

FEDERAL RESERVE BANK OF NEW YORK

CURRENT ISSUES

IN ECONOMICS AND FINANCE

February 2002

Volume 8 Number 2

Live Long and Prosper: Challenges Ahead for an Aging Population

Erica L. Groshen and Thomas Klitgaard

Over the next thirty years, the percentage of people who are 65 and over will grow rapidly while the percentage of people in their working years will decline. This shift in the age distribution of the population will put enormous pressure on social security systems in the United States, Germany, and Japan as the number of workers whose payroll taxes fund each retiree drops sharply.

The demographic profile of the United States will change dramatically in the coming decades. The combination of lower birth rates and longer life spans will swell the ranks of people aged 65 and over from 12 percent of the population today to 20 percent, or one out of every five people, by 2030. The shift to an older population is not unique to the United States, however: this phenomenon is projected to be global in nature. Indeed, major industrial countries such as Germany and Japan stand to experience even sharper increases in their retirement-age population.

Such a pronounced demographic change poses many challenges for a country's well-being. One key concern is how a government can support its retirement-age population when the number of workers whose payroll taxes fund each retiree steadily declines. In the United States, the population aged 15 to 64 is currently more than five times larger than the 65-and-over population. This ratio, however, will fall to only three by 2030. The ratio of working-age people to retirees will drop to still lower levels in Germany and Japan.

In this edition of *Current Issues*, we explore the economic pressures that an aging population places on the government financing of retirement benefits. Our approach is largely conceptual: we examine how benefit systems for retirees work and how the systems' structure makes government finances vulnerable to an increase in the retirement-age population. Although our chief focus is on the difficulties facing the Social Security program in the United States, we also consider how the corre-

sponding programs in Germany and Japan are being put to the test.

In reviewing possible solutions to the problem of financing retirement benefits, we find that the policy options are limited: Governments can increase social security taxes, decrease benefits, devote other tax revenues to social security, or combine these measures in some way. The need for such painful choices would be eased if countries were to experience a prolonged productivity boom that would boost wages and lighten the tax burden on workers. We argue, however, that even in this best-case scenario, the material well-being of both workers and retirees would still fall short of what it would have been without the demographic change.

The Demographic Transformation

The shift to an older population in the United States and other industrial countries stems in part from the decline in the total fertility rate, defined as the average number of children born to each woman. In the United States, the fertility rate has dropped markedly in recent decades, from 3.5 children per woman in 1950 to 1.8 in 1975.¹ The rate has since recovered slightly to 2.0, but the drop in the fertility rate relative to the baby-boom period after World War II is pushing up the average age of the U.S. population. Fertility rates are even lower in other developed countries. In Japan, the fertility rate has dipped from 2.7 children per woman in 1950 to 1.4 today, while in Germany the rate has fallen from 2.2 to 1.3.

A second factor behind the demographic transformation is increased longevity. Better healthcare and lifestyles mean that people live much longer than they did fifty years ago. In the United States, the life expectancy at birth was 68.9 years in 1950. By 2000, it had moved up more than seven years to 76.5 years. Germany experienced a somewhat larger rise, from 67.5 years to 77.3 years, while life expectancy in Japan has jumped from 63.9 years to 80.5 years.

In the decades ahead, lower fertility rates and longer life expectancy will substantially alter the age profile of these three countries. For the United States, the United Nations projects that the percentage of the population 65 and over will rise from 12.3 percent today to 20.2 percent in 2030.² For Germany and Japan, the extent of the upcoming demographic shift is even more remarkable. Germany's 65-and-over population is projected to increase from 16.4 percent today to 27.7 percent in 2030, while Japan's increases from 17.2 percent to 30.0 percent.³

Economic Consequences of the Shift

As older people claim a larger share of the population, the percentage of people who are working-age will decline. We can use the United Nations' estimate of the share of the population aged 15 to 64 as a rough estimate of the working-age share of the population in the three countries considered here. In the United States, this measure drops almost 5 percentage points, from 66.0 percent of the total population to 61.3 percent, between 2001 and 2030. Over the same period, the working-age population declines 10 percentage points in Japan (from 68.1 percent to 58.1 percent) and 8 percentage points in Germany (from 68.0 percent to 59.9 percent).

