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Frontispiece: Special Treasury securities, stored in a federal government filing cabinet in West Virginia, represent $700 billion in Social Security Trust Fund assets. Photo: Jeff Baughan.

Chapter 6
Simulating Benefit Levels Under Alternative Social Security Reforms

Gordon P. Goodfellow and Sylvester J. Schieber

Proposals to reform the U.S. social security retirement program can arrayed along a spectrum. At one end of the spectrum would be a continuation of the existing program, structured as it is today, financed on a mostly pay-as-you-go basis and with benefits that are redistributive based on lifetime earnings. For example, Robert Myers (1997a and b), former chief actuary of social security, advocates keeping the system essentially in its current form with some relatively minor modifications. To finance promised benefits, he would increase the payroll tax on both workers and employers by 0.30 percent of covered wages in 2015, and by similar amounts in 2020, 2025, and 2030. To the extent that further changes would be required to keep the program solvent, he advocates that the age of eligibility for benefits be increased. At the other end of the spectrum would be virtually total withdrawal of the government from playing any role in individual workers' retirement accumulation or provision.

In practice, few would advocate that the U.S. government withdraw completely from its role in assuring the retirement security of its citizens. Even the strongest advocates of individual choice in these matters are concerned about potential free-rider problems that could arise if the government did not require workers to make some provision for their own retirement needs. For example, Feldstein and Samwick (1997) proposed a system of mandatory Personal Retirement Accounts (PRAs) that would replace social security benefits. This proposal would significantly change the government's current role in securing and delivering retirement benefits, though PRA participation would be mandated by the government. This PRA system would still be supported by a safety net of welfare programs like the Supplemental Security Income system and food stamps.

Between these two end-points along the social security policy spectrum, several intermediate proposals have been suggested (see Chapter 1, this

volume). These are often characterized as privatization proposals, although they include varying degrees of funding, dependence on private financial markets, and personal retirement accounts. For example, the last Advisory Council on Social Security report (1997) described the Individual Account (IA) option as one where workers would contribute 1.6 percent of covered payroll to a mandatory savings program to be administered by the Social Security Administration (SSA). As these personal accounts grew, conventional social security benefits would be curtailed somewhat. SSA would operate the mandatory savings program much like a national 401(k) plan, with a limited number of investment options across which workers could allocate their contributions and accumulating assets. At retirement, the accumulated assets would be converted to annuities. This IA proposal would give workers greater control and flexibility than the system as modified according to Myers, so it would go some distance along the privatization spectrum. Under the IA plan, however, the government would still mandate contribution rates, manage all the assets of the system including those in the personal accounts, and require the annuitization of benefits at retirement. Hence, the extent of privatization in this proposal would still be extremely limited.

A second Advisory Council proposal, dubbed the Personal Security Account (PSA) option, would require workers to invest 5 percent of covered earnings now paid to social security. This option would allow workers to manage the investment of their retirement assets with much greater discretion than under the IA plan. It would not require that PSA accumulations be annuitized (or at least not be annuitized above certain base retirement income levels). This plan calls for even larger cuts in social security benefits than the IA plan. Because the PSA proposal would give individual workers more opportunity to make personal choices, it would go further along the "privatization spectrum" than the IA proposal.

Other reform proposals can be classified along the privatization spectrum, based on their curtailment of benefits provided directly through social security and the degree of personal choice they allow workers in managing some of their own retirement accumulations. For example, the Committee on Economic Development, an association of private business executives, has a proposal positioned along the privatization spectrum between the Advisory Council's IA and PSA proposals (CED 1997). This is because it calls for greater curtailment of social security's traditional benefits than the former, but less than the latter. It also calls for a mandatory 3 percent of pay mandatory contribution that would go to a personal account. It would give workers some discretion in how their money was invested, but would require annuitization at retirement.

Proponents of social security reform frequently develop comparative analyses showing the provision of retirement benefits under current law and under the proposed reform option. Typically, the projected asset accumula-

tions of individual workers under reform options that include personal accounts are based on historical long-term real rates of return for various classes of assets, assuming that workers would invest in "standardized" portfolios during their working careers. It is not uncommon for proponents of reform to calculate potential benefits under personal account options by assuming rates of return equivalent to historical mean or median rates of return on the assumed portfolios (see Carter and Shipman 1996; Feldstein and Samwick 1997; Advisory Council 1997).

Opponents of personal social security accounts are often critical of the projected benefits estimated to flow from such plans for two reasons. First, they argue that the stylized portfolios are not representative of likely investment patterns across the income spectrum. In particular, they suggest that lower-wage workers have largely been left out of 401(k) plans to date, have little investment experience, and might invest far more conservatively than the standardized portfolio. Second, they argue that the presentation of "typical" or average results obscures the range of outcomes that might be expected under such proposals. Both of these criticisms are examined in this chapter using a simulation model.

401(k) Participant Investment Patterns

To assess how workers direct the investment of their own retirement savings, we analyze administrative record files for 80 employer-sponsored 401(k) plans at the end of 1995. These plans are selected randomly, and hence are not necessarily representative of the universe of 401(k) plans. However, there is no reason to believe that these plans are atypical of patterns of investment behavior in plans of this sort.[1]

Our analysis of 401(k) investment patterns considers only the asset allocation patterns of employee contributions, since we are interested in workers' investment behavior. In addition, the investment options for employer contributions are more likely to be restricted to specific assets, most notably to employer stock. The analysis does not adjust workers' investment behavior to account for the fact that, in some plans, employer contributions are directed almost entirely to company stock. For this reason, we have probably understated somewhat the willingness of younger and middle-aged workers to invest in equities on their own.

The distribution of participant investments and asset holdings in these plans appears in Table 1. "Fixed income" investment vehicles account for 28 percent of total assets, which include money market funds, bonds, and guaranteed interest or stable value funds. "Balanced funds," which include a combination of bonds and corporate equities, account for another 8 percent of the assets. Assuming that the funds invested in the balanced funds in our analysis are roughly evenly split between fixed-income assets and equity assets, about one-third of the total assets in the 80 plans included here are

TABLE 1. 401(k) Assets by Type of Investment

Type of Asset	Participants with This Asset Type	Percent with This Asset Type	Total Assets	Percent of Total Assets	Average Asset Balance
Fixed income	61,102	60.2%	$538,934,914	28.3%	$ 5,314
Balanced fund	22,190	21.9	157,703,354	8.3	1,555
Company stock	25,954	25.6	309,113,664	16.2	3,048
Domestic equity	65,127	64.2	855,220,891	44.9	8,433
International equity	10,675	10.5	44,436,868	2.3	438
Total	101,417		1,905,409,691	100.	18,788

Source: Authors' calculations.
Note: The data are restricted to pay levels ≥$5,000 and balance ≥$10.

invested in fixed-income instruments, although well over half of the participants in the plans hold such assets. Sixteen percent of the assets is held in the corporate stock of the plan sponsor, and 47 percent in other equity funds. By comparison, Access Research, Inc. (1997a) estimates that 20 percent of all 401(k) assets is invested in guaranteed or stable value funds, 5 percent in money market funds, 7 percent in bonds, and 23 percent in the stock of the plan sponsor. This suggests that the distribution of assets in our dataset corresponds fairly closely with the distribution of assets across all 401(k) plans. Our sample plans average about 1,270 active participants per plan, with average participant balances of roughly $18,800. By comparison, Access Research (1997b) estimates that the average 401(k) balance in 1995 was $31,000, but their plan balances include both employer and employee financed funds, whereas ours include only the latter.

Table 2 focuses on subsets of the 401(k) participants by age, namely, those earning between $5,000 and $15,000, $25,000 and $35,000, and $60,000 and $75,000 per year. These three pay categories bracket the earnings levels designated as "low," "average," and "maximum" social security actuaries. The data indicate that higher-wage workers consistently invest a larger share of their retirement assets in equities than lower-wage workers, and younger workers consistently invest a larger share of their retirement assets in equities than their older counterparts. Table 3 summarizes equity holding patterns across age groups, and reveals that workers hold a relatively high fraction of their portfolio in stock, across all pay levels. We also show rates of equity investments developed by Dickson (1997), used for the Advisory Council's analysis of personal account accumulations and benefits under the IA and PSA proposals. Evidently, Dickson's investment portfolios assumed a more conservative asset allocation pattern than those of the 401(k) participants used in the current analysis.[2]

Dickson (1997) also suggested that annuitization requirements at retire-

TABLE 2. 401(k) Assets by Type of Investment, Plan Participant Age, and Earnings Level

	Percent of Assets by Participant Age					
	Under 21	21–30	31–40	41–50	51–60	60+
Annual earnings less than $15,000						
Fixed income	10.4	32.0	36.2	45.6	55.0	59.6
Balanced fund	1.7	6.4	7.8	8.7	8.6	5.9
Company stock	8.3	2.3	1.5	1.3	2.3	0.4
Domestic equity	77.5	55.2	52.4	42.5	31.9	31.7
International equity	2.1	4.1	2.1	1.9	2.2	2.3
Annual earnings $25,000 to $34,999						
Fixed income	0.0	25.6	29.7	34.7	39.1	44.3
Balanced fund	0.0	6.0	8.3	11.1	14.5	16.0
Company stock	100.0	19.8	18.1	15.7	14.0	11.7
Domestic equity	0.0	46.7	42.0	36.8	31.0	26.8
International equity	0.0	1.9	1.9	1.7	1.4	1.2
Annual earnings $60,000 to $74,999						
Fixed income	0.0	13.5	16.9	23.7	31.4	37.3
Balanced fund	0.0	8.9	10.0	8.1	7.5	7.8
Company stock	0.0	15.4	17.7	17.3	21.1	11.3
Domestic equity	0.0	57.8	53.0	48.8	38.2	42.7
International equity	0.0	4.4	2.3	2.1	1.8	0.9

Source: Authors' calculations.
Note: The data are restricted to pay levels ≥$5,000 and balance ≥$10.

ment could influence investment of assets during the working career. For instance, the PSA plan does not require annuitization of personal account distributions at retirement, whereas the IA plan would require annuitization. As a result, risk-averse individuals might invest more conservatively toward the end of their working careers if they are required to annuitize their asset accumulations at retirement, in order to guard against deterioration in the accrued value of their assets during market downturns. It is because of this latter reasoning that the stylized portfolios for IA investors were assumed to be allocated more conservatively at higher ages than those of the PSA investors.

