The Impact of Aging Populations on Private Pension Funds

by

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Background

After the end of World War II, birth rates in the United States jumped to a level significantly above long-term trends in fertility and stayed above generally expected levels until the mid-1960s as shown in Figure 1. As a result of the high birth rates from 1946 through 1964 the number of people born during the period comprise an unusually large segment of the total U.S. population and have come to be known as the baby boom generation. Many other countries experienced increased birth rates but few had elevated birth rates comparable to the U.S. post-war experience. Because of its size, the U.S. baby boom generation has had a more significant effect on various aspects of society than other comparably aged segments of the population.

At the end of the twentieth century, the baby boomers in the United States ranged in age from 36 to 54. Their predominant position in the population mix of the country at that time is clear from Figure 2. Today's retirees are from relatively small birth cohorts born prior to the end of World War II. The largest segment of the workforce is comprised of individuals from the baby boom birth cohorts. For every person in the country over age 65 in 2000, there were roughly 4.7 people between the ages of 20 and 64. The United States has relatively high labor force participation rates among both men and women, with approximately 95 percent of men and about 80 percent of women between the ages of 25 and 55 being in the labor force. The large number of workers and small number of retirees enhances the saving and cash flows of both the private and public pension systems.

The anticipated population age structure in the United States in 2030, reflected in Figure 3, is remarkably different than that of the contemporary population. The aging of the baby boom is expected to square up the upper part of the age distribution. The combination of fertility and immigration rates that portend continued slow growth in the population suggest an overall population structure that is much more rectangular than historically. The number of people age 65 and over relative to those ages 20 to 64 is projected to drop to 2.65 by 2030.

Given the retirement patterns of workers who have gone before them in recent times, we are now anticipating the retirement of the baby boomers. Their withdrawing from the labor force is likely to have significant implications on the retirement system and the general economy. The ability for workers to retire is generally related to their eligibility for pensions. The age at which workers qualify for a pension will vary depending on the type of pension coverage they have during their working career and their work pattern over their prime working ages. But the leading edge of the baby boom generation is turning 55 years old in 2001 and it is around that age that significant numbers of U.S. workers begin to retire.

The pension system in the United States is comprised of three elements, public social security pensions, employer-sponsored retirement plans, and individual saving for retirement outside of the other two elements of the system. Almost all workers are covered by the public element of the system and qualify for retirement pensions at age 62. Deferring retirement until later results in actuarially adjusted benefits. About half of all workers at any point in time

participate in an employer-sponsored retirement plan. In the last quarter century there has been a marked shift away from defined benefit toward defined contribution plans in this sector. Yet today, most of the largest employers in the United States still sponsor a defined benefit plan. Many of these plans provide relatively generous pensions to long-term workers as early as age 55. The two largest sources of cash income for U.S. retirees today are social security pensions and employer-sponsored tax-qualified retirement plans.

Social Security Financing and the Baby Boom Generation

In the United States, the term "Social Security" is generally associated with the payment of public pensions authorized under the Social Security Act. This includes pensions paid to retirees, their surviving elderly spouses, the permanently disabled, or juvenile dependents, children age 18 or younger, of persons receiving a pension under the program.[1] Formerly, the pension elements of the system are authorized under the Old-Age and Survivors Insurance and Disability Insurance (OASDI) titles of the Social Security Act.[2] The system is largely financed on a pay-as-you-go basis although there has been some accumulation of trust funds since 1983. The trust fund is wholly invested in U.S. government bonds and currently holds slightly more

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[1] Hardly anyone in the United States thinks of social security encompassing unemployment benefits or even medical insurance benefits provided under the Medicare or Medicaid programs even though all of these benefits are also authorized under the Social Security Act. In keeping with the common understanding of what Social Security is in the United States, when we use that term in this paper, we are referring to the pension programs.

[2] For a history of the Act and the evolution of the program in the United States, see Sylvester J. Schieber and John B. Shoven, *The Real Deal: The History and Future of Social Security* (New Haven: The Yale University Press, 1999).

than a trillion dollars. While this seems like a large amount in absolute terms, it represents about two years worth of benefit payments to current retirees. Most of the liabilities of the system are unfunded.

In pay-go retirement systems the total benefits paid from year-to-year roughly equal the total revenues as they are collected. Such systems generally utilize a small contingency trust fund because it is impossible to get benefits and revenues to be precisely equal in any given year. To the extent that there is a fund in these systems, it is simply a budgetary leveling device so the plans can continue to pay benefits as revenues vary across economic cycles. The "reserves" in such funds actually represent unexpended budgetary authority rather than a cash balance. Pay-as-you-go systems typically rely on taxes on workers' earnings, a payroll tax, as their primary means of finance. There are variants on this approach to financing, but they do not fundamentally alter the pay-as-you-go operations of the system. For example, Germany has some general revenues that supplement the payroll tax rate. Over time, however, changes in the overall cost of the German system will have to be financed out of expanded contemporary payroll tax revenues or alternative revenue sources. As a practical matter, any national pension or health benefit that is financed out of current year cash flow may be considered pay-as-you-go.

The payroll tax revenue available to such a system in any given time period is typically equal to the payroll tax rate, including both the employer and employee portion of the tax, times

the number of workers who pay the tax, times workers' average covered earnings level. The

amount of benefits paid under these systems is equal to the total number of people getting

benefits times the average benefit paid. The underlying mathematics of such a prototypical

system are shown in equation (1).

Revenues = Expenditures

$$(1) \; t \bullet N_W \bullet W = N_B \bullet B$$

where: t = payroll tax rate paid by employers and employees; N_W = number of covered workers

employed in a year; W = average wages of covered workers during the year; N_B = number of

retirees receiving benefits; and B = average benefits paid to retirees such that:

$$(2) \; t = (N_B/N_W) \bullet (B/W)$$

In this example, the "cost" of a pay-go retirement plan is equal to the payroll tax rate that

it takes to sustain it. In the kinds of plans that exist in many countries around the world today,

two very important ratios determine the cost of these systems. The required tax rate to support

such a system is the product of the relative number of beneficiaries to workers times the ratio of

average benefits to average covered earnings. This is shown in equation (2). People who work

with retirement plans often call the ratio of beneficiaries to workers the dependency ratio. They

often refer to the ratio of benefits to wages in a retirement plan as the replacement rate—it

reflects how much of an average worker's earnings are replaced by the retirement benefit when

he or she retires.

Holding constant the relationship between benefit levels paid to retirees and the wages of workers, a high old-age dependency ratio portends a high tax burden on workers compared to a low dependency ratio. Most countries that rely on national retirement systems financed on a pay-as-you-go basis have systems that base benefits on covered wages so the relationship of the benefits-to-wages ratio is relatively constant over time. That makes these systems' costs highly dependent on the dependency ratio and so that is a crucial variable to assess in understanding the potential effects of aging on social insurance costs.