This loss in share of population has significant economic consequences. As the number of workers declines relative to the number of retirees, national output per person will fall. Since this measure is often used as a gauge of living standards, we would expect to see some slippage in a population's material well-being.

More central to our immediate concerns, however, is the effect of changing population shares on an economy's ability to support its retirees. Since workers fund retirees through the payment of a social security payroll tax, a decline in their relative numbers will make it increasingly difficult to generate the revenue necessary to provide old-age benefits.

To understand the extent of the problem, consider the changes foreseen in the ratio of workers to retirees. According to U.N. projections, the ratio of the share of the population aged 15 to 64—again, a rough equivalent for the working-age population—to the share of the population aged 65 and over will fall from 5.4 today to 3.0 in 2030 in the United States (see chart). That is, by

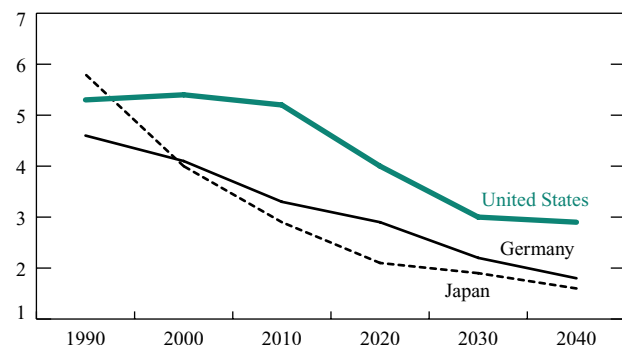
2030, there will be only three people in the working-age population for every retiree, down from more than five people for every retiree today. Similar shifts are projected to occur in Germany (from 4.1 to 2.2) and in Japan (from 4.0 to 1.9). Moreover, since not all those aged 15 to 64 will be working, the ratio in 2030 actually underestimates the burden on workers in each country.

Liabilities Created by a Pay-As-You-Go System

The original intent behind most public retirement programs was to alleviate poverty among the elderly. The Social Security program in the United States—Old-Age and Survivors Insurance (OASI)—and its counterparts in Germany and Japan are largely pay-as-you-go (PAYG) systems, which operate by collecting payroll taxes and immediately transferring the proceeds to retirees. A recent Bundesbank study of the German program called this system a “contract between generations” in which those able to work care for those who no longer can.⁴

The key weakness of a PAYG system is that the first wave of benefit recipients receive far more in benefits than they pay in payroll taxes. In principle, the creators of such a system could have paid the first beneficiaries only what they put into the system plus some market rate of return. However, providing nominal benefits to those workers who were near retirement—or nothing at all to those already retired—would not have seemed practical. As a result, when the PAYG systems were launched, current payroll tax receipts were used to pay benefits to the first generations. This large initial transfer of wealth is an implicit burden today on any PAYG system, with the gap between what early generations of recipients received in benefits and what they had paid in taxes creating an immense liability for public retirement programs. For example, a recent study estimated

Ratio of Working-Age Population to Population Aged 65 and Over



Source: United Nations (2001).

Note: The working-age population is defined as those aged 15 to 64.

that the net transfer of U.S. Social Security funds—that is, benefits received minus taxes paid in—was \$7.9 trillion (in 1997 present value dollars) for people born before 1917 and \$1.8 trillion for people born between 1918 and 1937, or a total of \$9.7 trillion.⁵

A PAYG system can carry such a liability indefinitely as long as demographics remain relatively unchanged. However, when large-scale demographic changes like those predicted for the United States, Germany, and Japan take effect, the system may no longer be able to sustain itself. In other words, when too many people retire, supported by too few workers, a PAYG setup can run into difficulties paying out promised benefits from current payroll taxes.