Comparing Dickson's assumed equity investment patterns in the PSA and IA plans with the actual pattern of investment by our sample of 401(k) investors, we conclude that the earlier analysis of the IA failed to account for variations in investment behavior across earnings classes. As a result, the previous analysis of these proposals may have been biased. Specifically, the pattern of more equity investing by workers at higher earnings levels means that the distribution of investment risk and expected returns varies across earnings groups. Below we assess how differences in investment behavior

TABLE 3. 401(k) Assets Invested in Equities by Plan Participant Age and Earnings Level: Actual and Assumed Rates

	Percent of Assets in Equities by Age of Participants				
	20s	30s	40s	50s	60s
Assumed rates					
PSA assumed rate	55.0	55.0	52.0	48.0	43.0
IA assumed rate	55.0	55.0	50.0	40.0	20.0
Actual rates					
Low-wage earner	64.8	59.9	50.0	40.7	37.4
Average-wage	71.4	66.1	59.7	53.6	47.7
Maximum-wage	82.0	78.1	72.2	64.8	58.8

Sources: "Assumed rates" from Advisory Council (1997): 171.

across the earnings spectrum affect anticipated investment patterns of the alternative reform plans.

Expected Investment Returns over Time

One reason that social security privatization plans seem so promising is that the assumed rates of return on assets accumulated under the proposals significantly exceed rates of return that will be achieved under the current system. But rates of return used in these analyses are controversial for at least three reasons. The first reason pertains to the assumed differential between the long-term rates of return on financial assets and the rates of return that accrue under the current system; the second concerns the administrative costs associated with the different reform proposals; and the third relates to volatility in returns over time and variations in benefits levels resulting from such volatility. We take up each in turn.

Expected Long-Term Rates of Return Under Alternative Social Security Approaches

Many analysts contend that today's workers will earn low returns on their contributions to the social security system. As discussed by Mitchell, Geanakoplos, and Zeldes (this volume), cohorts born after 1940 expect rates of return below two percent on average. For two-earner couples, expected returns based on benefits under current law are consistently between 0.3 and 0.4 percentage points higher than they are for single workers, and for workers with higher earnings levels, projected returns are lower. For single workers whose earnings are consistently at maximum levels throughout their careers, the current law returns are consistently below 0.5 percent. Of course, these returns will not, in fact, be paid since the current social se-

curity system underfunding means that taxes must rise or benefits must fall in the future. Either of these changes portends further reductions in the rates of return, to one percent or less.

For this reason, personal account proposals that give workers the prospect of getting historical financial market returns hold out considerable promise. Carter and Shipman (1996) argue that personal account investment could earn nominal rates of return of 10.5 to 12.5 percent per year, and Feldstein and Samwick (1997) assume a real rate of 9 percent per year in simulating their PRA proposal. Dickson (1997, p. 485) estimates that "based on historical averages, the real expected equity return would be about 9.25 percent per year." The Social Security Advisory Council used 7.0 percent as its "average" expected annual real rate of return on equities, a rate that corresponds roughly to the median return on equities over the last 70 years. For government bonds, the Advisory Council assumed an ultimate long-term real rate of 2.3 percent per year.[3]

Administrative Cost Considerations

Opponents of personal account reform proposals also argue that historical rates of return cannot be realized because of asset management and record keeping costs. For example, when a mutual fund company services an IRA account, it charges roughly $30 to $35 per account per year (Dickson 1997). This may be especially problematic for millions of workers with small accounts. As an example, consider the case of a student who works 40 hours a week in the summer at a minimum wage job. Such a workers would earn roughly $2,600, generating a PSA contribution of about $130 that year. If he were charged $35 for the management of his account, the charge would amount to 27 percent of his contributions. Part-time workers who worked throughout the year would face similar or even larger administrative burdens.

There may be ways to reduce the administrative burdens on small accounts, but the administrative costs are not trivial. A few basis points can ultimately mean significant differences in retirement accumulations over the long term. For example, consider a worker who earned $30,000 in her first year out of school, starting at age 21, and whose pay grew by 1 percent over inflation each year. Assume that she contributed 5 percent of pay to a PSA-type account throughout her career and the assets earned returns at a real rate of 4 percent per year. At age 65, her accumulated balance would be 28 percent larger if she incurred investment expenses of 50 basis points (bp) per year, than if she incurred expenses of 150 bp per year (note that 100 bp is equivalent to 1.00 percent per year). The difference in the two balances at age 65 would be equivalent to 85 percent of her final year's salary.

The Advisory Council's analysis assumed that the annual administrative

fees for the IA plan would be 10.5 basis points per year, and 100 basis points per year for the PSA plan. Opponents of personal account options argue that the administrative loadings would probably prove to be higher than the Council's assumed rates if either of the plans were adopted. Mitchell (1998) has looked at administrative costs in a wide range of public and private retirement systems both here and elsewhere around the world. She estimates that expense ratios for small and mid-sized 401(k) plans with an annuity product generally run at less than 100 bp if the plan offers an index equity fund, a balanced fund, a fixed income fund, and a money market fund. She estimates that a PSA-type system that could take advantage of existing 401(k) investment options might incur administrative costs of $50 to $60 per year if there were no annuities involved and an added $100 per year if an annuity option were included. Assuming a starting annual cost of $160 per year, with the administrative costs growing at the rate of growth in wages, lifetime administrative fees in a PSA plan realizing 4 percent real returns per year would be less than 30 basis points per year for a worker whose starting salary was $30,000 at age 21. For a worker whose initial pay level was $10,000 per year and whose wages grow at only 1 percent real per year, the cost would still be only 80 basis points per year. Using Morningstar data, Dickson (1997) found that overall arithmetic average of management expense for mutual funds was 122 bp per year, but the dollar-weighted average was 93 bp. This suggests that investors are sensitive to management expenses. Dickson noted that if personal accounts were invested in certificates of deposit and fixed annuities, the administrative costs would be higher. But he also noted that if administrative expenses were capped at 50 to 75 bp per year, many financial firms would still offer to manage the personal accounts under a plan modeled along the lines of the PSA plan.

Our analysis, in the next section, uses the same administrative cost rates employed by the Advisory Council — that is, 10.5 bp for the IA proposal.[4] For the PSA plan from the Advisory Council and another plan that would fully privatize social security, we use 100 bp as the annual administrative cost. This, we believe, is a conservative assumption and consistent with Dickson and Mitchell.[5]

Volatility of Returns over Time

Another concern about the rate-of-return assumptions used in many assessments of personal account proposals is that they do not recognize return volatility. For example, Figure 1 shows that the annualized total rates of return on large company stocks have varied considerably over the period 1926 to 1995. Consider the plight of a worker who hoped to retire at the beginning of 1975, and who had heavily invested in the stock market throughout his career. For such a person, inflation-adjusted returns on large-company stocks were −21.6 percent in 1973, and −34.5 percent in 1974. The net
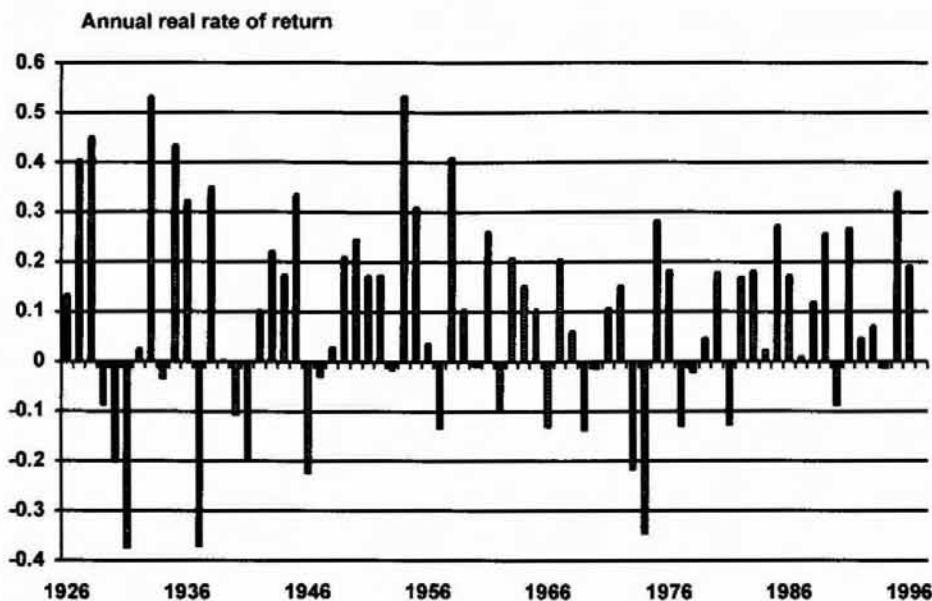
Annual real rate of return

Figure 1. Annualized total inflation-adjusted rates of return on large company stocks, 1926–95. Source: Ibbotson, R. and Associates (1996).

effect of this two-year period would have been to cut in half his retirement assets held as compared to 1972. Of course, this risk is overstated to the extent that older workers tend to shift assets into fixed-income vehicles. In any event, the fact that returns do fluctuate over time suggests that a proper evaluation of alternatives must compare these risks across social security reform scenarios.[6]

Potential Variation in Benefit Levels Under Alternative Social Security Reforms

Though no one knows what the future holds, certain financial market relationships have persisted historically. For example, real returns on Treasury bills are more serially correlated than the returns on stocks. As Fischer (1983: 153) has noted, "the variance of unexpected real returns on stocks, looking ahead one month, is about one hundred times the variance of the unexpected real returns on bills." This is what makes stock investing more risky in the short term than investing in government T-bills. However, Table 4 shows that investing in stocks has yielded historical higher returns than in either T-bills or bonds, particularly over a longer holding period.

