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5 The Consequences of Population Aging for Private Pension Fund Saving and Asset Markets

Sylvester J. Schieber and John B. Shoven

5.1 Background

In the United States the group of people born between 1946 and 1964 have come to be known as the "baby boom generation." After the end of World War II, birthrates in the United States jumped to a level significantly above long-term trends and stayed above generally expected levels until the mid-1960s. Because of the high birthrates over this period, the number of people born from 1946 to 1964 constitute an unusually large segment of the total U.S. population. Because of its size, the baby boom generation has had a more significant effect on various facets of the social structure during its lifetime than other birth cohorts represented in the population.

For example, as the baby boomers entered the education system they placed new demands on it. Between 1951 and 1954, the number of five- and six-year old children in the primary education system jumped by 70 percent. From 1950 to 1970, when the last of the baby boomers were in school, primary school enrollments jumped from 21 to 34 million students (U.S. Bureau of the Census 1975, 368). Then, as smaller cohorts of children reached school age, school enrollments began to fall off, dropping to 28 million students by 1975, and then stabilizing at around 28 million by 1980 (U.S. Bureau of the Census 1991, 132). As they came into the primary school system, the baby boomers created a fantastic demand for expanded educational services. As they exited the system,

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staffing positions were eliminated and schools were closed as student bodies were consolidated.

Counting kindergarten, the typical primary and secondary education program in the United States takes 13 years. For the baby boomers who did not go beyond secondary education, the leading edge of the group began to enter the workforce in significant numbers by 1964. The Vietnam conflict slowed the entrance of the oldest baby boom males, as many of them had a period of military service prior to entering the civilian workforce permanently. Of course, many of the baby boomers also pursued a college education. Thus, the baby boomers began to enter the workforce in earnest toward the end of the 1960s and throughout the 1970s. Between 1970 and 1986, the U.S. labor force grew at a compound rate of 2.60 percent per year. By 1985, the youngest of the baby boomers were 21 years of age, and most of those who were going to enter the workforce had done so. In the latter half of the 1980s, the U.S. workforce grew at an annual rate of 0.45 percent per year (U.S. Bureau of the Census 1975, 127; 1991, 384).

Given the predictability of the aging process and the evolving patterns of retirement behavior among workers, it is possible to begin to anticipate the retirement of the baby boom generation. Given its earlier disruptive effects on other aspects of the socioeconomic fabric, it is important to consider the implications of the baby boomers' retirements on existing social and economic institutions as far in advance of their retirements as possible. The two largest sources of cash income for retirees today are Social Security and employer-sponsored tax-qualified retirement plans. The extent to which policymakers have focused on the long-term status of the Social Security system and the employer-sponsored pension system varies significantly.

5.1.1 Social Security Funding and the Baby Boom Generation

For some time, policymakers have been aware that the baby boom generation will pose a particular set of challenges for the Social Security program. Traditionally, the Social Security program in the United States had been run largely on a pay-as-you-go basis. The 1983 Social Security Amendments, anticipating the special burden that baby boomers' retirements would place on workers in the future, included provisions for accumulating a substantial trust fund to prefund some of the benefits promised to the boomers. In other words, the baby boom generation was expected to prefund a larger share of its own benefits than prior generations had prefunded their own Social Security retirement income. The 1983 amendments also reduced the benefits promised to the baby boom generation by gradually raising the age at which full benefits would be paid, to age 67 after the turn of the century.

Shortly after the passage of the 1983 amendments, Social Security actuaries estimated that the Old-Age, Survivors, and Disability Insurance (OASDI) trust funds would grow from around $27.5 billion in 1983 to about $20.7 trillion in 2045 (see fig. 5.1). The trust funds were expected to have resources available

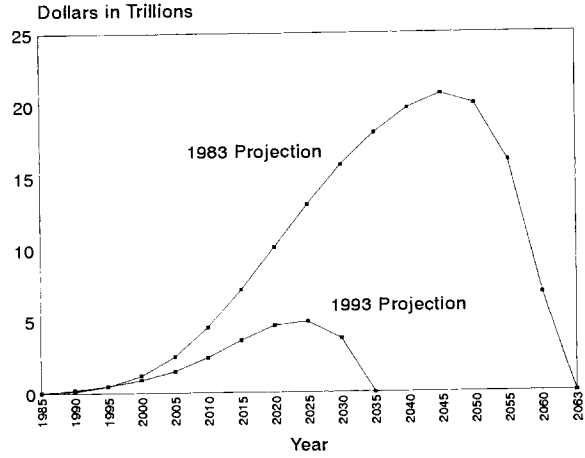

Fig. 5.1 Projected OASDI trust fund accumulations in current dollars
Sources: Ballantyne (1983) and Board of Trustees of the Federal OASDI Trust Funds (1993, 185).

to pay promised benefits until the youngest of the baby boomers reached 100 years of age. In the first projections after the passage of the 1983 amendments, OASDI trust funds were projected to be solvent until at least 2063.

In almost every year since 1983, the estimates of the accumulations in the OASDI trust funds have been revised downward. The most recent projection published in April 1993, also shown in fig. 5.1, suggests that the trust funds will accumulate to only about $5 trillion dollars around 2025 and will then decline to a zero balance in 2036. At that time the baby boomers will range in age from 72 to 90. Although their numbers will be declining there will still be significant numbers of them depending on their retirement benefits to meet their ongoing needs.

