Social Security Reform in the United States

Andrew A. Samwick
Dartmouth College, Hanover, NH 03755-3514

National Bureau of Economic Research, Cambridge, MA 02138

National Tax Journal
Vol. LII, No. 4

INTRODUCTION

The leading domestic policy issue of the 1990s has been the looming financial crisis in the Social Security system. This crisis is the result of long-term demographic and economic factors that have moved against the pay-as-you-go (PAYGO) method of financing retirement benefits. The crisis in Social Security represents a threat to the integrity of the nation's most popular entitlement program. Substantive reform of Social Security is required to resolve this crisis in a way that is fair to workers, beneficiaries, and their descendants.

Two factors have come together to promote a national debate on entitlement reform. The first is the report of the 1994–6 Advisory Council on Social Security (Advisory Council, 1996). This report focused renewed attention on the financial crisis in Social Security. Though unable to agree on a single proposal to resolve the crisis, three subgroups of members of the Council devised plans with varying degrees of benefit cuts and tax increases. A common element of all the plans was to invest a portion of Social Security's resources in private securities. Two of the plans explicitly called for a system of individual accounts to be established.

The second factor is the appearance in recent years of budget surpluses that are projected to persist for over a decade. In a PAYGO system, current payroll tax revenue from workers goes to pay the benefits of current retirees. Those tax revenues cannot be diverted without finding an alternative mechanism to pay current beneficiaries. Alternatively, new revenues must be raised in order to prefund any future liabilities. On several occasions during 1998 and 1999, projected revenues to the federal government have been revised upward, resulting in positive surprises for the surplus. Unanticipated surplus revenues, which by definition have not been allocated to other projects, provide an ideal mechanism for easing the tax burden on the transition generation of workers who must maintain current payroll tax rates to provide for current retirees while prefunding a portion of their own future benefits.

There is a real danger that found money is spent money inside the beltway. In late 1997, Martin Feldstein began to popularize a plan to save Social Security based on personal retirement accounts (PRAs) financed initially out of the bud-

get surplus.[1] This "Two Percent Plan" was more formally explained in our joint paper, Feldstein and Samwick (1998a). The plan works as follows. Contributions of two percent of taxable payroll would be made on behalf of each worker in each year. The funds in the PRAs would be invested in financial securities or bank deposits, just as Individual Retirement Account (IRA) and 401(k) assets are today. When the individual reaches retirement age and withdraws payments from his PRA, the individual's Social Security benefit in that year would be reduced by 75 cents for every dollar of PRA withdrawal. With the historic rate of return on a conservatively invested portfolio (60 percent in stocks and 40 percent in bonds), this plan would be sufficient to prevent the Social Security trust fund from being exhausted (as it would be in 2034 with the existing PAYGO system). It would permit the current 12.4 percent payroll tax rate to continue indefinitely without any increase.

Any plan to reform Social Security must be based on widely available, commonly accepted assumptions about future economic and demographic outcomes. The original calculations for the Two Percent Plan were based on the 1995 Trustees Report. An update was made for the 1998 Trustees Report in Feldstein and Samwick (1998b). This article further updates the simulations to be consistent with the projections in the 1999 Trustees Report. Favorable economic performance in the intervening years has improved the outcomes under both the existing PAYGO program and the Two Percent Plan.

In addition to updating the simulation model to the most recently available forecasts, this article discusses some of the broader issues regarding the specific problems the Two Percent Plan can address and the way it can be most efficiently implemented. It begins by characterizing the true financing problem facing Social Security as its long-term imbalance, rather than the projected date of a trust fund bankruptcy that is more commonly discussed. It then discusses the objectives that are appropriate in the larger Social Security reform debate. There have been proposals made that change the system by substantially more than what is absolutely required to address the financing shortfall. It is important to be clear about what might be lost if such proposals were adopted.

The presentation of the plan itself begins with a brief description of the assumptions on which the calculations are based. The evolution of aggregate PRA deposits and withdrawals and their effects on the Social Security payouts, tax rates, and trust fund balances are reported. Estimates of the effects of the PRA program on national saving, on the level of gross domestic product (GDP), and on the government budget are also presented. The analysis concludes by identifying the role that the federal government must play in the proposed system and by discussing the complications that arise as a result of equity investments by Social Security in general and their implementation in PRAs in particular.

THE PROBLEM FACING SOCIAL SECURITY

Figure 1 demonstrates the magnitude of the financial imbalances inherent in the Social Security program based on projections in the 1999 Trustees Report. The flat

[1] See Martin Feldstein. "Don't Waste the Budget Surplus." *The Wall Street Journal* (November 4, 1997); Martin Feldstein. "Let's Really Save Social Security." *The Wall Street Journal* (February 10, 1998); and Martin Feldstein. "Savings Grace." *The New Republic* (April 6, 1998). These articles can be found at www.nber.org/~msfeldst. Several related proposals to use the budget surplus to finance personal retirement accounts have since been discussed by Congressional leaders including Bill Archer, Phil Gramm, Judd Gregg, John Kasich, Bob Kerrey, Daniel Patrick Moynihan, and Bill Roth.

