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The populations of Japan, the United States, and other industrial countries are certain to grow older over the next five decades. By 2050 the ratio of people past age 64 relative to the number age 20-64 will exceed 45 percent in each of the seven largest industrial countries except the United States. In Japan, the aged dependency ratio will approach 70 percent; in Italy, it may reach 75 percent. Even though the United States will not age as fast, the American dependency rate is expected to be four-fifths higher in 2050 than it is today, rising from 21 percent to 38 percent (see Table 1).

The projected budget cost associated with population aging is so large that most countries will be forced to make painful changes in their public pension programs. Policymakers may be tempted to follow the example of Chile and replace part or all of their national pension systems with private systems organized around individual retirement accounts. Advocates of this kind of reform point to Chile's success in introducing an individual account system to replace its failing pay-as-you-go system, which the government began to phase out in the early 1980s. So far, Chile's individual account pension system has received high marks for sound administration, good returns, and broad political acceptance. The expected surge in public retirement costs in rich industrialized countries has made policymakers in many countries receptive to the idea of including individual investment accounts in their nations' public retirement systems.

This paper considers the arguments for fundamental pension reform in Japan and the United States. The two countries have recently made or are considering reforms that will eventually reduce the generosity of the traditional, pay-as-you-go pension system. Some of the lost benefits would be replaced by pensions from individual, defined-benefit accounts. In March 2000 the Japanese Diet passed a reform plan that may lead to the creation of defined-contribution pensions for millions of active workers. Working people are now permitted to contribute to voluntary defined-contribution pension plans and employers are allowed to

establish new defined-contribution plans in behalf of their workers. Contributions to the funds and the investment earnings of the funds receive favorable treatment under the Japanese income tax system. At the same time, public pensions under the existing retirement system were significantly scaled back for younger and middle-aged workers. One goal of the reform was to reduce costly public pension commitments to future Japanese retirees and replace the lost retirement benefits with pensions financed out of private, capital-funded pension accounts.

In May 2001 President George W. Bush appointed a national commission to propose designs for a new individual retirement account system that would provide supplements to pensions provided by the existing U.S. social security system. In December 2001 the President's commission published a report describing three plans to reform social security through the introduction of new, privately managed, defined-contribution pension accounts (President's Commission to Strengthen Social Security, 2002). The new accounts would be financed by diverting a portion of payroll taxes that are now used to pay for pensions under the existing defined-benefit public pension system. Like the new Japanese individual account system, the proposed revision of the existing American system would be voluntary. It would also require a substantial reduction in pensions provided by the traditional public pension program. The U.S. Congress has not yet acted on the presidential commission's proposals. Some critics of the existing pension system, both in Japan and the United States, urge an even more drastic overhaul of national pension programs, which they regard as excessively burdensome on workers and future government budgets.

The discussion in this paper is organized around two questions that go to the heart of the current controversy over pension reform.[1] Many critics of public pensions believe that the debate over pension reform revolves around only a single question: Would a system of capital-funded individual accounts provide pensions at lower cost than the existing pay-as-you-go system? Economists who have studied public pensions recognize that this question is impossible to answer simply or accurately. In a fully mature capital-funded system, many contributors would obtain better pensions at lower cost than they can obtain under the existing pay-as-you-go system. Unfortunately, along the transition path to a fully mature capital-

[1] The questions are among those posed by an expert panel on social security privatization established by the National Academy of Social Insurance, a panel on which I served. See Diamond (1999), pp. 1-31. I have written a very similar comparison of the case for pension reform in Germany and the United States (Burtless, 2001).

funded system, many contributors and taxpayers are likely to obtain worse pensions or make higher tax payments than they can anticipate under the existing system.

The paper addresses two issues that are relevant to fundamental pension reform. First, it considers whether rich countries should move toward more advance funding of their future pension obligations. And second, it considers whether rich countries should retain a collective system of shared risk under a defined-benefit pension system or move toward a system containing millions of individual (defined-contribution) accounts. Most proponents of individual retirement accounts believe they know the answers to these questions. Rich countries should move toward more advance funding, and they should establish a system of individual investment accounts in which contributors would be given broad discretion to invest their contributions as they please.

Economists and other pension specialists are uncertain whether these answers are correct. The advantages of capital funding over pay-as-you-go financing are less obvious than many people suppose. If a country adopts a capital-funded system, individual investment accounts have important disadvantages that must be weighed against their well-known advantages. Giving workers complete discretion in the investment and withdrawal of their retirement funds may mean that many of them will reach old age with few assets with which to pay for their retirement consumption. The pension system will not have accomplished its main objective, which is to assure a minimum and reasonably secure income in workers' old age.

1. Should we move toward more advance funding?

In a pay-as-you-go public pension system, the benefits paid to current pensioners are financed with the earmarked contributions of current workers or the tax payments of other taxpayers. In this kind of system, it is natural to respond to the budget pressure of an aging population by scaling back pension benefits or increasing the contribution rate. These responses to the system’s financing problem are inherently divisive, because they force generations and income classes into conflict over which group will have to make the larger sacrifice in order the maintain the solvency of the system. If pensions are reduced immediately, the retired population will make income sacrifices to hold down tax burdens on current and future workers. If contribution rates are increased, active workers must make an income sacrifice to protect the pensions of the retired.

The logic of higher saving. It is possible to reduce this conflict by increasing the future national income that will finance the consumption of both future workers and retirees. To achieve this, the current generation could increase its saving to finance more of its own retirement. In neoclassical growth theory, increased saving is one of the few mechanisms that can boost future aggregate income. Larger accumulations in the retirement system could raise the nation's capital stock or foreign asset holdings and thus increase future national income. Over the next several decades, a nation with an aging population would still be forced to spend a rising percentage of its national income on pensions, but it would pay for these obligations out of a larger economic pie, leaving a bigger slice for future workers. From the point of view of pension fund contributors, advance funding is also a way to increase the rate of return on their contributions. Part of each worker's retirement benefit would be financed out of earnings on capital investments, and the rate of return on these investments can easily exceed the return obtainable in a pay-as-you-go retirement program.

Moving away from pay-as-you-go financing toward advance funded pensions could provide a mechanism for increasing national saving. A capital-funded program differs from pay-as-you-go financing in that it implies a buildup of saving within the pension system and potentially a larger stock of capital prior to a cohort's retirement. As a result of this buildup, a portion of pensions is financed out of capital income rather than current wage taxes alone. Furthermore, future workers gain because the larger capital stock boosts their wages, and thus a given level of benefits can be financed with a lower effective contribution rate.

Advance funding does not have to occur within private pension funds or individual investment accounts, of course. It could also take place within the existing public pension system. Nor is advance pension funding necessary to boost a nation's saving rate. Countries' can boost national saving by increasing government surpluses (public saving) or encouraging greater household or business saving (private saving). Because future pension spending is one of the main sources of increased pressure on public budgets, however, it is natural to link the increase in saving to pension financing, either inside or outside the public sector.

Many American economists, including me, favor a policy of more advance funding of public (or publicly mandated) pensions. We believe that advance funding can be achieved in a way that leads to higher national saving, which must the ultimate goal of any policy that is aimed at reducing the future burdens of an older U.S. population. If advance funding does not

result in greater aggregate saving, it is hard to think of valid arguments in favor of such a policy. Unfortunately, many proposals to move toward advance funding would not accomplish the goal of increasing national saving.

The success of an advance funding policy in boosting saving depends on the fiscal behavior of other parts of the public sector and on the response of private saving to the pension reform. If the annual surplus of the reformed capital-funded system is simply used to finance higher spending in the public budget (through pension fund purchases of government bonds), no net addition to national wealth results from the "funded" system. Reliance on advance funding in public pension programs is controversial because many observers doubt that governments can resist using a large and growing public pension fund surplus to pay for other public consumption programs. Moreover, if the move toward more advance funding causes workers or pensioners to save less in their other private savings accounts, the effect of advance funding on aggregate saving will be reduced and possibly eliminated.

Well-informed proponents of fundamental pension reform recognize, of course, that the transition to a more funded system does not automatically produce higher saving. For example, if workers are given a rebate of their public pension taxes in order to make deposits into new pension accounts, as proposed by President Bush's pension reform commission, the public retirement system will be deprived of revenues that are needed to pay current pension obligations. The public pension system would then have a smaller surplus or a larger deficit, forcing the government to raise taxes, to reduce other spending, or to borrow extra money. If the government borrows all the extra money, as some advocates of advance funding suggest, the policy could easily *reduce* national saving. The flow of national saving in a given year is the sum of saving that takes place in the private sector plus saving of the government. Total government saving is the sum of saving in the public retirement system plus the surplus or deficit in non-pension government operations. If all the public pension surplus were diverted into new funded pension accounts, the government budget deficit would rise, reducing saving in the government sector and forcing the government to issue more bonds.

To be sure, the flow of funds into workers' new pension accounts would increase saving in the private sector. If private saving rose by the full amount of extra government borrowing, national saving (which is the sum of government and private saving) would be unchanged. But it is unlikely that private saving would grow by the full amount of extra

government borrowing. Some workers may already have retirement saving plans connected to their jobs. Many of these plans may be almost indistinguishable from the new voluntary or compulsory retirement accounts that would be established if a new funded system were established. At least a few workers or firms would reduce their contributions to existing occupational pension plans if they were forced or allowed to save in new government-mandated accounts. Any reduction in the flow of saving into old retirement accounts would offset part of the effect of the flow of saving into the new retirement accounts. Private saving would then climb by less than the extra government borrowing.