TABLE 4. Investment Performance of Stocks and Bonds by Holding Period

		Percent of Time		
Holding Period	Time Period	Stocks Outperformed Bonds	Stocks Outperformed T-Bills	Bonds Outperformed T-Bills
1 Year	1802–1992	60.2	61.3	49.4
	1871–1982	59.0	63.9	52.5
2 Years	1802–1992	64.7	64.7	53.2
	1871–1882	64.5	68.6	58.7
5 Years	1802–1992	69.5	72.7	51.9
	1871–1882	71.2	74.6	60.2
10 Years	1802–1992	79.7	79.1	52.8
	1871–1882	82.3	84.1	59.3
20 Years	1802–1992	91.3	94.2	51.7
	1871–1882	94.2	99.0	59.2
30 Years	1802–1992	99.4	96.9	46.9
	1871–1882	100.0	100.0	58.1

Source: Siegel (1994): 31.

Analysts often use historical financial market patterns to model alternative investment strategies and to project future returns under various investment risk/return scenarios. There are two main modeling approaches used to assess the implications of alternative investment patterns for participants in individually managed retirement accounts. The first assumes that historical patterns of returns will be repeated. For example, McCurdy and Shoven (1992) compare retirement accumulations for workers who invested their retirement saving entirely in stocks over their working careers with those who invested it all in bonds. They simulate likely returns by taking 25-, 30-, 35-, and 40-year moving averages of historical returns over the period 1926 through 1989. Poterba, Venti, and Wise (1997) use a similar methodology to project potential accumulations in 401(k) plans, assuming the workers invested in an all-stock portfolio throughout their careers, an all-bond portfolio, or a portfolio that was half bonds and half stocks. In both cases, the evidence shows that a strategy of investing all the retirement savings in stocks consistently outperformed a strategy of investing the assets entirely in bonds.

A different projection approach uses a Monte Carlo model to draw historical return rates randomly from prior periods, assigning them serially to create a wide range of potential future scenarios. Each of these scenarios is thought of as representing one possible outcome for a given investment strategy. The collection of resulting scenarios generates a probability distribution of outcomes under that investment strategy, which along with the

specification of preference goals allows the selection of optimal investment strategies. This approach has been used by Bajtelsmit, Johnson, and Nugent (1997) to project potential account balances and retirement benefit levels under the IA and PSA plans, and to compare them to benefits under a reform option that would essentially match the benefits promised under current law. That study did not account for administrative expenses or variations in the investment portfolios across workers' life cycles or at varying earnings levels, improvements that we think are crucial to realistic modeling of social security reform proposals.

Simulating Outcomes Under Various Social Security Reform Options

In this section we simulate three personal account plans, selected to fall at different points along the privatization spectrum discussed earlier. The first has a relatively small portion of total mandated retirement contributions in a personal account; the second has half of total retirement contributions in such an account; and the third has all contributions deposited in such an account.[7]

The first plan corresponds to the IA option developed by the Social Security Advisory Council. Here, social security benefits would be gradually scaled down to fit within the current payroll tax rate of 12.4 percent of covered payroll that finances Old-Age and Survivors Insurance and Disability Insurance (OASDI) benefits.[8] This plan mandates that workers save 1.6 percent of covered pay on top of the modified OASDI benefit, deposited into an IA account. This account would be managed by social security or its agents, giving workers limited ability to direct the investment of their accounts across broad index funds representing various segments of the financial markets.

The second plan is the Advisory Council's PSA proposal, under which disability and early survivors benefits would continue to be financed by the 2.4 percent of covered payroll that now finances those benefits, administered through the Social Security Administration. Half the remaining payroll tax (5 percent of covered payroll) would go to finance a flat floor benefit worth $410 per month (in 1996 dollars) provided to all full-career workers. This flat benefit would grow over time at the rate of growth of average wages in the economy. The remainder of the payroll tax would be invested in a PSA managed by the worker. Workers over age 55 in 1998 under this proposal would continue to participate in the existing system. Those between ages 25 and 55 in 1998 would be covered on a prospective basis under the new system. At retirement, they would receive a combined benefit based partly on their participation in the current system prior to 1998, and partly on their participation in the reformed system from 1998

onward. For those 25 years of age or younger in 1998, their full benefit at retirement would be based on their participation in the reformed system.

The third proposal we examine we call the Full Privatization (FP) plan, though disability and early survivor benefits would still be provided through the government as in the PSA proposal. Under the FP plan, the entire 10 percent of covered payroll that now goes to finance retirement benefits under the Old-Age and Survivors Insurance (OASI) program would be diverted to a personal account managed by the worker in the same fashion as the PSA plan. Consistent with the PSA transition, we assume that workers over age 55 (in 1998) would continue to be covered under the current system. Those between ages 25 and 55 (in 1998) would be covered under a combined system that would provide them a pro rata lifetime benefit based on their participation in the current system until 1998, supplemented by the benefits financed out of their FP personal account that accumulates between the beginning of 1998 and their retirement at age 65. Those workers aged 25 and under in 1998 would be fully covered by the new system.

Four birth cohorts covering people born in 1945, 1955, 1965, and 1975 are the focus of the analysis for prototypical workers with "low," "average," and "maximum" earnings levels. In each case, the simulations assume that the reform is implemented in 1998 and workers retire at age 65. As noted, we account for administrative expenses and also vary the composition of investment portfolios over the life cycle and across the wage distribution. Most of the models assume that accumulated balances in the personal accounts are converted to indexed annuities at age 65 on the same basis as in the Advisory Council's report. These annuity conversion rates do not include insurance loading factors that would be incurred if annuities were bought commercially. A final set of simulations does incorporate the cost of purchasing private annuities.

Investment portfolio allocations for the PSA and FP plan projections assume that workers at each earnings level would invest in equities at the rates shown in Table 3. For the IA plan projections, results are adjusted to account for the forced annuitization of benefits at retirement. We adjusted by the ratio of assumed IA to PSA investment in equities that was taken from the top two lines in Table 3.[9] This means that the personal account portfolios are somewhat more conservative for workers above age 40 for the IA projections than they are for the PSA and FP projections.

Monte Carlo simulations use nominal rates of return and inflation rates from a Watson Wyatt Asset Modeling system used for projecting investment scenarios for pension plan sponsors. The underlying assumptions in these simulations do not directly parallel the historical return patterns imbedded in the 1926–95 period used in the prior simulations. The expected risk-free real rate of return is significantly higher than that observed historically over the long term, 1.7 percent versus 0.6 percent. In addition, the expected risk

TABLE 5. Compound Average Returns over Selected Historical Periods

	Time Period (percent)			
	70 years 1926–1995	45 years 1951–1995	25 years 1971–1995	10 years 1986–1995
Inflation rate	3.1	4.1	5.6	3.5
Treasury bill rate	3.7	5.2	7.0	5.6
Real T-bill rate	0.6	1.1	1.4	2.1
Large-cap stock rates	10.5	12.2	12.2	14.8
Real l-cap stock rates	7.4	8.1	6.6	11.3
L-cap stock minus T-bill	6.8	7.0	5.2	9.2
Small-cap stock rates	12.5	14.5	15.5	11.9
Real s-cap stock rates	9.4	10.4	9.9	8.4
S-cap stock minus T-bill	8.8	9.3	8.5	6.3
Intermediate gov't bonds	5.3	6.4	9.0	9.1
Real interm gov't bonds	2.2	2.3	3.4	5.6
Int gov't bonds minus T-bill	1.6	1.2	2.0	3.5
Long-term gov't bonds	5.2	5.8	9.6	11.9
Real L-T gov't bond rates	2.1	1.7	4.0	8.4
L-T gov't bonds minus T-bill	1.5	0.6	2.6	6.3

Source: Ibbotson, R. and Associates (1996).

premiums for each asset class are generally lower than the observed historical risk premiums. We believe this is defensible because the capital market experience of the last 10 to 15 years suggests that the real risk-free rate has risen significantly. The rise in the real risk-free rate can be directly observd from the level of short-term interest rates — e.g., 30-day US Treasury bills as shown in Table 5 — which carry a minimum risk premium for unanticipated inflation. This measure of the real risk-free rate has averaged 1.4 percent over the last 25 years and 2.1 percent over the past 10 years, compared to 0.6 percent over the period from 1926 through 1995. Higher levels in recent years can be attributed to tight monetary policies and society's willingness or unwillingness to save at historical rates. The expected compound average return on large-capital stocks is assumed to be 9.2 percent (5.7 percent real) with a standard deviation of 17.5 percent. This compares with a historical average of 10.5 percent per year (7.4 percent real) over the 70-year period from 1926 to 1995, as shown in Table 5. Real returns are expected to be somewhat lower in this sector than the historical averages, because we are currently in one of the longest sustained bull markets in history. In addition, we believe that it makes sense to be conservative in estimating potential returns in this sector because of the concerns that some people have raised about the possible pricing effects on stocks when the baby boomers begin to liquidate their lifetime savings during their retirement period (e.g., see

Schieber and Shoven 1996). In developing the projections presented here, the expected return on small-capital stocks is 7.3 percent real versus 9.4 percent for the historical long-term rate.