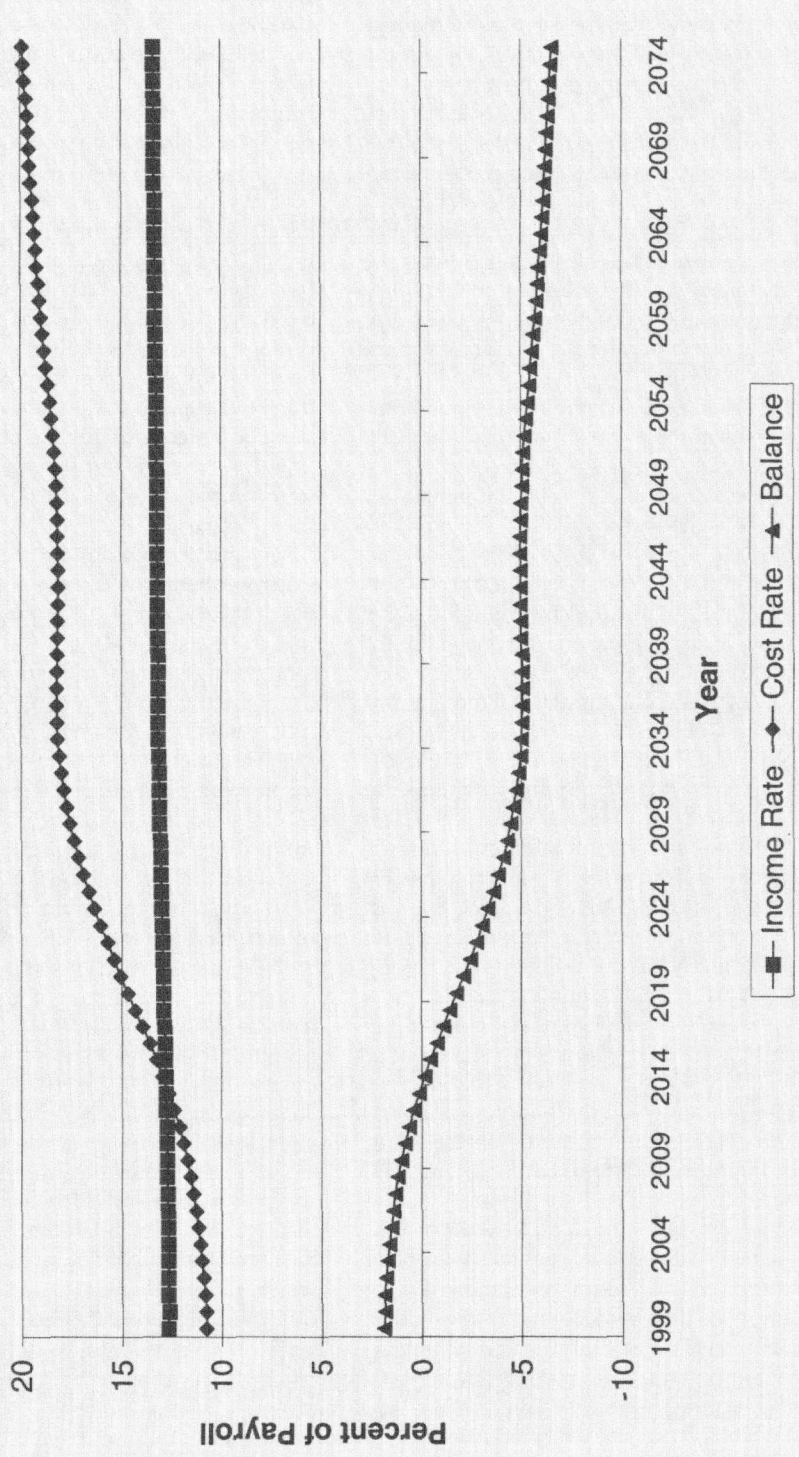

Figure 1. Estimated Income and Cost Rates, Intermediate Assumptions

line indicated by the squares represents the forecasted income rate. The income rate reflects revenue received by the Old-Age, Survivors, and Disability Insurance (OASDI) trust funds due to the payroll tax of 12.4 percent and the income tax on current benefits. Income taxation on benefits currently generates an amount equal to 0.30 percent of taxable payroll, making the income rate 12.70 percent in 1999. In 2075, income taxation of benefits will generate 0.96 percent of payroll, resulting in an income rate of 13.36 percent.[2]

The curve indicated by diamonds represents the cost rate or payments made by the Social Security system to beneficiaries. The cost rate in 1999 is 10.80 percent of payroll, generating the 12.70 – 10.80 = 1.90 percent annual balance in the program. The annual balance is graphed at the bottom and is indicated by triangles. Over time, the cost rate increases substantially, reaching a value of 19.90 percent of payroll in 2075. The annual balance in that year will be 13.36 – 19.90 = –6.54 percent of payroll (reported as 6.53 in the Trustees Report due to rounding).[3] Unless the Social Security system is reformed before that time, the payroll tax would have to rise from 12.40 to 18.93 percent to pay all benefits promised in current law. Such an increase represents an expansion of the program by over 50 percent.

It is common in public discussions to associate the financial crisis in Social Security with the approaching retirement of the Baby Boom generation. This is not an appropriate characterization. The problem is more fundamental than the aging of an unusually large birth cohort. In 2075, even the youngest Baby Boomer will be 110 years old. Almost all benefits in that year will be paid to retirees who were born after the Baby Boom generation. Therefore, even if no Baby Boomer pays another dollar in taxes or receives a dollar in benefits, the –6.53 percent balance in 2075 would be only trivially smaller. The retirement of the Baby Boomers does have an important impact on the system's finances, and this can be seen clearly in Figure 1. The period of rapid increase in the cost rate (and decline in the annual balance) occurs during the two decades starting in 2010 when the Baby Boom generation begins to retire. The annual balance over that period deteriorates by five percentage points of payroll, but note that it does not improve over the remainder of the 75-year period. The retirement of the Baby Boom generation does not cause the financial crisis; it simply makes the long-term problem appear in 35 years rather than 75 years.

The misperceptions in public discussions are abetted by the focus on two numbers that are not clear long-term indicators of financial balance. The first is the "long-range actuarial balance" of the OASDI trust fund, which was –2.07 percent of payroll in the 1999 Trustees Report. This actuarial deficit indicates that if the income rate were increased immediately by 2.07 percentage points (through a payroll tax increase, for example) and maintained at the higher level for the next 75 years, the program would on average be in actuarial balance. The shortcoming with this measure is that, despite its name, it does not really measure the long-range financial crisis. Noting that the higher cost rate in 2075 is the result of a long-term trend, years after 2075 will have actuarial balances similar to the –6.53 percent of payroll in that year. Internal calculations at the Social Security Administration associated with the 1998 Trustees Report indicated that the "open-ended actuarial balance" that includes years after 2075 was approximately –4.70 percent of payroll (cited in Kotlikoff (1999)). This number is an alternative to raising the income

[2] These figures are reported in Table II.F17 of the 1999 Trustees Report. All descriptions of the financial status of the Social Security program are based on the "intermediate" cost assumptions.

[3] See Table II.F13 of the 1999 Trustees Report.

rate by 2.07 percentage points until 2075 and by roughly 6.53 percentage points thereafter.

The second number that is popularly associated with the financial crisis in Social Security is the projected year in which the OASDI trust fund will be exhausted. In the 1999 Trustees Report, this was forecast to occur in 2034. The projected time path of the OASDI trust fund is graphed in Figure 2 as the hump-shaped curve indicated by diamonds (also reported in Table II.F17 of the Trustees Report). The real value of the trust fund peaks at $2376 billion in 2018 (in constant 1999 dollars). It is later than 2014, when the cost rate first exceeds the income rate, due to the interest credited on the assets. Starting in 2014, the federal government will have to find a source of revenue beyond the forecasted payroll taxes and income taxes on benefits to pay Social Security benefits. Between 2014 and 2034, it will "sell" the Treasury bonds in the trust fund back to itself. To pay itself, it will have to find new revenue (such as selling bonds to the public). After 2034, the federal government will have to find revenues in some other way, perhaps again by selling bonds to the public. Nothing of substance changes in 2034 beyond the change in 2014. Trust fund "assets" are simply an accounting convention: they do not represent a claim on real resources beyond the fiscal authority of the federal government.[4]

Due to better than average economic performance in 1998, the actuarial deficit of –2.07 in 1999 was smaller than the value of –2.19 percent reported in the 1998 Trustees Report. The date of bankruptcy in the trust fund was also two years later than the date of 2032 reported the previous year. However, the forecasted balance in 2075 worsened from –6.43 to –6.53 over that same period of time. It is unfortunate that the public attention to the retirement of the Baby Boom generation, the "long-run actuarial balance," and the date of trust fund exhaustion has distracted attention from the long-term financial imbalance. The problems confronting Social Security are the result of three factors that have become critically important over the last quarter century: lower fertility, lower productivity growth, and substantially lower mortality.[5]

Focusing on a notional date of Trust Fund bankruptcy or a 2.07 percentage point financing gap over 75 years dramatically understates the severity of the financial crisis in Social Security. Raising the payroll tax by 2.07 percentage points indefinitely and investing the proceeds at the rate of return forecast for Trust Fund assets would alleviate less than half of the open-ended deficit and postpone the bankruptcy only from 2034 to 2075. It is a step in the right direction, but it should not be mistaken for a large step.

As is evident from the 6.53 annual deficit in 75 years, approximately half of the promised benefits must be prefunded if benefit reductions are to be avoided. If the burden on the transition generation is to be kept low, then the prefunding must occur in private securities. To avoid the myriad of conflicts of interest that would arise from government ownership of private securities on this scale, private securities must be held by individuals in the type of personal retirement accounts discussed below. While many authors have made a case against personal retirement accounts, none has done so in the context of a feasible plan that provides an alternative means of addressing the entire financial shortfall.

[4] See Kunkel (1999) for a discussion of the operations of the Social Security trust funds.

[5] Reasonable changes in the assumptions for these factors do not substantially change the long-term outlook for Social Security's finances. Section II.G of the 1999 Trustees Report contains a sensitivity analysis of changing the key forecast assumptions from their intermediate values to a "low-cost" value. Each such change represents a substantial improvement in the potential finances of the system. However, in each case, using the more optimistic assumption of higher long-term fertility, slower improvements in mortality, or higher real wage growth improves the reported 2.07 long-range actuarial deficit by less than 30 percent.