There has been a general awareness since the late 1970s that the baby boom generation would pose a particular problem for the U.S. Social Security program. In 1983, legislation was adopted gradually increasing the age for entitlement to full benefits from age 65 to age 67. Those increases began to be implemented in 2000 but will not be completed until 2022. The increase in the age at which full benefits are paid is supposed to reduce the cost of the U.S. Social Security plan in one of two ways. First, it could reduce the dependency ratio by encouraging older workers to delay retirement, thus reducing the number of retirees while increasing the number of workers. Second, for retirees who still claim benefits prior to full benefit eligibility, actuarial reductions will reduce benefits relative to what they would have been under prior law, thus reducing the ratio between average benefits and covered wages. In the U.S. system, initial benefits are indexed to the rate of growth in wages and benefits in payment status are indexed to

the cost of living. With the increases in retirement age and growing real wages, average benefits under the program are expected to decline slightly relative to wages over time.

Today, there are approximately 3.25 workers paying into the system for each beneficiary, a relationship that has been relatively constant since the mid-1970s. When the baby boom retires, this ratio of workers-to-retirees is expected to drop, reaching a level of 2.0 by 2030. The pay-as-you-go cost of U.S. Social Security benefits today is approximately 10.5 percent of covered payroll. By 2030, the projected cost is expected to grow to about 17.3 percent of covered payroll. The legislated payroll tax rate supporting social security pensions in the United States is 12.4 percent of payroll. In addition, income taxes collected on Social Security benefits are returned to the system raising total income to the system to roughly 12.8 to 13.0 percent of covered pay between now and 2030. The system is now running a surplus but that is expected to dissipate by 2015 or so, and the projected deficits are expected to deplete the accumulated trust fund between 2035 and 2040. The projected trajectory of the Social Security trust fund accumulation is shown in Figure 4.

Policymakers in the United States are well aware of the implications of the demographic structure of the population for Social Security financing. There has been an evolving debate for the last five years or so about how to deal with the long-term financing of the program. During his campaign for president during 2000, George W. Bush said that he would take up Social Security reform if he were elected. He has recently appointed a commission to come up with a

specific reform plan by the fall of 2001 with the expectation that he will forward that plan to Congress before the end of the year.

Looking back to the financing equation facing traditional pay-as-you-go retirement systems, the policy options for dealing with the situation that Figure 2 portends are relatively limited. President George Bush has laid down a set of principles to guide policy development for dealing with the problem the U.S. society faces that include no new taxes and no reductions for benefits for people already retired or close to retirement or for future disability and survivor claimants. This would seem to fix the left side of Equation 2 indefinitely. For the short-to-intermediate term, it would hold relatively constant the relationship between benefits and wages. The U.S. economy is already operating at something generally considered close to full employment so the prospect of creating more jobs seems limited. Finally, to complicate matters, there is a tremendous reluctance on the part of policymakers to adjust the system to encourage workers to delay retirement beyond the increases in normal retirement age already in place. If retirement patterns and employment levels cannot be manipulated then it seems the dependency ratio is off the table as a policy lever to use here. So what has President Bush proposed? He suggests that the U.S. society should begin to fund a portion of its Social Security in the form of individual accounts. Without going into questions of where the "funding" might come from in President Bush's preferred approach to dealing with the U.S. Social Security problem, his

suggestion raises a question about how funding pensions will change the economic costs and implications of retirement for an aging society.

Funded Pensions and Aging Societies

Retirement plans are essentially mechanisms that facilitate the distribution of goods and services produced by workers to the elderly of a society who no longer work. In a pay-as-you-go system, the financing of retirees' consumption is financed by a tax on workers. In a funded system, the financing of retirees' consumption is financed, at least in part, by selling assets to workers. But higher tax rates and higher savings rates on workers both have the net effect of reducing workers' immediate consumption financed through returns on their labor. Part of the concern about doing this through pay-as-you-go mechanisms is that the net effects of higher taxes will lead to reduced labor supply from the working age population because the net returns on labor are reduced. Alternatively, some policymakers are concerned that much employment will move to the underground economy so workers and employers can avoid the higher taxes. In the short-to-intermediate terms, however, it would seem that additional funding of national retirement systems requires that workers forego added consumption as they fund their future retirement income. Will this form of reduced consumption be more palatable to workers than that required in paying higher taxes because they are accumulating a financial asset as opposed to a legislative promise of future income? Does the mere funding of a national retirement plan

somehow change the basic economics of aged dependency in a society? What happens in the

future as retiree populations expand rapidly and economies become asset sellers?

There has been limited discussion about these and other questions relating to national

pensions, although several of them have been considered as they apply to the employer-based

pension system in the United States. This system is comprised of plans offered voluntarily by

employers. The system is encouraged by public tax policy that allows workers to deduct

contributions to plans that meet certain qualification standards and does not require workers to

pay taxes on them until benefits are paid out. The Bureau of Economic Analysis of the U.S.

Department of Commerce, which compiles and publishes the U.S. National Income and Product

Accounts, estimates that total benefit payments from employer-sponsored pension and profit-

sharing plans during 2000 were $425.3 billion.[3] By comparison, Social Security benefit

payments for the year equaled $402.1 billion.[4]

Funding of Employer-Sponsored Pensions in the United States

Employer-sponsored retirement programs in the United States operate in a significantly

different environment than the federal Social Security program. Private employers are required

to fund their retirement obligations on the basis of rules laid out in the Employee Retirement

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[3] Bureau of Economic Analysis, U.S. Department of Commerce, *Survey of Current Business* (August 2000), vol. 80, no. 8, p. 81.

[4] *The 2001 Annual Report of the Board of Trustees of the Federal Old-Age and Survivors Insurance and Disability Insurance Trust Funds,* (March 19, 2001), p. 131.

Income Security Act (ERISA) and the Internal Revenue Code (IRC). While state and local governments are not subject to the funding requirements under ERISA, most of them do fund pension obligations as they accrue. The federal government operates its own employer-sponsored retirement programs largely on a pay-as-you-go basis.

ERISA became law in 1974. Its purpose was to provide more secure retirement benefits for all the participants in tax-qualified plans. Among other things, ERISA established rules for including workers in plans, set vesting rules for benefits based on periods of coverage under the plans, and required that benefits be funded on a scheduled basis. In order for a plan to qualify for retirement plan tax preferences in the IRC, it must meet certain requirements to ensure that the benefits being promised are actually provided. For all plans there are fiduciary requirements seeking to assure that the assets are prudently invested solely for the purpose of providing benefits promised by the plans. In addition, ERISA requires that plan trustees have to disclose relevant financial and participation data to the government on a periodic basis, so the ongoing viability and operation of the plan can be assured.

For defined contribution plans, the funding requirements are straightforward. On the date that a contribution to the plan is required by the plan rules, the employer makes a contribution to the plan equal to the obligation. In this case, the employer is not obligated to make any additional contributions for prior periods. The ability of the plan to provide an adequate

retirement benefit will depend heavily on the size of the periodic contributions and the investment returns to the assets in the plan.

