ratio of dependents to workers—sometimes called the age dependency ratio or support ratio.

Trends and projections of dependency ratios, including the relationship between both older (years 65 and older) and younger (under age 20) dependents to the working-age population in the United States are considered in the first section of this demographic report. If one considers the 130-year period from 1950-2080, the greatest demographic "burden"—when the number of dependents (children plus the elderly) most exceeds persons in the working-age population—is already in the past, having reached its height in 1965 when there were 94.7 dependents per 100 persons of working age. While the dependency ratio has generally been decreasing since that time, two trends are evident. First, the ratio of dependents to workers will again reverse course beginning around year 2013 with the retirement of a large number of baby boomers. Second, the composition of the dependency ratio is changing. The number of children per worker has been falling since 1965; most of the anticipated increase in the dependency ratio in the coming decades reflects a growing proportion of older persons (ages 65 and older). Age-specific trends in the age dependency ratios are not off-setting in terms of their federal budget implications. Programs administered by the federal government (especially Social Security and Medicare) focus much more heavily on assisting the elderly population whereas state and local governments have historically provided substantial support for families with children through spending on elementary and secondary education and other programs.

Next, the United States is compared to nine other nations. Seven of the countries are members of the G8, a consultative grouping of leading industrial democracies: Canada, France, Germany, Italy, Japan, Russia, the United Kingdom. (The United States is the 8th member). In addition, China and India, the two most populous countries globally, are included to highlight that population aging is occurring even in nations that are less industrialized and have "younger" current age structures. Population aging, which largely results from declining fertility rates and increasing survival, is a global phenomenon. Today, the United States is the "youngest" of the industrialized G8 nations. While the proportion of the U.S. population that is aged 65 and older will continue to increase, aging in the United States is still projected to be considerably slower than in any of the other industrialized countries.

In the final section, policy implications of the changing dependent-to-worker ratios are considered in the context of pay-as-you-go (paygo) social security systems.

This report will be updated every two years.

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Background

> Social Security's financing problems ... are very large and serious. People are living longer, the first baby-boomers are nearing retirement, and the birth rate is low. The result is that the worker-to-beneficiary ratio has fallen from 16.5-to-1 in 1950 to 3.3-to-1 today. Within 40 years it will be 2-to-1. At this ratio there will not be enough workers to pay scheduled benefits at current tax rates.[1]

As highlighted by the Social Security Administration (SSA), the aging of the (United States) population, hastened by the impending retirement of the huge baby-boom generation,[2] has caused policy-makers to question whether the U.S. Social Security system can meet the demands for retirement benefits in the future. Because the current system largely pays benefits through taxes paid by current workers,[3] the financial health of the system is sensitive to the ratio of dependents to workers—sometimes called the age dependency ratio or support ratio. Trends and projections of dependency ratios, including the relationship between both older (years 65 and older) and younger (under age 20) dependents to the working-age population in the United States are considered in the first section of this demographic report. Next, the United States is compared to nine other nations, including the seven other members of the G8.[4] In the final section, policy implications of the changing dependent-to-worker ratios are considered in the context of pay-as-you-go (paygo) social security systems.

Age Dependency Ratios

This section summarizes information on trends and projections over time in the ratio of working-age persons to persons in the dependent ages in the United States for the period 1950-2080.

Definitions

The age-dependency ratio relates the number of persons in "dependent" ages (defined here as persons under the age of 20 and over age 64) to those in "economically productive" ages (20-64 years) in the population. It addresses the question of how many dependents are being supported per 100 persons of working age.[5] The age-dependency ratio is divided into old-age dependency (the ratio of persons 65 years and older to those in the working ages 20-64) and child dependency (the ratio of people under age 20 to those ages 20-64).[6]

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[1] Social Security Administration, *Social Security's Future—FAQs, Frequently Asked Questions About Social Security's Future; Question: I hear that Social Security has a big financial problem. Why?* at http://www.ssa.gov/qa.htm, accessed Oct. 20, 2006.

[2] Americans born in years 1946 to 1964.

[3] This is often referred to as a pay-as-you-go (or "paygo") system.

[4] The G8 is a consultative grouping of leading industrial democracies—Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States.

[5] Alternatively, one could ask how many workers there are to support each dependent. A graph of these trends, which is not analyzed in the text of this report, is provided in **Figure A-1**.

[6] These age breaks are arbitrary. These are the age breaks used by the SSA in its reporting of the status of the Social Security trust funds. The age at which a worker could receive full Social Security benefits (the full retirement age, FRA) was, until recently, age 65. The FRA will gradually rise from 65 to 67 years beginning with people who attained (continued...)

Trends

Based on data contained in the Annual Report (2006) of the Federal Old-Age and Survivors Insurance and Disability Insurance ("Social Security") Trust Funds,[7] **Figure 1** shows the estimated and projected trends in age-dependency ratios for the period 1950-2080 in the United States. Ratios for years 1950-2005 are historical estimates based on actual data[8]; years 2006-2080 are model-based projections that rely upon assumptions about future trends in mortality, fertility, and immigration. A detailed table with the underlying population data and age dependency ratios for years 1950-2080 is provided in **Table A-1**. Data in this section and in **Table A-1** reflect the Social Security actuaries' intermediate assumptions (i.e., their best guess) of future trends in the underlying assumptions. The impact of variability in the assumptions used for the projections is considered later in this report (**Figure 2**).

As seen in **Figure 1**, there were 72.5 dependents per 100 persons of working age in 1950; of these, 58.7 dependents were children while 13.8 were older persons. The total dependency ratio reached its height in 1965, just after the last of the Baby Boom generation was born. In 1965, there were 94.7 (of which 76.5 were children and 18.2 were older persons) dependents per 100 persons of working age. There have been divergent trends for the child and old-age dependency ratios in recent decades with the child ratio generally falling and that of older persons increasing. Children continue to out-number older persons in their contribution to the total dependency ratio in 2006 by a sizable margin: there are 45.9 child and 20.3 older dependents per 100 persons of working age.