In order to boost national saving, a privatization plan must reduce someone's consumption. The plan could reduce the public pension benefits -- and thus the consumption -- of people who are already retired or who will soon retire. Alternatively, it could increase the combined contributions that workers make to the old pension system and new funded pension accounts and thereby reduce their consumption. For example, if benefit payments were cut $10 billion, the public pension surplus would be $10 billion larger and the government deficit $10 billion smaller. National saving would then be $10 billion higher. Alternatively, if workers were required to contribute an additional $10 billion of their pay to the old public pension system and new retirement accounts, the revenue flowing into the public pension fund and the new retirement accounts would be $10 billion larger. This policy, too, would raise national saving.

Some plans to increase pension funding have a good chance of boosting aggregate saving. Plans with the best chance of success would follow one or both of the following strategies: (a) Increase the combination of payroll taxes for the existing pension system and mandated or voluntary contributions into new pension accounts; or (b) Cut benefits to current pensioners or workers who will retire in the next few years without lowering contributions to the system.

The case for advance funding in Japan and the United States. Assuming that a policy of advance funding is desirable, is the case for funding more compelling in Japan or the United States? Chart 1 shows the predicted impact of population aging in Japan and the United States on the future old-age dependency rate and the annual growth of the working-age population. Japan clearly faces a larger aging burden than the United States. Table 1 summarizes the demographic outlook and pension fund challenges facing the seven largest

industrial countries. The first three columns show the U.S. Census Bureau's estimates of old-age dependency rates in 2000, 2025, and 2050, respectively. High rates of fertility and immigration give the United States the lowest predicted dependency rate in 2025 and 2050. The comparatively low dependency rate combined with a modest level of pensions also give the United States the lowest level of spending on public pensions, measured as a percentage of GDP (column 4). Although pension spending will increase in the future, it will remain substantially lower than spending in the other G-7 countries, with the notable exception of Great Britain (see column 5). Revisions of the British pension system enacted in the 1980s will cause basic pensions to rise more slowly than average wages, almost guaranteeing that pension outlays will eventually shrink as a share of national income – assuming the current British system survives unchanged until 2050. Along with Britain's public pension system, the American social security system has the smallest gross and net liabilities (columns 6 and 7).

Japan faces a more dramatic change in its population age structure than the United States, and for that reason pension reform is a more urgent policy concern than it is in the United States. Japan provides somewhat more generous public pensions than the United States. On an after-tax income basis, the public pension of an average-wage Japanese worker replaces about 55 percent of the pre-retirement wage. The comparable replacement rate in the United States is 50 percent (Bosworth and Burtless, 1998, pp. 8-9). The combination of an older population and a slightly more generous pension formula means that Japan must devote more of its national income to pensions. Japanese public pensions consume a share of GDP that is significantly larger than the share in the United States – 6.6 percent of GDP in Japan versus 4.1 percent of GDP in the United States in 1995 – and the share of Japanese GDP devoted to pensions is expected to rise substantially faster.

Chart 2 summarizes a recent forecast of the future financial operations of the U.S. public pension system. The dark horizontal line shows the annual income of the social security system, excluding interest payments, measured as a percentage of taxable earnings. Since virtually all social security income, except interest, is derived from payroll taxes, the income of the system is slightly more than 12.4 percent of taxable wages, the combined

payroll tax imposed on workers and employers.[2] The lighter curved line shows total social security receipts, including interest payments on social security reserves. Interest payments now represent 12 percent of total social security revenues, and they are expected to reach 22 percent of revenues by 2015. The chart also shows social security benefit payments and administrative costs, measured as a percentage of taxable wages. If the U.S. social security system were a strictly pay-as-you-go system, this line would represent the payroll tax rate needed to keep the program solvent. However, tax and interest revenues are currently substantially higher than benefit payments, so the program has large annual surpluses (bottom line in Chart 2). By 2015 the retirement of the baby boom generation will cause benefit payments to exceed payroll and income tax revenues, and by 2025 benefit payments will exceed the combined income from taxes and interest earnings. The reserve fund will then begin to decline, and it will be exhausted in 2038 unless the benefit formula is changed or the contribution rate is increased. If the U.S. public pension system is to remain solvent after 2038, the payroll tax rate must be increased in that year by 4.6 percentage points (to 17 percent) or benefits will have to be cut about 25 percent.

Although the long-term outlook for U.S. public pensions is poor, the outlook for the Japanese pension system is much worse. The contribution rate of the principal program for private sector Japanese employees is 17.35 percent of covered wages, about 5 percentage points higher than the comparable rate in the United States. Even a 17.35-percent contribution rate is not high enough to pay for future Japanese pensions, however. Contributions could rise to 31.9 percent of covered wages by 2025 under the 2002 population projections of Japan's National Institute of Population and Social Security Research (Takayama, 2002, p. 3). In comparison, the required payroll tax rate in the U.S. system in 2025 is about 16 percent (see Chart 2).

The contrast between Japan and the United States is a bit less striking once we take account of occupational pensions in the two countries. Slightly more than one-half of all active workers in the United States (including a large majority of workers with above-average

[2] The system also derives income from the federal income tax imposed on social security pensions. Since these income taxes are predicted to rise in the future, the total income of the system, including payroll and income tax payments, will rise slowly in comparison with the taxable wage base.

wages) are covered by an employer-sponsored -- or "occupational" -- pension scheme.[3] By law, employer-sponsored plans are fully funded. In addition, many American workers make voluntary contributions to Keogh plans (for the self-employed), 401(k) or 403(b) plans (for private company and nonprofit institution employees), or Individual Retirement Accounts (primarily for employees not covered by an employer pension plan). These schemes are by definition fully funded pensions. According to estimates of the World Bank, the assets of occupational pension plans were equal to almost 60 percent of U.S. national income in 1996 (see Chart 3). The capital accumulation of the private pension system in Japan is somewhat smaller. Comparing the balance sheets of public and private pension plans and the future pressures of an aging population, the case for moving toward advance funding of pensions seems more compelling in Japan than the United States.

It is not obvious, however, whether the higher level of funding of pension obligations in the United States has led to increased national saving. Chart 4 shows gross domestic saving rates in the G-7 countries, measured as a percentage of GDP. The United Kingdom and the United States, which have the highest levels of advance pension funding among the G-7 countries, also have the lowest rates of gross saving.[4] What is more, the rate of net private U.S. saving has declined significantly during the past 15 years, in spite of the rapid accumulation of assets in pension funds (see top panel of Chart 5). Pension saving in occupational pension funds is included in household saving. As a fraction of U.S. GDP, net household saving fell from an average of 7.3 percent during the twenty-five years after 1960 to just 2.5 percent between 1996 and 2000. Even as private pension funds were accumulating substantial amounts of assets, other components of household saving fell.

The accumulation of funds in the social security reserve has helped to offset the large drop in U.S. private saving. The growing social security surpluses contributed to a surge in government saving during the late 1990s, helping to reverse a long-term trend toward lower overall saving rates (see the bottom panel of Chart 5). Nonetheless, net saving in the United States remains far below average levels in earlier decades and significantly below the rates in other industrialized countries, including Japan. Net U.S. investment remained strong in the

[3] Among working American families where the head of household is less than 65 years old, 57 percent of families have at least one member who participates in an occupational pension plan (EBRI, 2000).

[4] See Disney (2000) Table 3, for statistics on the funding status of pensions in the industrialized countries.

late 1990s only because of a large swing in foreign investment flows. In recent years foreign savers invested much more in the United States than Americans invested abroad, reversing the pattern of cross-border saving flows that characterized the first decades after World War II. Even though U.S. investment remained robust until a recession began in 2001, an increasing share of the income flow from U.S. investment has been received by foreign savers rather than Americans.

The Japanese social security system also has a substantial cash-flow surplus, which the IMF estimated to be 1 percent of Japanese GDP in fiscal year 2000. However, the surplus is shrinking rapidly. Between fiscal years 1998 and 2002, the IMF predicts the cash-flow surplus will fall from 1.9 percent to just 0.5 percent of Japanese GDP. At the same time, the fiscal position of the Japanese government is more precarious than that of the United States. As the United States government moved toward substantial surpluses over the 1990s, the Japanese government moved toward sustained and historically large deficits.[5]

In several respects the situation of Japan is almost the mirror image of that of the United States. While the U.S. working-age population is expected to grow at an average rate of about 0.6 percent per year between 2000 and 2050, the working-age population in Japan may shrink by almost 1 percent per year (see the lower panel of Chart 1). A move toward greater advance funding of pensions would increase Japan's saving rate in comparison with the rate that would occur under a pay-as-you-go system. Under standard neoclassical assumptions about growth in a closed economy, an increase in saving above the rate warranted by technical progress and the rate of growth of the working population must result in a decline in the rate of return on Japanese physical capital. As the rate of return falls, the advantage of advance funding over pay-as-you-go financing shrinks. The returns that savers can obtain on their domestically invested savings could fall to unacceptable levels. Faced with a sharp drop in the domestic rate of return, Japanese savers might look overseas for more attractive investment possibilities. Advanced pension funding thus can have important implications for international capital movements because the implied increase in national saving may be reflected in the build-up of large trade and current account surpluses. Japan is already a major exporter of savings. In 2000-2001, its current account surplus averaged 2.3

[5] International Monetary Fund (2001), p. 35.

percent of GDP. In those same years, the U.S. current account *deficit* averaged 4.3 percent of U.S. GDP.[6]

The external positions of Japan and the United States differ mainly because of sizeable differences in the two countries' private saving rates. While public saving is higher in the United States, private saving is much higher in Japan, producing a much higher gross saving rate (see Chart 4). Since Japanese saving is high in relation to Japan's domestic investment requirements, the excess of saving flows overseas and is invested abroad. A move toward greater advance funding, if it lifts Japanese saving rates, should increase the flow of saving to overseas destinations. An increase in U.S. saving would reduce the large inflow of investment funds from the rest of the world into the United States.