For defined benefit plans the funding requirements are somewhat more complicated because defined benefit plans promise future benefits. If a worker enters a firm at age 25 and works until age 65 and he is retired under the plan for 20 years before dying, his span of life under the plan is 60 years. The essence of the ERISA funding requirements for defined benefits plans is that the employer gradually contributes enough to the plan so the promised benefits will be fully funded at the point a worker retires. The annual contribution to the plan is determined on the basis of an actuarial valuation of the plan's obligations and assets, and specific funding minimums and maximums specified in the law. The funding minimums in the law are to assure that employers are laying aside money to pay promised benefits. The funding maximums are in the law to assure that extraordinary contributions are not made to the plan simply to avoid paying federal taxes.

One major motivation behind the adoption of ERISA was to secure the retirement benefits that employers promised their workers through their defined benefit plans. Before ERISA, plan sponsors were not legally required to fund benefits as they were earned, and some plan sponsors found themselves unable to meet their benefit obligations. As a further backstop against benefit losses, Congress also established the Pension Benefit Guaranty Corporation (PBGC). If a plan sponsor cannot meet its benefit obligations, due to financial duress and

inadequate assets, the PBGC takes over the payment of guaranteed benefits. The funding requirements in ERISA have varied significantly over the years.

The initial legislation required employers to fund the normal cost of their plans over time and make additional contributions to amortize any supplemental liabilities. The normal cost is an actuarial measure of the cost of a retirement benefit as it is being earned. Its calculation entails the estimation of the value of the total retirement benefits that will be paid to a worker discounted back to his date of hire or attained age in present value terms, and then spread over the worker's total remaining service under the plan. The costs are generally allocated as a percentage of salary when the benefit is based on salary. Supplemental liabilities existed initially under ERISA for many plans because they had not been funded previously. Such liabilities also arise under other plans from time to time because of plan enhancements, plan experience that deviates from expectations and so forth. ERISA required that such supplemental liabilities be amortized over defined periods.

In the early days of ERISA, most plans were funded on an entry-age normal cost basis. The actuary estimated the funding requirements such that the contribution for a newly hired employee would be a constant percentage of her wage over her working career under the plan. After ERISA had been in operation for about 12 years, the Financial Accounting Standards Board (FASB) adopted an accounting standard for pensions that based plan cost on an alternative actuarial method of estimating pension costs, namely the projected unit credit method. The

projected unit credit method results in a different pension cost profile over a worker's career than the entry-age normal cost method. Under this approach, the cost of the pension as a percentage of a worker's pay rises over the career. Changing from the entry age normal method to the projected unit credit method leads to lower costs early in a worker's career and higher costs later on. The difference in the two profiles is reflected in Figure 5.

In order to determine pension expense consistently with the funding requirements, many plan sponsors changed the method of funding their retirement plans. In 1983, 10 percent of defined benefit plans in which the benefits were related to final pay were funded on a projected unit credit basis. By the mid-1990s, nearly two-thirds of them were being funded that way.[5] The baby boomers were in their 20s and 30s when the FASB rules were discussed and ultimately adopted. Shifting from an entry age normal funding method to a projected unit credit funding method when such a large cohort of workers was so young slowed the funding of their retirement benefits. The net effect of this shift was to delay the funding of a portion of the baby boomers' retirement benefits from the first half of their careers to the last half.

At the same time FASB was studying how to account for pensions, public policymakers began adopting a number of changes in ERISA that further altered the funding patterns of defined benefit plans. One of the most important of these was the adoption of the Omnibus Budget Reconciliation Act of 1987 (OBRA87). Until OBRA87, employers could deduct contributions to

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[5] Watson Wyatt Worldwide, *Survey of Actuarial Assumptions and Funding* (Bethesda, MD: Watson Wyatt Worldwide, various years).

their pension plans up to the level of "actuarially accrued liabilities" in the plan. In Figure 4, this level of funding is shown for a hypothetical worker under a hypothetical pension plan by the upper line. OBRA87 lowered the maximum funding for plans that allowed further deductible contributions to 150 percent of current liability. For workers at younger ages, 150 percent of the current liability is often significantly less than 100 percent of the actuarially accrued liability.

The differences in these two concepts of actuarial liability are important. The actuarial accrued liability takes into account future pay increases. Since most plans base benefits on salary during the working career and many base them on salary toward the end of the working career, taking pay increases into account is important in estimating ultimate benefits for workers covered under a plan until retirement. The current liability measure does not allow the consideration of future pay increases— it is simply a measure of the obligation an employer would face in paying off a pension for a worker as of the pension valuation date. It is a measure of the contractual obligation of the plan to date, but does not allow anticipation of future developments.

While the difference in the pension funding limits before and after OBRA87 may seem subtle, its effects are important. First, it further slowed the funding of pensions, which had already been slowed by employers' shift from entry-age normal funding to projected unit credit funding. Under the new rules, many employers that had been contributing to their plans under alternative funding methods suddenly found that their plans now held excess funding. This

basically meant that further contributions had to wait until accruing liabilities caught up with the

assets put into the plan under the earlier rules. Many of these employers thus enjoyed

contribution holidays, where their plans required no funding at all for some years. Second, it

changed the funding perspective from an obligation to an ongoing plan to an obligation if the

plan were to terminate. The changes in the regulatory environment controlling the funding of

defined benefit plans, especially the funding limits imposed under OBRA87, clearly slowed the

funding of younger workers' pension benefits during the early part of their careers. When the 1987

act was signed into law, the baby boom generation ranged in age from 23 to 41. Using Watson

Wyatt's 1988 *Survey of Actuarial Assumptions and Funding* of pension plans, Schieber and

Graig estimated that 47 percent of large plans in the United States would be affected by the

funding limits of the 1987 law.[6]

Adequacy of Pension Funding Rates with an Aging Workforce

A variety of issues have arisen out of the change in the pattern of funding of defined

benefit plans sponsored by private U.S. employers that are summarized elsewhere.[7] One of the

issues that policy analysts have become increasingly aware of is the implication of the baby

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[6] Sylvester J. Schieber and Laurene A. Graig, *U.S. Retirement Policy: The Sleeping Giant Awakens* (Washington, D.C.: Watson Wyatt Worldwide, 1994), p. 29.

[7] See for example, Sylvester J. Schieber and John B. Shoven, eds., *Public Policy toward Pensions* (Cambridge: MIT Press, 1997) or Sylvester J. Schieber, "The Employee Retirement Income Security Act: Motivations, Provisions, and Implications for Retirement Security," in William Gale, John Shoven, and Mark Warshawsky eds. *The Evolving Pension System: Trends, Effects and Proposals for Reform* (Washington, DC: The Brookings Institution, 2001, forthcoming).

boom generation's retirement claim on the funded segment of the U.S. retirement system.