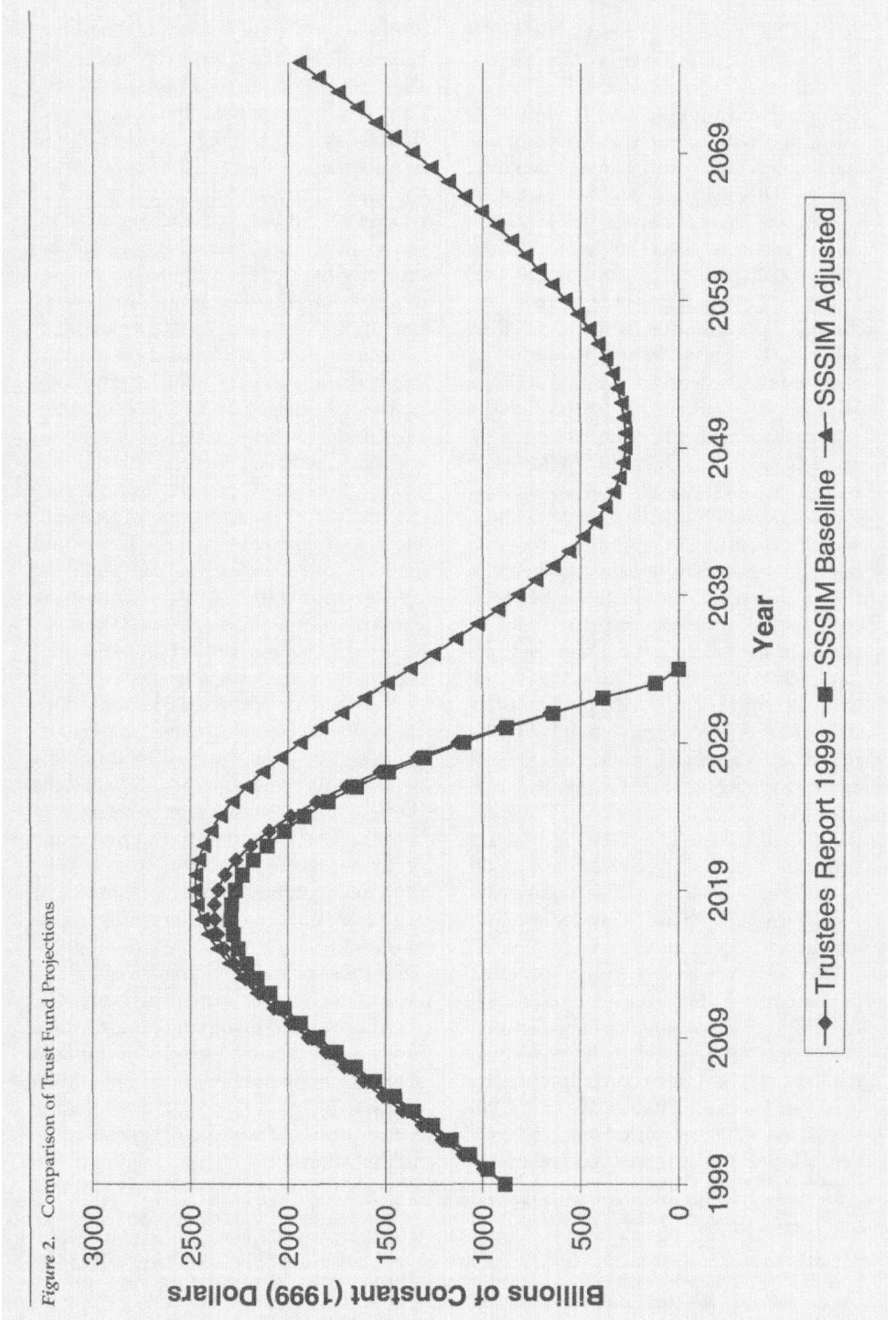

Figure 2. Comparison of Trust Fund Projections

OBJECTIVES FOR SOCIAL SECURITY REFORM

Social Security plays a central role in maintaining the well-being of retirees and other beneficiaries. Opportunities for substantial reform have come along only infrequently, perhaps once every 15 years since the program's inception. As a result, the multitude of proposals that have been put forth to rectify the system's financial problems have also generated suggestions for more substantial change, such as introducing an explicitly defined contribution portion of the plan.[6]

Two important themes must guide this debate and have been instrumental in the development of the system of PRAs. The first and more important is that the reform should address the entire financing problem, not just a notional bankruptcy in 2034 or a 2.07 percent financing gap over a limited horizon of 75 years. This means that the reform must find a way to address the 4.70 percent open-ended deficit, including the 6.53 percent financing gap in 2075 and subsequent years. Otherwise, the reform is incomplete and continues to leave the insolvency of Social Security as a legacy for future generations.

The second theme is that the reform should be designed in a way such that, to the extent possible given the first theme, it does not *require* substantial erosion of the levels of retirement security provided by the current law. For example, a proposal that simply reduced benefit levels by the amount of the annual actuarial imbalance in all years after 2034 would solve the financial crisis but would leave open important issues of retirement security. As a starting point, the Two Percent Plan does not reduce the expected benefits but instead raises additional revenues to close the gap.[7]

Beyond the overall level of retirement benefits, several features of the current system are noteworthy and should not be eliminated without careful consideration. First, Social Security provides critical relief from poverty, especially among surviving spouses and the oldest old. According to the Social Security Administration (1996, Table VI.A.2), 61 percent of households 65 or older receive a majority of their income from Social Security. For the bottom 60 percent of the income distribution, this proportion exceeds 75 percent. Second, the current system promotes horizontal equity within cohorts by paying benefits as a function of lifetime earnings. In proposed systems based on PRAs or other defined contribution elements, workers with identical earnings histories may have different retirement incomes based on their individual-specific investment experiences. Third, Social Security pays benefits in the form of an indexed annuity. In the current market for either individual or group annuities, explicitly price-indexed annuity contracts are extremely rare. Fourth, Social Security's benefit formula is progressive and redistributes income within and across generations based on lifetime earnings rather than current income. It is unique among government programs in doing so.

Any reform proposal should at least be compatible with these features of the program. It would be unfortunate if the reform implemented to restore financial solvency to the program resulted in future generations of elderly in poverty or lesser protection against longevity risk due to inadequate annuitization.

[6] See Weaver (1999) for a systematic comparison of reform proposals.

[7] Medicare faces an even more immediate financial crisis than does Social Security. While proposals to rectify Medicare's problems are scarce, it seems fairly certain that whatever reforms are adopted, resources available to the elderly will be more restricted. As a matter of intergenerational equity, reforms of Social Security are likely to be more generous to beneficiaries than in the absence of Medicare reform.

TWO PERCENT PERSONAL RETIREMENT ACCOUNTS

This section updates the description of the Two Percent Plan in Feldstein and Samwick (1998a, 1998b) to be consistent with the most recent projections in the Trustees Report. The plan begins by taking the two percent of payroll that represents the 75-year long-range actuarial imbalance and investing it in corporate stocks and bonds rather than the portfolio of Treasuries in the trust fund. The plan uses the projected federal surpluses to fund the initial deposits into the PRAs. It eliminates the *income* tax cut that future generations might otherwise have received if the entire surplus had been used to buy back the explicit debt of the government. Instead, it uses the favorable budget surprises to pay down the implicit debt that government would have had to finance with *payroll* tax increases on those same generations.

If using the unanticipated surplus to fund PRAs simply replaces lower explicit debt with lower implicit debt, then why bother? The straightforward answer is that without such a formal arrangement to devote surplus revenues to Social Security reform, the additional forecasted revenues will be used for tax cuts or other government spending programs that will not increase national saving. The budget discussions thus far in 1999 provide strong support for this presumption. The PRAs provide a particularly convenient mechanism to prevent that from happening.

The version of Social Security reform ultimately chosen may differ in its details from the particular implementation discussed below. Many other plans involve more wholesale adoption of defined contribution (DC) arrangements. The principal advantage of the Two Percent Plan is that it stays true to the current system as much as possible while expanding the framework to include a DC portion to alleviate the shortfall at low cost. However, it is possible to use the same framework that generates the Two Percent Plan in Feldstein and Samwick (1998a) to evaluate other, more substantial changes to the system.