An alternative way to look at the financing of Social Security is to segment it into periods. Table 5.1 reflects the Social Security actuaries' April 1993 long-term OASDI financing projections broken into three 25-year periods. For the most part, the first 25-year period, from 1993 to 2017, will precede the bulk of the baby boom's claim on the program. The baby boomers first will be eligible for early retirement benefits in 2008, and only about half of them will have attained age 62 by 2017. In addition, if the increases in the actuarial reductions for early retirement benefits and the increases in actuarial adjustments for delayed retirement have any effect, the baby boomers will proceed into retirement somewhat more slowly than prior generations. Even on a purely pay-as-you-go basis, the tax revenues funding OASDI benefits are expected to exceed outgo as late as 2015. Over the next 25 years starting in 1993, OASDI has projected revenues that are about 7 percent above projected outlays.

As the baby boom moves fully into retirement, the projected financing situa-

Table 5.1 **Social Security Income and Cost Rates as Projected under Current Law**

Period	Income Rate	Cost Rate	Over or Under (−) Funding as a Percentage of Income Rate
1993–2017	12.72	11.87	6.76
2018–42	13.10	15.73	−20.08
2043–67	13.18	17.28	−31.11

Source: Board of Trustees of the Federal OASDI Trust Funds (1993, 26).

tion for Social Security turns decidedly negative. During the second 25-year period reflected in table 5.1, when the majority of the baby boomers expect to get the bulk of their lifetime benefits, the projected OASDI outlays exceed revenues by 20 percent. In other words, every bit of evidence available to national policymakers today indicates that Social Security will not be able provide the benefits currently being promised to the baby boom generation on the basis of inherent benefit promises now being held out to them and existing funding legislation. While it is impossible to anticipate exactly how OASDI projections might change over the next 5 or 10 years, assuming no change in legislative mandates, the recent history of continual deterioration in the projected actuarial balances of the program leads us to conclude that the future may turn out even worse than we now officially anticipate.

The recent history of major Social Security legislative adjustments, specifically including the 1977 and 1983 amendments, suggests that when benefit promises exceed program revenues, at least part of the rebalancing of the program comes in the form of reduced benefits for retirees. Given the size of the baby boom generation and the potential adjustment that may be required in their Social Security benefit expectations, it seems imperative that policymakers begin to address the funding of the baby boomers benefits as soon as possible so they will have the maximum amount of time to adjust their other retirement savings relative to more realistic Social Security promises.

5.1.2 Employer-Sponsored Retirement Plan Funding and the Baby Boom Generation

In the general context of retirement policy it is interesting that there is so much consternation about the long-term prospects of Social Security and the potential underfunding of benefits for the baby boom generation when there is hardly any concern about the long-term prospects of the funded pension system. A review of the effects of recent legislation and contributions to employer-sponsored retirement plans suggests there may be reason for concern on the pension front as well.

Employer-sponsored retirement programs typically operate in a significantly different environment than the federal Social Security program. While the fed-

eral government operates its own employer-sponsored retirement programs largely on a pay-as-you-go basis, most state and local governments prefund retirement obligations on some basis, and private employers are required to fund their retirement obligations on the basis of rules laid out in the Employee Retirement Income Security Act (ERISA) and the Internal Revenue Code (IRC).

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, rules for vesting or guaranteeing benefits, and requirements 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 assure 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 disclose relevant financial and participation data to the government on a periodic basis so that 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-benefit plans is that the employer gradually contribute enough to the plan so that 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.

It may seem odd to worry about the funding of employer-sponsored pension obligations, at least those of private plan sponsors, when the federal government has seemingly established strong funding and disclosure standards to assure that promised benefits will ultimately be delivered. The problem is that there is an inherent neurosis in federal law governing pensions between the provisions aimed at providing retirement income security, on the one hand, and

those limiting the value of the preferences accorded pensions in the federal tax code, on the other. From the passage of ERISA in 1974 until the early 1980s concerns about benefit security held the upper hand in driving federal policy toward pensions. Since 1982, policies aimed at limiting tax leakages related to employer-sponsored retirement plans have played the dominant role. While a number of tax law changes have had an effect on defined-contribution plans since 1982, the effects on defined-benefit plans have been considerably more profound. This was especially true of the Omnibus Budget Reconciliation Act of 1987 (OBRA87).

Defined-benefit plans have a special appeal for workers because they ensure a promised level of benefits regardless of the gyrations in financial markets. Over the years, defined-benefit plans have had a special appeal for employers because they have provided the flexibility to fund promised benefits actuarially over the working lives of their employees. Traditionally, actuarial funding allowed employers to advance fund for benefits that increase steeply at the end of workers' careers. Through 1987 employers were allowed to fund up to 100 percent of the projected benefits that would be paid to a worker at retirement based on his or her current tenure, age, and actuarial probabilities of qualifying for a benefit in the future. OBRA87 dropped the full funding limits for defined-benefit plans from 100 percent of ongoing plan liability to 150 percent of benefits accrued to date.

The net effect of the new funding limits under OBRA87 was to delay the funding of an individual's pension benefit relative to prior law. Table 5.2 helps to show the implications of the revised funding standards. For purposes of developing this example, we assumed that a worker begins a job at a firm at age 25 earning $25,000 per year. We assumed that the worker's pay would increase at a rate of 5.5 percent per year throughout his or her career. This individual participates in a defined-benefit plan that pays 1.25 percent of final average salary per year of service at age 65. We assumed that accumulated assets in the plan would earn a return of 8 percent per year.

The column of the table labeled "Projected Unit Credit Contribution Rate" shows the contribution rate, as a percentage of the worker's salary, that would be required to fund this individual's benefit at retirement under the projected unit credit funding method. The other four contribution rates in the table show what the effect of imposing a funding limit of 150 percent of accrued benefits would have on workers affected at four different points in their careers. The column labeled "Age 25" was developed assuming that the worker is covered by the more restrictive funding limit throughout his or her career. The "Age 35," "Age 45," and "Age 55" columns were developed assuming that the new funding limit was not imposed until the individual had already participated in the plan for 10, 20, and 30 years, respectively.