Schieber and Shoven have developed projections of employer-sponsored retirement plans in the

United States that parallel the projections of Social Security presented earlier.[8] They used the

U.S. Social Security Administration's 75-year projections of the U.S. population and workforce

so their analysis would be consistent with the projections on the national retirement program. In

developing their projections of private pensions, the authors initially assumed that plan sponsors

would continue to contribute to them on the basis of contribution rates in the early 1990s. For

defined contribution plans, they assumed that accumulated benefits would be paid out in the form

of annuities. In their baseline projections, they assumed that defined benefit annuities would be

paid in accordance with the benefit formulas in existence in the early 1990s when they developed

their analysis. From a pension funding perspective, the latter projection is the more interesting of

the two and the results of the baseline analysis are presented in Figure 7. In fact, their projection

of the private employer-sponsored defined benefit system looked remarkably like the projections

of the national Social Security program.

Under Schieber and Shoven's baseline assumptions, the outlook for the defined

contribution plans turned out to be relatively positive. They projected that defined contribution

plan assets would continue to growing relative to economy-wide aggregates over the next thirty

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[8] Sylvester J. Schieber and John B. Shoven, "Population Aging and Saving for Retirement," in Ralph
Landau, Timothy Taylor, and Gavin Wright, eds., *The Mosaic of Economic Growth* (Stanford: Stanford University
Press, 1996), pp. 150-172.

years or so and then stabilize. The defined contribution system by its nature is not susceptible to

"running out of assets." In the case of defined contribution plans, the benefit that is ultimately

delivered is simply the accumulated sum of contributions plus accumulated return on assets over

the period there are assets in the plan. From a funding perspective, the projections on the defined

contribution system were not particularly interesting.

Schieber and Shoven's projections of the combined private defined benefit and defined

contribution system captured much greater public attention than their separate projections of the

separate components of the employer-based pension system. In this case, they stated their results

in net flow terms as a percentage of workers' pay. Their results are summarized in Figure 8. The

reason that this result captured significant attention was because pension saving in the United

States has represented more than 100 percent of personal saving by some measures over most of

the past 10 to 20 years.[9] The prospect that pension savings rates might turn negative was cause

for alarm for reasons completely separate from those about the retirement income security of

workers who were participating in the retirement plans underlying the projections.

This baseline projection was less a cause for alarm than many people took it to be

because it described a scenario that would violate the funding requirements in ERISA. Under the

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[9] For example, see John B. Shoven, *Return on Investment: Pensions Are How America Saves* Washington, DC: Association of Private Pension and Welfare Plans, September 1995 and James M. Poterba, Steven F. Venti, and David A. Wise, "The Transition to Personal Accounts and Increasing Retirement Wealth: Macro and Micro Evidence," a paper presented at a National Bureau of Economic Research Conference, Phoenix, Arizona, May 18, 2001.

funding rules covering pension plans, employers simply cannot accrue massive pension

obligations without funding them. Ignoring the legal requirements that require funding, the

discipline of the financial markets would preclude the scenario drawn in Figure 7 from occurring.

 Beyond restrictive limits, defined benefit obligations that accrue in excess of funding have to be

addressed in one of two ways. Either the plan sponsor has to accelerate the funding of the plan or

has to curtail further accrual of benefits.

The implication of increasing pension contributions on the funding of obligations is

relatively straightforward. The thought that curtailing further accrual of benefits might reduce

pension obligations relative to current funding levels, on the other hand, might seem illogical.

Most employer-sponsored defined benefit plans in the United States base pension benefits on

salary levels toward the end of a worker's career. If the plan is frozen or terminated well before a

worker reaches retirement age, benefits are not indexed for further increases in pay beyond the

curtailment in the plan. Referring back to Figure 6 helps to clarify the point.

The vertical line for a worker at age 50 crosses the three sloped lines in the figure. Point

C represents the benefit earned by the worker under a plan that would base the benefit on his or

her average salary in the three or five years just before retirement. If the plan continues its

operation, this is the benefit that will ultimately be paid. Point B represents the maximum level

of tax deductible funding allowed for this worker at this age under the funding limits. If the plan

is terminated or frozen while the worker is age 50, however, the legal obligation the plan sponsor

has to the plan participant is a benefit with the value A in the figure. The reason A is less than C

under the law is that once the plan is frozen, benefits will be based on the average salary prior to

age 50 rather than that paid in the immediate years before retirement. Freezing a plan can

significantly reduce obligations for plan sponsors relative to those in an ongoing plan.

In order to explore the implications of increasing pension contributions to resolve the

long-term funding imbalance in the private pension system in the United States, Schieber and

Shoven simulated a scenario where employers would begin to increase their contributions to their

plans to a level that would sustain the systems.[10] Under this scenario, they gradually increased

contribution rates to the plans such that the asset levels in them would stabilize over the

projection period. In the years leading up to the projections, private employer contributions to

defined benefit plans had averaged about 2.8 percent of private sector payroll (n.b., this is all private

sector pay, not just pay in covered employment). The projection was based on a scenario that

assumed contribution rates would increase steadily over a decade until the contribution rate equaled

4.5 percent of payroll. Under these assumptions, the assets in defined benefit plans would remain at

a relatively constant level in comparison to payroll over the 75-year projection period. The pattern

of real saving in this scenario is shown in Figure 9. Under this scenario the pattern of real pension

saving to payroll would increase over the period in which employer contributions to defined benefit

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[10] Sylvester J. Schieber and John B. Shoven, "The Aging of the Baby Boom Generation: The Impact on Private Pensions, National Saving and Financial Markets," a paper presented at a conference *Tax Policy fort the 21st Century* sponsored by American Council on Capital Formation, Washington, DC, December 5, 1996.

plans was increasing but would decline over the remainder of the period, although the net real

saving is positive in every year.

According to this set of projections, private pensions would contribute to net savings

throughout the period, but would decline as the baby boomers claimed their retirement benefits.