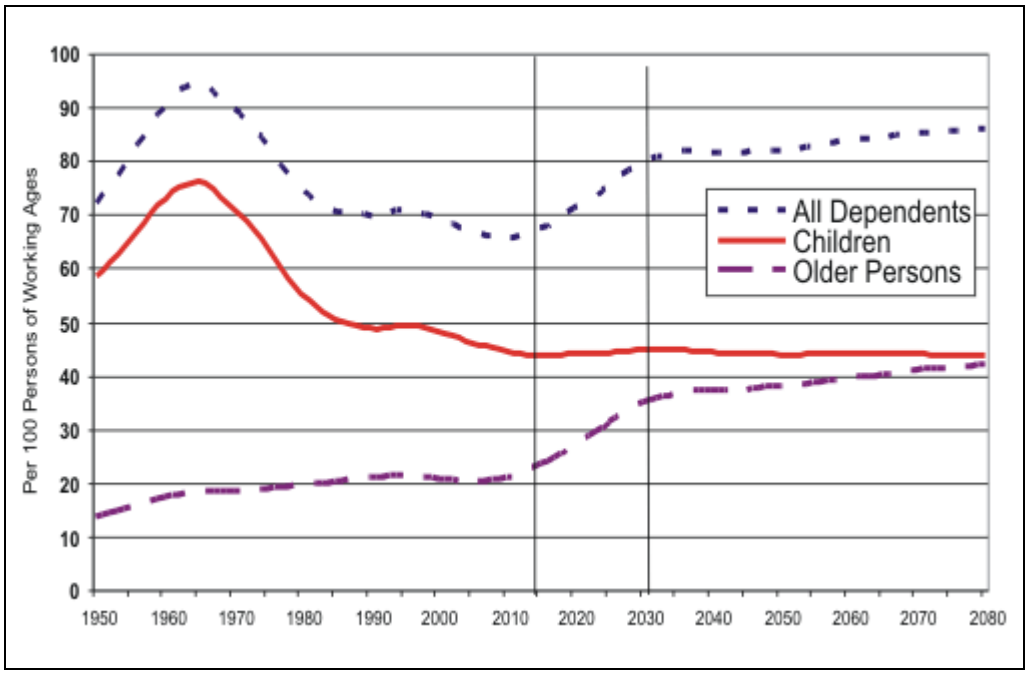
(...continued)

age 62 in 2000 (those born in 1938). See CRS Report 94-622, *Social Security: Raising the Retirement Age Background and Issues*, by Geoffrey C. Kollmann.

[7] *2006 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds, May 1, 2006*, available at http://www.ssa.gov/OACT/TR/TR05/tr06.pdf, accessed Oct. 20, 2006. (Hereafter cited as *Trustees Report, 2006*.)

[8] Note that data for 2003, 2004, and 2005 are preliminary.

Figure 1. Dependency Ratios: Number of Dependents Per 100 Persons of Working Age, United States: 1950-2080



Source: Congressional Research Service (CRS) analysis based on statistical tables in: *2006 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, May 1, 2006, available at http://www.ssa.gov/OACT/TR/TR06/tr06.pdf, accessed Oct. 20, 2006.

Notes: "Dependents" refers to the population under age 20 and age 65 and older; working age refers to persons ages 20-64 inclusive. Ratios for years 1950-2005 are based on actual data; years 2006-2080 are projections which rely upon assumptions about future trends in mortality, fertility, and immigration. Projections use SSA's intermediate assumptions.

Older Dependents

The old-age dependency ratio has generally been increasing since 1950. The baby-boom generation (persons born between 1946 and 1964) will accelerate the rate at which the old-age dependency ratio changes. Baby boomers will begin to attain age 65 beginning in 2011 (for those born in 1946) and continuing through 2029 (for those born in 1964). As highlighted in **Figure 1**, the older age dependency ratio will quickly increase as a result of the aging of the baby-boom generation, from about 21.2 to 34.3 older dependents per 100 persons of working age between 2011 and 2029. Population aging,[9] however, will continue to be one of the most important defining demographic characteristics of the U.S. population, even after the youngest of the baby-boom generation passes away.[10] The number of older dependents per 100 persons of working age will continue to increase, albeit at a slower pace than will be experienced during the years in which the baby boomers retire. Based on the SSA Trustees' current assumptions, there will, for instance, be 42.1 older dependents per 100 workers in 2080.

[9] As measured by increases in the median age of the population and increases in the proportion of the population aged 65 and older.

[10] See CRS Report RL32701, *The Changing Demographic Profile of the United States*, by Laura B. Shrestha. (Hereafter cited as CRS Report RL32701).

These trends reflect forecasts of continuing improved survival at the older ages and continuing low fertility rates.[11] Increasing rates of survival mean a greater number of older dependents (the numerator of the ratio), which in turn increases the old-age dependency ratio. Fewer (than current) births will mean fewer young dependents in the short-run, but will translate into fewer future workers in about two decades. At that time, the net effect will be that the old-age dependency ratio will be increasing (as the number of dependents will be increasing in the numerator) while the number of working age persons to support them will be falling (in the denominator). From the perspective of the Social Security program, the *old-age* dependency ratio is the most critical of the dependency measures as it relates the number of potential Social Security beneficiaries ($ outlays) to the number of projected payroll tax payers ($ income). Thus, the lower the old-age dependency ratio, the lower the dollars paid out versus received, and the better the finances of the Social Security program outlook.

How Useful Are Dependency Ratios?

The standard definition of a support ratio is a simple ratio of the number of persons in broad age groups. The ratios do not reflect whether the people of working age are actually economically productive or whether the older person and children are economically dependent. For instance, many older persons are financially and physically independent whereas there are substantial portions of the working-age population who may not earn incomes because they are unemployed, unable to work, in school, in prison, or have opted out of the labor force.

Although it is difficult to include factors such as intra-family financial assistance in an overall measure of social support, it is feasible to consider employment characteristics of the populations in the relevant age groups. Estimates of the "economically active population" can be further adjusted to account for average retirement ages, levels of pension receipt, institutionalization, the prevalence of disabilities, and other factors.

This information has been adapted from K. Kinsella, and D. R. Phillips, "Global Aging: The Challenge of Success," *Population Bulletin*, vol. 60, no. 1, Mar. 2005.

Child Dependents

Referring again to **Figure 1** and **Table A-1**, the child dependency ratio increased from 58.7 to 76.5 child dependents per 100 working age adults between 1950 and 1965, largely reflecting the birth of the baby-boom generation. Since 1965, the child dependency ratio has experienced a mostly steady decline due to falling fertility rates in the United States. Nonetheless, in 2006, the number of child dependents is more than double the number of older dependents—45.9 and 20.3 per 100 working age adults, respectively.

The SSA Trustees' current projections assume that child dependency ratios will slowly decline through year 2080 but that the rate of decline will be very slow. Child dependency ratios will stay in the narrow range of 43.9 to 45.9 child dependents per 100 working age adults throughout this 75-year time span.

Note that, even with the pending retirement of the baby-boom generation, the number of child dependents has and will continue to be greater than the number of older dependents in each of the years of the time frame considered here.