For the worker who is covered by OBRA87 throughout his or her career, the full funding limits mean that the plan sponsor's contributions to the plan during the first half of the worker's career, until age 45, will be less than if the plan

Table 5.2 **Effects of OBRA87 Full Funding Limits on Contribution Rates for Workers at Ages when Implemented**

Age	Pay ($)	Projected Unit Credit Contribution Rate	Contribution Rates at Various Ages under Funding Limit of 150 Percent of Accrued Benefit			
			Age 25	Age 35	Age 45	Age 55
25	25,000	4.2	0.9	4.2	4.2	4.2
26	26,375	4.3	0.9	4.3	4.3	4.3
27	27,826	4.4	1.0	4.4	4.4	4.4
28	29,356	4.5	1.1	4.5	4.5	4.5
29	30,971	4.6	1.2	4.6	4.6	4.6
30	32,674	4.7	1.4	4.7	4.7	4.7
31	34,471	4.8	1.6	4.8	4.8	4.8
32	36,367	4.9	1.8	4.9	4.9	4.9
33	38,367	5.0	2.0	5.0	5.0	5.0
34	40,477	5.2	2.3	5.2	5.2	5.2
35	42,704	5.3	2.6	0.0	5.3	5.3
36	45,052	5.4	2.9	0.0	5.4	5.4
37	47,530	5.5	3.2	0.0	5.5	5.5
38	50,144	5.7	3.5	0.0	5.7	5.7
39	52,902	5.8	3.9	0.0	5.8	5.8
40	55,812	5.9	4.4	0.0	5.9	5.9
41	58,882	6.1	4.9	0.0	6.1	6.1
42	62,120	6.2	5.4	0.0	6.2	6.2
43	65,537	6.4	6.0	0.0	6.4	6.4
44	69,141	6.5	6.7	1.8	6.5	6.5
45	72,944	6.7	7.4	7.4	0.0	6.7
46	76,956	6.8	8.2	8.2	0.0	6.8
47	81,188	7.0	9.1	9.1	0.0	7.0
48	85,654	7.2	10.0	10.0	0.0	7.2
49	90.365	7.3	11.1	11.1	0.0	7.3
50	95,335	7.5	12.3	12.3	0.0	7.5
51	100,578	7.7	13.5	13.5	1.5	7.7
52	106,110	7.9	15.0	15.0	15.0	7.9
53	111,946	8.1	16.5	16.5	16.5	8.1
54	118,103	8.2	18.2	18.2	18.2	8.2
55	124,599	8.4	16.2	16.2	16.2	0.0
56	131,452	8.6	14.6	14.6	14.6	10.8
57	138,682	8.8	13.4	13.4	13.4	10.5
58	146,309	9.1	12.6	12.6	12.6	10.3
59	154,356	9.3	12.0	12.0	12.0	10.3
60	162,846	9.5	11.5	11.5	11.5	10.2
61	171,802	9.7	11.3	11.3	11.3	10.3
62	181,251	9.9	11.2	11.2	11.2	10.4
63	191,220	10.2	11.1	11.1	11.1	10.5
64	201,737	10.4	11.1	11.1	11.1	10.7

Source: Wyatt Company (1987).

were being funded on an ongoing basis. Of course, lower contributions in the early part of the worker's career mean that contributions in the latter half of the career would have to be higher to fund the promised benefits under the plan. In this particular example, the contribution rate to the plan during the worker's early to mid-fifties would have to be more than twice the contribution rate under the projected unit credit funding method.

For the worker not hit by the contribution limits until he or she is 10 years into the career, the imposition of the contribution limit implies that the employer would have a nine-year contribution holiday when no contributions would be made. In this case, the accrued benefit would have to catch up with the level of funding accomplished early in the career. Again, the contribution rate in the mid-fifties would be more than twice what it was under projected unit credit funding. For the worker not hit until age 45, the contribution holiday would be shorter, but the same general effect of delaying retirement funding would significantly increase late career contribution requirements given the level of promised benefits. Finally, for the worker not hit until age 55 by the new funding limit, the contribution holiday would only be one year, and while contributions during the remaining career would be higher than under projected unit credit funding, the implications are far less significant than in the previous cases.

In 1988, when OBRA87 funding limits took effect, the leading edge of the baby boom generation was 42 years of age. The trailing edge was 24 years of age. The gross effect of OBRA87 is that it has significantly delayed the funding of the baby boom generation's defined-benefit retirement promises. Given the significant numbers of workers falling within the baby boom cohorts of workers, OBRA87 has meant an overall slowdown in pension funding. As this legislation was being considered, The Wyatt Company analyzed its 1986 survey of actuarial assumptions and funding covering 849 plans with more than 1,000 participants to estimate the effects of the new funding limits. They found that 41 percent of the surveyed plans had an accrued benefit security level of 150 percent or greater. All of these plans would have been affected by the new limit and could not have received deductible contributions had the proposed limit been in effect for 1986. For a subset of 664 plans where they could estimate the marginal effects of the new limits, they found that 40 percent would be affected by the new proposal, compared with only 7 percent under prior limits (Wyatt Company 1987, 4).

In its 1987 survey of actuarial assumptions and funding, The Wyatt Company reported that 48 percent of the plans had an accrued benefit security ratio of 150 percent or more. Because plans at this funding level cannot make deductible plan contributions, the percentage of plans overfunded by this measure should decline over time. In its 1992 survey, Wyatt found that 37 percent of large defined-benefit plans still had accrued benefit security ratios of 150 percent or greater (Wyatt Company 1992, 4).