While stock returns used in the simulation are somewhat lower than those actually experienced over the 70-year period 1926–95, the returns on bonds are somewhat higher than historical averages — 0.5 percent per year. This reflects the higher returns on risk-free assets in recent years and also wariness about government's ability to deal with the aging of the baby boom and their potential claims on government budgets. Although public policy-makers have made significant progress on balancing the federal budget on a current cash basis, they have not yet significantly addressed the long-term fiscal imbalances in entitlement programs. Over the last decade, unfunded liabilities calculated on an ongoing basis for social security alone have risen by several hundred billion dollars more than has the federal debt. The unfunded liabilities in Medicare have risen by even greater amounts. Until these liabilities are addressed, long-term government bond rates are likely to stay above historical long-term rates.

Model simulations generated 500 scenarios of returns for three invest-ment vehicles over an 80-year period. The investment vehicles are equities, bonds, and short-term fixed investments best characterized as money mar-ket funds. The equity returns are based on a blend of 75 percent large-cap stocks and 25 percent small-cap stocks. The bond return is based on an assumed 50-50 blend of intermediate government and corporate bond re-turns, and the money market return a blend of the returns on short-term fixed-income investments. The compound average returns over the 500 simulations were 5.5 percent per year on the money market funds (1.5 percent real) with a standard deviation of 1.9 percent, 7.6 percent on the bond funds (3.6 percent real) with a standard deviation of 7.5 percent, and 10.8 percent on the stock funds (6.8 percent real) with a standard deviation of 7.5 percent.

Projection Results and Analysis

The simulations presented next use a Monte Carlo model that generates investment returns with a variance distribution consistent with U.S. histor-ical patterns.[10]

Baseline Projections

Projections for a low-earnings worker born in 1965 appear in Figure 2. The various panels reflect the cumulative probability distribution of benefits that would be provided under the three reform plans. The top left-hand panel shows the distribution of pre-tax benefits expected under the IA: for in-stance, there is a 50 percent probability that expected benefits would be
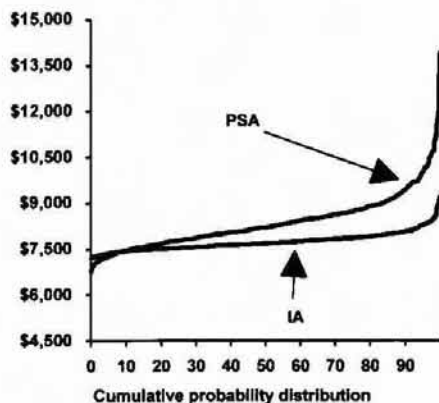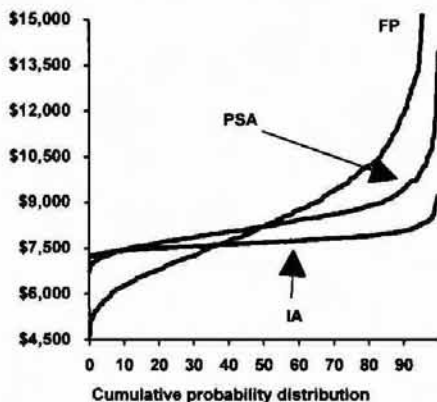
IA Benefits

Annual benefit in 1997 dollars

Cumulative probability distribution
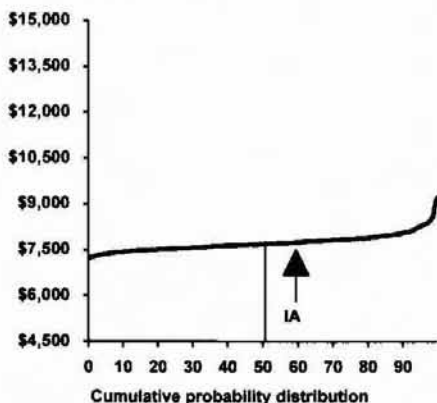
IA and PSA Benefits

Annual benefit in 1997 dollars

Cumulative probability distribution

IA, PSA, and FP Benefits

Annual benefit in 1997 dollars

Cumulative probability distribution

1965 Birth Cohort Benefit Options

Annual benefit in 1997 dollars
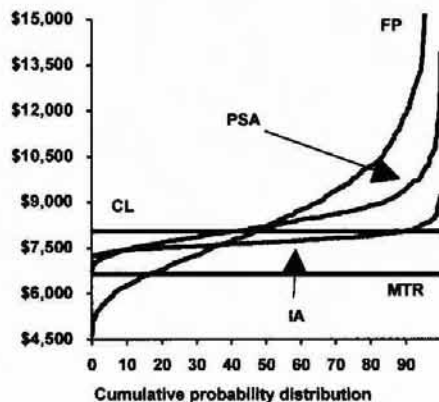

Cumulative probability distribution

Figure 2. Distribution of expected benefit levels under the PSA and IA plans for 1965 birth cohorts, workers with low lifetime earnings. Source: Authors' calculations.

roughly $7,700. The range of benefits across the whole probability distribution goes from around $7,200 to $9,200. The top left-hand panel shows the distribution of projected pre-tax benefits under the simulated PSA plan. In this case the PSA projected benefits exceed the benefits provided by the IA plan in roughly 92 percent of the simulations: projected benefits at the 50

percent probability level are $8,200 for the PSA plan, versus $7,700 for the IA plan. At the bottom end of the probability distribution, there is some added downside risk in the PSA plan which would provide only a $6,800 benefit versus $7,200 for the IA plan. Conversely there is significantly greater upside potential with a maximum benefit under the PSA plan of around $14,000, versus $9,200 under the IA plan. Eliminating the extreme tails of the two distributions, in 95 percent of the simulated outcomes the PSA benefits fall between $7,100 and $10,500, and the IA benefits between $7,300 and $8,400. For this worker, the PSA plan would seem to offer considerable upside gain, without large added downside risk.

The bottom left-hand panel in Figure 2 adds the FP plan pre-tax benefit pattern. At the 50 percent probability level, the FP and PSA plan provide essentially the same benefit. In about half the cases, the FP benefit would be considerably above that of the PSA plan, but in the other half it would be considerably lower. The FP benefit exceeds the IA benefit in roughly 60 percent of the simulations. While the FP plan provides much greater upside potential than either of the other plans, it would do so at the cost of adding substantial downside risk for this particular worker.

All three plans may be compared to current law (CL) benefits in the bottom right-hand panel of Figure 2. Of course, current law benefits cannot be paid unless additional taxes are raised. Another reference level in the bottom right-hand panel of Figure 2 represents estimated pretax benefit that could be maintained under the current OASDI payroll tax rate. This particular benefit, called the "Maintain Tax Rate" (MTR) benefit level, is exactly equal to the benefit provided under the defined benefit element of the IA plan. As noted earlier, the MTR benefit would redistribute social security benefits somewhat differently across the earnings spectrum than current law because it would reduce benefits more for workers with higher earnings than for those at lower earnings levels. While other patterns of benefit reductions could be developed to live within the current financing rates, this is at least as good a model for comparing policy alternatives as any other.

The two horizontal lines in Figure 2 and subsequent figures can be thought of as defining the range of policy options for redefining benefits within the context of the current structure of social security. The top line assumes that all adjustments to current policy will be made on the financing side by raising revenues. The bottom line assumes that all adjustments to current policy will be made on the benefit side by reducing expenditures.

Alternative projections for workers at the low-, average-, and maximum-earnings levels are offered in Figures 3, 4, and 5 respectively, where each figure shows the results of a complete set of projections for a different birth cohorts. All benefits are shown on a pre-tax basis. All of the plans simulated assume that the reform would be implemented in 1998, so workers in the 1945 birth cohort would participate in the reformed systems between 10