[11] Note that improved population survival and decreased fertility are the root causes of the aging boom though immigration also contributes to trends in dependency ratios over time. Immigration is currently and is projected to remain over-shadowed by the trends in mortality and fertility in the dependency ratios. See CRS Report RL32701, *The Changing Demographic Profile of the United States*, by Laura B. Shrestha.

Some Take-Away Messages

- If the Social Security population estimates and projections for the 130-year period of 1950-2080 are correct, then the greatest demographic "burden"—when the number of dependents (children plus the elderly) relative to the working-age population—is already in the past, having reached its height in 1965 when there were 94.7 dependents per 100 persons of working age.
- The total number of dependents per 100 persons of working age has generally been decreasing since 1965 but is expected to reverse course beginning around year 2013. The change coincides with the retirement of some early cohorts of the baby-boom generation.
- The composition of the dependency ratio is changing. The number of children per worker has been falling since 1965; most of the anticipated increase in the dependency ratio in the coming decades reflects a growing proportion of older persons (ages 65 and older). These age-specific trends in the age dependency ratios are not, however, off-setting in terms of their federal budget implications. Programs carried out by the federal government focus much more heavily on assisting the elderly population. Based on estimates from the Congressional Budget Office (CBO), the federal government spent a little over one-third of its budget—about $615 billion—on transfer payments and services (with the Social Security and Medicare entitlement programs being the biggest expenditures) for people age 65 and older in FY2000. Federal spending on children was about $148 billion, or $175 billion if payments to the children's parents were included.[12] State and local governments have historically provided substantial support for families with children through spending on elementary and secondary education and other programs. Nevertheless, because federal spending dwarfs state and local figures, total government spending for the average person 65 years or older is still much greater than for the average child.[13]
- Age dependency ratios, while providing a glimpse at how the age structure of the population is changing, are nonetheless crude measures that do not take into consideration whether persons of working age are actually working and supporting the economy, nor whether dependents are truly economically dependent and receiving transfers from working-age persons. Furthermore, as noted by Friedland and Summer,[14] "society's future is not determined solely by demographic changes. Focusing on the anticipated growth in population by age

[12] Congressional Budget Office (CBO), *Federal Spending on the Elderly and Children*, July 2000, at http://www.cbo.gov, accessed June 17, 2005. (Hereafter cited as CBO, *Federal Spending on the Elderly and Children*.) See also: (1) CRS Report RS22008, *Federal Spending for Older Americans*, by April Grady and William Klunk (hereafter cited as CRS Report RS22008); and (2) C. Eugene Steuerle, "The Incredible Shrinking Budget for Working Families and Children," *National Budget Issues*, no. 1, Dec. 2003.

[13] *CBO, Federal Spending on the Elderly and Children.* Note, however, that the increase in the ratio of older persons to people under 65 also has important implications for state budgets because of the growth in Medicaid spending as a share of total state government expenditures. Medicaid is the largest public source of spending on long-term care (LTC), and this will strain state budgets because a substantial contributor to the rise in the old-age dependency ratio will be due to increases in the number of people 85 and older who are disproportionately large consumers of LTC services.

[14] Robert B. Friedland and Laura Summer, *Demography Is Not Destiny, Revisited*, Commonwealth Fund Publication 789 (New York, Mar. 2005), p. v. (Hereafter cited as Friedland and Summer, *Demography is Not Destiny*.)

> group is just too simplistic an approach. Rather, the future is shaped by the choices made—or not made—individually and collectively, bounded by the limits in resources and, in particular, knowledge. Knowledge is at the heart of gains in productivity, economic growth, and the advances in medical care, agriculture, communication, transportation, and the environment."

Variability of Future Projections

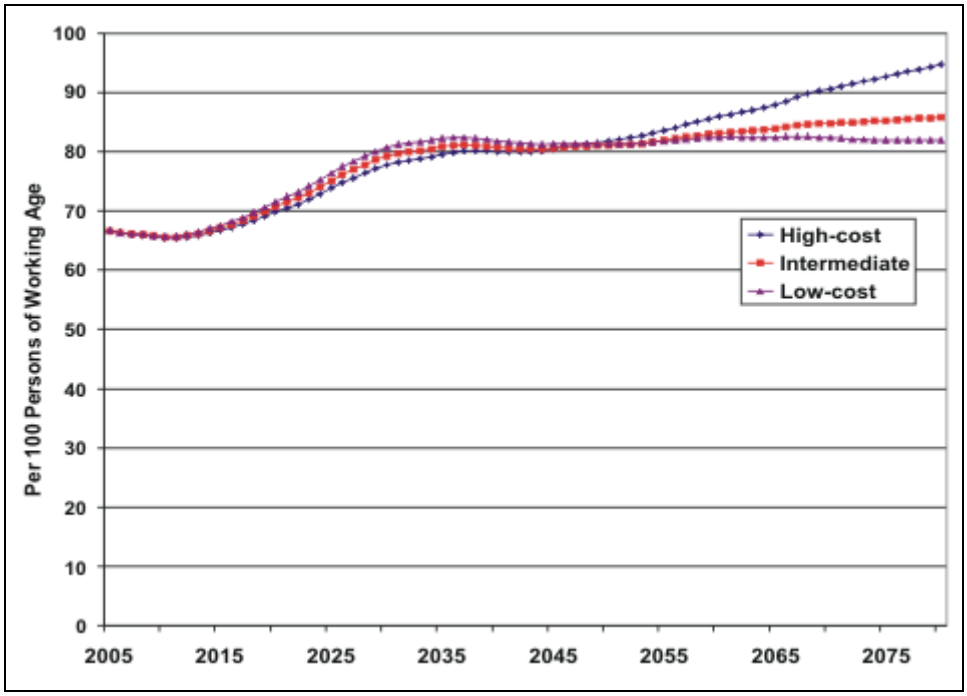
The ratios reported here are CRS compilations based on estimates and projections from the SSA.[15] The information for years 1950 (the earliest available year) to 2005 are estimates that are based on actual data[16]; the information for years 2004-2080 are projections, which rely upon assumptions about future mortality, fertility, and immigration patterns.

To address the uncertainty that is inherent in all population projections, SSA constructs several sets of projections which are based on different combinations of assumptions. The data represented here uses the intermediate set of projections in the Trustees Report, which represents the Board's best estimate of the future course of the population. The Trustees produce two additional sets of projections, the "high-cost" and "low-cost" scenarios, which use differing assumptions about the future courses of fertility, mortality, and immigration. **Figure 2** highlights the possible variation in the total dependency ratio through 2080 under these three different scenarios. While SSA's best guess of the total dependency ratio in year 2080 is 86.1 dependents per 100 persons of working age, the range of possible values varies from 83.1 to 94.5.