While OBRA87 significantly limited the funding of defined-benefit plans, it was only one piece of legislation out of several that affected the funding of tax-qualified retirement plans after 1982. In 1982, the Tax Equity and Fiscal Responsibility Act (TEFRA) reduced and froze for a period of time the dollar funding and contribution limits for both defined-benefit and defined-contribution plans. TEFRA also established new discrimination tests that had the practical effect of lowering contributions for many plans. The next year, the Deficit Reduction Act extended the freeze in the funding and contribution limits established by TEFRA. The Tax Reform Act of 1986 again reduced and froze funding and contribution limits for tax-qualified plans. Finally, the Omnibus Budget Reconciliation Act of 1993 (OBRA93) included provisions that reduce the level of individual employee's compensation that can be considered in funding and contributing to tax-qualified plans. The practical effects of the OBRA93 provisions will be to further limit the funding of employer-sponsored retirement programs.

Figure 5.2 shows annual employer contributions to private pension and profit-sharing plans dating back to the period just after the end of World War II. There was a gradual increase in contributions up through the early 1970s, and then an escalation in contribution levels as ERISA was passed and implemented. But right around the time that the federal government started passing the various restrictive tax measures affecting employer-sponsored retirement plans, contributions began to decline. By 1990, employer contributions to these plans were about 15 percent below contribution levels in the early 1980s. On an inflation-adjusted basis, contributions in 1990 were at about the same level they had been in 1970, four years before the passage of ERISA.

Most of the pension legislation passed in the past decade has evolved within the context of short-term fiscal considerations. The need to raise revenues to reduce the federal government's deficit has delayed the funding of the baby boom generation's pension benefits with virtually no consideration of the long-term impact on the cost or viability of those benefits. While the Social Security Act established a Board of Trustees to oversee the financial operations of the OASDI programs and requires that the board report to the Congress on the financial and actuarial status of the programs, there is no similar oversight body to identify pending problems with the funded pension system and to warn policymakers about them. Retirement plan sponsors are individually required to disclose the current funding status of their plans on a periodic basis, but the evolving policy focus pushing plan sponsors to fund for only current obligations hardly encourages planning for longer-term contingencies. In the aggregate, public policymakers have completely ignored the long-term implications of tax policy on pension funding in an attempt to minimize the short-term structural imbalances underlying federal fiscal policy. In the following sections of this paper we attempt to lay out a longer-term view of pension funding.

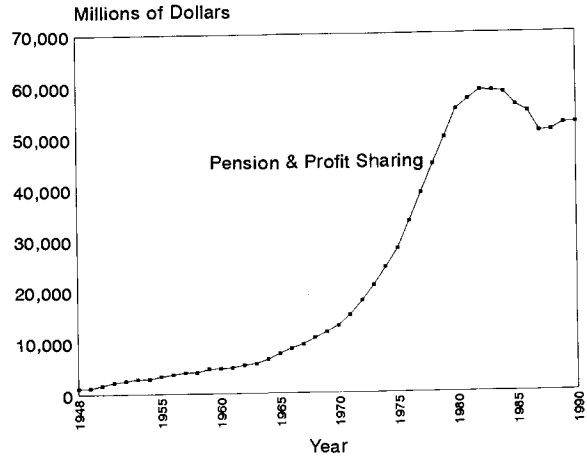

Fig. 5.2 Employer contributions to private pension and profit-sharing plans
Source: National Income and Product Accounts

5.2 Methodology of Current Study

This section gives a brief outline of the underlying methods, assumptions, and inputs that were used to develop the estimates that are presented in the next section of the paper. Projections of the U.S. pension system require a long-term projection of the population and workforce and their respective characteristics. For purposes of this exercise, we were not interested in developing a long-term demographic and labor force projection model. First of all, to develop such a model would have been a more herculean undertaking than we were prepared to commit to in the time frame we had. Second, we felt the nature of the projection we were making might lead to comparisons with the long-term Social Security projections and thought that it would make sense to have the same underlying demographic and workforce characteristics as utilized in developing those projections. Thus we began with the Social Security Administration's 75-year projections of the U.S. population, which gave us estimated numbers of people by single year who had attained ages between 0 and 99 for each of the projection years. We also started with their projections of the workforce in each year, distributed in five-year age cohorts.

We utilized published data and our own computations developed from the Department of Labor's Form 5500 pension reporting forms plus computations from the March 1992 Current Population Survey (CPS) and the 1991 Survey of Income and Program Participation (SIPP) to develop age- and sex-specific participation and vesting in and receipt of benefits from defined-benefit and defined-contribution plans. We developed age- and sex-specific distributions of tenure in current job, which is important for projecting the vesting rates of

participants in pension plans. We developed estimates of total wages for the private, state and local, and federal sectors of the economy from data published by the Bureau of Economic Analysis in the National Income and Product Accounts. Estimates of age- and sex-specific pay levels were developed.