To see how this might occur, assume that there are four workers for each retiree in the United States and that the average taxable wage is \$40,000. If the four workers (together with their employers) each contributed 10 percent of their payroll income to pay for social security, then benefits equal to \$16,000, or 40 percent of average taxable payroll income, would be paid, on average, to each retiree. If, however, a major shift in demographics reduced the number of workers responsible for paying benefits to each retiree to 2.5, then the size of the benefit payment would fall. A 10 percent contribution would pay for benefits equal to \$10,000 in current dollars, or only 25 percent of average payroll income. This represents a substantial 37.5 percent drop in the average benefits received by retirees. If a country did not want to accept such a deep cut in benefits, it could raise payroll taxes. In this example, however, balancing the budget without reducing benefits would require a sizable increase in the tax rate, from 10 percent to more than 16 percent of payroll income.

In Germany and Japan, the PAYG system of financing retirement benefits is already under strain: social security benefits now exceed social security taxes collected (see table). The United States collects less in taxes and pays less in benefits (measured as a share of GDP) than the other two countries, and its social security revenues still cover its benefit payments. By contrast, Germany, and to a lesser extent Japan, are drawing on other tax revenues to fund benefit payments.

The anticipated aging of the population will increase the pressure on all three countries' fiscal balances. In the United States, the OASI Board of Trustees currently estimates that payroll taxes will cease to cover benefit payments starting in 2016 (Social Security Administration 2001). The difference between payroll taxes and benefits will then continue to grow over time, with the gap estimated to equal 1.4 percent of GDP by 2030 (see table). Over the 2000-2030 period, revenues for OASI stay roughly the same while the rising share of recipients pushes the payments from 3.6 percent of

Social Security Operations

Percent of GDP

	2000			2030
	United States	Germany	Japan	United States
Social security taxes	4.3	7.4	6.9	4.2
Social security benefits	3.6	10.6	7.8	5.6
Balance	0.7	-3.2	-0.9	-1.4

Sources: For U.S. figures, Social Security Administration (2001); for German figures, Deutsche Bundesbank (2001, Table VII.12); for Japanese figures, IMF (2000b, Table 11.5) and supplemental data from the authors of the IMF report.

Note: The table reports taxes and benefits for the following programs: In the United States, Old-Age and Survivors Insurance; in Germany, Wage and Salary Earners' Pension Insurance Fund; in Japan, National Pension Insurance, Employee Pension Insurance, Mutual Benefits, and various minor funds.

GDP to 5.6 percent.⁶ By these calculations, in 2030, payroll taxes will cover only three-quarters of benefits. Although similar estimates are not available for Japan and Germany, the social security systems in these countries will have to cope with increases in the share of the retirement-age population larger than the increase predicted for the United States.

Policy Choices

Concerns about existing or future gaps between payroll tax revenues and benefit payments are prompting countries to reexamine their social security systems. The options for change are limited:

- Increase payroll taxes by raising the rates or increasing the upper limit of an individual's income that is subject to the payroll tax.
- Cut future benefits by lowering the initial benefit level, reducing the yearly inflation adjustment, or raising the retirement age (that is, the age at which retirement benefits are offered).
- Use other tax revenues to pay social security benefits.

Germany and Japan passed legislation to shore up their public pension systems in 2001 and 2000, respectively. Both countries have chosen to avoid increasing tax rates and will instead reduce the financing gaps by lowering future benefits.⁷ This course of action may reflect the fact that payroll taxes in Germany and Japan, at close to 20 percent (split evenly between workers and employers), are already high, particularly in comparison with the U.S. payroll tax rate of a little more than 10 percent. The cuts in future benefits planned by the two countries take several forms: raising the retirement age, lowering the initial level of benefits over time, and, in the case of Japan, indexing benefits to prices rather than wages.

Although Germany and Japan will rely heavily on these cuts to reduce the pressure on government balances in the years ahead, Germany has also decided to dedicate other taxes—specifically, an increase in its existing value-added tax and an energy tax—to help fund future social security benefits. In addition, to allay concerns about the impact of reduced benefits, Germany has begun an initiative to allocate government revenue to subsidize personal pensions. This program—which might be likened to a government-managed 401(k) plan—seeks to encourage individuals to create their own pension plans and thereby to increase saving for retirement. Germany anticipates that the current tax revenues used to pay for these subsidies will reduce the need for future tax revenues to supplement benefits.