The Social Security Simulation Model

The estimates presented in this paper use an accounting model developed in the course of our research in a broader National Bureau of Economic Research project on Social Security reform.[8] This simplified model is calibrated so that with the current Social Security rules it closely approximates the basic time series of benefits, revenues, and trust fund assets predicted in the 1999 Social Security Trustees Report.

The unit of analysis in these simulations is the individual. Benefits for spouses and survivors, as well as disability benefits, are subsumed in the individual benefit projections. We incorporate the actual current age structure of the population, the Census Bureau projections of future births through 2050, and the projected cohort specific life tables for individuals born through that year. To reflect the net inflow of immigrants, we scale up the projected population at every age to coincide with the aggregate population projections of the Social Security Administration.

The simulations simplify by assuming that individuals enter the labor force at age 21 and work until they reach their legislated Social Security normal retirement age (or death if that occurs sooner). Since not everyone in the population actually works during those years, we adjust the

[8] The economic and demographic aspects of the model were developed originally in Feldstein and Samwick (1997, 1998c). Samwick (1997), Feldstein and Ranguelova (1998), and Feldstein, Ranguelova, and Samwick (1999) also provide discussions of variants of the PRA system discussed here.

labor force participation rate to obtain the number of covered workers in each year specified in the Social Security Administration projections.

We use the historic data for average earnings in covered employment in years before 1999 and follow the intermediate assumption in the 1999 Social Security Trustees Report that the average real wage rises at 0.9 percent per year in the future. The movements in the average real wage are assumed to reflect changes in the age structure of the labor force and differences among age groups in the rate of increase of wages as well as the overall rate of increase of age specific wage rates.

As in Feldstein, Ranguelova, and Samwick (1999), the investments in the PRAs are assumed to earn a real after-inflation rate of return of 5.5 percent. From 1946 to 1995, the average log return on a portfolio that was 60 percent in the Standard and Poor's 500 portfolio and 40 percent in a broad index of corporate bonds was 5.9 percent.[9] These portfolio shares approximate the capital structure of the corporate sector.

Forty basis points are deducted to allow for administrative costs. This is approximately twice the fee charged in indexed equity funds by companies like Vanguard and Fidelity. Bond funds generally have even lower administrative charges. The 5.9 percent return is net of the payment of corporate income and property taxes. Poterba (1998) estimates that the pretax return on capital in the nonfinancial corporate sector averaged 8.5 percent over the 1959–96 period. We return below to the implications of the taxes collected on incremental capital but not included in the return earned on PRA accounts. We follow the Social Security Trustees in assuming that the real return on the Social Security trust fund will decline gradually from the current level to a 3.0 percent real interest rate in the future.

Because we are primarily interested in total benefit payments and not in their distribution by income and family type, we base our calculations on taxable payroll in each year and do not distinguish income levels or family structures. Although we therefore cannot apply the actual Social Security benefit rules, we can calculate aggregate average benefits by attributing an implicit rate of return on the taxes paid by individuals in each birth cohort. Our estimates are modifications of the estimates originally developed by Boskin et al. (1987) for birth cohorts spaced 15 years apart between 1915 and 1990. Our cohort specific rates of return are estimated in a way that minimizes the sum of the annual squared deviations of our projected cost rates from those of the 1999 Trustees Report (Figure 1). They are as follows.

Year of Birth	Real Rate of Return
1915	5.73
1930	2.48
1945	1.78
1960	1.49
1975	1.47
1990	1.15

Each rate of return is the annual real rate of return at which the cohort's payroll taxes have accumulated to generate their projected benefit streams. The values for cohorts born outside the 1915–90 interval are the same as those on the relevant endpoint. Values for cohorts born within each interval are linearly interpolated. The values for cohorts after 1915 are slightly higher than those in earlier work based on the 1998 Trustees Report (see Feldstein and Samwick, 1998b; Feldstein, Ranguelova, and Samwick, 1999), because the Trustees forecast of economic growth improved over the course of the year. It is

[9] Including the more recent period would increase this rate of return.

important to note that these are the rates of return that will prevail if all future benefits are paid.[10]

Personal Retirement Account Deposits and Benefits

Our analysis assumes that the PRA deposits begin with the year 2000. The PRA deposits in that year are projected to be $74.3 billion. The deposited amounts increase over time as earnings grow, reaching $86.6 billion in 2010, $109.0 billion in 2030, $135.2 billion in 2050, and $163.9 billion in 2070. All of these amounts are in constant 1999 dollars. These figures are shown in column 1 of Table 1.

We assume that individuals begin withdrawals from their PRAs at their normal retirement ages in the form of an annuity that earns the same 5.5 percent real rate of return. The first annuities are paid to the individuals who become 65 in the year 2001 and total only $70 million.[11] Total annuities grow rapidly, reaching $1.2 billion in 2005, $5.4 billion in 2010, $118.8 billion in 2030, and $768.3 billion in 2070. These annuity totals at ten-year intervals are shown in column 2 of Table 1. The rapid rise in the annuity amounts reflects increases in the number of annuitants and rapid increases in the average annuity amount, which in turn reflects the increased number of years of PRA deposits.

These annuity withdrawals are shown in column 3 of Table 1 as a percent of the taxable payroll of all individuals in each of the selected years. This amount rises from 0.12 percent of covered earnings in 2010 to 2.18 percent in 2030, 6.57 percent in 2050, and 9.37 percent in 2070. Each dollar that retirees receive from their PRAs reduces their regular Social Security benefits by 75 cents. Even with this Social Security benefit reduction, the retirees will have higher average retirement incomes (by 25 percent of the PRA annuity amount) than they would have had without the PRA program.[12] The projected reductions in Social Security outlays as a percentage of covered earnings are shown in column 4 of Table 1.

Note first that in the long run (e.g., in the year 2070) the reduction in Social Security outlays is 7.03 percent of taxable payroll, which is three-fourths of the 9.37 percent of payroll that annuities are projected to be in that year. Since the annual actuarial deficit in 2070 is only 6.29 percent of payroll, the reduction in benefit outlays of 7.03 percent of payroll reduces the amount that must be financed by the PAYGO tax by 0.74 percent of payroll. Over the remaining years of the forecast period, this differential remains above 0.5 percent of payroll.

The evolution of the Social Security trust fund itself is traced in column 5 of Table 1. In the early years, the trust fund grows because the sum of the income rate and the interest on the existing trust fund (at the 3 percent real rate projected by the

[10] Geanakoplos, Mitchell, and Zeldes (1998) emphasize that these rates of return include the payment of the obligations of the PAYGO system. These rates of return cannot be directly compared to individual account systems that earn capital market returns but do not pay off the obligations of the PAYGO system. In the plan described here, all such obligations are paid off. The 5.5 percent return is the historical rate of return on the corporate sector net of corporate taxes. Because of the offset against the PAYGO benefits, a dollar contributed to the PRA generates an increase in *total retirement income* that is less than the annuity value of a dollar accumulated at 5.5 percent per year. See Feldstein (1998) for a discussion of the conditions under which prefunding Social Security through capital markets can improve welfare.

[11] In practice, the program might require a minimum of, say, five years of deposits to avoid very small annual payments.

[12] In reality, the return on PRA accounts is uncertain and some individuals will earn more than a 5.5 percent return while others earn less. Individuals who have higher returns will have greater Social Security benefit reductions but will still have a higher net PRA income and a higher combined PRA-plus-Social Security income than those with lower rates of return. For simulations of a PRA programs that incorporate risk more explicitly, see Feldstein and Ranguelova (1998) and Feldstein, Ranguelova, and Samwick (1999).