1945 Birth Cohort

Annual benefit in 1997 dollars

Cumulative probability distribution

1955 Birth Cohort

Annual benefit in 1997 dollars

Cumulative probability distribution

1965 Birth Cohort

Annual benefit in 1997 dollars

Cumulative probability distribution

1975 Birth Cohort

Annual benefit in 1997 dollars
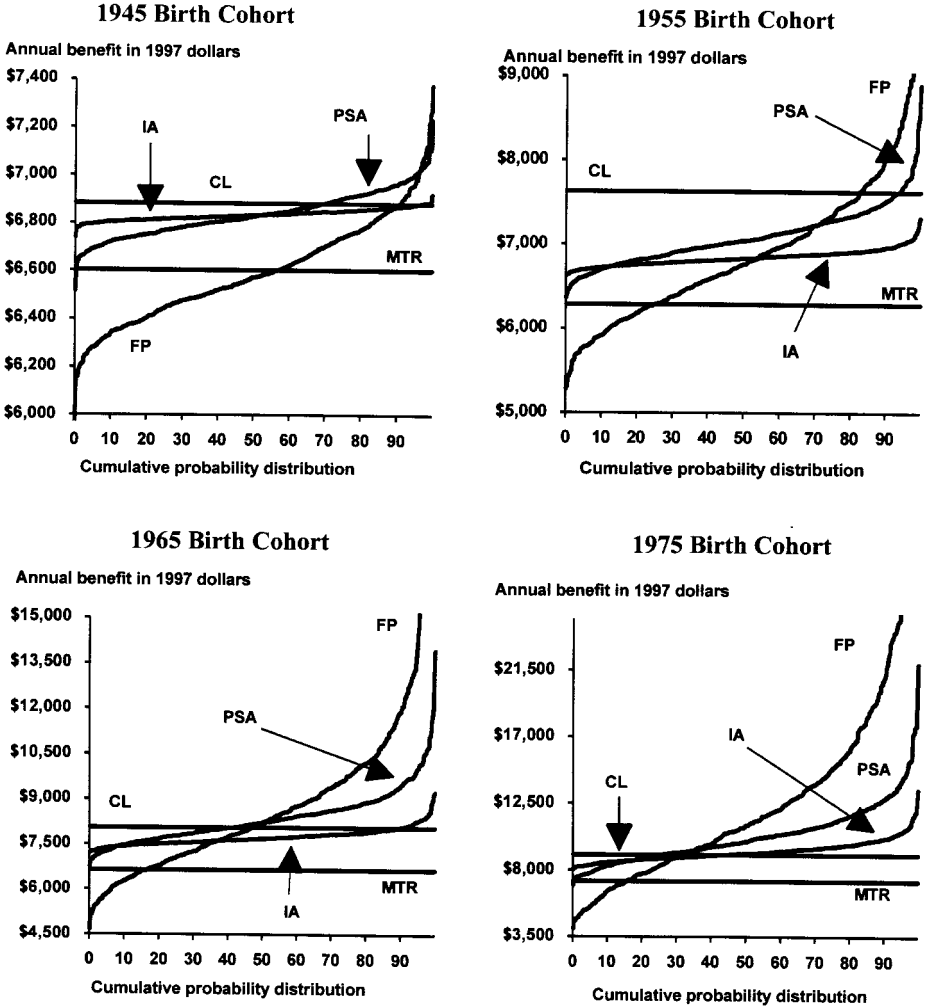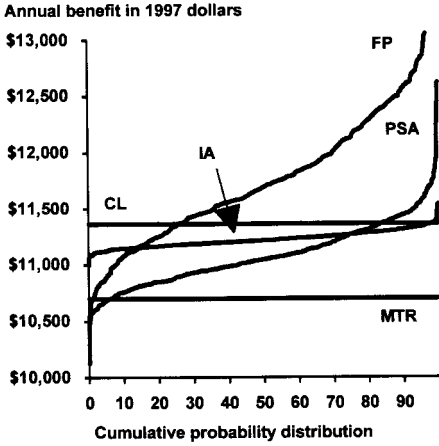

Cumulative probability distribution

Figure 3. Distribution of expected benefit levels under the PSA and IA plans for selected birth cohorts, workers with low lifetime earnings. Source: Authors' calculations.
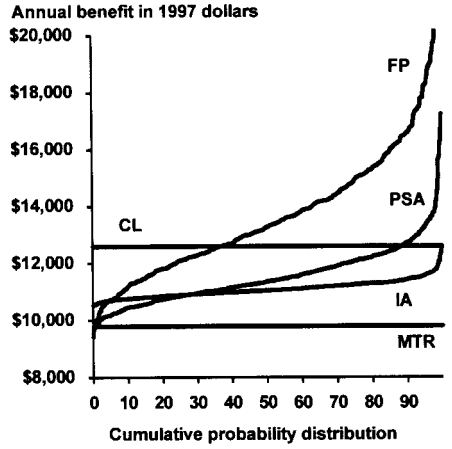
and 15 years prior to retirement, depending on actual retirement dates. Those in the 1955 cohort would spend roughly half their working lives in the current system and half in the reformed system. Those born in 1975 would spend virtually all of their working lives in the reformed system.

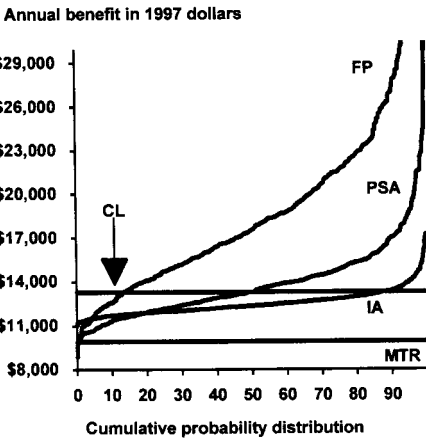Simulations for workers with low earnings are shown in Figure 3. For the

1945 Birth Cohort

Annual benefit in 1997 dollars

Cumulative probability distribution

1955 Birth Cohort

Annual benefit in 1997 dollars

Cumulative probability distribution

1965 Birth Cohort

Annual benefit in 1997 dollars

Cumulative probability distribution

1975 Birth Cohort

Annual benefit in 1997 dollars
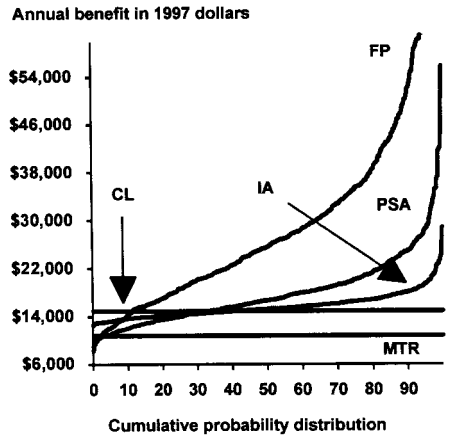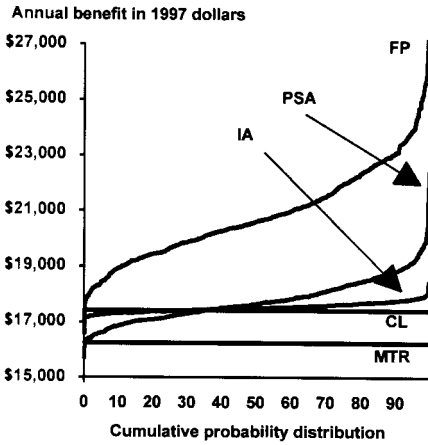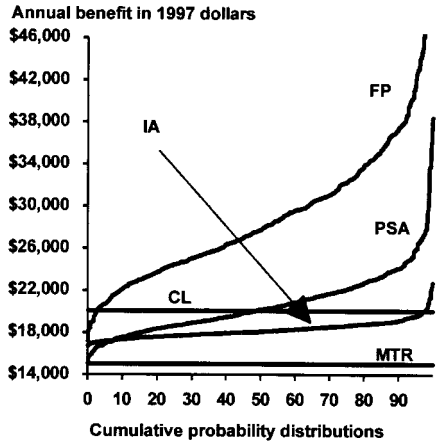

Cumulative probability distribution

Figure 4. Distribution of expected benefit levels under the PSA and IA plans for selected birth cohorts, workers with average lifetime earnings. Source: Authors' calcuations. Note: scales on panels vary.

1945 birth cohort, the FP plan would present significant downside risk relative to either the IA or PSA, plans with very little potential upside opportunity. The variance across and between the PSA and IA plans appears considerably less than with the FP plan. For subsequent birth cohorts, the FP plan would provide somewhat greater upside opportunity, but still presents
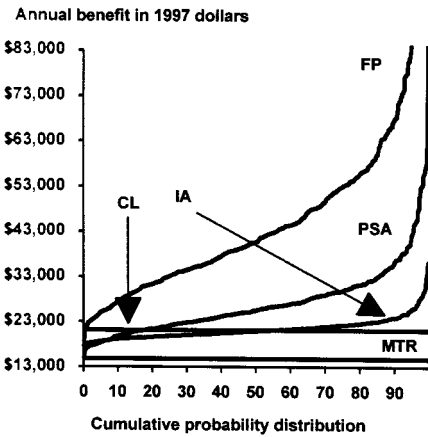
1945 Birth Cohort

Annual benefit in 1997 dollars

1955 Birth Cohort

Annual benefit in 1997 dollars

1965 Birth Cohort

Annual benefit in 1997 dollars

1975 Birth Cohort

Annual benefit in 1997 dollars
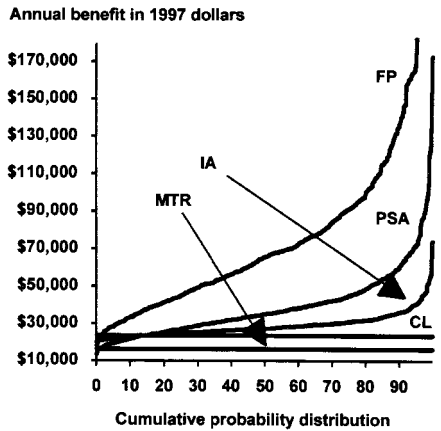
Figure 5. Distribution of expected benefit levels under the PSA and IA plans for selected birth cohorts, workers with maximum lifetime earnings. Source: Authors' calculations. Note: scales on panels vary.

considerable downside risk for workers with low earnings levels. As we will show later, these downside risks become even greater for workers with low earnings who consistently invest conservatively throughout their working lives. The PSA plan performs as well or better than the IA in about 90 percent of the simulations for the 1955 and subsequent birth cohorts. For

workers with average and maximum earnings levels throughout their careers, the PSA plan would generally provide a level of benefits superior to the IA plan for all but the earliest cohorts affected by the plans. The FP plan, on the other hand, appears to create mostly upside opportunities relative to either the IA or PSA plans.