In the United States, debate about social security reform continues, and no changes to the system are imminent. Earlier reforms, enacted through the Social Security Amendments of 1983, stabilized the situation for a time. Beginning in 1975, OASI benefit payments had surpassed tax revenues, and by 1980, after more than forty years of operation, the OASI Trust Fund had assets of only \$23 billion, equivalent to less than one-quarter of the benefits paid out that year. To bolster the system and accumulate assets, the 1983 amendments raised payroll taxes and lowered benefits. As a result, total assets increased to \$214 billion in 1990 and, by the end of 2000, to \$931 billion, or 2.5 times the benefits expected to be paid in 2001.⁸ In 2000 alone, the trust fund's assets increased by \$132 billion. Continued surpluses in coming years, according to the OASI Trustees' estimates, will raise the ratio of assets to annual benefits to 4.8 in 2015.

The effects of these earlier reforms, however, will not last. As we noted earlier, the Trustees project that 2015 will be the last year in which payroll taxes exceed benefit payments. Although the assets accumulated in the fund will be large enough to offset the shortfall of social security taxes for another twenty-five years, the fund will not be able to cover benefit payments after 2040 (see Box 1). At that point, when all the assets have been sold, social security payments will be a third greater than tax receipts.

The current pressure for social security reform in the United States stems from a desire to minimize this anticipated gap. Although a review of specific proposals is beyond the scope of this article, it is clear that the United States, like Germany and Japan, will have to increase payroll taxes, reduce benefits, or dedicate other tax revenues to social security.

Strong Economic Growth: A Way out of the Bind?

Demographic changes are clearly taxing the social security systems in the United States, Germany, and Japan, but improvements in the countries' economies can mitigate the strain. The Trustees' projections for the

Box 1: U.S. Social Security Assets

U.S. policymakers continue to debate whether the accumulated Social Security assets should be considered “real” assets. Those arguing that they are not real emphasize that future sales of the assets will do little to ease the pressures on government financing of retirement benefits. Specifically, the assets—special government bonds—will be sold back to the government to obtain the funds necessary to pay benefits once Social Security tax revenues fall short. To buy these assets, however, the government must raise money by issuing new debt, increasing taxes, or cutting other spending. Thus, owning these securities will not insulate the government from the need to pay benefits that will increasingly exceed payroll taxes. By contrast, if the assets were private bonds or stocks, the government would be able to sell them without the need to raise money elsewhere.

The counterargument is that the accumulated OASI Trust Fund assets are real to the extent that they have reduced the overall level of government debt. If the surpluses are keeping debt and interest payments on that debt lower than they would have been otherwise, then they are putting the government in a better position to cope with future Social Security deficits.

OASI Trust Fund are based in part on specific assumptions about growth. If the U.S. economy performs better than anticipated, then the challenge of covering social security payments will be made easier. One source of economic growth would be an increase in the number of people working. If a greater percentage of working-age people joined the labor force or if those aged 65 and over chose to continue working, then the economy could grow faster (see Box 2). For social security finances, the increase in the number of people working would add to the amount of payroll taxes collected.

A second spur to the economy would be rapid labor productivity growth. If employers succeed in increasing productivity, then wages will rise faster than prices. Higher wage growth, in turn, means that more money will be collected in social security taxes. Thus, stronger than expected productivity growth should ease the burden that the payment of social security benefits imposes on workers and the government.

This effect is particularly pronounced when social security systems adjust annual increases in benefits to inflation, as in the United States and Japan, rather than to wages, as in Germany.⁹ Price-adjusted benefits ensure that as recipients age, their social security checks will maintain their purchasing power. However,

while benefits increase in line with prices, they do not increase as fast as they would if they were indexed to wages. Retirees miss out on the income gains that stem from increased productivity and that raise the standard of living for those still working. Thus, although strong labor productivity growth has the positive effect of lightening the burden on the workers who fund social security payments, it also increases the standard of living gap between retirees and wage earners.