The low net saving rate of Americans relative to Japanese suggests that it is the United States, rather than Japan, that is in greater need of a policy to spur additional saving. Unfortunately, the cross-national evidence does not offer any persuasive evidence that advance pension funding will automatically provide a stimulus to higher private or aggregate national saving. Mackensie et al. (1997) find no clear association between the size and degree of funding of occupational schemes, on the one hand, and the level of national saving, on the other (see also IMF, 2000, p. 86). Thus, even though the case for higher national saving may be more persuasive for the United States than it is for Japan, it is not clear that faster accumulation of funds in private pension accounts will actually spur higher private or aggregate saving. On balance, the U.S. evidence suggests that faster accumulation of funds in the *public* pension system is more likely to result in higher aggregate saving through its effect on government saving.

2. Should the pension system shift to defined-contribution individual accounts?

One way to move toward greater advance funding of pension obligations is to scale back the traditional pay-as-you-go pension system and supplement or replace it with an individual retirement account system. A retirement system based mainly on individual investment accounts would look very different from the present public pension system in both Japan and the United States. Instead of contributing to state-sponsored social security, workers would be required to build up retirement savings in individually owned and directed

[6] International Monetary Fund (April 2002), p. 9.

private accounts. Workers would be free to decide how their contributions are invested, at least within broad limits. They would withdraw funds from their accounts when they became disabled or reached the retirement age. To ensure that retired workers do not out-live their retirement savings, some or all of the funds in workers' accounts could be converted on a mandatory basis into annuities when workers retire.

Individual defined-contribution accounts differ from traditional public pensions in an important way. The worker's ultimate retirement benefit would depend solely on the size of the worker's contributions and the success of the worker's investment plan. Workers who make larger contributions receive bigger pensions, other things equal. Workers whose investments earn high returns collect larger annuities than workers who invest poorly.

Advantages. There are three principal advantages of an individual account system compared with a traditional defined-benefit system. Only one of these advantages is strictly economic. The other two represent political advantages, although these political advantages may have important economic consequences. The only economic advantage of an individual account system relative to a traditional defined-benefit system is that workers are allowed to choose their own investment strategy for retirement savings. Workers who prefer to accept greater risk in exchange for higher expected returns are permitted to select an investment strategy that reflects this preference. Workers who are less tolerant of risk and willing to accept lower expected returns can choose an investment portfolio based on this preference. In a collective retirement system that pays for all workers' benefits out of the same investment fund, workers must accept the risk-return characteristics of the portfolio selected by pension fund managers. Workers with a high tolerance for risk are likely to find that returns in the collective system are unacceptably low. Workers with a low tolerance for risk would accept a somewhat smaller expected pension in exchange for reduced exposure to financial market risk.

Of course, workers who have savings in addition to their pension fund accumulation can partly or fully offset the investment choices of the pension fund manager by choosing a more or less risky strategy when investing their nonpension assets. However, many workers, especially low-income and young workers, have few financial assets of their own. They must accept the portfolio choices of the pension fund manager, regardless of their own attitudes toward financial market and expected returns. The principal economic advantage of an individual account system is that it allows workers to follow their own investment preferences.

One political advantage of an individual account system is that government officials do not have to decide how to invest the assets accumulated in the pension fund. If retirement savings are invested in corporate equities, public officials do not have to decide how to vote in corporate elections. These decisions can be left to millions of individual workers when they choose how to invest their retirement savings. Even though government officials would not be directly involved in these decisions in an individual account system, they might still play an important indirect role through their regulatory power over private pension funds and workers' investment choices. Nonetheless, the influence of public policymakers over retirement investment decisions in an individual account system is considerably smaller than it would be under a collective, defined-benefit system.

A second political advantage of individual accounts is that the funds accumulated in such accounts are difficult for legislators to use to pay for nonpension public spending. In contrast, it is straightforward for legislators to use growing surpluses in a public pension system to cover growing deficits in nonpension government programs. Many critics of the U.S. social security surpluses in the late 1980s claimed that these surpluses were being used by Congress and the President to obscure the true size of the government deficit. Congress and the President acted as though the surplus of payroll tax revenue over pension benefits was available for spending on other public services, such as national defense and health care. (This criticism seemed less plausible in the late 1990s, when the surpluses in social security accounted for an overwhelming percentage of net government saving.) If the pension surpluses had instead been accumulated in millions of individual retirement accounts, the federal government would have found it more difficult -- though not impossible -- to spend them on nonpension programs or imprudent tax reductions. This political advantage may be crucial if the move to advance funding is to produce an increase in national saving. If the government moves toward advance funding of pensions, but then spends the pension surpluses on current operations, no change in national saving will occur.

Disadvantages of individual accounts. Along with the economic and political advantages of individual accounts, policymakers must consider some important disadvantages. Just as the accumulation of additional funding in a *public* pension program can encourage legislators to increase nonpension deficits, the accumulation of additional funding in *private* investment accounts can induce workers to reduce other forms of household saving. If the

new funded pensions are very similar to existing occupational pensions, the extra funds accumulated in new accounts may be partly or fully offset by reduced saving in the old pension schemes. Of course, many workers do not participate in voluntary pension schemes and do not have much financial wealth. These workers do not have much room to offset compulsory contributions to a new funded pension system through reductions in other forms of household saving. If they are enrolled in a new compulsory retirement saving plan, they will be forced to reduce current consumption, thus boosting aggregate saving.

The major disadvantages of an individual account system are economic. One disadvantage is that the administrative burden of an individual account system is substantially higher than the cost of managing a single retirement fund. If workers are offered a large number of investment options, it can be costly to collect contributions and allocate them to the appropriate investment fund. Even if the number of investment choices is limited, competition among private fund managers does not necessarily lead to low administrative costs. It can lead, as it has in Chile, to costly sales campaigns that attempt to differentiate fund companies through advertising and extraneous services rather than through differences in funds' net rates of return.

The cost disadvantage of an individual account system may be even greater at the stage when pension accumulations are converted into annuities. Under a collective pension plan, all workers' contributions can be converted into compulsory and fair annuities at the point of retirement. This is much more difficult and costly for a private retirement fund, since each private fund must be concerned about the possibility of adverse selection among the workers who have elected to invest pension savings and purchase annuities from the fund. (The problem of adverse selection arises when workers with above-average life expectancy apply to purchase annuities while workers with lower-than-average life expectancy refrain from doing so. This pattern of differential demand will drive up the cost of annuities, making them less and less attractive to workers with average- and below-average life expectancy.) Adverse selection will lead many pension funds to impose heavy charges when workers' retirement savings are converted into annuities, greatly reducing the rate of return workers can obtain on their retirement savings. Of course, these problems and others can be handled through sensible regulation. But supervision of private investment managers and annuity

companies is costly, and, as the experience of Great Britain suggests, regulation itself is fraught with error.[7]

Financial market risk. Probably the most important shortcoming of an individual account system is that it reduces the risk pooling across workers and generations that is inherent in a collective retirement system. Because the connection between individual contributions, investment returns, and pension benefits is very straightforward in a defined-contribution pension program, such a system offers less scope to insure workers against poor investment returns. Workers who make foolish investment decisions or who have the misfortune to invest when financial market returns are poor can end up with extremely small pensions. To duplicate the traditional pension system's success in keeping down poverty among the elderly, a private system would have to supplement the pensions from individual retirement accounts with a minimum, tax-financed pension or with public assistance payments.

When contributions are invested prudently, defined-contribution retirement accounts can usually provide good pensions, at least in the United States. Assume, for example, that workers can purchase fair annuities and that they earn the historical U.S. stock market return on their pension contributions. Under these assumptions American workers who contribute 6 percent of their pay to a defined-contribution plan over a 40-year career can anticipate receiving an initial pension that replaces 50 percent to 60 percent of their peak annual earnings. This pension compares favorably with the initial pension received by average workers under the U.S. social security system. American workers who earn average U.S. wages collect social security pensions that are between 34 percent and 43 percent of pre-retirement earnings, depending on the age when benefits are first claimed. If a worker has a dependent spouse who never worked, the social security pension would range between 51 percent and 65 percent of the pre-retirement earnings of an average-wage worker.[8]

Although the typical retirement pension under an individual investment account system would provide good retirement incomes to most retirees, the pension received by

[7] The United Kingdom established a system in which workers could opt out of the state-provided earnings-related pension system if they found a private pension provider which offered benefits meeting government minimum requirements. Many workers were persuaded by private providers to opt out of the state-provided scheme, even though the benefits provided by the private alternative were less generous than those obtainable under the state-provided scheme.