We used the Labor Department's Form 5500 files in conjunction with data from the Employee Benefit Research Institute's *Quarterly Pension Investment Report* (QPIR) to estimate the starting total distribution of assets and contributions between defined-benefit and defined-contribution plans. We also used the QPIR data to estimate the distribution of financial assets held by plans across various forms of investments. The resulting distribution of assets by plan type is shown in table 5.3. We are focusing on the private-defined benefit and defined-contribution plans in this paper. We note with interest the relatively large amount of cash and other short-term investments held by these pension funds, despite the long-run nature of the funds themselves. Equities, which have a superb track record over long holding periods, amount to only 36 or 41 percent of the total portfolio. Given historic returns, the pension funds would be better off with a larger stake in stocks. Our assumed real rates of return for the different asset categories are also shown in table 5.3. The numbers are loosely based on the information in Ibbotson (1993), although we are admittedly conservative. Ibbotson reports that the geometric average real rate of return for the Standard and Poor's 500 stock portfolio over the years 1926–92 was 7.0 percent. The corresponding average real rate of return on long-term corporate bonds was 2.3 percent, while it was 0.5 percent for short-term Treasury bills. We do not have any corresponding data for guaranteed investment contracts, which are fixed-income contracts, typically issued by insurance companies, and featuring a somewhat shorter maturity than long bonds. As the

Table 5.3 **Asset Allocation of Pension Plans as of July 1992 (percent)**

Type of Plan	Equities	Bonds	Guaranteed Investment Contracts	Real Estate	Cash
Private defined benefit	36	33	0	15	16
Private defined contribution	41	14	13	6	26
Federal defined benefit	44	44	1	6	5
Federal defined contribution	30	70	0	0	0
State and local defined benefit	44	44	1	6	5
State and local defined contribution	33	49	5	8	5
Real rate of return	5	2	1.2	2	0
Blended real rate for private DB plans: 2.76					
Blended real rates for private DC plans: 2.646					

Source: For asset allocation, Employee Benefit Research Institute, *Quarterly Pension Investment Report;* for rates of return, authors' assumptions.

reader can see, we have consistently assumed rates of return somewhat below the long-run averages calculated by Ibbotson.

The Social Security population projection was distributed by age, sex, and workforce participation for each year of the projection. Our analysis distributed the workforce into three separate sectors, the private employment sector, the state employment sector, and the federal employment sector. The working population was further distributed by tenure and pension participation status. In each year of the projection, the population and workforce were rolled forward one year with appropriate mortality decrements and workforce adjustments to account for job leavers, entrants, and changers. We had an underlying assumption that there was 14 percent turnover of workers between jobs each year.

The projections were developed separately for private employer plans, state and local defined-benefit plans, and the federal employee thrift plan. In each case, separate projections were developed for defined-benefit and defined-contribution plans and then aggregated. For example, in the case of the projection for the private sector, we estimated that total employer contributions to private plans were 2.8 percent of payroll, approximately 30 percent of which has been going into defined-benefit plans in recent years. Employee contributions to private plans were estimated to be 1.75 percent of payroll, with slightly less than 2 percent of that going to defined-benefit plans. Based on estimates from the Form 5500 files of plans with 100 or more participants, we estimated that employer contributions to defined-contribution plans were 1.13 times employee contributions to those plans.

In the initial year, benefits were estimated from the Form 5500 files and the QPIR data. Going forward, benefits were estimated on the basis of workers being covered by a pension and passing into immediate retirement starting at age 54. At that age, we assumed 3.7 percent of existing workers would retire. By age 80, we assumed all remaining workers would retire. For workers who terminated their employment under a defined-benefit plan, if they were vested we assumed they would be paid a deferred benefit at age 65. The accrual rate of the benefit formula for people working up until retirement calculated out to be 1.25 percent of final salary per year of service on average. For people receiving a deferred benefit it was 1.00 percent of final salary per year of service. For people participating in a defined-contribution plan, we assumed that 40 percent of the workers who terminated prior to retirement would take a lump-sum benefit and use it for some purpose other than meeting their retirement needs. For defined-contribution plans generally, benefits commence at retirement and are paid out as an annuity over a maximum of 30 years.

Future contributions and trust fund accumulations are driven in large part by economic assumptions. Our assumptions on inflation, 4.0 percent per year, and wage growth, 5.1 percent per year, correspond with those used in the Alternative II Social Security projections.

5.3 Projections for the Private Pension System

The current dollar figures of our projections for the combined defined-benefit and defined-contribution private pension plans are shown in table 5.4. Under the assumptions of our forecast, the assets of the total private pension system are shown to continue to grow in nominal terms for the next 60 years. However, this growth is almost continuously slowing. For instance, in 1993 the benefits (payouts) of the defined-benefit and defined-contribution private plans combined are 82.3 percent of total contributions. This means, of course, that there is a net inflow of funds into the total system, even without taking into account the investment return on the $3 trillion asset pool. However, by the year 2006, benefits are projected to be 102.4 percent of contributions, and we expect that aggregate benefits will continue to outstrip contributions for the entire remaining period through 2065. By 2025 benefits are projected to be 163 percent of contributions.

If inflation and asset returns match our assumptions, the value of pension assets will continue to climb, albeit at slowing rates until peaking (in nominal terms) in 2052. In real or relative terms, however, pension assets are projected to peak and begin to fall much earlier. Our model indicates that the ratio of pension assets to total payroll (now at 1.245) will climb modestly until reaching a peak of 1.362 in 2013 and 2014. The ratio is projected to fall after that and drop below 1.0 for the first time in 2038. Real inflation-adjusted pension assets would peak in 2024 with our set of assumptions.

The important story coming from our analysis is that private pensions will gradually cease being the major engine of aggregate saving that they have been for the past 20 years or more. This projected occurrence is shown in figure 5.3. Here we show the total real saving of the private pension system (projected contributions less benefits plus real inflation-adjusted asset returns) relative to the projected total private payroll in the economy for 1992 to 2065. We use total private payroll as the scaling factor simply because it is a readily available by-product of the Social Security forecasting operation. What figure 5.3 shows is that under our assumptions the pension system continues to generate significant investable funds for the American economy for the next 20 years or so. In fact, the decline is very minor for about the next 10 years and then it steepens considerably. By 2024 the pension system is projected to cease being a net source of saving for the economy. In fact, the pension system will then become increasingly a net dissaver. By 2040 the net real dissaving is more than 1.5 percent of payroll, and by 2065 the negative saving is projected to reach almost 4.0 percent of payroll. This change of the pension system from a large net producer of saving to a large absorber of saving or loanable funds will likely have profound implications for interest rates, asset prices, and the growth rate of the economy.