The OASI Trustees do not offer a sensitivity analysis for their productivity assumption, but they do publish one for real wage growth, which can be used as a proxy for productivity growth. The baseline forecast assumes that taxable real wages average 1.0 percent growth in the future. Raising that figure to 1.5 percent boosts the assets accumulated by the OASDI Trust Funds so that they are not depleted until 2044, instead of 2038, as in the baseline case.¹⁰

This calculation suggests that strong productivity growth would ease the strains created by the coming demographic change. However, such a development would not essentially alter the adverse economic effects

that arise when a large share of the population moves into retirement. Workers will be still worse off than they would have been if there were no aging of the population, because a portion of their productivity-related wage gains will be deducted from their paychecks to fund benefits for the growing pool of social security recipients. And the retirees themselves will still see downward pressure on benefits.

Conclusion

The coming demographic transformation of the United States and other industrial countries poses significant challenges. This article focuses on the problems that lie ahead for social security systems in the United States, Germany, and Japan as the number of workers available to pay for the benefits of each retiree declines.

Countries can strengthen their social security systems in different ways, but all approaches involve difficult political choices. The burden of having fewer workers supporting each retiree over time will necessitate some combination of raising social security taxes, reducing

Box 2: Labor Force Participation

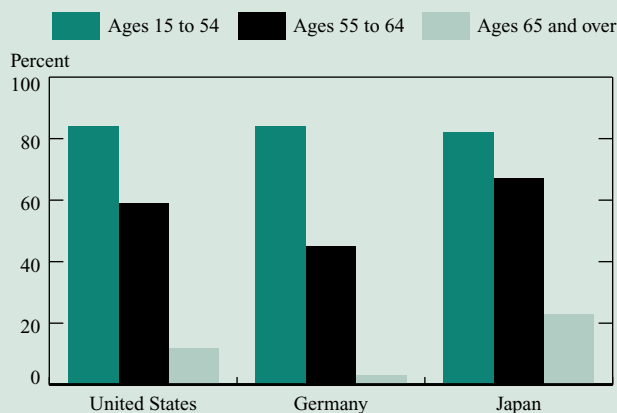
Existing work and retirement patterns differ in the United States, Germany, and Japan. Although the labor force participation rate—the percentage of the population either working or looking for work—is between 82 and 84 percent for those aged 15 to 54 in all three countries, the rate for older age groups is much less consistent across the countries (see chart). For those aged 55 to 64, labor force participation drops to 67 percent in Japan and 59 percent in the United States. In Germany, the decline is much larger, with only 45 percent of the population in this age

group continuing to work or to look for work. Moreover, for the 65-and-over population, the labor force participation rate in Germany is only 3 percent, significantly lower than the U.S. figure of 12 percent and far below Japan’s 23 percent rate.

A recent study of retirement plans across countries (Gruber and Wise 2001) offers some explanations for this disparity. In Germany, a generous level of retirement benefits tends to discourage work after 60. Early retirement at 60 offers the typical German worker benefits equal to 62 percent of previous earnings. In addition, workers who become unemployed at age 57 and those deemed disabled can also opt for the same early retirement benefits. In Japan and the United States, by contrast, early retirement benefits are more modest. Japanese workers who retire at 60 receive benefits equal to 52 percent of previous earnings, while U.S. workers who retire at 62 receive benefits equal to 41 percent of wages. Interestingly, Gruber and Wise also find a strong correlation between labor force participation and a measure of the tax and benefit penalties for continuing to work past early retirement.

To offset the pressures that an aging population has placed on the government financing of retirement benefits, countries might adopt a policy of encouraging people to work longer. The variations in work and retirement behavior outlined here suggest that this strategy might be particularly effective in Germany and other European countries where older age groups currently have low labor force participation rates.

Labor Force Participation Rates, 1999



Source: OECD (2000).