[8] The after-tax replacement rates for average-wage workers are somewhat higher than this, because social security benefits are more lightly taxed than wages.

individual workers can be highly variable and depends critically on the sequence of financial market returns over each worker's career. Some people mistakenly believe the annual ups and downs in stock market returns average out over time, assuring even the unluckiest investor of a high return if he or she invests steadily over a 20- or 30-year period. A moment's reflection shows that this cannot be true. From January 2000 to July 2002 the Standard and Poor's composite stock market index fell 41 percent after adjusting for changes in the U.S. price level. The value of stock certificates purchased in January 2000 and earlier lost substantially more than one-third their value in 30 months. For a worker who planned on retiring in 2002, the drop in stock market prices between 2000 and 2002 would have required a major change in consumption plans if the worker's sole source of retirement income depended on stock market investments.

A defined-contribution system allocates risks in a very different way than the traditional, defined-benefit system. Under the Japanese and U.S. public pension systems, workers born in the same year who have similar earnings records are assured similar retirement benefits. Because of political constraints on democratically elected legislators, the benefit formula changes very slowly and only after protracted political debate. Since this debate involves both contributors and beneficiaries, changes in contribution and benefit formulas tend to reflect a compromise between the interests of the two groups. The adverse effects of unanticipated demographic, labor market, and financial market developments are rarely if ever borne by a single cohort. They are spread across a number of cohorts through gradual changes in contribution rates and benefit levels. In contrast, workers participating in a defined-contribution system bear much more of the risk associated with financial market fluctuations. Workers who invest wisely and redeem their retirement savings when asset prices are high will enjoy comfortable retirements. Workers who invest foolishly or redeem their savings when asset prices are low will collect small pensions.

These risks have been analyzed for U.S. workers by considering the hypothetical returns workers would have obtained between 1911 and 2000 if they had accumulated retirement savings in individual accounts (Burtless, 2000 and forthcoming). In this section I extend the analysis to cover hypothetical retirements through July 2002 (see Chart 6). The 93 hypothetical contributors are assumed to have identical careers and to contribute 6 percent of their annual salaries to private investment accounts from age 22 until their 62nd birthdays. When contributors reach age 62, they convert their retirement savings into level annuities. To

make the calculations comparable across time, all contributors are assumed to have an identical career path of earnings and to face the same mortality risks after retirement.[9] Contributors differ only with respect to the stock market returns, bond interest rates, and price inflation they face over their careers. These differences occur because of the differing start and end dates of the workers' careers.

One way to summarize a worker's success in saving for retirement is to calculate the pension replacement rate, that is, the worker's pension measured as a percentage of his earnings immediately before retirement. Chart 6 shows the replacement rate for hypothetical American workers retiring at the beginning of successive years from 1911 through 2003.[10] The experiences of 93 workers are displayed in this figure. The top line in the chart shows the initial replacement rate available to workers who invested all of their retirement savings in the U.S. stock market. The worker who entered the workforce in 1871 and retired at the beginning of 1911, for example, would have accumulated enough savings in his individual retirement account to buy an annuity that replaced 47 percent of his peak lifetime earnings (that is, his average annual earnings between ages 54 and 58). The worker who entered the workforce in 1962 and retired at the beginning of 2002 could purchase an annuity that replaced 74 percent of his peak earnings. The highest replacement rate (111 percent) was obtained by the worker who entered the workforce in 1960 and retired in January 2000. The lowest (18 percent) was obtained by the worker who entered the labor force in 1881 and retired in January 1921. Nine-tenths of the replacement rates shown in the chart fall in the range between 27 percent and 86 percent. The average replacement rate is 67 percent, and the median is 49 percent.

The range of replacement rates is strikingly wide. Workers with the highest pensions had the happy experience of accumulating stocks during lengthy periods when stock market prices were depressed and converting their retirement savings into annuities when stock prices were exceptionally high. Workers with the lowest replacement rates retired when stock

[9] The age-earnings profile of a worker corresponds to that of American male workers who had positive earnings in 1995, and I assume that economy-wide average real wages grow 2 percent per year. The mortality risk at each age 62 and above was determined by using the U.S. Social Security Administration's projections of mortality for male workers who attained age 65 in 1995. For additional details, see Burtless (2000 and forthcoming).

[10] To calculate the replacement rate for a worker who retires in January 2003, I assume that stock market prices, stock dividend and bond yields, and annuity prices will be the same as those observed at the close of the market on July 19, 2002, when the calculations were performed.

market prices were unusually depressed. The changes in replacement rates over short periods are often startling. The replacement rate rose from 53 percent for a worker retiring in January 1995 to 111 percent for a worker retiring in January 2000 and then fell to 49 percent for a worker retiring just 30 months later in July 2002.

Workers can follow a couple strategies to reduce the riskiness of their pensions. One strategy is to invest a portion of their retirement savings in bonds rather than stocks. This strategy reduces the volatility of the worker's replacement rate, but it also reduces the expected value of the annuity. The historical real return on low-risk U.S. bonds has been about 5.5 percentage points below the equivalent return on U.S. common stocks. In fact, the average real return on U.S. government bonds has historically been less than the return that workers can expect under the present social security system, even if benefits are scaled back to keep the program solvent. The lower two lines in Chart 6 show individual retirement account replacement rates when American workers steadily invest part or all of their pension contributions in long-term government bonds. The bottom line shows replacement rates when *all* of the worker's 6-percent salary contribution is invested in U.S. Treasury bonds; the intermediate line shows rates when *one-half* of each year's contribution is invested in stocks and one-half is invested in bonds. (Replacement rates are not shown for years before 1964 because long-maturing Treasury bonds were not available in all years before 1924.) The median replacement rate for a worker who invests all his contributions in bonds is almost 33 percentage points lower than it is for a worker who invests all of his contributions in U.S. equities. However, the variance of replacement rates is considerably smaller with bond investments than with stock investments.

This analysis suggests that the financial market risks of a private retirement system are empirically quite large. The risks are of two kinds. Two workers who have the same career earnings and who retire in the same year can obtain widely different pensions depending on the investment strategy they follow. The results in Chart 6 show that workers who invested in U.S. stocks would on average have received much higher pensions during the twentieth century than workers who invested in U.S. government bonds. Workers also face a substantial risk that they will retire when asset prices are low. Rates of return are quite uncertain, and differ widely for workers who end their careers in different years, even if the workers followed an identical investment strategy when investing their retirement savings.

Are the financial market risks facing Japanese workers larger or smaller than those facing American workers? The historical evidence on stock and bond returns suggests that the risks are larger in Japan than the United States. Table 2 compares real stock market returns and government bond returns in the five largest OECD economies, including Japan and the United States. The calculations show the total real annual returns on stock and bond investments for the period from January 1927 through the end of December 2000. Information on returns can be presented in a variety of ways. The table shows the real internal rate of return on a stock or bond investment made in one year that is sold exactly 15 years later. To calculate annual returns, I assume that all dividend and interest payments are reinvested in the same asset class at the time such payments are received. The table shows selected statistics on the distribution of trailing returns for 60 overlapping 15-year periods. (The first period begins in 1927 and ends in 1941; the second begins in 1928 and ends in 1942; and so on.) The top panel shows distributional statistics on equity returns in the five countries; the bottom panel shows statistics on bond returns.

Interestingly, both stock and bond returns have tended to converge in the five countries, probably as a result of the closer integration of world capital markets. The gap between the highest and lowest government bond return in the five countries was just 1.5 percentage points in 1974-2000, whereas it was more than 6 points in the early post-war period and 13 points in the period from 1927 to 1946. Similarly, the cross-national difference between the best and worst stock market performance has also narrowed. With the conspicuous exception of stock returns in Japan, both stock and bond returns have tended to increase over time. Note that each of the five countries has experienced 15-year periods in which stock market returns were zero or negative. Each country has also experienced an era in which the 15-year average annual return has exceeded 15%. The United States and United Kingdom have experienced the smallest fluctuation in 15-year trailing returns. France and especially Japan have experienced much greater variability in returns. The gap between the best and worst 15-year trailing return was almost 45 percentage points in Japan (-20.0% at the low end and +24.5% at the high end). In contrast, the gap between the best and worst 15-year return was just 16 percentage points in the United States (-0.6% at the low end and +15.3% at the high end).

The United States and Great Britain have also experienced much smaller fluctuations in bond returns than the other three countries. The standard deviation of trailing bond returns is more than twice as large in France and Germany as it is in the United States; it is more than three times larger in Japan than the United States. Much of the variability in French, German, and Japanese bond returns can be traced to high inflation or currency reform in the immediate post-war period, when outstanding government bonds lost much of their value. Since the mid-1960s the 15-year average of real bond returns has been more stable in Germany and Japan than in Britain or the United States.

U.S. investors have enjoyed the highest long-term returns on stocks, while Japanese investors have obtained the smallest returns. One dollar invested in the U.S. stock market at the beginning of 1927 would have been worth $210 at the beginning of 2001. One yen invested in the Japanese stock market in 1927 would have been worth just 12.9 yen at the beginning of 2001. Stock market performance in the three European countries has been closer to U.S. than to Japanese experience. Japanese investors enjoyed an extraordinary 14 percent annual rate of return on equities between 1947 and 1973, but they also suffered when stocks lost 85 percent of their value between 1927 and 1946. Japanese investors have also obtained relatively poor long-term returns on their bond investments. U.K. and U.S. investors have earned the highest returns on bond investments, primarily because their governments have not defaulted on the public debt through high inflation or major currency reform.