TABLE 1
EFFECTS OF PRA DEPOSITS AND ANNUITIES ON SOCIAL SECURITY OUTLAYS

Year	PRA Deposits (1)	PRA Annuities (2)	PRA Annuities (3)	SS Outlay Reductions (4)	SS Trust Fund (5)
2000	74.27	0.00	0.00	0.00	26.39
2010	86.64	5.36	0.12	0.09	45.80
2020	98.19	37.52	0.76	0.57	50.34
2030	108.97	118.81	2.18	1.64	33.60
2040	121.89	251.76	4.13	3.10	11.94
2050	135.19	444.12	6.57	4.93	4.04
2060	148.79	639.37	8.59	6.45	8.66
2070	163.93	768.34	9.37	7.03	17.72

Notes:
(1) These figures correspond to Feldstein and Samwick (1998a), Table 1, updated to the 1999 Trustees' Report.
(2) Columns (1) and (2) are reported in billions of dollars at the 1999 price level.
(3) Columns (3)–(5) are reported as a percentage of Social Security taxable payroll.

Social Security Trustees) exceeds the cost rate. The impact of the reductions in Social Security outlays in response to the PRA annuities is shown in column 4 of Table 1. This reduction of Social Security outlays is very small in the early decades of the program. But by 2030, when the Social Security trust fund would be almost exhausted under current law, the 75 percent offsetting reductions have added a cumulative amount of $730 billion (again at 1999 prices) to the trust fund. These net additions, plus the resulting increase in the trust fund's investment income, raise the trust fund in 2030 to $1831 billion or 33.60 percent of taxable payroll.

Note that even with the reduced benefit outlays, the trust fund does decline from its peak in 2018. But the decline does not cause the trust fund to be exhausted because the reductions in Social Security outlays, shown in column 4 of Table 1, continue to grow in relative terms. This slows the decline of the trust fund and permits it to be a growing share of earnings in the long run while the PAYGO tax rate is maintained at 12.4 percent. The full evolution of the trust fund is shown in Figure 2. The two hump-shaped curves, denoted by diamonds and squares, are the projections from the 1999 Trustees Report and the Social Security Simulation Model (SSSIM) model, respectively. The curve that extends throughout the forecast period is the trust fund under the Two Percent Plan as projected by the SSSIM model.

National Saving and Increased GDP

The PRAs would increase national saving and capital accumulation. As discussed above, it is reasonable to assume that in the absence of the PRA program, the government would use the projected budget surpluses to finance various tax cuts and spending increases, bringing the economy back to budget balance. If the government were somehow able to use the budget surplus to retire existing national debt, then the national saving rate would rise by as much as in the PRA system.

Although some individuals might be tempted to reduce other saving in response to this new form of accumulation, the vast majority of Americans have too little in financial assets to do any such dissaving. In any case, the 75 percent benefit offset implies that 75 percent of the PRA balance "belongs" to the government and only 25 percent of the assets in the PRA accounts are net wealth of the individuals. Even if individuals reduced other saving by the full amount of their share of the PRA deposits (i.e., 25 percent of total PRA deposits), the growth of the nation's net capital stock would be substantially greater than it would otherwise have been. This section reports results

under the assumption that the nation's capital stock increases by the full growth of the assets in PRA accounts; readers who believe that individuals would reduce their other saving can decrease these amounts by up to one-fourth of the total value.

The aggregate value of the assets in the PRA accounts grows over time because of the difference between the PRA deposits and the annuity withdrawals. The primary source of the increase after the early years is, however, the 5.5 percent return that is earned on the net assets in the PRA accounts.

The magnitude of the PRA deposits and annuity withdrawals are shown in columns 1 and 2 of Table 1. The resulting growth of the PRA assets is shown in column 1 of Table 2. These assets grow from $74 billion in the year 2000 (the first year of the program) to $1139 billion in 2010. By the year 2020, the assets are $2.9 trillion and by 2040 they are $8.0 trillion; these amounts are all in 1999 dollars. To put these numbers in perspective, they are expressed in column 2 as a percentage of the projected GDP. The ratio of assets to GDP rises from 10.6 percent in 2010 to 23.2 percent in 2020 and 49.9 percent in 2040.

What is the impact of this asset accumulation on economic growth and GDP? An increase in PRA assets raises GDP because the incremental capital that those assets represents earns a substantial rate of return. Using the 8.5 percent real rate of return on nonfinancial corporate capital that the United States has experienced during the past 40 years[13] implies that real GDP is increased by $97 billion in 2010 (i.e., 8.5 percent of the $1139 billion increase in assets), by $246 billion in 2020, and by $682 billion in 2040. These figures are shown in column 3 of Table 2 and are expressed as percentages of the baseline projected GDP in column 4. These calculations imply that the PRA program raises real GDP by 2 percent in 2020, by 4.2 percent in 2040, and by 5.4 percent after 70 years. This is equivalent to an increase in the real rate of growth of about 0.075 per cent per year for 70 years.[14]

TABLE 2
PRA ASSETS, INCREASES IN GDP, AND CORPORATE TAX REVENUE

	PRA Assets		GDP Increase		Corporate Tax Increase	
Year	(1)	(2)	(3)	(4)	(5)	(6)
2010	1139.05	10.55	96.82	0.90	22.78	0.21
2020	2889.86	23.19	245.64	1.97	57.80	0.46
2030	5286.28	37.48	449.33	3.19	105.73	0.75
2040	8029.26	49.90	682.49	4.24	160.59	1.00
2050	10706.00	58.87	910.01	5.00	214.12	1.18
2060	12767.92	62.58	1085.27	5.32	255.36	1.25
2070	14203.03	64.03	1207.26	5.44	284.06	1.28

Notes:
(1) These figures correspond to Feldstein and Samwick (1998a), Table 2, updated to the 1999 Trustees' Report.
(2) Columns (1), (3), and (5) are reported in billions of dollars at the 1999 price level.
(3) Columns (2), (4), and (6) are reported as a percentage of GDP.
(4) GDP increases are equal to 8.5 percent of the PRA assets.
(5) Corporate tax increases are equal to two percent of the PRA assets.

[13] The increase in the capital stock would reduce the real return on capital by increasing the ratio of capital to labor. But even after 70 years when the additional capital is estimated to be 64 percent of the baseline GDP, this would only raise the currently projected capital stock by about 20 percent. A standard economic analysis would imply that this reduces the rate of return from 8.5 to about 7.0 percent.

[14] It is of course possible that the real rate of return earned on the incremental capital generated by the PRA assets would be less than 8.5 percent. Some of those funds are used in housing construction (which earns a lower rate of return), and some of the funds are invested abroad where the United States earns only the return net of the foreign corporate taxes.

The Budget Impact

As noted earlier, the covered earnings on which the two percent PRA savings are based are equal to approximately 40 percent of GDP. The PRA deposits therefore have a budget cost equal to 0.8 percent of GDP. According to the latest projections by the Congressional Budget Office (1999, Table 5), the total budget surplus will average 2.53 percent of GDP from 2000 to 2009, with values of 3.0 and 3.1 in the last two years. The on-budget surplus (i.e., excluding Social Security) will average 0.85 percent of GDP over that same period, with values of 1.2 and 1.3 in the last two years. Since the percentages are essentially flat, budget surpluses can be expected to continue for several additional years. This implies that the contributions of two percent to the PRAs can be financed at least until that date without a payroll tax increase, a reduction in other government spending, or a budget deficit. Before considering what happens immediately thereafter when the increasing outlays for Social Security and Medicare bring the projected budget surpluses to an end, consider what happens in the more distant future.

The 5.5 percent real rate of return that the PRA accounts are assumed to receive has been the historic rate of return earned by portfolio investors after the corporations have paid corporate profits taxes and property taxes to federal, state, and local governments. Since the total pretax return is 8.5 percent, the extra revenue collected by federal, state, and local governments is equal to 3 percent of the PRA assets. Taking that extra revenue into account implies a more favorable overall budget impact of the PRA program.