Note: The labor force participation rate is defined as the percentage of the population working or actively looking for work.

benefits, or diverting other tax revenues to fund benefits. The degree of pain involved in making these choices will depend on future economic growth, which depends, in turn, on what share of the population works and how much more productive the workforce becomes. But while faster growth may ease the pressures on government and workers, it will not eliminate the difficulties of providing for an aging population.

Notes

1. All demographic data are from the United Nations (2001).
2. The Social Security Administration (2001) offers a slightly more conservative projection. It assumes less of a decline in the fertility rate (to 1.95 percent instead of the U.N. assumption of 1.90 percent) and a shorter life expectancy (79.7 years instead of 80.1). It also assumes more net migration (900,000 a year versus 750,000). Using these assumptions, the Social Security Administration projects that people aged 65 and over will rise to 19.5 percent of the population by 2030.
3. For Germany, the United Nations assumes that fertility rates rise from 1.3 today to 1.5 by 2030 and that life expectancy increases from 78.2 years to 81.9 years. It assumes that the fertility rate in Japan will show a similar increase and that life expectancy in that country will rise to 86.3 years.
4. See Deutsche Bundesbank (1999), p. 15.
5. See Geanakoplos, Mitchell, and Zeldes (1999).
6. Forecasting over a long period is inherently risky, and it is quite possible that the set of baseline forecasts from the Social Security Administration used here will prove to be off target. Recognizing this uncertainty, the Trustees calculate two alternative scenarios for future revenues and benefits. One incorporates more optimistic assumptions about productivity growth and demographic change; the other, more pessimistic assumptions.
7. Information on the German system and its recent reform can be found in Deutsche Bundesbank (1999) and IMF (2000a). Information on the Japanese system can be found in IMF (2000b).

8. See Social Security Administration (2001), Table VI.A2, for asset data.

9. In all three countries, the initial benefit granted to new retirees is indexed to wages.

10. The OASDI Trust Funds combine the OASI Trust Fund and the Disability Insurance Trust Fund. The sensitivity analysis is only available for the combined funds.

References

- Deutsche Bundesbank. 1999. "Prospects for, and Obstacles to, a Stronger Reliance on Funding in the Statutory System of Old-Age Provision in Germany." *Deutsche Bundesbank Monthly Report*, December.
- . 2001. *Deutsche Bundesbank Monthly Report*, September.
- Geanakoplos, John, Olivia Mitchell, and Stephen Zeldes. 1999. "Social Security Money's Worth." In Olivia Mitchell, Robert Myers, and Howard Young, eds., *Prospects for Social Security Reform*, 79-151. Philadelphia: University of Pennsylvania Press.
- Gruber, Jonathan, and David Wise. 2001. "An International Perspective on Policies for an Aging Society." NBER Working Paper no. 8103, January.
- International Monetary Fund (IMF). 2000a. "Germany: Selected Issues." IMF Staff Country Report no. 00/142, October.
- . 2000b. "Japan: Selected Issues." IMF Staff Country Report no. 00/144, November.
- Organisation for Economic Co-operation and Development (OECD). 2000. *Labor Force Statistics*.
- Social Security Administration. 2001. *The 2001 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds*. Washington, D.C.: U.S. GPO.
- United Nations. 2001. *World Population Prospects: The 2000 Revision*. Vol. 1. New York: United Nations.

About the Authors

Erica L. Groshen is an assistant vice president in the Domestic Research Function of the Research and Market Analysis Group; Thomas Klitgaard is a research officer in the International Research Function.

The views expressed in this article are those of the authors and do not necessarily reflect the position of the Federal Reserve Bank of New York or the Federal Reserve System.

Current Issues in Economics and Finance is published by the Research and Market Analysis Group of the Federal Reserve Bank of New York. Dorothy Meadow Sobol is the editor.

Subscriptions to *Current Issues* are free. Write to the Public Information Department, Federal Reserve Bank of New York, 33 Liberty Street, New York, N.Y. 10045-0001, or call 212-720-6134. *Current Issues* is also available at the Research and Market Analysis Group's web site: http://www.ny.frb.org/rmaghome/curr_iss/2000.html.