The return data displayed in Table 2 imply that Japanese workers face very uncertain retirement income prospects if all of their pension savings are invested in the Japanese stock and bond markets. Workers who allocate most of their retirement savings to Japanese stocks can obtain stunningly large pensions if they have the good fortune to retire at the end of a 15-year period with high returns, but they would obtain very small pensions if they retire after a 15-year period in which the annual real rate of return falls toward the bottom of the Japanese historical range. Even assuming that Japanese stock and bond markets will never repeat the calamitous performance of the 1927-1947 period, the post-war period has also included a long interval in which Japanese stock returns were significantly negative. In the 15 years from 1987 through 2001, the real return on Japanese equity investments was –3 percent per year. This record suggests that Japanese workers with careers that coincide with a period of high stock and bond returns can obtain individual retirement account pensions that are significantly

larger than the best U.S. pensions shown in Chart 6, but Japanese workers who retire after a sustained period of poor returns would receive lower pensions than the smallest pension shown in Chart 6.

Although some of the financial market risks of an individual retirement account are present to some degree in traditional public retirement systems, a public system has one important advantage over private pensions. A public retirement system is backed by the taxing and borrowing authority of the state. It can therefore spread risks over a much larger population of potential contributors and beneficiaries. This makes the risks more manageable for active and retired workers, many of whom have little ability to insure themselves privately against financial market risk.

Americans' investment portfolios suggest they have a higher tolerance for risk than do Japanese households. Gross personal financial wealth is more likely to be held in the form of equities and securities in the United States, whereas household financial wealth in Japan is much more likely to be held as currency and bank deposits (see Chart 7). This difference between Japanese and American tastes for financial market risk suggests that Americans would be more willing to tolerate the risk associated with individual retirement accounts which are invested in equities. The difference in tastes is reflected in the pension systems of the two countries. The U.S. system contains a smaller defined-benefit collective pension, in which risks are broadly shared across the population, and a larger defined-contribution individual pension, in which financial market risks are borne by individual workers.

3. The Outlook for Pension Reform

Japan and the United States will have to support their retired workers out of the national incomes available when future generations reach retirement age. Whether retirees receive most of their income from public pensions, as they do today, or from private pensions, as they would under a system of individual accounts, their consumption will be derived from the output of future workers and the future capital stock. If productivity grows rapidly, the elderly can be generously supported and active workers can enjoy steady increases in their after-tax incomes. This is true whether old-age pensions are provided under the existing public pension program or under a system of private investment accounts. If productivity grows slowly, future workers will have to accept lower after-tax incomes and retirees will have to accept smaller pensions unless workers can be persuaded to delay their retirement.

The implications of slow growth will be the same whether pension incomes are derived from a public or private system.

Moving the retirement system toward advance funding of future pension obligations can help increase productivity and future national income, but only if it results in higher national saving. Advance funding can be achieved by reforming the existing public, defined-benefit system or by introducing individual, defined-contribution pension accounts. In either case, higher saving will require a consumption sacrifice in the short run. This is true whether pension reserves are invested in a broad portfolio of financial assets or held as government bonds. The economic advantage of an individual account system is that contributors to the pension system have the opportunity to choose the investment portfolio that most closely matches their taste for risk and expected reward. The political advantage is that it reduces the scope for political interference in investment selection and company decision-making. The offsetting disadvantages are that such a system is more costly to manage, thus reducing workers' ultimate pensions, and fails to spread financial market risk broadly across workers and generations.

The analysis in this paper suggests that while the burden of future aging will be greater in Japan, the gains from increased saving are almost certainly larger for the United States. Net saving represents a smaller share of national income in the United States than it does in Japan. The large imbalance between U.S. domestic saving and investment produces a large and chronic deficit in its current account. The large U.S. deficit suggests there are many profitable opportunities for investment in the United States that are not being exploited by U.S. savers. In contrast, Japanese households have higher rates of saving than are needed to fund Japanese investment. The excess of saving over investment is invested overseas and produces chronic surpluses in Japan's trade accounts. However, the Japanese experience of sustained current account surpluses has produced an international political backlash. The Japanese government has been subject to strong political pressure from the United States and other trading partners to reduce public and private saving and promote domestic consumption. The international repercussions of maintaining or expanding the already large Japanese current account surplus may make it politically difficult for Japanese savers to increase their investment in overseas assets.

All workers would welcome the opportunity to earn better returns on their contributions to the retirement system. Individual defined-contribution accounts can provide better returns than the existing pension systems of both Japan and the United States, but they would expose workers to a substantial hazard that their pensions would be too small to finance a comfortable retirement. The most often cited benefit of private retirement systems is that they can provide better returns to covered workers. If public systems were reformed to include advance funding and prudent investment of reserves, they could provide the same expected return to workers with far less financial market risk.

The choice between the public and private reform alternatives depends ultimately on political rather than economic considerations, because the economic advantages of neither system are decisive (Burtless and Bosworth, 1997). Advocates of privatization are skeptical that elected officials can be trusted to manage the accumulation of a big retirement fund. They fear that larger public pension surpluses would be spent on other government consumption (and hence not saved) or that fund accumulation will be invested unwisely. Opponents of privatization believe that scaling back the public program so that it provides only modest, poverty-level benefits will cause the public component to be viewed as a public assistance program. This could undermine the political popularity of the program and possibly threaten the continuation of redistribution to the low-income elderly. A public plan offers stronger assurances to low-wage workers, but a private plan is more appealing to workers who want a better return on their contributions.

Japan has begun to move toward a retirement system in which some fraction of the workforce will contribute to individual pension accounts on a voluntary basis. The most recent Japanese public pension reform will significantly scale back benefits in the traditional, pay-as-you-go retirement program for workers who will retire over the next quarter century. Even when the reform is fully implemented, however, Japan's public pension program will face much more serious funding problems than the equivalent system in the United States. It remains to be seen how much additional reform will be needed to keep Japan's public system affordable. Pension reform has not advanced as far in the United States as in Japan, in part because population aging represents a less serious short-run and long-run problem. While the United States has less need for reform than Japan, its voters have a greater tolerance for

financial market risk and may have a stronger aversion to high taxes. In the long run, these preferences could be crucial in determining the ultimate course of reform.

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Table 1: Dependency Rates and the Outlook for Pensions in G-7 Countries

Percent

Country	Aged dependency ratio [1]			Public pension expenditures / GDP [2]		Gross pension liabilities / GDP in 1994 [3]	Net pension liabilities / GDP in 1994 [4]	Private pension fund assets / GDP 1994 [5]
	2000	2025	2050	1995	2050			
Canada	21	36	46	5.2	8.7	204	101	34
France	27	40	51	10.6	14.4	318	102	4
Germany	26	40	54	11.1	17.5	348	62	6
Italy	29	43	75	13.3	20.3	401	60	2
Japan	27	50	69	6.6	16.5	299	70	6
U.K.	27	37	50	4.5	4.1	142	24	68
U.S.A.	21	34	38	4.1	7.0	163	23	67

[1] The aged dependency ratio is the ratio of persons aged 65 and over to those who are 20-64. *Source:* U.S. Census Bureau.

[2] *Source:* Roseveare et al. (1996). "Ageing Populations, Pension Systems and Government Budgets: Simulations for 20 OECD Countries." Economics Department Working Paper No. 168 (Paris: OECD).

[3] Gross pension liabilities are the discounted present value of future public pension payments. *Source:* Roseveare et al. (1996).

[4] Net pension liabilities are calculated by subtracting the present value of future contributions from discounted gross liabilities. *Source:* Roseveare et al. (1996).

[5] *Source:* E. Philip Davis (1997). "Can Pension Systems Cope? Population Ageing and Retirement Income Provision in the European Union." Special paper (London: Royal Institute of International Affairs).

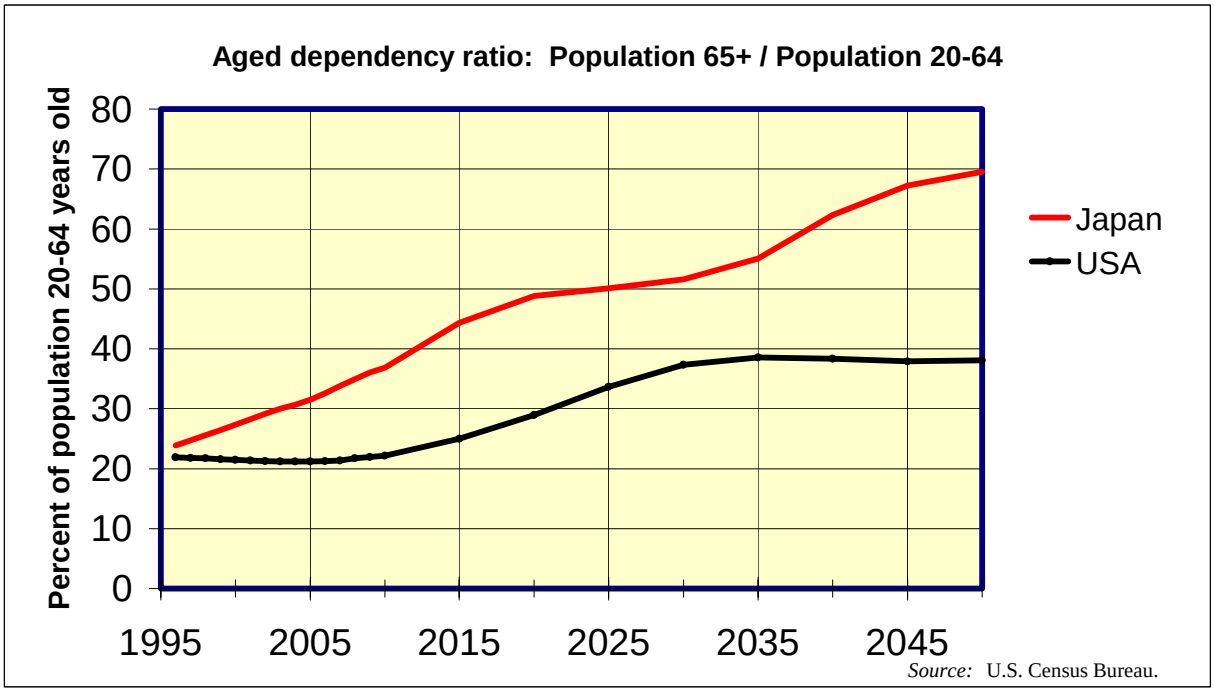
Table 2. Statistics on the Distribution of Fifteen-Year Trailing Stock and Long-Maturity Government Bond Returns in Five Countries, 1927-2001