The federal government's share of that revenue could be used to finance the tax credits for the PRA deposits. To get a sense of the potential importance of this additional tax revenue, consider the implication of assuming that the federal corporate income tax collects 2 percentage points of this 8.5 percent. If so, the federal corporate tax will recover 23.5 percent of the 8.5 percent increase in GDP shown in columns 3 and 4 of Table 2. By the year 2020, this revenue would be 0.46 percent of GDP, enough to finance more than half of the cost of the PRA tax credits (equal to 0.80 percent of GDP); see columns 5 and 6 of Table 2. By 2030, the extra corporate tax revenue would be 0.75 percent of GDP, essentially enough to finance the entire cost of the PRA tax credits. After that year, the additional corporate tax revenue would be more than enough to finance the PRA tax credits and could be used to expand the size of the PRA programs, raising retirement incomes or to further reduce the required PAYGO tax rates.

Summary

The way the Two Percent Plan restores solvency to the Social Security system is graphed in Figure 3. The curve denoted by diamonds indicates the financing gap in the PAYGO system—when the trust fund is exhausted in 2034, this curve steps from zero to about five percent of payroll. After 2034, this curve also shows the size of the annual actuarial deficit in the system (the cost rate minus the income rate). The curve denoted by squares indicates the reduction in required PAYGO benefits due to withdrawals from the PRAs (i.e., 75 percent of the PRA withdrawals in each year). It starts off quite low, but it grows steadily as more retirees have PRAs and the average balance in PRAs increases due to more years of contributions. By 2051, the offsets from PRAs exceed the annual actuarial deficits. Note that in Figure 2 the trust fund begins to grow again starting in this year. Prior to this year, the financing gap was covered by running down the extra assets in the trust fund due to the PRA offsets. By 2075, PRA offsets are 7.07 percent of payroll, or 0.5 percent of payroll higher than the forecasted PAYGO

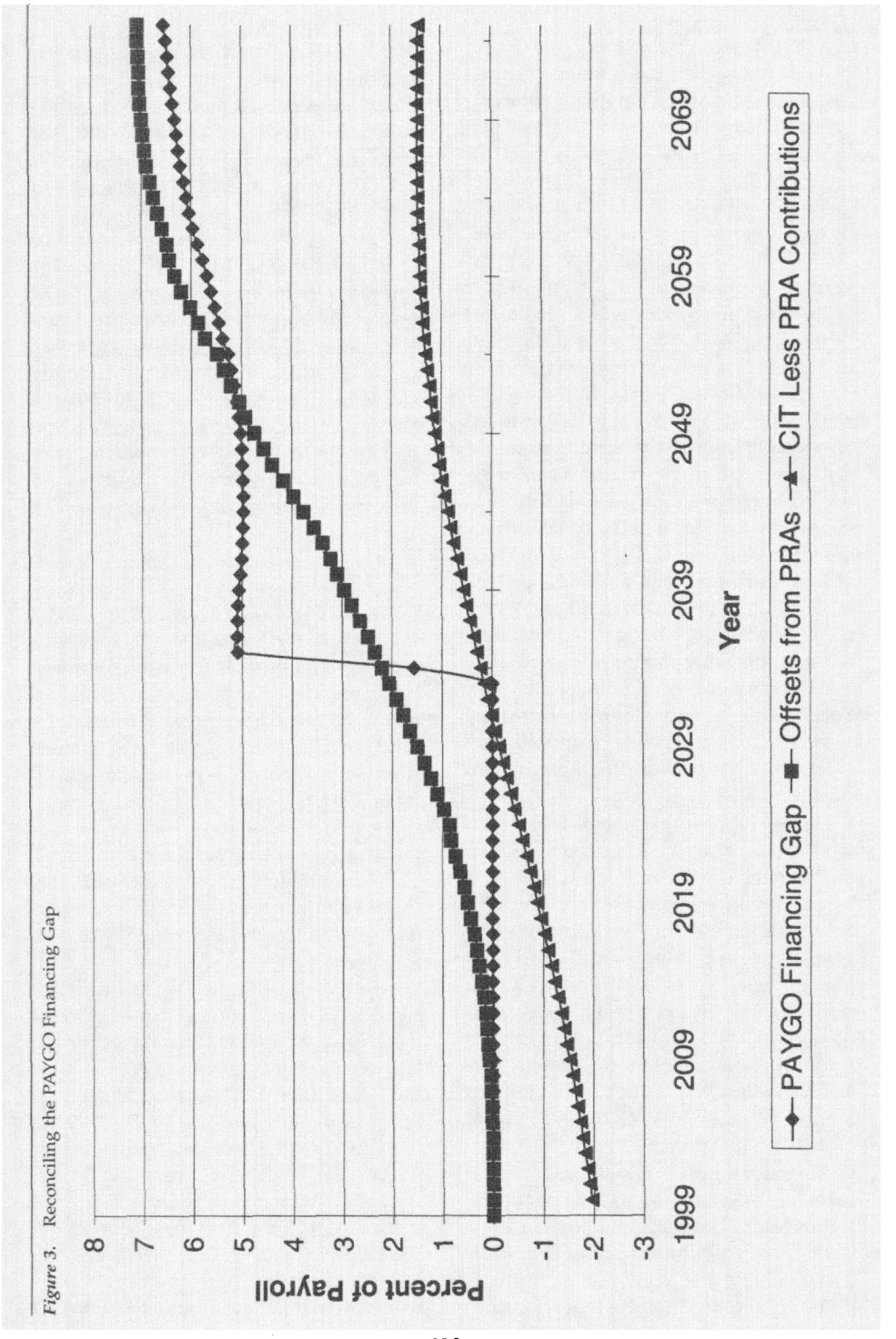

Figure 3. Reconciling the PAYGO Financing Gap

deficit. The last curve, denoted by triangles, is the excess of revenue from the corporate income tax collected on PRA assets less the two percent PRA contributions. It starts at –2 because there are no assets in the first year. In 2031, it crosses from positive to negative, indicating that if all PRA assets reflected new saving, the program would be self-financing. By 2075, the excess revenue is 1.45 percent of payroll. Due to the 25 percent of the PRA withdrawals that are not offset by PAYGO benefit reductions, total retirement benefits are also higher on average by about 10 percent.

A program of PRAs funded by deposits equal to two percent of taxable payroll would permit retirees to receive more income in retirement on average than with the current Social Security program. At the same time, the PRAs eliminate the need to increase the 12.4 percent payroll tax in response to the aging of the population. The gross cost of the credits, approximately 0.8 percent of GDP, could be financed for at least a decade out of the budget surpluses currently projected by the Congressional Budget Office. By the year 2030, the additional corporate tax revenue that results from the enlarged capital stock financed by PRA assets would be able to finance fully these personal tax credits. During the intervening years (about 2015 to 2030), a reduction of other government spending or an increase in taxes would be needed if budget deficits are to be avoided. If implemented, the PRA program would not only increase retirement income but also stabilize the Social Security payroll tax. It would also cause a substantial increase in national saving and GDP.

COMPLICATIONS ASSOCIATED WITH PRAs

The possibility of prefunding Social Security liabilities with private securities rather than government bonds raises several new policy issues. This section briefly discusses how the framework detailed above can resolve or accommodate these issues.

Are Individual Accounts Really Necessary?

There is considerable disagreement among participants in the current Social Security reform debate regarding the issue of how the private securities are to be held. Some, including the president in his State of the Union proposal, have suggested that the Social Security trust fund can directly hold the shares. In brief, a portion of the Social Security trust fund would be used to purchase equities rather than government bonds.[15] An independent board would oversee investments and would be required by law to make decisions based only on financial considerations. Others, such as Federal Reserve Board Chairman Greenspan (1999) have insisted that Social Security reform cannot include government ownership of private securities. The general point is that direct government ownership creates the potential for too many conflicts of interest.

Three particular questions seem relevant to this debate. First, would the government fund pursue a political agenda in choosing investments? Would "socially responsible" companies receive special attention, and would companies that sell harmful products like tobacco or move jobs overseas be shut out? Second, as a matter of logistics, how would the government vote the shares? Further, would a political agenda be pursued in the voting of the shares? Third, would other government policies be altered based on the composition of the trust fund? For example, suppose that to avoid such con-

[15] Details of how such ownership would work are presented in recent testimony by Treasury Secretary Summers (1999).

flicts, the trust fund was invested in an index fund and passively managed. Today, its largest holding would be Microsoft. Would that make it less likely that the government would be pursuing its antitrust lawsuit against that company?