One issue not addressed in this chapter is the issue of transition costs that the various proposals would create. These are addressed at some length by the Advisory Council (1997), by Feldstein and Samwick (1997), and by Geanakoplos, Mitchell, and Zeldes (this volume). Advocates of the PSA proposed an explicit increase in the payroll tax of 1.52 percent of covered payroll plus some transitional borrowing over a 70-year period to cover these costs. Feldstein and Samwick would cover the transition costs for their proposal by a similar taxing mechanism, although their transition costs would be somewhat hidden in that they merely propose the personal account benefit be funded up to a level that matches the benefits provided by social security under current law. The point is that while the FP plan would provide a superior benefit to the PSA, IA, or current law benefit for most workers at or above average earnings levels, there may be substantial transition costs associated with the provision of such benefits.

Figures 4 and 5 support the approach that Feldstein and Samwick have taken in developing their proposal. These results suggest that there would be considerable room in the transition to a fully privatized system to use some of the current contribution rates for workers with average earnings or higher to pay transition costs for getting out of the current system. This would be accomplished by using a portion of the contributions from such workers to pay transition costs directly, leaving the remainder of their contributions to fund a personal account benefit in line with current law benefit levels. These results also suggest that there might be some flexibility to develop a redistributive mechanism on the contributory side of a fully privatized system, where workers with higher earnings levels would have some portion of their contributions redistributed to those with lower earnings. These redistributed contributions could be used by the workers with lower earnings to offset the downside risks they would suffer under a fully privatized system, as discussed above.

Benefit Projections for Conservative Investors

Simulations thus far assume that workers will invest in accordance with the patterns shown in Table 3. We believe these are reasonable assumptions on average, but some workers will be more conservative investors throughout their lives. For this reason, we have computed the fraction of workers who invested 80 percent of more of their 401(k) money in fixed income investment vehicles during 1995. The results show that while low-wage workers are somewhat more likely to invest conservatively than those with higher earn-

TABLE 6. 401(k) Plan Participants Holding 80 to 100 Percent of Self-Directed Plan
Balances in Fixed-Income Assets, by Earnings Level

	Percent of Participants by Earnings Level		
Participant's Age	*Under $15,000*	*$25,000 to $34,999*	*$60,000 to $74,999*
20s	18.5	13.4	5.5
30s	20.3	19.4	8.4
40s	23.3	24.2	12.9
50s	32.3	28.8	15.7
60s	40.6	33.9	25.7

Source: Authors' calculations.
Note: The data are restricted to pay levels ≥$5,000 and balance ≥$10.

ings, there are also many higher-paid workers who would invest quite conservatively over their whole careers (see Table 6).

How would our results change if we assumed the worker invested all of his retirement savings in bonds over his entire working life? Results under the PSA and the IA proposals (Figure 6) are more similar to each other than in the earlier presentations, and there is a relatively smaller probability of achieving benefit levels comparable to those in current law. The downside risks are greater under the FP plan for all birth cohorts than in the earlier simulations. These results suggest that the potential beneficial effects of funding under a range of personal account plans can largely be offset by failure to diversify investments. But new financial products may be developed that could make even risk-averse individuals better off under personal account proposals than the results shown in Figure 6. For example, a product that provided a guaranteed rate of return over a specified investment period, but still allowed the investor to participate in some share of the upside benefit of higher returns if the market performs better than the return guarantee, could provide an acceptable floor for accumulations for risk-averse investors.

Table 7 shows the potential benefits that workers could achieve if they participated in such an investment program, when the real annual return on their personal account investments is 3 percent. Under the IA plan, the first three cohorts would receive benefits comparable to those under current law, and the PSA plan would out-perform current law in every case. The FP plan would provide benefits consistently 60 to 100 percent higher than the PSA plan. Part of the challenge in crafting a personal account proposal for reforming social security is to find creative ways to deal with the problems that can arise under such approaches. If future long-term financial market returns can approach the levels we have experienced over the past century, there should be considerable room to guarantee investors real

1945 Birth Cohort

Annual benefit in 1997 dollars

1955 Birth Cohort

Annual benefit in 1997 dollars

1965 Birth Cohort

Annual benefit in 1997 dollars

1975 Birth Cohort
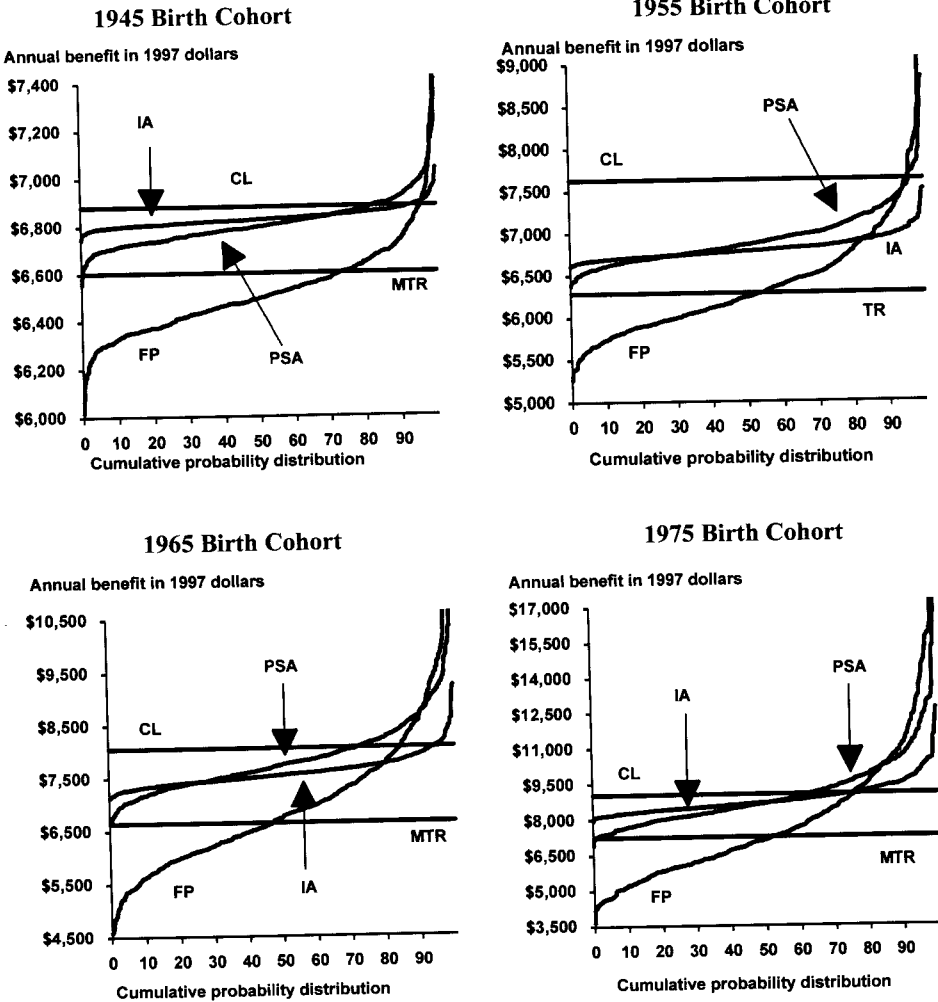
Annual benefit in 1997 dollars

Figure 6. Distribution of expected benefit levels under the PSA and IA plans for selected birth cohorts, workers with low lifetime earnings and assuming only bond investing. Source: Authors' calculations. Note: scales on panels vary.

TABLE 7. Benefit Levels Under Alternative Social Security Reform Scenarios Assuming 3 Percent Real Returns Per Year on Individual Accounts (1997 dollars)

Birth Cohort	CL	MTR	PSA	IA	FP
Workers with low earnings					
1945	6,884	6,605	7,036	6,892	13,928
1955	7,639	6,291	7,863	7,056	14,919
1965	8,066	6,653	10,437	8,281	18,718
1975	9,060	7,273	14,890	10,410	25,300
Workers with average earnings					
1945	11,368	10,705	11,480	11,343	22,823
1955	12,618	9,802	13,030	11,502	24,532
1965	13,321	9,957	17,939	13,573	31,512
1975	14,960	10,883	26,872	17,855	44,727
Workers with maximum taxable earnings					
1945	17,439	16,258	18,638	17,794	36,432
1955	20,086	15,071	23,849	19,156	43,005
1965	21,243	14,940	35,761	23,620	59,381
1975	23,793	16,291	57,351	33,015	90,366

Source: Authors' calculations.

returns in the range of 3 or 4 percent and still leave considerable margin for the institutions that provide the vehicles.

The Tax Treatment of Benefits Under the Alternative Proposals

Thus far all of our simulations have been pre-tax, but the reform proposals differ significantly in how benefits would be taxed at distribution. For example, the Advisory Council's MB and IA plans would subject to income tax all benefits above workers' contribution amounts. The personal account benefit under the IA plan would be afforded consumption tax treatment—i.e., the contributions would be made on a pre-tax basis and benefits would not be taxed at distribution. In the case of the PSA plan, all benefits would be accorded consumption tax treatment. Benefits financed by employer contributions would be taxed when the benefit is paid because the employer contributions was a tax-deductible expense when made. Benefits financed by employee contributions would be financed with post-tax earnings and would not be subject to further income taxation when paid.