Percent

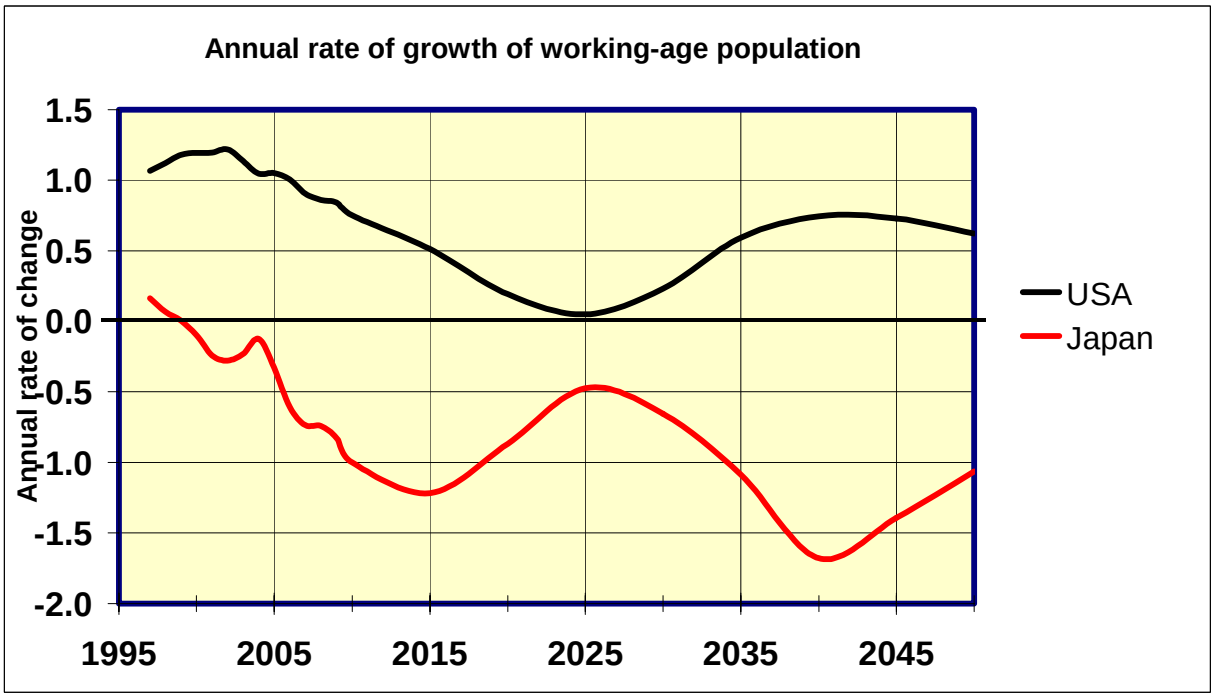
	Country				
	France	**Germany**	**Japan**	**U.K.**	**U.S.A.**
Stock market returns					
Average	**6.0**	**6.1**	**4.0**	**6.7**	**7.6**
Std. Dev.	6.0	5.1	9.5	3.8	4.8
Minimum	-5.0	-3.7	-20.0	-4.1	-0.6
1st quartile	0.0	1.5	0.5	3.4	2.8
Median	**3.9**	**5.6**	**6.5**	**6.9**	**7.1**
3rd quartile	9.6	9.3	9.8	9.5	11.5
Maximum	16.5	24.6	24.5	16.3	15.3
Government bond returns					
Average	**-0.6**	**1.1**	**-2.0**	**2.4**	**2.1**
Std. Dev.	9.0	7.4	11.6	5.7	3.4
Minimum	-19.6	-14.1	-27.1	-6.0	-3.4
1st quartile	-7.7	-1.6	-12.9	-2.8	-1.2
Median	**-0.7**	**3.4**	**1.8**	**-1.2**	**0.5**
3rd quartile	2.1	4.8	4.1	5.0	3.2
Maximum	11.7	7.3	6.6	10.3	9.0

Source: Author's calculations of real internal rate of return in 60 overlapping 15-year periods. Annual total return and inflation data supplied by Global Financial Data.

Chart 1. Population Trends in Japan and the United States, 1995-2050

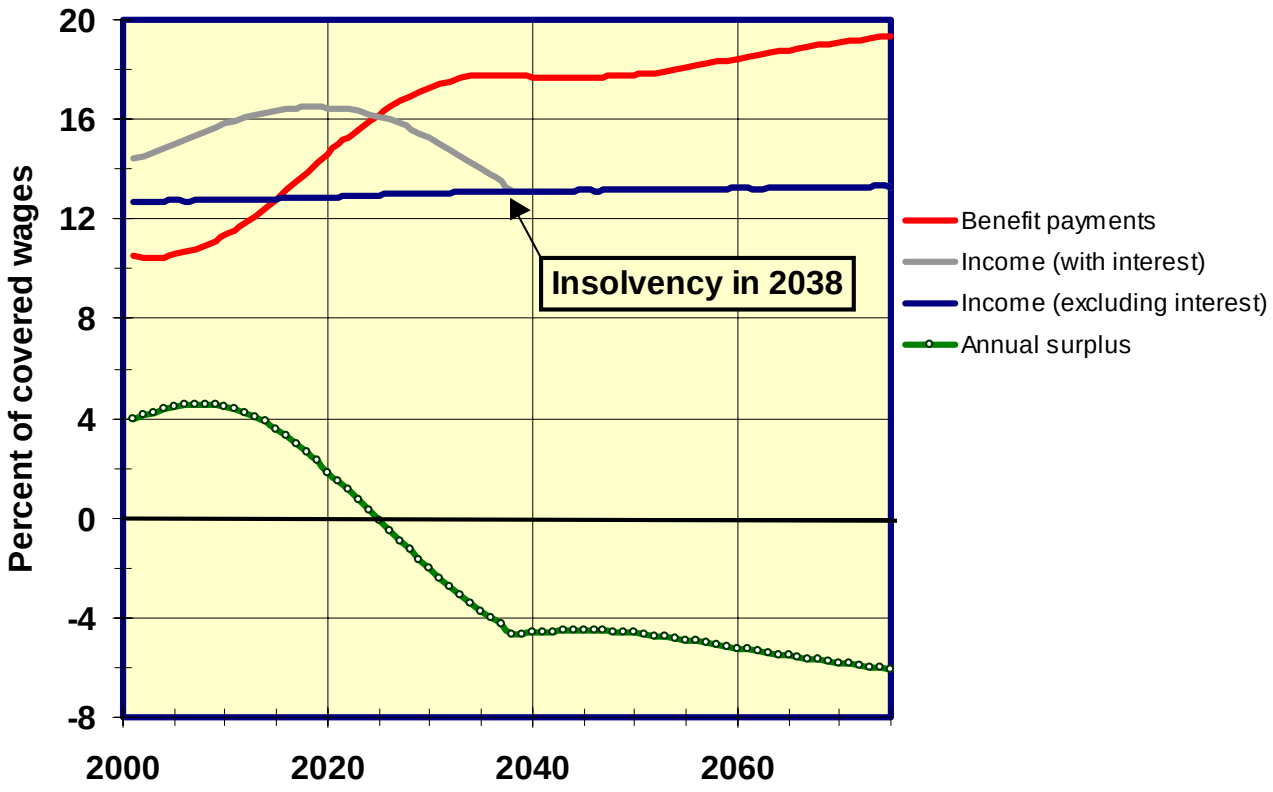


Source: U.S. Census Bureau.