The private sector defined benefit pension system would have assets to pay benefits until the

baby boom generation has completely passed on. In 2065, assets relative to payroll would be

down about 4 percent from the current ratio and would be declining ever so slightly. In other

words, this funding scenario would get private sector defined benefit plans through the baby

boomers' retirement period and would be roughly sufficient to last indefinitely beyond that. Over

almost all of the projection period, however, employer contributions under this scenario would be

60 percent higher than they are today. The alternative is reduced benefits.[11]

The implications of benefit reductions as opposed to increasing contributions to cover

defined benefit obligations would alter somewhat the pattern reflected in Figure 9. In the short-

term period after the reduction in benefits, savings rates would not go up as much, if at all, as in

the projection reflected in the figure. But in the longer term, the drop off in saving would not

likely to be as pronounced as reflected. This conclusion depends on the extent to which workers

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[11] There is some evidence that some employers have begun to curtail the obligations in their defined benefit
plans by either terminating them and covering workers under replacement defined contribution plans or by
converting them to a hybrid form of plan that curtails benefit accruals for older workers. These hybrid plans are of
two types, cash balance or pension equity plans. Both define the benefit in terms of an accumulated balance rather
than in terms of an annuity that will be payable at retirement. For a full discussion of this phenomenon, see Robert
L. Clark and Sylvester J. Schieber, "An Empirical Analysis of the Transition to Hybrid Pension Plans in the United

substitute defined contribution saving for any reduction in projected saving that would

accompany cutbacks in defined benefit plan generosity. It would also depend on the rate of

distribution from any added defined contribution savings compared to the distribution rates from

defined benefit plans. Given that most defined contribution accumulations in the United States

are distributed as lump sums while most defined benefit distributions are still paid as annuities,

one would not expect the same rates of spend down under the two types of plans.

Implications of Population Aging on Private U.S. Pension Funds

Private pensions have been an increasingly important savings vehicle in the United States

over the past half-century. Figure 10 shows the growth in average private pension wealth in

constant dollars from 1952 through 2000. The values are reported relative to average private

pension wealth in 1952. At the end of the twentieth century, average per capita pension wealth

were 50 times larger than they had been in 1952. By comparison, net per capital wealth in 2000

in the United States was about three times the level in 1952. The landmark dates in

understanding the patterns in Figure 8 are 1974 and the passage of ERISA, 1981-1982 and the

beginning of 401(k) defined contribution programs, and the stock market decline in 2000.

If pension savings patterns follow the path suggested in Figure 9, it is likely that the

future growth in pension wealth will flatten somewhat relative to the period since the passage of

ERISA. The basic assumption underlying the pattern in Figure 9 is that pension savings rates in

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States," in William G. Gale, john B. Shoven, and Mark J. Warshawsky, eds., *Public Policies and Private Pensions*

the United States will rise and there is some evidence that instead employers may simply shift more toward defined contribution pension arrangements or modify their defined benefit plans to function like defined contribution plans. The implications of this on pension savings rates are not as straightforward as one might think for at least two reasons.

The first has to do with the relative contribution rates to private defined benefit and defined contribution plans in the United States. In the private sector, almost all contributions to defined benefit plans are made by the employer. By contrast, most defined contribution plans today require employee contributions. Employers frequently contribute to these plans but it is generally on the basis of matching employee contributions. Many people assume that contribution rates will be higher where the employees are not required to put money into the plans. On average, the opposite actually appears to be the case. Samwick and Skinner simulated a broad array of hypothetical workers through representative sets of defined benefit and defined contribution plans to evaluate the relative benefit accruals in the two types of plans. Using actual contribution rates and investment allocations from a representative sample of 401(k) plans, they concluded that defined contribution benefits will be "substantially higher than corresponding [defined benefit] benefits." They estimated that defined contribution plans "provide higher levels of benefits in all but the bottom quintile of the distribution of pension income."[12] The defined

(Washington, DC: The Brookings Institution, forthcoming, 2001).

[12] Andrew A. Samwick and Jonathan Skinner, "How Will Defined Contribution Pension Plans Affect Retirement Income?" (Cambridge, Massachusetts: National Bureau of Economic Research, July 1998), working paper no. 6645, p. 3.

benefit system cannot possibly provide higher average benefits across time unless it is generating

larger contributions. Poterba, Venti, and Wise estimate that contributions in 401(k) plans are

substantially larger than in defined benefit plans. This is even the case where workers are

covered by both types of plans.[13]

The second reason that the cutback in defined benefit plan generosity might not reduce

pension savings rates is because the cutbacks are likely to result in workers extending their

careers. Clark and Schieber have documented that a significant element of the shift to hybrid

pension plans by private employers is the elimination of early retirement incentives in traditional

defined benefit plans.[14] If workers stay in the workforce longer, it will extend their productivity,

prolong the working period when they are contributing to their pensions, and delay the drawing

down of their pension assets. All of these will have positive effects on the economy.

Extending the U.S. Experience Elsewhere in the World

The outlook for the U.S. funded pension system suggests these plans might become less

of a source of savings in the future than they have been in the past. But the projections presented

here suggest they will continue to make a positive contribution to savings even during the baby

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[13] James M. Poterba, Steven F. Venti, and David A. Wise, "The Transition to Personal Accounts and Increasing Retirement Wealth: Macro and Micro Evidence," a paper presented at a NBER conference May 18, 2001, Phoenix, Arizona, p. 64.

[14] Robert L. Clark and Sylvester J. Schieber, "An Empirical Analysis of the Transition to Hybrid Pension Plans in the United States," in William G. Gale, John B. Shoven, and Mark J. Warshawsky, eds., *Public Policies and Private Pensions* (Washington, DC: The Brookings Institution, forthcoming, 2001).

boom generation's retirement. The primary reason for that is that the United States has a relatively favorable demographic outlook compared to most other developed countries. Fertility rates continue to be just below population reproduction levels and the country continues to enjoy relatively high rates of immigration. Population and labor force projections through the next couple of decades suggest both will continue to grow modestly for the foreseeable future. Many other countries are not in such a relatively positive situation. For example, Table 1 shows the expected ratio of people over age 65 as a ratio of those between the ages of 20 and 64 in the G-7 economies for 2010, 2030, and 2050. The U.S. aged dependency ratio is currently among the lowest among highly developed countries and is expected to stay so for the next half century. The situation depicted in Table 1 may be considerably worse for some countries than official forecasts suggest. This might be particularly true of France, Germany, Italy, and Japan as it appears their official demographic forecasts might be overestimating their future fertility rates and underestimating future improvements in life expectancy.[15]

Looking at funded pension plans in the United States individually, many of them already have declining asset balances. The mere fact that a plan or a system is funded does not preclude the possibility of claims on the system turning net cash flows negative. Any society that is considering moving to a funded system should understand that situation. The funding of

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[15] Sylvester J. Schieber and Paul S. Hewitt, "Demographic Risk in Industrial Societies," *World Economics* (October-December 2000), vol. 1, no. 4, pp. 27-72.

retirement plans offers many benefits. This includes the ability to make claims on the capital

base of a national economy that a payroll financed pay-as-you-go system does not. It includes

changing the nature of the claim of the retirement system from a tax based claim on other

people's productivity to a property right claim for returns on the economic use of one's assets in

the production processes. It includes the ability to make claims on economic productivity outside

one's own borders, by claiming returns on foreign investments.