[15] *Trustees Report, 2006.*

[16] Note that the data for years 2003, 2004, and 2005 are preliminary.

Figure 2. Total Projected Dependency Ratio, 2005-2080, Under Three Sets of Assumptions of Future Mortality, Fertility, and Immigration



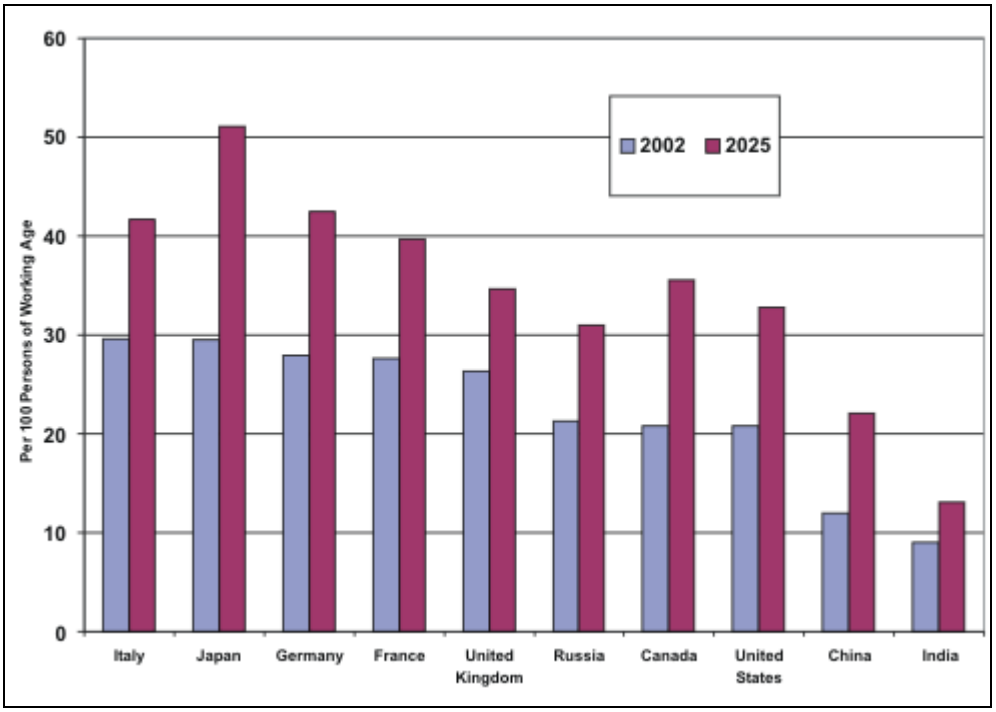
Source: Congressional Research Service (CRS) analysis based on statistical tables in: *2006 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, May 1, 2006, available at http://www.ssa.gov/OACT/TR/TR06/tr06.pdf, accessed Oct. 20, 2006.

An International Comparison: Is the American Situation Unique?

Figure 3 presents statistics on the number of *older* persons supported per 100 persons of working age in 2002 in 10 countries.[17] Eight of the countries are members of the G8, a consultative grouping of leading industrial democracies: Canada, France, Germany, Italy, Japan, Russia, the United Kingdom, and the United States. In addition, China and India, the two most populous countries globally, are included to highlight that population aging is occurring even in nations that are less industrialized and have "younger" current age structures.

[17] CRS compilation based on U.S. Census Bureau, International Population Reports WP/02, *Global Population Profile, 2002* (Washington, DC: GPO, 2004).

Figure 3. Number of Older Dependents per 100 Persons of Working Age in Selected Countries, 2002 and 2025



Source: Congressional Research Service (CRS) compilation based on U.S. Census Bureau, International Population Reports WP/02, *Global Population Profile, 2002* (Washington, DC: GPO, 2004).

Notes: Figures for China exclude Taiwan, Hong Kong S.A.R., and Macau S.A.R. Countries are sorted by highest *old-age* dependent-to-worker ratio in 2002. Estimates relate the number of persons age 65 and older per 100 persons of working age (20-64) regardless of the usual age of retirement or age at entry into the work force in each of these countries.

Of the 10 countries included in the comparison, Italy ranked first, with Japan close behind, in terms of the number of older persons being supported per 100 workers in 2002—29.6 and 29.5, respectively. Among the G8 countries, Canada and the United States were tied for last place at 20.8[18] older persons per 100 persons of working age—indicating that the Canadian and American "burdens" are less than those of the other G8 countries.[19] Not coincidentally, the proportions of their population aged 65 and older—13% and 12% respectively in 2000—are also the lowest of the G8 nations. In India, with its young age structure, there were only 9.0 older persons per 100 persons of working age. The *total* age dependency ratio (not shown in graph) is, however, greatest for India among the 10 countries—there are 90.5 dependents (mostly children) per 100 persons of working age.

Figure 3 also highlights that population aging is a global phenomena—the number of older dependents per 100 persons of working age is projected to increase through 2025 in all 10 of the countries considered here. The projected increase in Japan, where the ratio will reach 51.1, is especially notable. Italy and Germany will each have over 40 older dependents per 100 persons of

[18] Note that the Census Bureau's estimate of the old-age dependency ratio for the United States in 2002 was 20.8, which is slightly higher than Social Security's estimate of 20.6 for the same year (as seen in **Figure 1 and Table A-1**).

[19] Note, however, that the *total* dependency ratio is greater in the United States than in Canada since Americans are supporting a higher number of children.