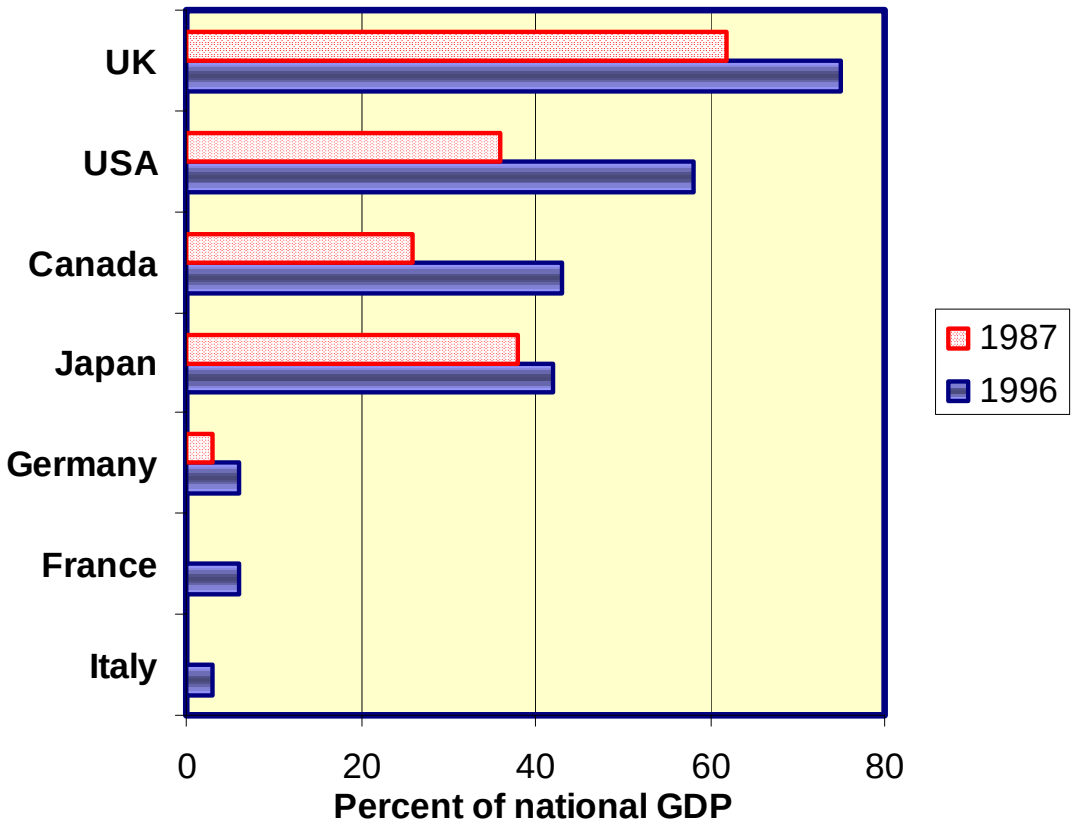
Source: U.S. Census Bureau, International Data Base (accessed 2001).

Chart 2. U.S. Social Security Operations as a Percent of Taxable Payroll, 2001-2075



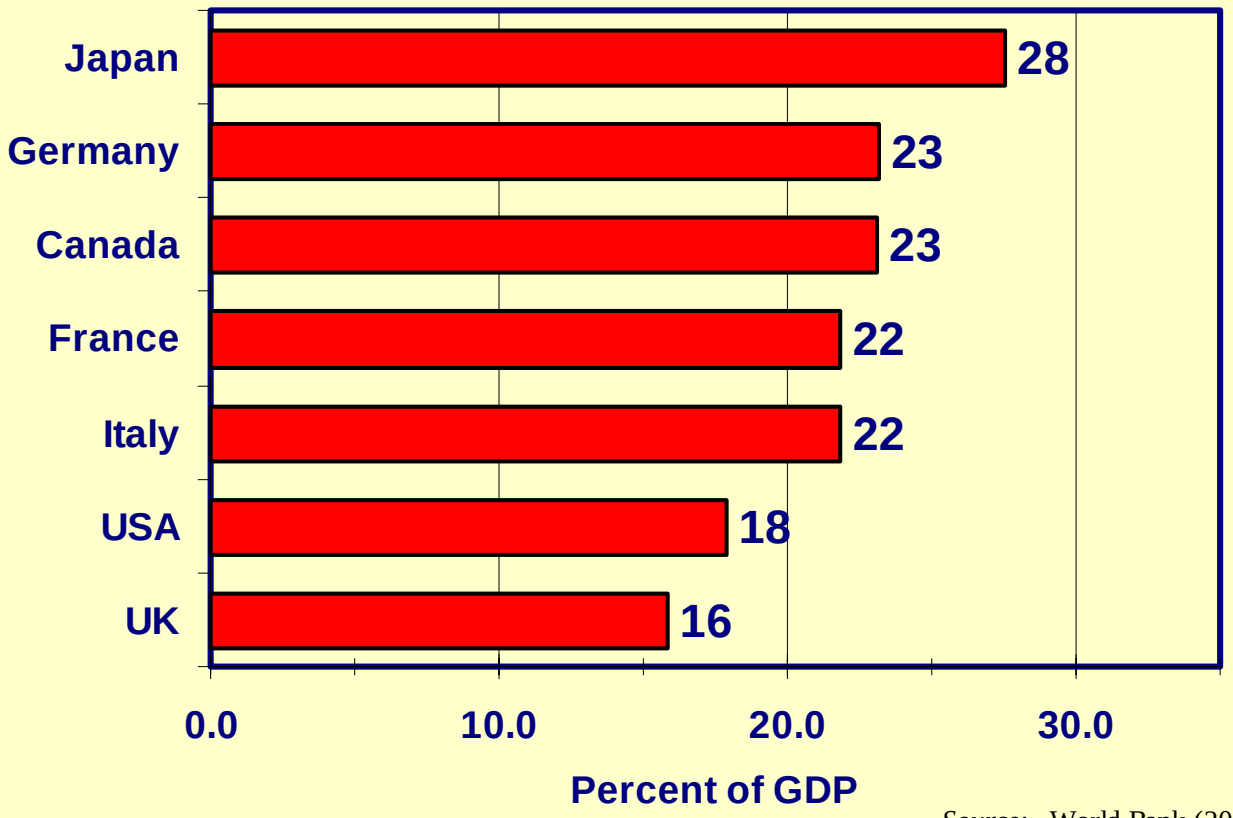
Source: Author's tabulations and OASDI Trustees, *Annual Report* (2001).

Chart 3. Pension Assets as a Share of GDP, 1987 and 1996



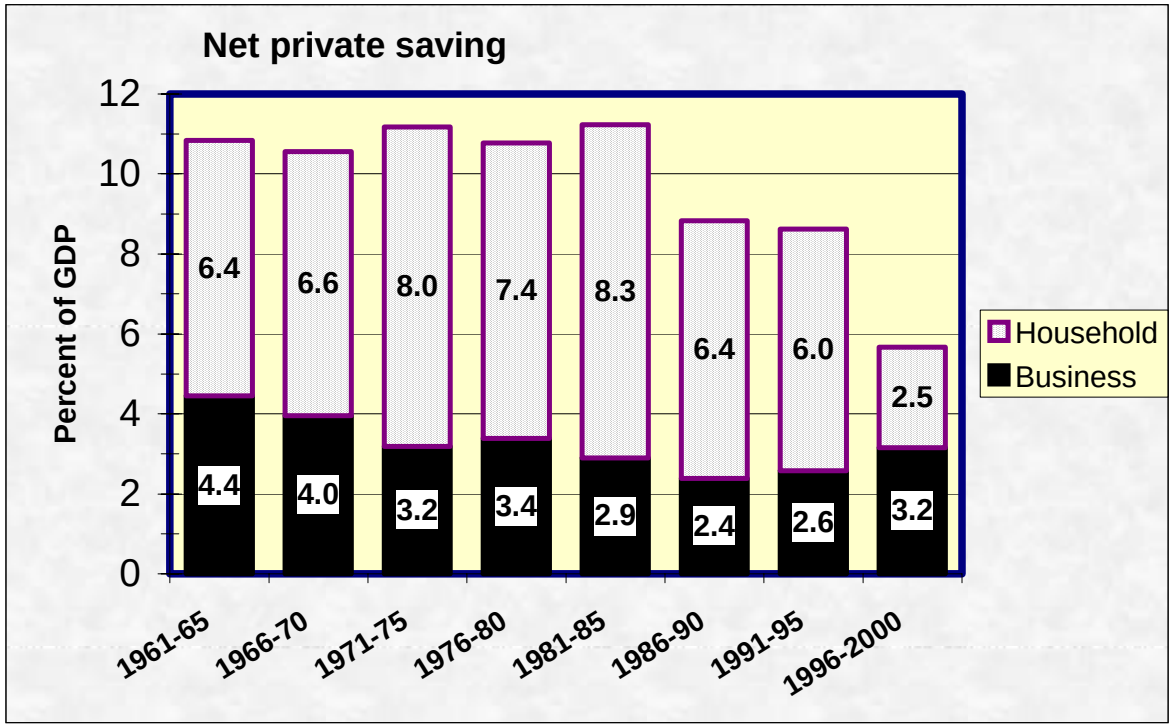
Source: Disney (2000), Table 3.