The earlier discussion suggested there were two crucial ratios that determined the cost of

pay-as-you-go retirement plans. A funded system that depends largely on investment in the

domestic economy still is facing the same dependency problem as a pay-as-you-go system in a

maturing society. Such a funded system does not face as severe a claim on workers' wages with

growing dependency as a payroll tax financed system but the claim on the economy will be

equivalent. If demographics portend a workforce shrinking more rapidly than worker

productivity is increasing, the net result has to be a declining standard of living over time in the

economy. Being able to invest outside of one's home economy will ameliorate this problem but

it creates another set of problems. In order for the developed countries to be able to undertake a

massive funding of retirement obligations and investment in developing economies depends on

those economies being politically and economically stable places to invest. It requires that the

developing economies be willing to allow the foreign owners of capital to regularly repatriate the

returns on their retirement savings. In order for this strategy to be successful, it will require a

new-world order with more integration of economies across both political and economic

boundaries than we have seen thus far.

Figure 1: Total Fertility Rate in the United States for White Women from 1800 to 1996 and for All Women from 1917 to 1996
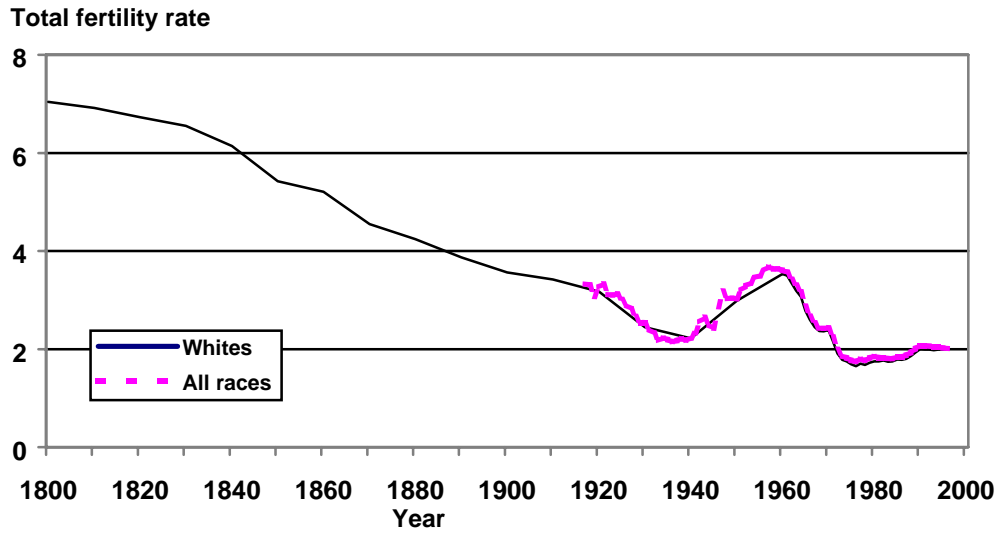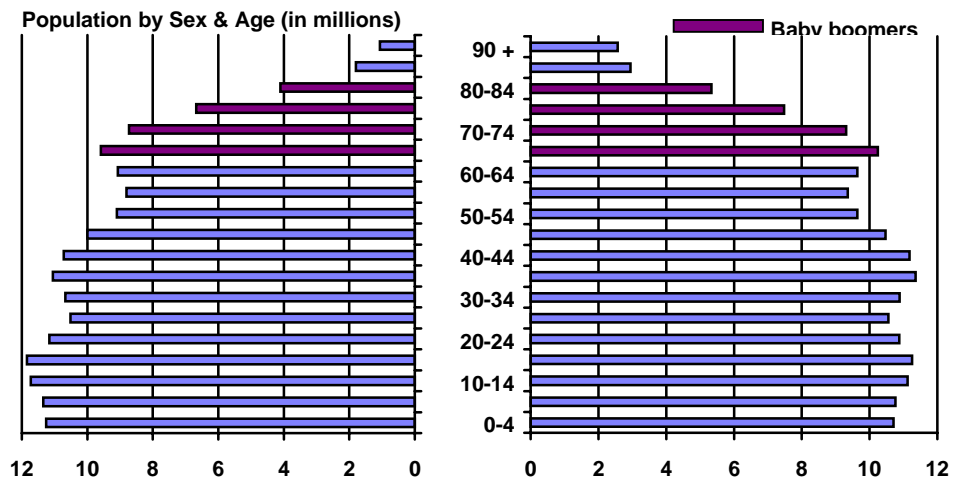
Total fertility rate

29

Figure 2: Population Age Structure of the United States in 2000

Population by Sex & Age (in millions) — Baby boomers
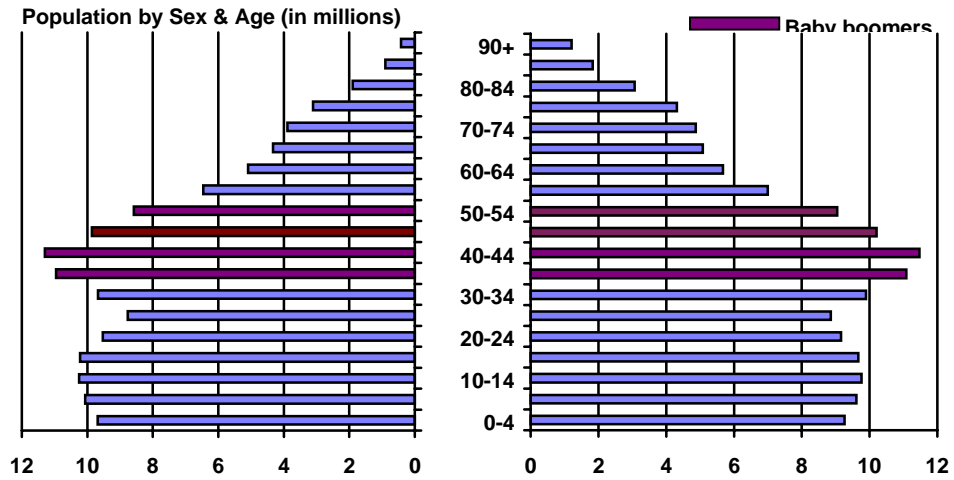
Source: U.S. Bureau of the Census, *Estimates of the Population of the United States*, found at http://www.census.gov/population/estimates/nation/intfile2-1.txt.

Figure 3: The Population Age Structure of the United States in 2030

Population by Sex & Age (in millions) — Baby boomers

Source : U.S. Bureau of the Census, *Population Projections of the United States, by Age, Sex, Race, and Hispanic Origin: 1992 to 2050*, Current Population Reports, Series P25, no. 1092, middle series projection.