Proponents of a single fund rather than individual accounts (see, for example, Aaron and Reischauer (1998)) often cite the Federal Employees Thrift Savings Plan (TSP) as a prototype for government sponsored investment in private securities. It covers several million workers and has remained free of political interference. There are two caveats to this example. The first is that the TSP is formally organized with individual accounts—it is a defined contribution system, not a defined benefit system. It is modeled after private 401(k) plans and is expected by the participants whose names are on the accounts to behave as such. The second is that, compared to a fund that would cover 140 million participants, the TSP is a small program. It hardly registers on the radar screen for special interest groups who might lobby for politically motivated investment. A more appropriate example of the dangers of centralized management might be state and local government workers' defined benefit pensions, which have historically been subjected to political interference.[16]

All participants in the debate recognize that the key to preventing political interference is to make it very difficult for political branches of government to affect the management of the accounts. Those who favor a centralized strategy believe that is possible given the particular role that equity investment plays in their particular proposals. For example, the president's proposal calls for "only" $700 billion of equity investment. Perhaps that fund is small enough to be managed within the Social Security trust fund subject to careful oversight. But recall that this proposal is inadequate to address even the 75-year actuarial deficit in the program. The Two Percent Plan solves the long-term financial crisis, but when fully phased in, it will have assets of 64 percent of GDP. If such a fund existed today, it would be $5.66 trillion, or over eight times as large. The investments in private securities that are large enough to completely prefund the forecasted shortfall are simply too large to be managed centrally. Any fund small enough to avoid the governance problems is also likely to be too small to resolve Social Security's financial crisis.

Would Administrative Costs of PRAs Be Prohibitive?

The most critical disadvantage of a system of PRAs is the administrative costs of establishing and servicing the millions of individual accounts. Administrative costs on a centrally managed fund would be at most a few basis points per year. A recent report by the National Academy of Social Insurance (1998) provides a discussion of the sources of administrative costs of a system of individual accounts. It further suggests a range of $25–$50 per participant per year for a low-cost/low-service system. The report shows that over a working career, a fixed fee of this magnitude is equivalent to a 5–11 percent front-end load on contributions or a 25–50 basis point charge on assets per year. The simulations of the Two Percent Plan presented here include charges of 40 basis points per year in addition to all of the forecasted administrative costs of the PAYGO system (equal to roughly 0.8 percent of the projected cost rate in each year). The simulations of PRAs presented above therefore include reasonable allowances for administrative costs.

[16] See, for example, testimony by Baronian (1999) regarding the State of Connecticut Retirement and Trust Funds' failed attempt to save jobs within the state.

The government can facilitate low-cost PRAs in two ways. The first is by establishing a clearinghouse for payments between funds and participants, as in the operation of the TSP. This centralizes the process of coordinating transfers and checking for errors and can reap appropriate economies of scale. Individuals and their employers should not have to contact private investment companies for these tasks. In a recent paper, Goldberg and Graetz (1999) develop a flexible and efficient framework for keeping administrative costs low. Their system uses existing income and payroll tax reporting and filing mechanisms to transfer payments in and out of PRAs. There is no requirement, or even a reason, that the PRA system be a full-service IRA plan for everyone. Such opportunities for saving already exist, and it is not necessary to *require* the Social Security system to provide more than basic services.

The second way the government can assist in keeping administrative costs low is by establishing a default plan. A default plan is necessary as an "incubator" of small accounts (such as those of teenagers with summer jobs). Once a worker has contributed for a sufficient number of years, she will have the option to switch to a private investment company. The default plan avoids fixed fees on the smallest accounts. The government will contract out its management to financial services companies, as in the TSP, and require that the accounts be passively managed as an index fund. Other aspects of administrative costs are the costs of worker education. A default plan allows for the group of workers who are either unable or unwilling to play a role in choosing their own investments to avoid that task. While a default plan may reintroduce problems of a centrally managed trust fund, the expectation is that all accounts will eventually have large enough balances to be privately managed. Finally, it would also be possible to use the administrative costs of the default plan as the standard for any benefit guarantees that are offered by the government on PRAs.

Are Private Security Returns Too Risky?

There seems to be general agreement on all sides of the public policy debate that the optimal degree of equity investment in the Social Security system is not zero. Economic justifications based on general equilibrium analyses can be found in Bohn (1997) and Diamond and Geanakoplos (1999). There is substantially more disagreement regarding the appropriate size of those investments and the magnitude of the burden they might impose on taxpayers and beneficiaries. In reforms that have explicitly defined contribution portions, such as the Advisory Council's (1996) PSA plan, the risk is borne by the account holders. In reforms that simply invest Trust Fund assets in equities, the risk is borne by future taxpayers who are still responsible for meeting the defined benefit obligations of the largely PAYGO system. In reforms like the Two Percent Plan in which a minimum guarantee can be offered, the risk will be shared by account holders and taxpayers in general. In any of these three forms, bearing risk has a cost.

There are two perspectives on how to measure the economic cost of bearing this risk. The first is to simulate the distribution of possible outcomes under an assumed stochastic process for security returns and then compare the expected utility of that distribution across proposals or investment strategies. This is shown for the Two Percent Plan (corresponding to the 1998 Trustees Report) in Feldstein, Ranguelova, and Samwick (1999, Section 7). The standard deviation of the portfolio earning 5.5 percent was 12.5 percent over the same period. Without any government guarantees, the distributions of

outcomes in 2050 and 2070 for a worker who is 21 years old at the start of the transition in 2000 are as follows.

	Years	
Percentile	2050	2070
1	0.66	0.59
2	0.68	0.60
5	0.73	0.63
10	0.79	0.67
50	1.27	1.17
90	2.89	3.88

Each value in the table is the ratio of the combined benefits of the PRA annuity and the PAYGO system assuming that PAYGO benefits are reduced by 75 percent of the *expected* accumulation at the 5.5 percent rate of return. This operates as a lump sum reduction, without any offset at the margin. The individual then keeps the entire PRA balance. In 2050, when the worker is 71, the combined benefit is 27 percent higher than under the present system at the median. In only 10 percent of the simulations are the combined PRA and PAYGO benefits less than 80 percent of the benefits under the current system. Over time, the distribution of PRA balances becomes more dispersed. The median account finances total benefits that are 17 percent higher than under the current system, and there is a 10 percent chance that benefits are only two-thirds of those under the current system.

The same simulations are used to compute the distribution of costs to the government of providing a generous guarantee in each year. The guarantee provides a floor of the current PAYGO benefit plus 25 percent of the PRA annuity.[17] In 2070, the median value of the transfers that need to be made into the accounts is a mere 0.07 percent of payroll. There is only 1 chance in 10 that the funds needed exceed 5.32 percent of payroll and only 1 chance in 100 that the required funds exceed 6.92 percent of payroll. The excess corporate income tax revenue (shown in Figure 3) can defray some of the costs of the guarantee. If all of these incremental corporate tax revenues are used (when needed) to finance the guarantee, then in 2070, there is only a 2 percent probability that the additional transfer will exceed 3.7 percent of payroll. Even with the PRA contributions due that year, this is still less than the currently forecasted 6.29 percent annual actuarial deficit in 2070 if no reform is implemented.[18]

The second framework for assessing the risk of investing in equities is based on option pricing techniques. Providing a guaranteed minimum payment from a PRA is analogous to providing the account holder with a put option—the right to "sell" the portfolio in the PRA to the government at a "price" that is equal to the guaranteed amount. Smetters (1997, 1999) uses option pricing formulas to calculate the cost of the put option and shows that the cost of the guarantee is quite large. The different conclusions of the two approaches are a manifestation of the equity premium puzzle (see Mehra and Prescott, 1985). The equity premium is the excess

[17] Note that this guarantee provides a higher retirement income to the individual (and therefore a greater cost to the government) than would a plan in which 75 percent of the PRA offsets PAYGO benefits. In a system of PRAs, any guarantees provided by the government restore the shortfall between the benchmark benefit and the *greater* of the actual PRA balance and the value that the account would have obtained if it had been invested in the default plan of low-cost index funds. Successful investors are not given additional resources when the market does poorly, and unsuccessful investors are not given resources when the market does well. This system eliminates the moral hazard problems that might arise from allowing individuals to direct their own investments in the presence of a guarantee.