It should be emphasized that the timing of the prediction of the change in

Table 5.4 **Combined Private Defined-Benefit and Defined-Contribution Projections**

Year	Assets	Benefits	Contributions	Investment Income	Net Inflow	Real Net Inflow	Total Payroll	Saving/Payroll
1992	2,869,606	86,292	105,355	181,452	200,515	85,731	2,313,253	0.03706
1993	3,070,121	92,537	112,479	194,062	214,004	91,199	2,465,286	0.03699
1994	3,284,126	99,252	120,008	207,267	228,023	96,658	2,625,930	0.03681
1995	3,512,149	107,211	127,891	221,313	241,993	101,507	2,794,001	0.03633
1996	3,754,143	115,610	136,183	236,196	256,769	106,603	2,970,726	0.03588
1997	4,010,912	124,926	144,899	252,071	272,044	111,608	3,156,614	0.03536
1998	4,282,957	134,903	154,006	268,813	287,916	116,598	3,351,017	0.03479
1999	4,570,973	144,808	163,563	286,404	305,159	122,320	3,565,269	0.03431
2000	4,876,032	154,379	173,631	304,210	323,462	128,421	3,770,616	0.03406
2001	5,199,494	169,280	184,215	324,054	338,989	131,009	3,997,943	0.03277
2002	5,538,484	182,849	195,147	344,368	356,666	135,127	4,233,018	0.03192
2003	5,895,150	197,579	206,582	366,077	375,080	139,274	4,479,204	0.03109
2004	6,270,231	213,535	218,612	388,881	393,958	143,149	4,738,435	0.03021
2005	6,664,189	231,002	231,308	412,906	413,212	146,644	5,013,158	0.02925
2006	7,077,402	250,492	244,540	437,620	431,668	148,572	5,300,866	0.02803
2007	7,509,070	272,198	258,213	463,764	449,779	149,416	5,598,777	0.02669
2008	7,958,850	295,578	272,447	491,042	467,911	149,557	5,909,334	0.02531
2009	8,426,761	320,357	287,389	519,242	486,274	149,204	6,235,716	0.02393
2010	8,913,036	346,804	303,087	548,865	505,148	148,627	6,580,062	0.02259
2011	9,418,184	375,792	319,368	579,169	522,745	146,018	6,937,680	0.02105
2012	9,940,929	407,643	336,274	610,570	539,201	141,564	7,309,161	0.01937
2013	10,480,130	441,887	353,901	643,137	555,151	135,946	7,695,870	0.01766
2014	11,035,281	477,858	372,472	676,251	570,865	129,454	8,103,981	0.01597
2015	11,606,146	516,572	391,934	709,685	585,047	120,801	8,532,145	0.01416
2016	12,191,193	557,943	412,230	744,651	598,938	111,290	8,977,996	0.01240
2017	12,790,132	601,942	433,550	780,449	612,057	100,452	9,446,231	0.01063

2018	13,402,189	648,802	455,956	817,384	624,538	88,450	9,938,106	0.00890
2019	14,026,726	698,513	479,462	854,776	635,725	74,656	10,453,567	0.00714
2020	14,662,451	751,265	504,115	891,036	643,886	57,388	10,993,210	0.00522
2021	15,306,337	806,645	529,997	930,136	653,488	41,235	11,558,981	0.00357
2022	15,959,825	864,634	557,153	969,236	661,755	23,362	12,151,004	0.00192
2023	16,621,581	925,853	585,757	1,008,436	668,340	3,477	12,774,036	0.00027
2024	17,289,921	989,525	615,875	1,047,991	674,341	−17,256	13,429,026	−0.00128
2025	17,964,262	1,055,792	647,722	1,087,816	679,746	−38,824	14,121,320	−0.00275
2026	18,644,009	1,125,128	681,415	1,127,603	683,890	−61,870	14,852,756	−0.00417
2027	19,327,899	1,197,367	717,166	1,167,947	687,746	−85,370	15,627,696	−0.00546
2028	20,015,646	1,271,896	755,176	1,206,796	690,076	−110,550	16,451,511	−0.00672
2029	20,705,722	1,349,723	795,427	1,247,233	692,937	−135,292	17,324,066	−0.00781
2030	21,398,659	1,430,323	837,850	1,286,751	694,278	−161,668	18,243,015	−0.00886
2031	22,092,937	1,512,302	882,678	1,326,998	697,374	−186,343	19,212,820	−0.00970
2032	22,790,312	1,597,600	930,321	1,365,657	698,378	−213,234	20,244,774	−0.01053
2033	23,488,690	1,685,872	980,469	1,405,971	700,568	−238,980	21,329,161	−0.01120
2034	24,189,257	1,778,429	1,033,426	1,444,936	699,933	−267,637	22,476,016	−0.01191
2035	24,889,191	1,875,903	1,089,114	1,482,187	695,398	−300,170	23,683,343	−0.01267
2036	25,584,589	1,977,573	1,147,554	1,519,897	689,878	−333,506	24,948,948	−0.01337
2037	26,274,467	2,082,637	1,209,295	1,554,827	681,485	−369,494	26,286,980	−0.01406
2038	26,955,952	2,192,273	1,274,318	1,588,186	670,231	−408,007	27,696,937	−0.01473
2039	27,626,183	2,306,337	1,342,526	1,624,502	660,691	−444,356	29,176,895	−0.01523
2040	28,286,875	2,426,835	1,413,861	1,659,771	646,797	−484,678	30,725,273	−0.01577
2041	28,933,672	2,552,646	1,488,587	1,693,501	629,442	−527,905	32,348,308	−0.01632
2042	29,563,114	2,686,159	1,566,938	1,724,462	605,241	−577,284	34,051,585	−0.01695