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Figure 4: Historical and Projected OASDI Trust Fund Balances in Current Dollars

Billions of dollars
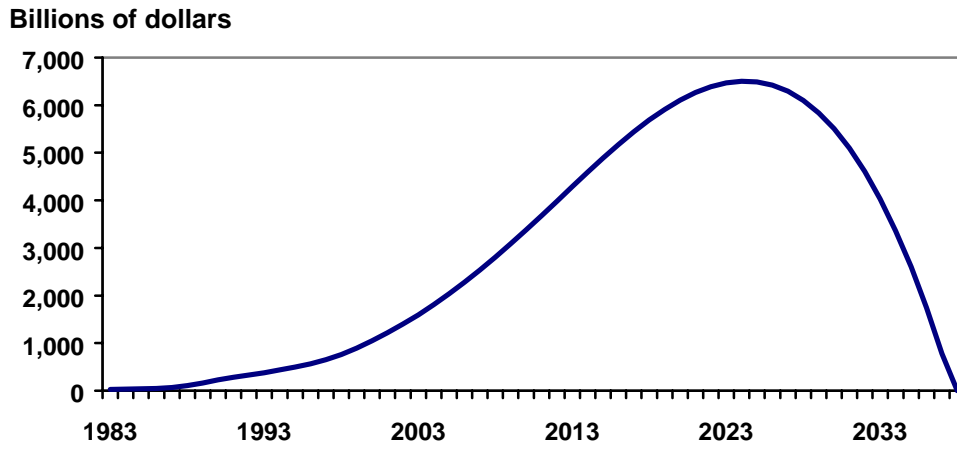
Source: Office of the Actuary, Social Security Administration.

Figure 5: Alternative Pension Cost Perspectives for a 25-Year Old Worker over a 40-year Career under Alternative Actuarial Cost Methods
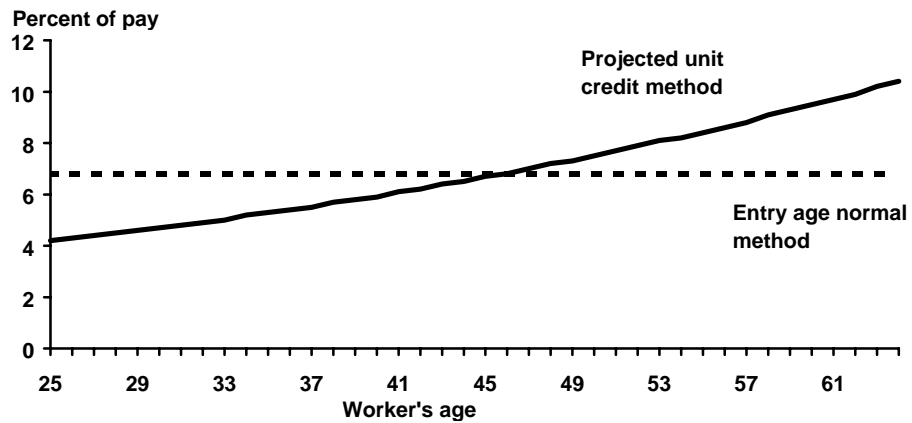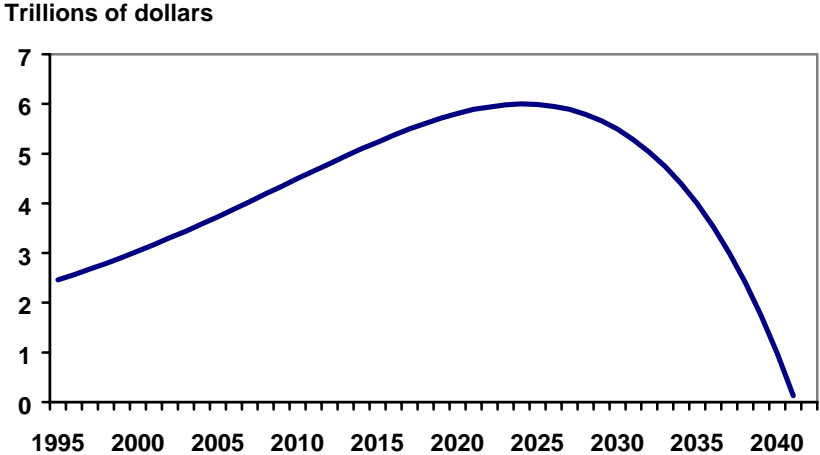

Source: Watson Wyatt Worldwide.

Figure 6: Alternative Pension Funding Perspectives for a 25-Year-Old Worker over a 40-year Career under Alternative Actuarial Cost Methods[16]

Multiple of salary
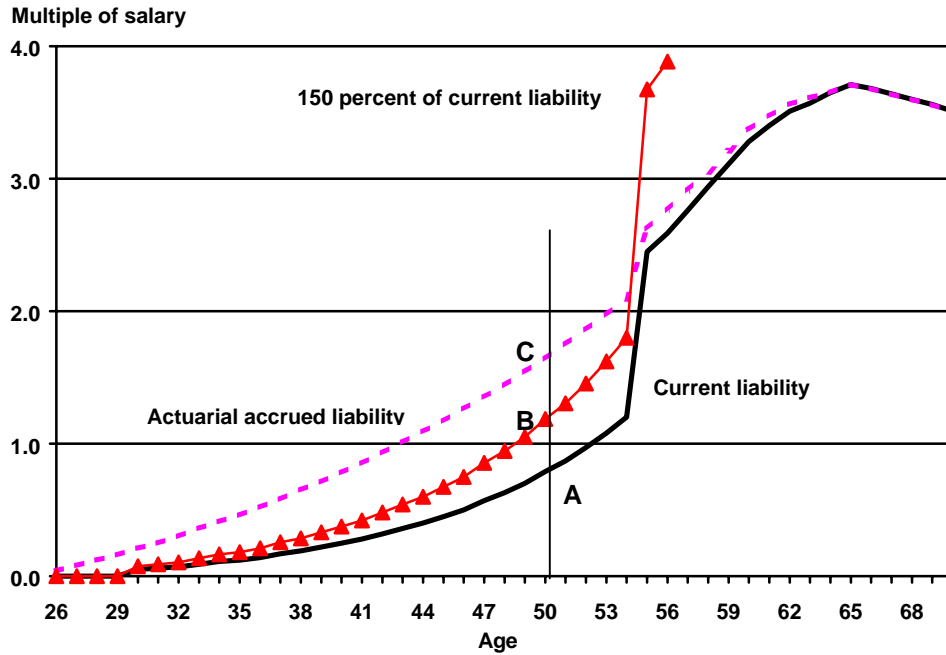
Source: Watson Wyatt Worldwide.

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[16] The patterns of benefit accrual in Figure 4 suggest that something major occurs in this plan as a worker reaches age 55. This plan—like many defined benefit plans sponsored by U.S. employers today—allows workers with long tenure to retire at age 55 with a subsidized early retirement benefit. As soon as the worker is eligible to retire, the current liability (ABO) and the actuarial accrued liability (PBO) become almost exactly equal. One reason they are not precisely equal is that we assume the worker would continue to receive pay increases if she worked longer and so the PBO is still slightly more than the ABO until the worker reaches the normal retirement age (NRA) of 65. In addition, any actuarial reductions before the NRA disappear at that age.