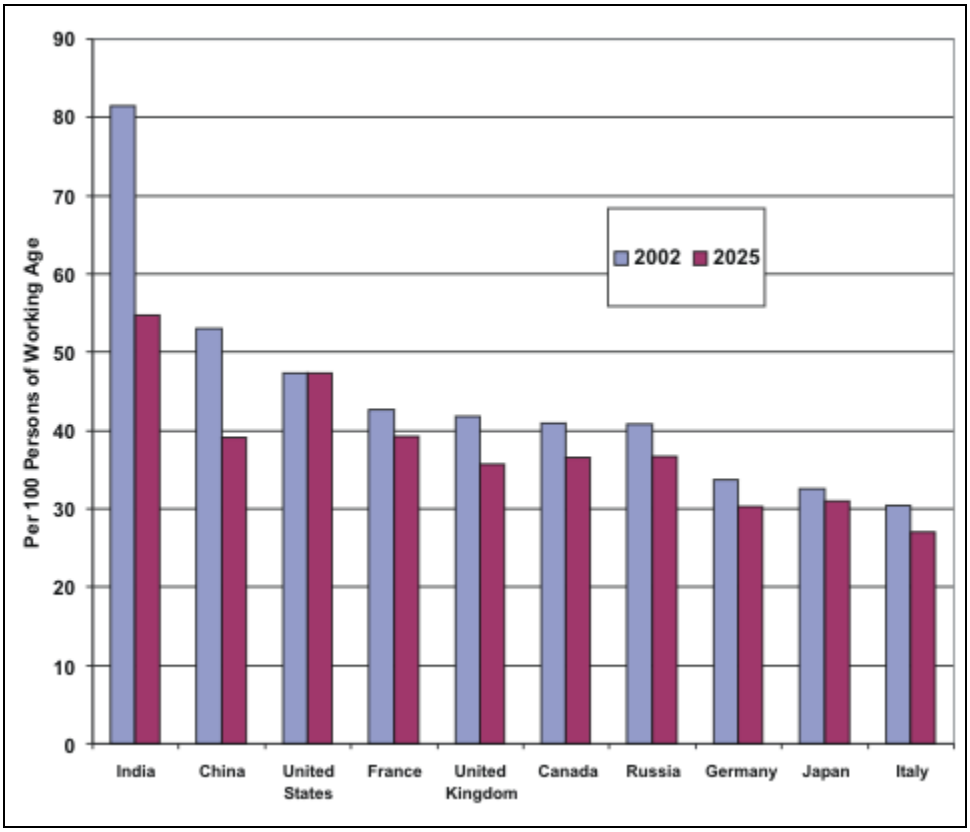
working age. Increases are also expected in both China and India. In fact, the old-age dependency ratio in 2025 in China[20] will exceed the level observed in the United States, Canada, and Russia today.

Figure 4 shows the number of *child* dependents per 100 persons of working ages. India had the highest child dependency ratio in 2002 at 81.5. Of the G8 countries considered, the United States was the leader, largely reflecting the fact that the American fertility rate, while currently hovering around the replacement level,[21] has not fallen as far as in the other G8 nations. For instance, the total fertility rate in Italy was 1.2 in 2002 compared to 2.1 in the United States in the same year. The estimates for India and China, and to a lesser extent the Russian Federation, are also affected by differential (higher) rates of infant and childhood mortality.

[20] China's age structure is quickly transforming from that of a "young" population to that of an older one, as measured by the mean age of the population and proportions in the relevant young and old age groups. The speed of population aging in China is also significantly faster than had been observed in the G8 countries. In China, it is expected that 26 years (from 2000-2026) will be required for the percent of the population age 65 or older to rise from 7% to 14%. In comparison, 115 years (from 1855-1980) were required in France; 69 years in the United States (1944-2013); and 65 years (1944-2009) in Canada. See Kevin Kinsella and David R. Phillips, "Global Aging: The Challenge of Success," *Population Bulletin*, vol. 60, no. 1, Mar. 2005.

[21] The level of fertility and mortality in a population at which women will replace themselves in a generation, in the absence of migration. It corresponds to a total fertility rate (the average number of children a cohort of women would have by the end of their childbearing years) in the range of 2.04 to 2.10.

Figure 4. Number of Child Dependents per 100 Persons of Working Age in Selected Countries, 2002 and 2025



Source: The Congressional Research Service (CRS) compilation based on U.S. Census Bureau, International Population Reports WP/02, *Global Population Profile, 2002* (Washington, DC: GPO, 2004).

Notes: Figures for China exclude Taiwan, Hong Kong S.A.R., and Macau S.A.R. Countries are sorted by highest *child* dependent-to-worker ratio in 2002. Estimates relate the number of children age under 20 years per 100 persons of working age (20-64) regardless of the usual age at entry into the work force in each of these countries.

Unlike the increasing old-age dependency ratios highlighted in **Figure 3**, the child dependency ratios are projected to *fall* through 2025 in most of the countries considered. The notable exception is the United States where it is projected that there will be 47.4 child dependents in 2025, as there had been in 2002.

In summary, population aging, which results primarily from declining fertility rates and increasing survival, is a global phenomenon. Today, the United States is the "youngest" of the industrialized G8 nations. While the proportion of the U.S. population that is aged 65 and older will continue to increase, aging in the United States is still projected to be considerably slower than in any of the other industrialized countries.[22] In addition to reflecting the fact that the American fertility rate, which is currently hovering around the replacement level, has not fallen (nor is it projected to) as far as the other G8 nations, the "U.S. is leading the way in adapting to the changing balance ... by encouraging immigration."[23] The SSA estimates that net legal

[22] Friedland and Summer, *Demography is Not Destiny*.

[23] David E. Bloom, A. K. Nandakumar, and Manjiri Bhawalkar, *The Demography of Aging in Japan and in the United* (continued...)

immigration and net other immigration were about 675,000 persons and 400,000 persons, respectively, in 2005. For its future projections, SSA assumes the total level of net immigration (legal and other, combined) under the intermediate projection to be 1 million persons annually in the 2010s, 950,000 annually in the 2020s, and 900,000 annually in 2030 and each year thereafter through 2080.[24] While these comparatively high levels of immigration differentiate the United States from the other G8 nations, they have a small effect on the median age of U.S. residents and on the total dependency ratio as immigrants are mostly young people who have children (and also higher fertility rates than the U.S.-born population). Immigration nudges the worker-elderly ratio a little higher, meaning that there are more people of working age per person age 65 or older. The more dramatic effect, however, is at the younger ages. Immigration after 2000 is projected to add about 15 million more children under age 18 than there would be without any post-2000 immigration. Continued immigration will lower the worker-child ratio and increase the child component of the dependency ratio.[25]

Implications for a Paygo Social Insurance Program

What is Paygo?

Most Western industrialized nations, including the United States, have systems in place providing significant social security benefits, and virtually all of these plans originated with pay-as-you-go (paygo) or quasi-paygo funding schemes.[26] In the United States, payroll or self-employment tax contributions by current workers (and their employers) are transferred to current beneficiaries. The majority of Social Security taxes paid by today's workers are not put into a special account to pay for their future benefits. Rather, they are used to pay benefits for persons receiving benefits today, just as the future benefits for today's workers will be paid by future generations of workers. In general, a low ratio of retirees to workers (the system's old age dependency ratio) and a high rate of productivity and real wages would permit a paygo social security system with high benefits or low contributions.[27]

(...continued)

States, in Gail B. Hedges, ed., "Aging and Health: Environment, Work and Behavior", Harvard Printing and Publications, 2003.