(continued)

Table 5.4 (continued)

Year	Assets	Benefits	Contributions	Investment Income	Net Inflow	Real Net Inflow	Total Payroll	Saving/Payroll
2043	30,168,355	2,828,664	1,648,874	1,754,856	575,066	−631,668	35,833,093	−0.01763
2044	30,743,421	2,979,900	1,734,528	1,782,782	537,410	−692,327	37,693,201	−0.01837
2045	31,280,831	3,139,932	1,823,985	1,806,726	490,779	−760,454	39,643,201	−0.01918
2046	31,771,610	3,308,622	1,917,650	1,827,904	436,932	−833,932	41,681,502	−0.02001
2047	32,208,542	3,487,113	2,015,964	1,844,202	373,053	−915,289	43,820,980	−0.02089
2048	32,581,595	3,675,560	2,119,188	1,856,193	299,821	−1,003,443	46,067,832	−0.02178
2049	32,881,416	3,875,283	2,227,452	1,863,022	215,191	−1,100,006	48,425,244	−0.02272
2050	33,096,607	4,087,847	2,340,741	1,865,432	118,326	−1,205,538	50,891,965	−0.02369
2051	33,214,933	4,312,374	2,459,466	1,862,594	9,686	−1,318,911	53,475,702	−0.02466
2052	33,224,620	4,548,513	2,584,327	1,853,173	−111,013	−1,439,998	56,192,914	−0.02563
2053	33,113,607	4,798,158	2,715,652	1,835,601	−246,905	−1,571,449	59,050,927	−0.02661
2054	32,866,701	5,062,265	2,853,699	1,807,621	−400,945	−1,715,613	62,055,455	−0.02765
2055	32,465,756	5,344,679	2,998,678	1,765,939	−580,062	−1,878,692	65,211,909	−0.02881
2056	31,885,693	5,641,642	3,150,628	1,716,488	−774,526	−2,049,954	68,512,928	−0.02992
2057	31,111,167	5,950,656	3,311,404	1,650,758	−988,494	−2,232,941	72,009,968	−0.03101
2058	30,122,673	6,274,655	3,480,657	1,570,040	−1,223,958	−2,428,865	75,689,196	−0.03209
2059	28,898,715	6,615,627	3,659,028	1,469,293	−1,487,306	−2,643,255	79,566,775	−0.03322
2060	27,411,408	6,972,036	3,846,599	1,363,427	−1,762,010	−2,858,466	83,640,683	−0.03418
2061	25,649,398	7,347,019	4,044,539	1,220,242	−2,082,238	−3,108,214	87,942,578	−0.03534
2062	23,567,160	7,741,093	4,252,689	1,074,337	−2,414,067	−3,356,753	92,463,750	−0.03630
2063	21,153,092	8,152,261	4,472,002	891,500	−2,788,759	−3,634,883	97,230,372	−0.03738
2064	18,364,332	8,584,350	4,702,640	689,624	−3,192,086	−3,926,659	102,242,424	−0.03841
2065	15,172,245	9,037,520	4,945,204	462,211	−3,630,105	−4,236,995	107,513,489	−0.03941

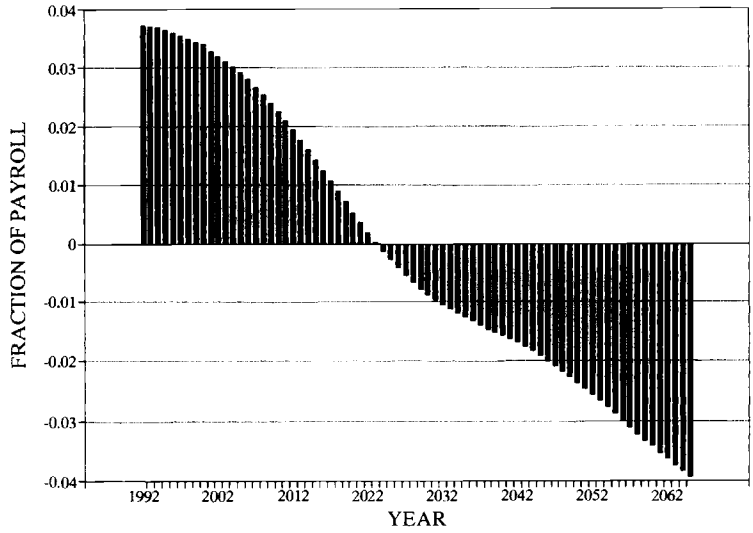

Fig. 5.3 Real saving of private pensions relative to total private payroll, 1992–2065

pensions from a net buyer of assets to a net seller is very sensitive to our assumptions about the rates of return earned on pension investments as well as to the assumed level of pension contributions. However, we feel that the pattern of figure 5.3 is almost inevitable; only the timing could be somewhat different than pictured. If investment returns exceed our fairly conservative assumptions, then the decline of the saving contribution of pensions will be delayed in time. Still, the demographic structure is such that the decline will by necessity occur. Higher investment returns would result in more saving in the early years and even more dissaving in the later years of our analysis. It is not even correct to think of the dissaving as a negative development. After all, pension assets are accumulated to provide the resources needed by the elderly in retirement. It is only natural that when we have an extraordinarily large number of retirees, the real assets of the private pension system will shrink and the system will at least temporarily cease to be a source of new investment funds for the economy.