To illustrate how alternative tax treatments affect projected benefits, we assumed that 85 percent of the benefits provided through OASDI would be taxable at a 15 percent marginal rate for the MB, IA, and MTR plans. For the

PSA plan, we assumed that 50 percent of the old benefit earned prior to 1998 would be taxable and that 100 percent of the new flat benefit earned under the reform plan would be taxable at a 15 percent marginal rate. Under the PSA proposal, half the old benefit and all the flat benefit would be financed by pre-tax employer contributions. Under this proposal, the share of total benefits financed with pre-tax contributions would be accorded consumption tax treatment, which is consistent with the tax preferences accorded virtually all private employer-sponsored pension. Because half of the old OASDI benefit is financed by post-tax employee contributions, and all of the personal account benefit is financed by post-tax dollars, half the old OASDI benefit and none of the personal account benefit would be taxable under the PSA plan. Taxation of the FP benefit follows the same rules; thus 50 percent of it would be taxable at a 15 percent rate. The results of the modified benefit distributions are shown in Figure 7.

Comparing the distributions in Figure 5 with those in Figure 7 shows the differing tax effects; Table 8 summarizes the changes in the probabilities that the PSA plan will exceed the current law (CL) and IA benefits on a pre- and post-tax basis (note that the post-tax benefits are labeled CL′, IA′, and so forth in the figures and table). The differential tax effects are important. In relative terms, the effects are greater for the older cohorts than for the younger ones. While we have not extended the analysis to the maximum-wage workers, the improvement in net benefits under the PSA plan relative to the CL or IA plans would be even greater than for workers at average earnings levels.

Implications of Annuitization Fees on Benefit Levels

One of the concerns about reforming social security through creation of personal accounts is that the cost of annuitization will significantly deplete the advantages of higher rates of returns that workers can achieve through the funding of their retirement benefits. To address this concern, we developed projections that include a charge for the purchase of an annuity at retirement. Mitchell, Poterba, and Warshawsky (1999) have estimated that, on average, individual annuity policies delivered payouts valued at between 80 and 85 cents on the premium dollar paid in 1995. They found that the best plans offered at that time had payouts of slightly above 90 cents on the premium dollar. This load was used in conjunction with post-tax projections for workers with average earnings. While 10 percent is below the average prevailing now, Mitchell et al's work suggests that these markets are becoming increasingly efficient. In addition, we believe that there would be further cost pressure on these markets if the demand for annuitization increases.

Results for the PSA and FP plans including annuity loadings appear in Figure 8, labeled PSA″ and FP″. It is interesting that the pattern of PSA

1945 Birth Cohort

Annual benefit in 1997 dollars

Cumulative probability distribution

1955 Birth Cohort

Annual benefit in 1997 dollars

Cumulative probability distribution

1965 Birth Cohort

Annual benefit in 1997 dollars

Cumulative probability distribution

1975 Birth Cohort

Annual benefit in 1997 dollars

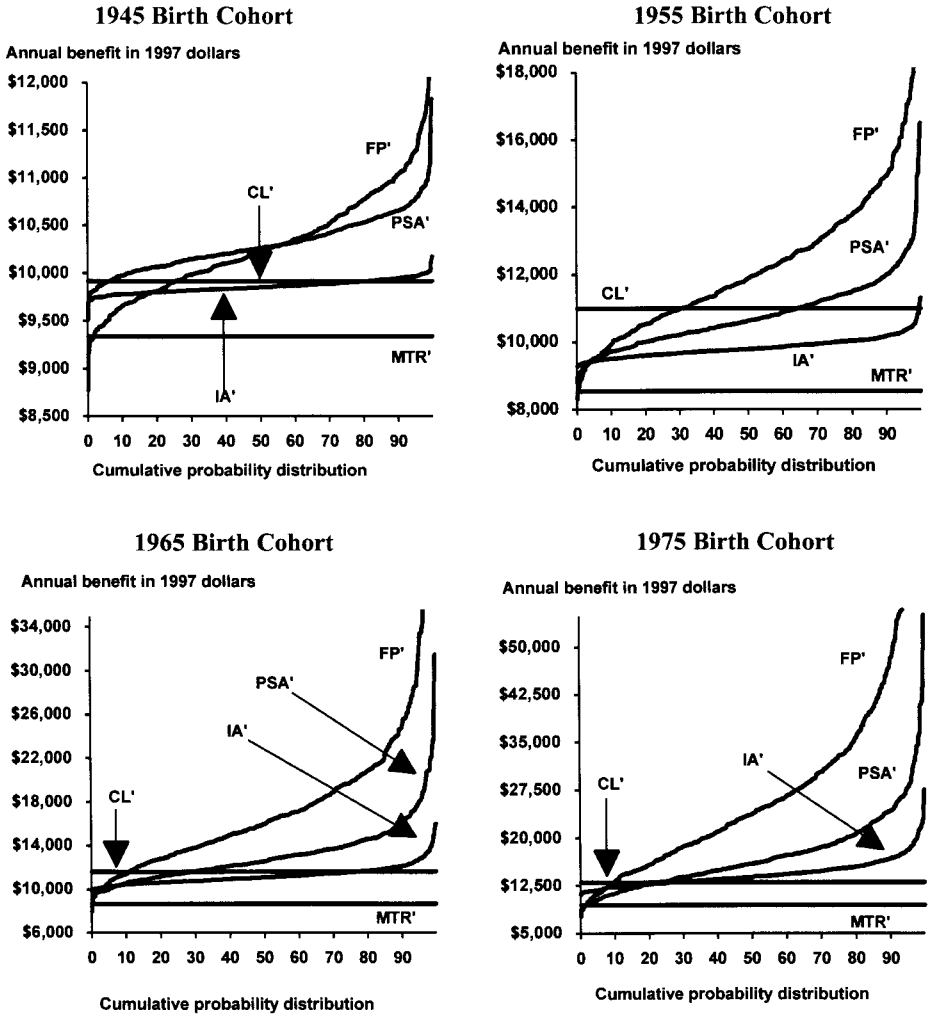Cumulative probability distribution

Figure 7. Projected post-tax benefit levels under the PSA and IA plans for selected birth cohorts, workers with average lifetime earnings. Source: Authors' calculations. Note: scales on panels vary.

benefits does not change much from those without annuity loadings. The reason is that at the lower end of the PSA benefit distributions, the flat benefit still provided through the OASDI program is relatively significant. Since the flat benefit is not subject to the annuity loading, the loading rate on the total benefit is significantly ameliorated. At the higher end of the

TABLE 8. Probability that PSA Benefit Exceeds the MB and IA Benefit for Worker with Average Career Earnings: Pre-Tax versus Post-Tax Computation

	P(PSA>MB)		P(PSA>IA)	
	Pre-tax	Post-tax	Pre-tax	Post-tax
1945 birth cohort	0.17	0.94	0.25	0.99
1955 birth cohort	0.12	0.34	0.72	0.95
1965 birth cohort	0.52	0.72	0.81	0.91
1975 birth cohort	0.67	0.77	0.72	0.80

Source: Authors' calculations.

distribution, the portion of the benefit financed by the personal account becomes much more significant. As this occurs, the annuity loading takes on greater significance, but it does so at benefit levels where the PSA tends to significantly outperform the other policy options, and it is not sufficient to overwhelm that improved performance.

The situation for the FP benefits is slightly different than under the PSA plan. For the 1945 birth cohort, the PSA plan would provide higher benefits than the FP plan over a larger portion of the probability distribution where annuitization costs are considered. The downside risks in the FP plan are somewhat greater as well. In the other cases, the annuitization of benefits would dampen somewhat the superiority of the FP benefit over the PSA benefit or benefits provided under the alternative policy options. The explanation for this effect is that the FP benefit would subject a larger share of total benefits to private market annuitization costs than any of the other plans. In any event, the FP plan would generally provide a superior benefit to the other options for most workers born during or after the mid-1950s.

While this analysis of annuitization costs and options could be more extensive, it suggests that some of the concerns about annuity costs relative to personal account options may be overblown.

An Alternative Perspective on Risk and Retirement Benefit Levels

Critics of personal account options point to variations in market returns over time as one of the primary reasons they oppose such plans. The implication is that personal account options include benefit risks and that the traditional defined-benefit structure of the current system does not have such risks. But this is not a fair conclusion. While the risks under the various models have a somewhat different nature and might be distributed differently, neither is free of the risk that expected levels of benefits might not be achieved for some workers. For instance, current-law benefit levels can only be achieved if taxed are raised substantially. Social security actuaries