[24] *Trustees Report, 2006*.

[25] Philip Martin and Elizabeth Midgley, "Immigration: Shaping and Reshaping America," *Population Bulletin*, vol. 58, no. 2, June 2003.

[26] Robert L. Brown, "Paygo Funding Stability and Intergenerational Equity," *Transactions of Society of Actuaries*, vol. 47, 1995. (Hereafter cited as Brown, *Paygo Funding Stability*.) Note that significant modifications have been made to the original designs of the systems over time.

[27] Estelle James, *Averting the Old Age Crisis: Policies to Protect the Old and Promote Growth*, World Bank Policy Research Report, 1994. (Hereafter cited as James, *Averting the Old Age Crisis*.)

What Made Paygo an Attractive Option for Financing Social Security Systems?

Advantages of government-sponsored paygo schemes relative to fully funded systems include the following:[28]

- The entire working population can be covered relatively easily.
- The benefits can serve as social insurance against the (income) risks associated with old-age and disability.
- Benefits can be immediately vested and are fully portable, an important feature for a mobile work force.
- Administrative costs are usually very low.

Given these advantages, paygo systems looked very attractive in the immediate post-World War II years. Projections of labor force growth, coupled with forecasts of real wage growth, implied a potential total annual return near 5% for a fully mature paygo system. In contrast, the common view of a funded system involved investing contributions in government securities with a return of 1% or less. In the aftermath of the Great Depression, the market for equities seemed far too risky, and many countries lacked private bond markets. Furthermore, most countries instituting a new pension system were unwilling to delay initial benefit payments for several decades, as would have been required under a funded system. There was a desire to address the immediate problem of high poverty among the elderly, and most countries provided benefits to an older generation of workers which had not contributed fully to the system.[29] Also, to many at that time, a high rate of population growth (and subsequent work force growth) seemed inevitable, in which case pay-as-you-go seemed a good way to finance an old age pension program.[30]

The Current Outlook for Paygo, Given Demographics and Other Factors

The current outlook is much different. Birth rates have fallen considerably while the life expectancy at the older ages has increased significantly, resulting in less favorable old-age dependency ratios (as shown in **Figures 1 and 2**). While the old-age dependency ratio had already been increasing since 1950, the upcoming retirement of the baby-boom generation will accelerate the rate at which it grows. However, even after the youngest of the baby-boom generation has passed away, the number of older dependents per 100 persons of working age will still continue to increase, albeit at a slower pace than will be experienced during the years in which the baby boomers retire.

Concurrent with these demographic trends, the Congressional Budget Office (CBO) projects that federal spending for Social Security, adjusted for inflation, will rise substantially—from $483

[28] See, for instance, Brown, *Paygo Funding Stability*.

[29] Barry Bosworth and Gary Burtless, "Pension Reform and Saving" (Washington, DC: Brookings Institution). Paper prepared for a conference of the International Forum of the Collaboration Projects, held in Tokyo, Japan, Feb. 17-19, 2003. (Hereafter cited as Bosworth, *Pension Reform and Saving*.).

[30] James, *Averting the Old Age Crisis.*

billion in 2003 to $2.5 trillion in 2075.[31] The projected rise in Social Security spending is due, in part, to the demographics of an aging society; CBO estimates that approximately 55% of the higher spending is due to the expected increase in the number of beneficiaries, as the number of new claimants grows and as life expectancy rises. The remaining 45% of the rise is due to a projected increase in the real value of Social Security benefit checks. Specifically, they note that, under rules put into effect in 1979, benefits of newly eligible recipients are based on a formula and earnings records that are adjusted for wage growth. Those adjustments, referred to as wage indexing, are designed to keep the ratio of initial benefits to pre-retirement earnings—that is, replacement rates—approximately the same from one generation of new recipients to the next. Wages tend to rise along with productivity in the economy, at a faster pace than prices and, over the long run, a system pegged to wage growth will gradually afford greater purchasing power.[32]

As both CBO and the Government Accountability Office (GAO) are warning, current spending policies are likely to be unsustainable.[33] The policy implication is that, unless there are large offsetting productivity gains in the U.S. economy, contribution rates by current workers (e.g., tax rates) must markedly rise or benefit levels must fall under Social Security's paygo system. Alternatively, the structure of the underlying paygo system could be modified such that part or all of the scheme is fully funded. This, however, raises the same issues that caused most countries to originally select paygo systems: reduction of (investment) risk and the need to pay benefits for the current generation of beneficiaries.

[31] Congressional Budget Office, *The Future Growth of Social Security: It's Not Just Society's Aging, An Issue Summary from CBO*, no. 9, July 2003, at http://www.cbo.gov.

[32] Ibid. See also CRS Report RL32900, *Indexing Social Security Benefits: The Effects of Price and Wage Indexes*, by Patrick Purcell, Laura Haltzel, and Neela K. Ranade.

[33] See CRS Report RS22008, *Federal Spending for Older Americans*.

Appendix.

Table A-1. Age Dependency Ratios, United States, 1950-2080

(Number of dependents per 100 persons of working age)

	Population (in thousands)				Dependency Ratio (number of dependents per 100 persons of working age)		
Year	Total	Children (0-19)	Working Age (20-64)	Older Persons (65-65+)	All Dependents	Children (0-19)	Older Persons (65-65+)
1950	160,118	54,466	92,841	12,811	72.5	58.7	13.8
1951	163,808	56,419	94,102	13,287	74.1	60.0	14.1
1952	166,369	57,923	94,727	13,719	75.6	61.1	14.5
1953	168,977	59,600	95,209	14,168	77.5	62.6	14.9
1954	171,686	61,398	95,656	14,632	79.5	64.2	15.3
1955	174,510	63,261	96,176	15,073	81.4	65.8	15.7
1956	177,878	65,313	97,075	15,490	83.2	67.3	16.0
1957	181,324	67,401	97,992	15,931	85.0	68.8	16.3
1958	184,305	69,374	98,538	16,393	87.0	70.4	16.6
1959	187,236	71,256	99,129	16,851	88.9	71.9	17.0
1960	190,172	73,076	99,818	17,278	90.5	73.2	17.3
1961	193,151	74,858	100,614	17,679	92.0	74.4	17.6
1962	196,082	76,444	101,576	18,062	93.0	75.3	17.8
1963	198,876	77,766	102,703	18,407	93.6	75.7	17.9
1964	201,539	78,997	103,796	18,746	94.2	76.1	18.1
1965	204,018	80,132	104,795	19,091	94.7	76.5	18.2
1966	206,281	80,743	106,116	19,422	94.4	76.1	18.3
1967	208,421	80,723	107,932	19,766	93.1	74.8	18.3
1968	210,494	80,616	109,755	20,123	91.8	73.5	18.3
1969	212,547	80,571	111,477	20,499	90.7	72.3	18.4
1970	214,765	80,684	113,158	20,923	89.8	71.3	18.5
1971	217,039	80,755	114,913	21,371	88.9	70.3	18.6
1972	219,105	80,502	116,784	21,819	87.6	68.9	18.7
1973	220,955	79,961	118,718	22,276	86.1	67.4	18.8
1974	222,756	79,247	120,742	22,767	84.5	65.6	18.9
1975	224,599	78,437	122,857	23,305	82.8	63.8	19.0
1976	226,501	77,576	125,054	23,871	81.1	62.0	19.1
1977	228,523	76,700	127,366	24,457	79.4	60.2	19.2
1978	230,687	75,884	129,750	25,053	77.8	58.5	19.3