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Figure 7: Projected Asset Balances in Private U.S. Defined Benefit Plans Assuming Contributions at Current Rates and Benefits Paid under Current Formulas

**Trillions of dollars**

Source: Projections by Watson Wyatt Worldwide underlie the analysis presented in Sylvester J. Schieber and John B. Shoven, "The Consequences of Population Aging on Private Pension Fund Saving and Asset Markets," (Cambridge, Massachusetts: National Bureau of Economic Research, March 1994), NBER Working Paper No. 4665.

Figure 8: Potential Real Saving of Private Pensions Relative to Total Private Payroll Assuming Baseline Plan Characteristics and Contribution Rates
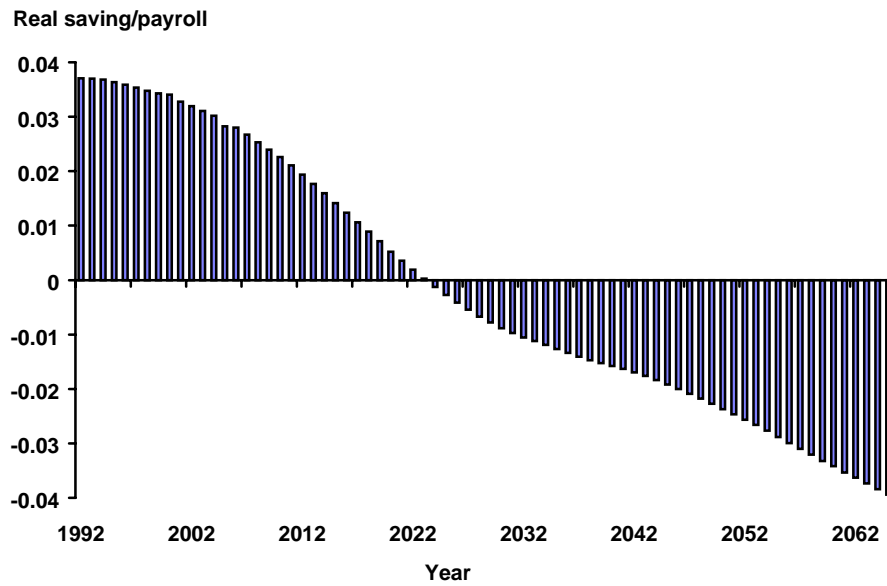

Source: Sylvester J. Schieber and John B. Shoven, "The Consequences of Population Aging on Private Pension Fund Saving and Asset Markets," (Cambridge, Massachusetts: National Bureau of Economic Research, March 1994), NBER Working Paper No. 4665, p. 23.

Figure 9: Potential Real Saving of Private Pensions Relative to Total Private Payroll for the Years 1995 to 2065 Assuming Current Plan Characteristics Persist and Contribution Rates Rise

Real saving/payroll
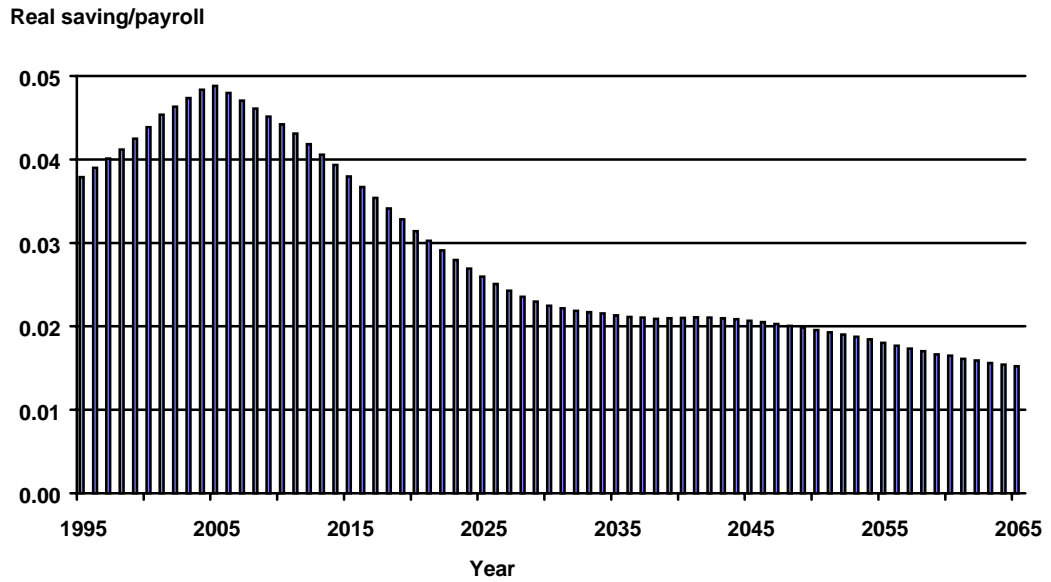
Source: Watson Wyatt Worldwide.

Figure 10: Average Per Capital Private Pension Wealth in the United States From 1952 through 2000 in 1996 Dollars Stated Relative to Holding in 1952

Average per capita pension wealh compared to 1952
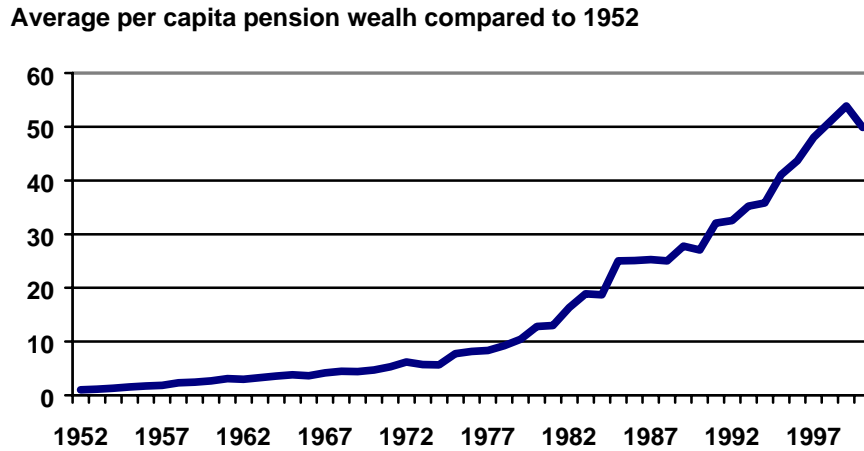
Table 1: Official Forecasts of the Old-Aged Population
Relative to Populations 20 to 64 Years of Age for Selected Years

	2010	2030	2050
Canada (to 2040 only)	0.204	0.348	0.365
France	0.281	0.440	0.512
Germany	0.317	0.447	0.509
Italy	0.334	0.465	0.608
Japan	0.345	0.472	0.592
United Kingdom	0.273	0.415	0.471
United States	0.214	0.353	0.371

Source: Sylvester J. Schieber and Paul S. Hewitt, "Demographic Risk in Industrial Societies," *World Economics* (October-December 2000), vol. 1, no. 4, p. 59.