1945 Birth Cohort

Annual benefit in 1997 dollars

1955 Birth Cohort

Annual benefit in 1997 dollars

1965 Birth Cohort

Annual benefit in 1997 dollars
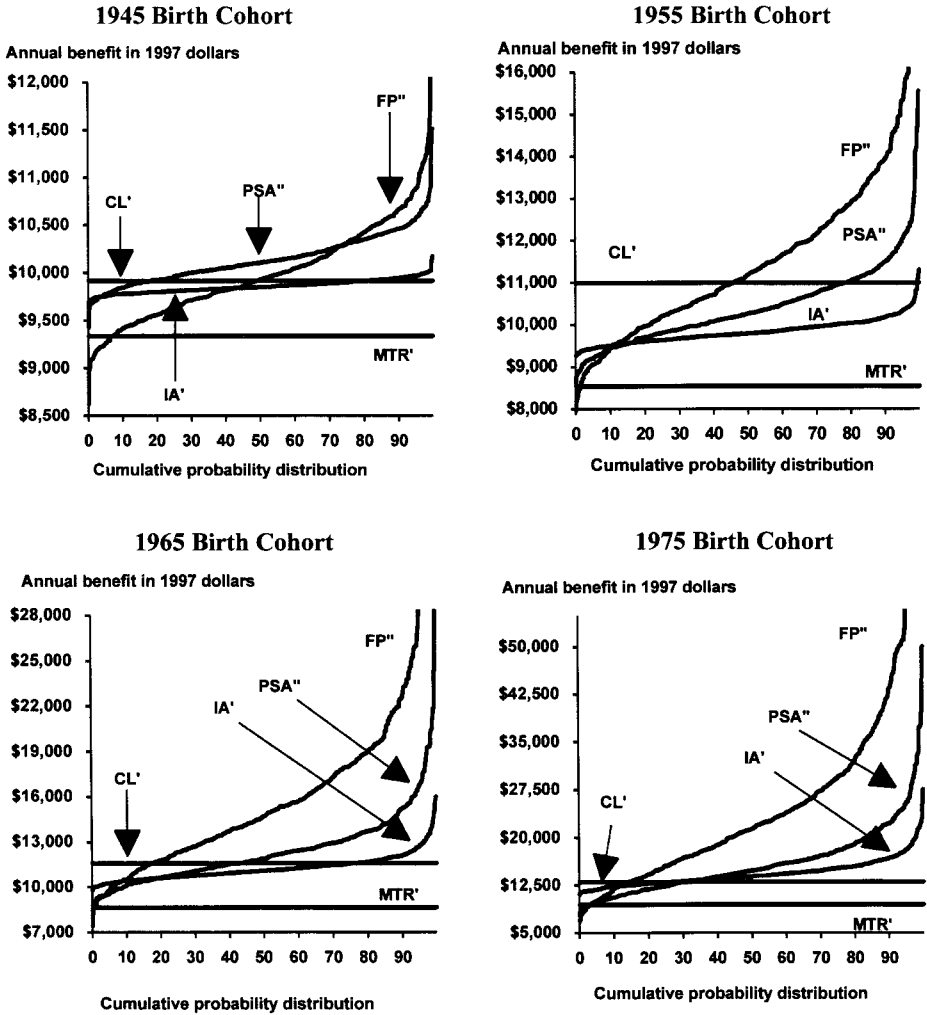
1975 Birth Cohort

Annual benefit in 1997 dollars

Figure 8. Projected post-tax benefit levels less annuity loadings under the PSA and IA plans for selected birth cohorts, workers with average lifetime earnings. Source: authors' calculations. Note: scales on panels vary.

estimate that the payroll tax rate would have to rise 2.5 percentage points to eliminate the current actuarial imbalance in OASDI financing and create a sufficient reserve so the trust fund balance would be stable at the end of the 75-year projection period (Goss, this volume). Conversely, personal accounts would expose workers to greater financial market risks in the ac-

cumulation of their base pensions than they now face. Personal accounts held under many reform proposals would be sensitive to the tides of those markets. It is not clear that the overall risks of a system of funded personal accounts would be any greater than they are in the current environment of unfunded political promises.[11] There is no way to cover the real deficit that exists in the current system without incurring some real costs. If the only way policymakers can get society to bear these costs is to hide them, this increases the chances that current promises will not be met. The current difference in benefit promises and financing rates in social security is so large that it is not conceivable that policymakers can conceal the cost of closing it.

One way to evaluate the tradeoffs between political and financial risks is to see what happens to the majority of people under various policy options. For example, consider the average-wage worker born in 1945 (Figure 4). Under the IA plan, required contributions would have to rise about two-thirds as much as the increase in the payroll tax required to secure current-law benefits. That is, if we raised the payroll tax today, by 1.6 percent, this takes us 2/3 of the distance needed to eliminate the actuarial deficit and stabilize the trust fund. For the 1945 birth cohort of average workers, the MTR benefit is $10,705 in 1997 dollars, and their current-law benefit is $11,368 (under the assumptions used in developing our analytic comparisons). If an added 1.6 percent of covered payroll were raised in taxes and it was distributed on a pro rata basis relative to the differences between the current law and MTR benefits within the current benefit structure, the new expected benefit level would be $11,129 — that is, 64 percent of the way toward the current law benefit going from the MTR benefit level. Looking back to Figure 4 for the benefit projection for a worker born in 1945 and with average earnings, under the IA reform proposal there is an 81 percent probability the worker would get a benefit in excess of $11,129 under the IA plan. While it is hard to guess at what rate workers might be willing to trade political risk for financial market risk, our guess is that many workers in the situation just described would prefer one of the personal account policy proposals to either the MTR option or one that would have them simply pay higher taxes to support the current system.

Conclusion

Social security reform plans that include a personal account are sometimes criticized because of costs and risks associated with these proposals. This chapter shows that there is considerable variability in the way people invest across the earnings spectrum, variability that should be considered when evaluating such proposals. We have also shown that administrative costs matter and that historical volatility in financial market returns would probably lead to some considerable dispersion of benefits within and across co-

horts. Our analyses rest on defensible assumptions that address criticisms of earlier studies.

We find that most baby boomers will not receive their money's worth under social security for any policy option examined here, including the PSA option. Some baby boomers may have reduced benefit levels relative to current law promises, and these cuts are likely to be largest for the middle cohorts of the baby boomers. In the long term, though, our projections suggest that social security reforms including some level of personal account funding would lead to improved benefit levels for significant segments of future retiree populations. While our analysis does not consider possible potential macroeconomic effects that might arise if a personal account reform option were adopted, we are confident that higher savings rates would contribute to general improvements in worker and retiree welfare over time.

Our analysis also suggests that the greater the level of privatization and funding of the social security system under a reform plan, the greater the potential to raise benefits or reduce costs for workers in the broad middle class and higher earnings levels. Moving to a program heavily reliant on personal accounts without putting in place some form of redistribution or floor of protection at the lower end of the earnings distribution, however, would expose some workers to the risks of significantly lower benefits than they would receive under current law or alternatives that maintain some sort of floor of protection. Those exposed to these risks would be those most vulnerable to a retirement of poverty level incomes.

Our analysis of the implications of annuity costs suggests that the costs associated with private annuitization may not be as large a factor in determining the relative merits of personal account approaches to social security reform versus more traditional defined benefit approaches as previously thought. This does not mean that the issue of mandatory annuitization up to some appropriate income level is not important or worthy of consideration. Further analysis of the annuitization issues should be undertaken to improve the understanding of the potential implications of personal account reforms to social security.

Finally, we have documented the implications of financial market risks on the distribution of benefits under three specific personal account social security reform models. Those critical of personal accounts might take solace from our results showing that not everyone will come out with higher benefit levels under such policy approaches than under current social security provisions. But we assert that current law is not the appropriate standard against which to compare viable policy options. No one today is seriously suggesting that policymakers will ultimately raise taxes sufficiently to pay current promises. Until the risks associated with the unfunded political promises in the current system are factored into the analysis, there can

be no fair assessment of the relative desirability of personal account approaches to social security reform.

Notes

1. About half of the plans are administered by Watson Wyatt with the remainder administered by another plan vendor.

2. In developing stylized portfolios, Dickson considers both 401(k) and IRA investment patterns. In his analysis, he notes that IRA investment patterns tend to be somewhat more conservative than those for 401(k) plans and half of all IRA assets are owned by individuals over the age of 60, whereas nearly 70 percent of 401(k) assets are concentrated in accounts of workers between the ages of 40 and 59. He attributes part of the difference to the distribution of assets in the two types of plans to the age of the asset holders. He also notes that individuals tend to allocate an ever larger portion of their assets to fixed income assets as they age. The large concentration of IRA assets among the elderly suggests that much of the IRA money is held by people already retired. Since the focus of the current analysis is on investment patterns of workers, we do not believe that the investment patterns in IRAs are as relevant as those of 401(k) participants.

3. Whether these real returns are the correct ones to use is discussed by Mitchell, Geanakoplos, and Zeldes (this volume).

4. Mitchell's analysis of TIAA/CREF suggests that this plan's costs might run 20 to 30 basis points per year with some added costs on the annuity provisions, but the IA proposal as structured with monolithic government management of the system might drive such cost rates down considerably. In addition, the 10.5 basis points for IA administration is consistent with Dickson's analysis of mutual fund administration costs. For example, in a world of 4 percent inflation with an initial annual $35 per account administrative cost growing at the rate of inflation, with 5 percent wage growth, and 3 percent real returns on assets over a worker's career for a worker starting to work at age 21 and working until reaching age 65, administrative costs as a percentage of assets managed would average 17.2 basis points per year for a worker whose starting salary was $12,000 per year, 8.3 basis points for one with a starting salary of $25,000, and 5.2 basis points for one at $40,000 per year.

5. Since the government could limit administrative loadings for small accounts, a case could be made that the 100 bp we assume is an upper bound on costs.

6. This concern was partially addressed in the Advisory Council on Social Security's report by presenting alternative projections where workers were assumed to invest only in government bonds throughout their careers, or alternatively, where

they were assumed to invest only in stocks with annual administrative costs of only 50 basis points per year. The former was assumed to provide an estimate of the potential outcome for a worker who realized relatively low career returns and the latter was considered an estimate of a high-return scenario. Under this approach, there is no way to estimate the probability of one or the other outcomes or how they might actually distribute around benefits promised by current law or some alternative level of defined benefit promise.

7. The first two proposals are described in detail in the Advisory Council's final report (1997) and the third is a variant on the second proposal.

8. Under this proposal, the scaling back of benefits would be skewed toward workers with higher lifetime earnings levels. Those at the low end of the earnings spectrum would experience relatively small reductions of their basic OASDI benefits.

9. This adjustment keeps our assumed ratio of equities to fixed-income investment equivalent to the ratio of equities to fixed-income investments in the Advisory Council's comparative analysis of the IA and PSA plans.

10. Results from additional projections are available from the authors on request.

11. Some critics of personal retirement accounts point to the potential for financial market collapse as a reason to stay with the current social security structure. Of course, a wage-based, pay-as-you-go system would also be badly affected by the collapse of financial markets.

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