Year	Population (in thousands)				Dependency Ratio (number of dependents per 100 persons of working age)		
	Total	Children (0-19)	Working Age (20-64)	Older Persons (65-65+)	All Dependents	Children (0-19)	Older Persons (65-65+)
1979	232,931	75,161	132,117	25,653	76.3	56.9	19.4
1980	235,233	74,568	134,428	26,237	75.0	55.5	19.5
1981	237,627	74,126	136,693	26,808	73.8	54.2	19.6
1982	240,104	73,788	138,891	27,425	72.9	53.1	19.7
1983	242,541	73,493	141,028	28,020	72.0	52.1	19.9
1984	244,923	73,249	143,096	28,578	71.2	51.2	20.0
1985	247,335	73,211	144,957	29,167	70.6	50.5	20.1
1986	249,801	73,393	146,603	29,805	70.4	50.1	20.3
1987	252,313	73,703	148,197	30,413	70.3	49.7	20.5
1988	254,893	74,099	149,840	30,954	70.1	49.5	20.7
1989	257,609	74,545	151,581	31,483	69.9	49.2	20.8
1990	260,457	75,060	153,368	32,029	69.8	48.9	20.9
1991	263,372	75,749	155,036	32,587	69.9	48.9	21.0
1992	266,342	76,690	156,522	33,130	70.2	49.0	21.2
1993	269,273	77,751	157,931	33,591	70.5	49.2	21.3
1994	272,081	78,740	159,370	33,971	70.7	49.4	21.3
1995	274,787	79,621	160,844	34,322	70.8	49.5	21.3
1996	277,511	80,433	162,458	34,620	70.8	49.5	21.3
1997	280,248	81,123	164,267	34,858	70.6	49.4	21.2
1998	282,898	81,710	166,161	35,027	70.3	49.2	21.1
1999	285,517	82,192	168,149	35,176	69.8	48.9	20.9
2000	288,279	82,581	170,275	35,423	69.3	48.5	20.8
2001	291,250	82,906	172,613	35,731	68.7	48.0	20.7
2002	294,223	83,172	175,034	36,017	68.1	47.5	20.6
2003	297,001	83,432	177,319	36,250	67.5	47.1	20.4
2004	299,645	83,705	179,447	36,493	67.0	46.6	20.3
2005	302,322	83,963	181,457	36,902	66.6	46.3	20.3
2006	304,849	84,218	183,364	37,267	66.3	45.9	20.3
2007	307,340	84,472	185,082	37,786	66.1	45.6	20.4
2008	309,798	84,697	186,659	38,442	66.0	45.4	20.6
2009	312,264	84,838	188,316	39,110	65.8	45.1	20.8
2010	314,740	84,895	190,083	39,762	65.6	44.7	20.9
2011	317,226	84,959	191,627	40,640	65.5	44.3	21.2

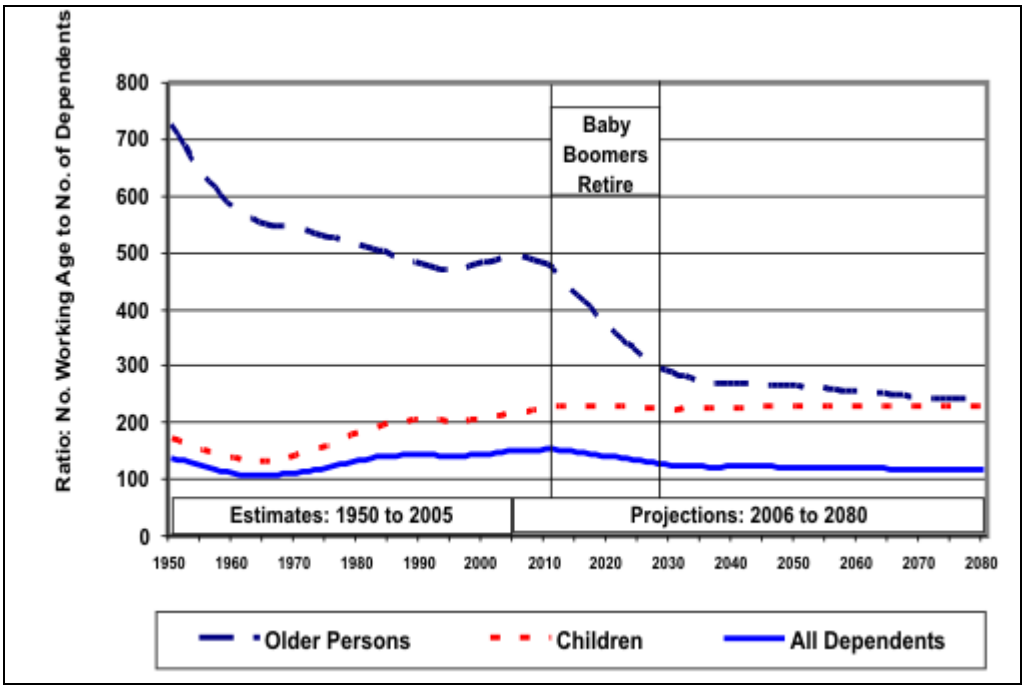
	Population (in thousands)				Dependency Ratio (number of dependents per 100 persons of working age)		
Year	Total	Children (0-19)	Working Age (20-64)	Older Persons (65-65+)	All Dependents	Children (0-19)	Older Persons (65-65+)
2012	319,718	85,087	192,733	41,898	65.9	44.1	21.7
2013	322,215	85,283	193,681	43,251	66.4	44.0	22.3
2014	324,710	85,525	194,629	44,556	66.8	43.9	22.9
2015	327,202	85,796	195,496	45,910	67.4	43.9	23.5
2016	329,662	86,106	196,245	47,311	68.0	43.9	24.1
2017	332,086	86,466	196,874	48,746	68.7	43.9	24.8
2018	334,497	86,859	197,405	50,233	69.4	44.0	25.4
2019	336,892	87,247	197,826	51,819	70.3	44.1	26.2
2020	339,270	87,547	198,213	53,510	71.2	44.2	27.0
2021	341,626	87,736	198,642	55,248	72.0	44.2	27.8
2022	343,958	87,883	199,059	57,016	72.8	44.1	28.6
2023	346,255	88,003	199,475	58,777	73.6	44.1	29.5
2024	348,514	88,233	199,736	60,545	74.5	44.2	30.3
2025	350,729	88,597	199,789	62,343	75.5	44.3	31.2
2026	352,871	88,942	199,847	64,082	76.6	44.5	32.1
2027	354,936	89,266	199,965	65,705	77.5	44.6	32.9
2028	356,946	89,574	200,139	67,233	78.3	44.8	33.6
2029	358,898	89,863	200,347	68,688	79.1	44.9	34.3
2030	360,794	90,133	200,644	70,017	79.8	44.9	34.9
2031	362,633	90,385	201,120	71,128	80.3	44.9	35.4
2032	364,418	90,625	201,748	72,045	80.6	44.9	35.7
2033	366,150	90,855	202,431	72,864	80.9	44.9	36.0
2034	367,828	91,076	203,037	73,715	81.2	44.9	36.3
2035	369,451	91,288	203,518	74,645	81.5	44.9	36.7
2036	371,024	91,494	204,028	75,502	81.8	44.8	37.0
2037	372,547	91,694	204,721	76,132	82.0	44.8	37.2
2038	374,025	91,890	205,594	76,541	81.9	44.7	37.2
2039	375,461	92,082	206,520	76,859	81.8	44.6	37.2
2040	376,856	92,268	207,416	77,172	81.7	44.5	37.2
2041	378,215	92,449	208,311	77,455	81.6	44.4	37.2
2042	379,543	92,629	209,180	77,734	81.4	44.3	37.2
2043	380,845	92,813	209,977	78,055	81.4	44.2	37.2
2044	382,121	93,002	210,647	78,472	81.4	44.2	37.3