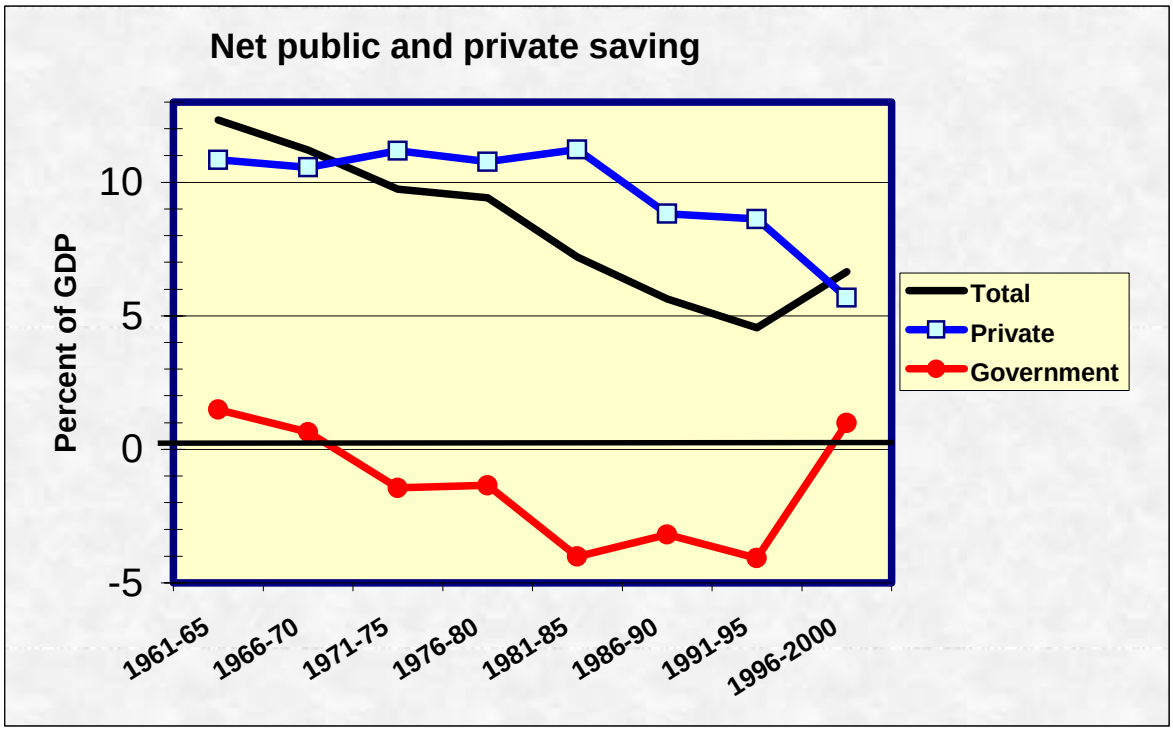
Chart 4. Gross Domestic Saving in G-7 Countries, 1999



Source: World Bank (2002).

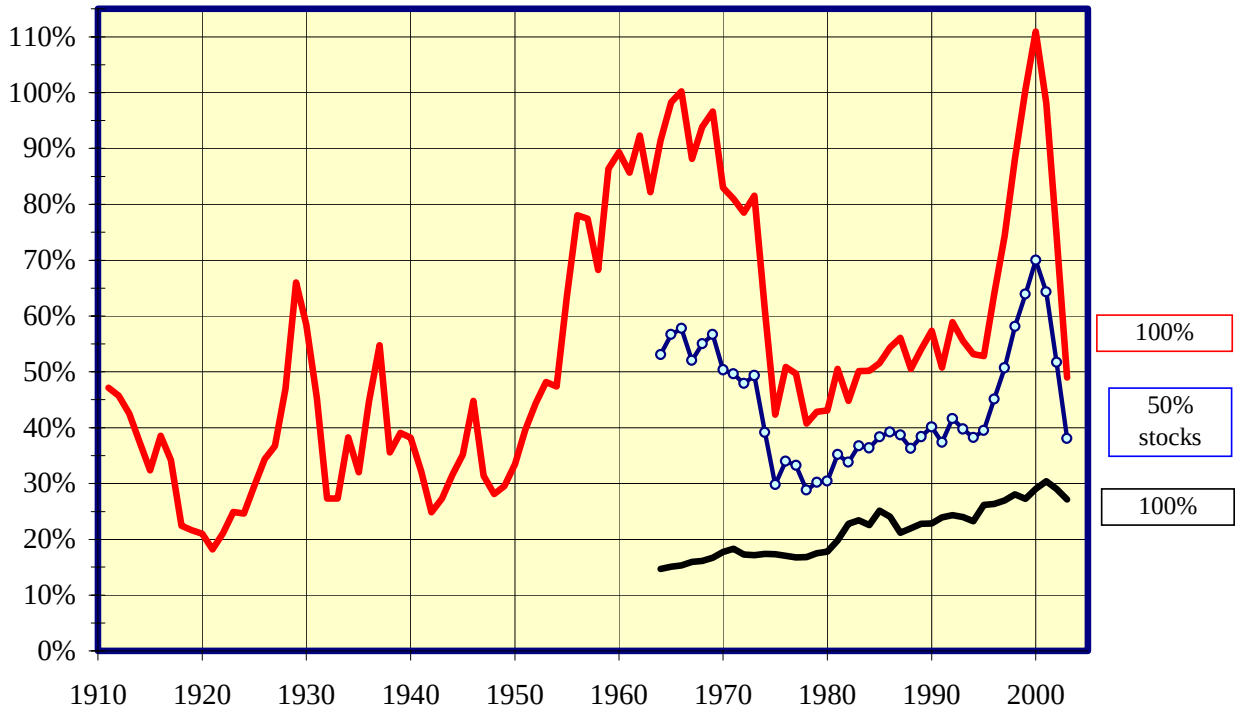
Chart 5. Components of Net U.S. Saving, 1961-2000





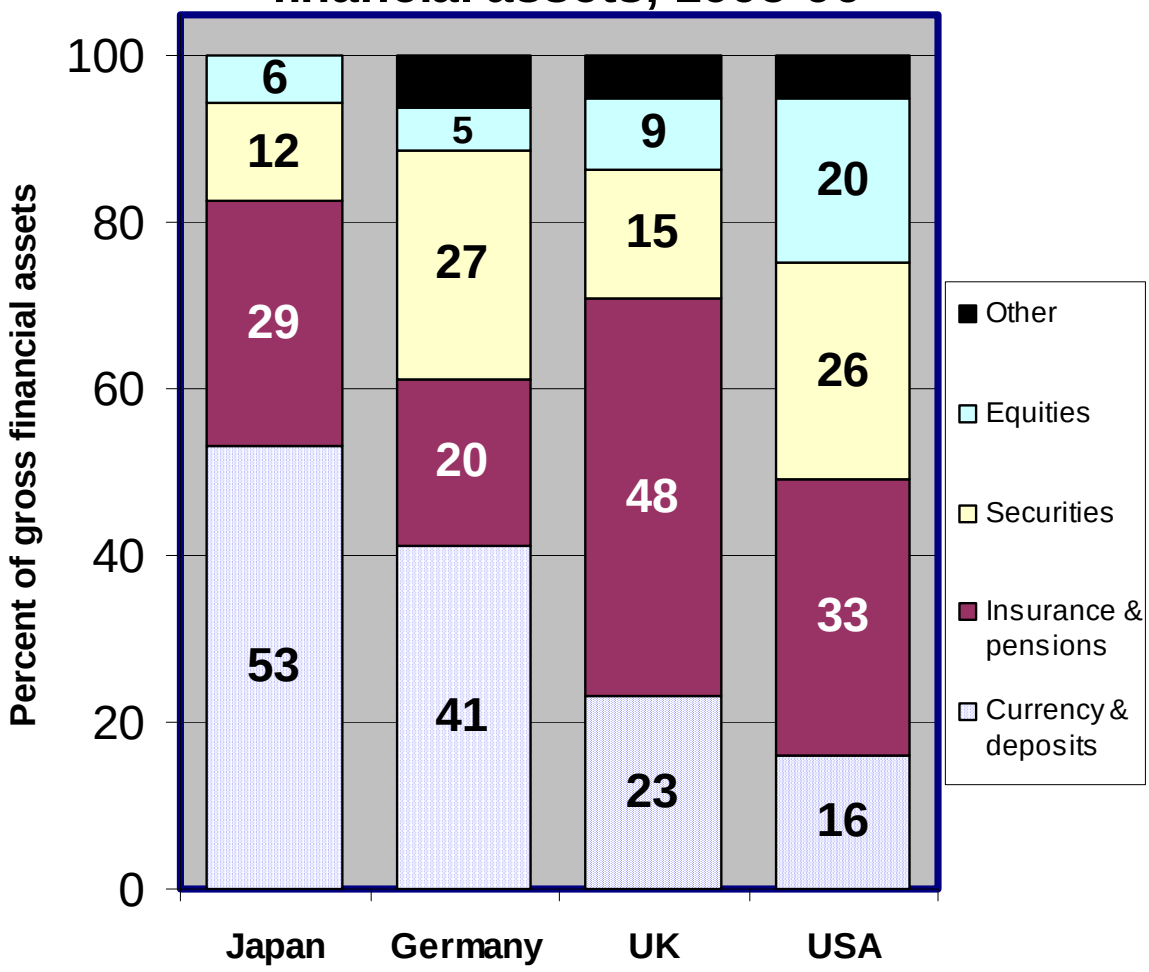
Source: Author's tabulations of U.S. Department of Commerce, BEA, National income and product accounts.

Chart 6. Individual Retirement Account Replacement Rates for Men Reaching Age 62 in Specified Years, 1911-2003



Note: January 2003 replacement rates calculated using closing financial market prices on July 19, 2002.
Source: Author's tabulations as described in the text.

Chart 7. Personal sector gross financial assets, 1995-96



Source: U.S. Federal Reserve and Bank of Japan.