One concern that all of this may raise is the impact on the prices of pension assets, mainly stocks and bonds. We share that concern to some degree but cannot predict the size or timing of any effect. One thing to note in this regard is that, while the pension system will become a less important purchaser of securities, it will not become a net seller for quite a while. As noted earlier, our model predicts that benefits will first exceed contributions in 2006. However, at that point the annual investment income (dividends, interest, and capital gains) on the $7 trillion dollar portfolio should approximate $450 billion in nominal terms and $170 billion in real terms. Needless to say, there would be no reason

to be net sellers of assets at that point in time, and in fact, we would suppose that pensions will still be accumulating assets then. The period of time when the pension system begins to be a net seller is more likely in the early part of the third decade of the next century under our conservative assumptions. This could depress asset prices, particularly since the demographic structure of the United States does not differ that greatly from those of Japan and Europe, which also will have large elderly populations at that time. Another comment about the asset price effect is that if it occurs, it would likely affect all long-term assets. What we think may happen is high real interest rates that could depress the prices of stocks, bonds, land, and real estate. While this might suggest that a good investment for this period would be short-term Treasury bills, the effect if it occurs is likely to be gradual and to last for decades. In the twentieth century the longest stretch of time over which Treasury bills outperformed equities was about 15 years. We have little else to go on, but we certainly are not advocating that long-term investors invest in short-term instruments to ride out this demographic tidal wave. In fact, it is our opinion that far too many people invest in short-term instruments for long-term accumulations.

With our assumptions, the private defined-benefit plans are the ones that experience net outflows (dissaving) the earliest. These plans are already in a situation where benefits exceed contributions. In fact, benefits are roughly three times contributions. The robust investment returns of the past decade or so have permitted this and in fact forced it to be true. If investment returns drop to our conservative figures and if firms contribute a total of 2.8 percent of payroll to pension plans, then the real assets of the defined-benefit plans begin to fall immediately. Defined-benefit pension assets (which are now 88 percent of the total payroll in the economy) would fall to 77 percent of total payroll by 2000, 66 percent by 2010, and 42.5 percent by 2025. The net flow of funds into the defined-benefit plans (or savings) would be positive, but only in nominal terms. Even nominal defined-benefit saving becomes negative by 2025, and the entire stock of defined-benefit plan assets would be exhausted by 2043.

It is important to note that this is not a forecast of doom for the defined-benefit plans; it is simply a "what if" exercise. If by magic our rate of return assumptions proved to be precisely accurate, then employers would be forced to increase their pension contributions above the 2.8 percent of aggregate payroll that we have assumed or to curtail the pension benefits they offer workers. While vested benefits of existing workers cannot be cut, certainly the accrual of new benefits can be reduced by changes in the plan design. This tough choice of higher costs or lower pension benefits would occur long before the 2043 date when the model says that the assets of defined-benefit plans would be exhausted. Government regulators and pension actuaries would sound the alarm, hopefully decades before the forecast could come true. The problem may become apparent and the tough choice may have to be faced very early in the next century. One concern we have is that employers may have gotten used to the very low contributions that many of them have had to make to defined-

benefit plans in recent years thanks to the extraordinary performance of financial markets. When they face the higher long-run funding costs of their pension plans under more normal return realizations, they may choose to curtail the benefits that they offer. It is also possible that just about the time this is being resolved, we as a society will have to acknowledge that Social Security is not in long-run equilibrium; once again, the choice will be to either raise taxes or lower benefits. In this sense, both Social Security and the funded private defined-benefit pension system will likely face cost pressure to scale back retirement benefits.

Under our assumptions, the outlook for the defined-contribution plans is decidedly more optimistic. Our model shows defined-contribution plan assets growing relative to economy-wide aggregates over the next 30 years or so and then stabilizing at the relatively larger level. Again using total economy-wide private payroll as our scaling factor, defined-contribution assets are now about 37 percent of one year's payroll. We project those assets will climb to 52 percent of private payroll by 2000, to 70 percent by 2010, and to level out at about 85 percent for 2025 and beyond. The defined-contribution system is much less susceptible to "running out of assets," and indeed, we do not project any such occurrence. The private defined-contribution system would be a modest net source of saving in the economy even in the period with the maximum number of baby boom retirees.

5.4 Conclusions

The major result of this paper is that the national saving generated by the private pension system can be expected to decline from current levels, gradually for about a decade, and then far more steeply. With our set of conservative assumptions about the rate of return earned by pension assets, the pension system would cease to be a source of saving roughly in 2024. It is our opinion that this will indeed happen, although there is considerable uncertainty about the timing of the event.

We also find that the defined-benefit portion of the private pension system faces a tough choice. Our model shows that the system would run out of money in 2043 if it were funded according to our assumptions and if rates of return were consistent with those we have projected. The running-out-of-money part of our story will not happen. However, what the model is implicitly predicting is that either corporate pension contributions will have to be substantially raised or pension plans will have to be scaled back. It is highly unlikely that the current low contribution rates, caused by the high realized rates of return on financial assets over the past decade, can be sustained.

We briefly speculated about the impact of the reduced saving of the pension system on asset prices. Even though we do not think the change will be as dramatic as our model predicts (due to adjustments in contributions and plan design), we still feel that the demographic structure is such that a major change

in pension saving will occur. The timing and magnitude of the effect on asset prices is impossible to determine. Capital markets are worldwide, interest rates are determined by both supply and demand, and forecasts of financial rates of return some 30 or more years into the future are futile. However, the population bulge that we call the baby boom caused considerable strain on the U.S. education system in the 1950s and 1960s. Absorbing those people into the workforce was a challenge in the 1970s and early 1980s and may have been a factor in slowing the growth in worker productivity. It is probably safe to say that the same numerous cohort will strain the economic system once again during their retirement years, roughly 2010 to 2050.

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