	Population (in thousands)				Dependency Ratio (number of dependents per 100 persons of working age)		
Year	Total	Children (0-19)	Working Age (20-64)	Older Persons (65-65+)	All Dependents	Children (0-19)	Older Persons (65-65+)
2045	383,379	93,199	211,166	79,014	81.6	44.1	37.4
2046	384,621	93,404	211,628	79,589	81.7	44.1	37.6
2047	385,852	93,619	212,130	80,103	81.9	44.1	37.8
2048	387,074	93,843	212,709	80,522	82.0	44.1	37.9
2049	388,293	94,077	213,334	80,882	82.0	44.1	37.9
2050	389,510	94,318	213,935	81,257	82.1	44.1	38.0
2051	390,730	94,563	214,511	81,656	82.1	44.1	38.1
2052	391,954	94,810	215,085	82,059	82.2	44.1	38.2
2053	393,186	95,057	215,634	82,495	82.3	44.1	38.3
2054	394,425	95,303	216,097	83,025	82.5	44.1	38.4
2055	395,675	95,550	216,474	83,651	82.8	44.1	38.6
2056	396,934	95,796	216,845	84,293	83.0	44.2	38.9
2057	398,204	96,040	217,265	84,899	83.3	44.2	39.1
2058	399,485	96,283	217,737	85,465	83.5	44.2	39.3
2059	400,777	96,522	218,247	86,008	83.6	44.2	39.4
2060	402,080	96,760	218,777	86,543	83.8	44.2	39.6
2061	403,391	96,994	219,348	87,049	83.9	44.2	39.7
2062	404,710	97,225	219,969	87,516	84.0	44.2	39.8
2063	406,034	97,452	220,617	87,965	84.0	44.2	39.9
2064	407,362	97,676	221,257	88,429	84.1	44.1	40.0
2065	408,693	97,897	221,816	88,980	84.2	44.1	40.1
2066	410,022	98,115	222,274	89,633	84.5	44.1	40.3
2067	411,350	98,330	222,696	90,324	84.7	44.2	40.6
2068	412,675	98,544	223,098	91,033	85.0	44.2	40.8
2069	413,997	98,756	223,608	91,633	85.1	44.2	41.0
2070	415,315	98,968	224,244	92,103	85.2	44.1	41.1
2071	416,629	99,180	224,879	92,570	85.3	44.1	41.2
2072	417,937	99,392	225,509	93,036	85.3	44.1	41.3
2073	419,239	99,606	226,130	93,503	85.4	44.0	41.3
2074	420,535	99,821	226,740	93,974	85.5	44.0	41.4
2075	421,827	100,039	227,337	94,451	85.6	44.0	41.5
2076	423,113	100,258	227,920	94,935	85.6	44.0	41.7
2077	424,394	100,480	228,490	95,424	85.7	44.0	41.8

	Population (in thousands)				Dependency Ratio (number of dependents per 100 persons of working age)		
Year	Total	Children (0-19)	Working Age (20-64)	Older Persons (65-65+)	All Dependents	Children (0-19)	Older Persons (65-65+)
2078	425,669	100,704	229,048	95,917	85.8	44.0	41.9
2079	426,942	100,930	229,597	96,415	86.0	44.0	42.0
2080	428,214	101,159	230,137	96,918	86.1	44.0	42.1

Source: Congressional Research Service (CRS) analysis based on statistical tables in: *2006 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, May 1, 2006, available at http://www.ssa.gov/OACT/TR/TR06/tr06.pdf, accessed Oct. 20, 2006.

Figure A-1. Number of Working Age Persons Per 100 Dependents, United States, 1950-2080



Source: Congressional Research Service (CRS) analysis based on statistical tables in: *2006 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*, May 1, 2006, available at http://www.ssa.gov/OACT/TR/TR06/tr06.pdf, accessed Oct. 20, 2006.

Notes: This figure relates the number of workers (numerator) to the number of dependents (denominator). For example, in 1950, there were 725 workers to support every 100 persons age 65 and older. **Figure 1** in the main body of the text showed dependency ratios which relate the number of dependents (numerator) to the number of workers (denominator). In 1950, there were 13.8 older dependents per 100 workers.

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