[18] Another indication of the cost of protecting the PRAs against risk is to consider the required contribution if the rate of return on PRAs were set equal to the current rate of return on Treasury Inflation Protected Securities. At a rate of return of 3.7 percent, the reform would require PRA contributions of 3.4 percent rather than 2 percent each year.

return on stocks relative to riskless assets. The puzzle is why it is so large, at six or seven percent per year over the last 50 years. In order to reconcile the excess return in a standard framework, risk aversion would have to be implausibly high. At those high levels of risk aversion, welfare gains from the PRA system are more modest than indicated by the simulations presented above. However, those values of risk aversion are inconsistent with other aspects of individual behavior regarding risk. At lower values that are consistent with more reasonable attitudes toward risk, the gains from the PRA system, net of the expected cost of the guarantees, are large. Reconciling these competing views awaits the resolution of the equity premium puzzle.

Will PRAs Be Able To Pay Annuities?

An important feature of the current Social Security system is that it pays out benefits in the form of an indexed annuity. Perhaps as a result of the annuitization provided by Social Security, private annuity markets in the United States are quite thin. Adverse selection arises in insurance markets when customers have private information about their own risks. In this case, people who suspect that they have greater longevity will disproportionately purchase annuities. Annuitants are currently subject to loads of 5–10 percent (Mitchell et al., 1999) that compensate providers for adverse selection.

If the PRA system had to rely on the current annuity market, it might be infeasible. However, much of the selection in annuity markets would disappear if annuitization were mandatory.[19] A requirement that annuities be indexed to prices or paid as variable annuities could also make those products more widely available from private providers.

The Two Percent Plan can also be implemented even in the absence of a sufficiently well-developed private annuity market. The federal government could simply run the annuity portion, while leaving investment management and administration to private companies. Such a scheme would operate by having the government set the payout ratio from the PRA based on the appropriate life table when the individual retires. All balances in the PRAs revert to the government upon the death of the worker or beneficiary. Each year, the government would top off the PRAs of the survivors by enough to ensure that they can maintain the same benefit level (apart from fluctuations in security returns around their expected levels) going forward. If the life table is the correct one, then the government's position is expected to be zero.

This scheme will work for any individual account plan. Because the Two Percent Plan has an offset of PRA withdrawals against PAYGO benefits, annuitization is even easier. The government could simply set an appropriate withdrawal rate for PRAs. At death, balances revert to the government. If an individual lives long enough to exhaust the PRA, then subsequent PRA withdrawals are zero and the government simply pays the beneficiary the PAYGO benefits in all subsequent years. Again, the pattern of withdrawals can be chosen consistent with the life table so that the government's net position is expected to be zero. The absence of a frictionless annuity market can therefore be overcome without additional complications. Existing loads on private annuities are not relevant for the Two Percent Plan.

[19] Walliser (1997) analyzes adverse selection in annuity markets and its implications for Social Security reform. Even mandating annuitization may not remove all adverse selection if annuity providers are allowed to base their fees on the size of the account to be annuitized, given the (positive) correlation between lifetime earnings and longevity. However, this selection effect works to the advantage of low-income individuals.

Will PRAs Eliminate Redistribution?

By their nature, defined contribution plans such as PRAs build in less redistribution within and across generations than do defined benefit plans such as the current system. If the investment results in each individual's PRA determine his retirement income, then two workers with identical earnings histories will receive different total benefits if one invests better or is luckier than the other. It is also likely that higher income individuals will earn higher investment returns, whether through better investment advice or skill or as a result of being less risk averse. Similarly, a generation that is alive during periods of high investment returns will have higher retirement incomes than those alive during periods of lower investment returns. If a system of individual accounts were implemented without any attention to redistribution, the progressivity of Social Security would be reduced.

It is important to note first that some redistribution that is now implicit in the system would almost certainly be legislated away if it were made explicit. The vast differentials in the effective tax rates between one-earner and two-earner couples (see Feldstein and Samwick, 1992) are an example. Given the changes in the nature of the workforce, the occasion of Social Security reform may be the appropriate time to reconsider the transfers inherent in the system.

Nonetheless, progressivity can be maintained in several ways under a system of PRAs. Under the Two Percent Plan, the federal government is overseeing the depositing of contributions into the PRAs. It could make these contributions progressively. This is similar to levying a redistributive tax on contributions. If a redistributive tax were applied to PRA withdrawals, then the government could tax investment success within a generation. If some of that tax revenue were accumulated in the trust fund, then investment success across generations could be smoothed as well. Another alternative simply recognizes that PRAs represent only about a third of aggregate benefits. The underlying benefit formula for the PAYGO system could be made more progressive to compensate for less progressivity in the PRA withdrawals.

ROLE OF THE GOVERNMENT

It is evident from the previous sections that a system of individual accounts does not imply that the government has no role in supporting retirement income even in a largely "private" system. There are four key areas in which government involvement and supervision can promote the success of the proposed system.

First, the simple fact that the first two-thirds of current law benefits will be provided by the current system is important. These benefits keep retirees and their dependents out of poverty. As stressed by the World Bank (1994), a PAYGO defined benefit system may be the most efficient mechanism for alleviating poverty within a social insurance system. Given that tier of benefits, it is then possible to use ownership of private securities in individual accounts to generate replacement rates that maintain the preretirement standard of living.

Second, low-cost administration of the PRA system can be facilitated by relying on existing systems for reporting and filing income and payroll taxes within the federal government. Directing payments to each participant's account requires only one additional piece of information on payroll tax forms—the identification number for the chosen investment manager. A clearinghouse could be established to coordinate the transfer of funds from the Treasury to the PRAs. There is no need to duplicate these reporting structures among private investment companies (see Goldberg and Graetz, 1999).

Third, the federal government can establish a default plan that serves several purposes. A default plan is necessary to accommodate unsophisticated participants who would simply prefer not to take any responsibility for their own investments. A default plan can also incubate small accounts for several years so that they are not severely depleted by administrative charges that are invariant to the account size. A default plan is also critical in setting the target for any system of government guarantees that is to overcome moral hazard problems associated with individual-directed investments.

Fourth, it may be most efficient for the federal government to retain the responsibility for annuitizing account balances during retirement. This will depend primarily on whether the adverse selection that is present in the largely voluntary market for annuities today is substantially reduced by mandating annuitization of PRA balances.

CONCLUSIONS

The original Two Percent Plan in Feldstein and Samwick (1998a) established a framework in which a transition to a mixed system of PAYGO benefits and PRAs was feasible at a low cost to the transition generations. This paper has updated that analysis and placed it in a broader context of Social Security reform. The most important feature of the system of PRAs proposed here is that it addresses the entire financial crisis confronting Social Security. Under the Two Percent Plan, the trust fund is never exhausted and is growing at the end of the forecast period. The actuarial deficit in the last year of the forecast period is covered, and total retirement benefits increase by up to ten percent. Contributions to PRAs are also a mechanism through which the projected budget surpluses can be added to national saving.

The system of PRAs adds an opportunity for more individual participation in the process of providing resources during retirement. But even with the addition of these private elements, there is an important role that the government must play. The next decade represents a window of opportunity for solving the program's financial crisis. Delay only serves to make the remedy more burdensome when it is finally undertaken.

There are complications associated with establishing a system of PRAs, but they are not insurmountable. Goldberg and Graetz (1999, p. 29) expressed the challenges confronting the current generations quite eloquently.

> To put the administrative challenge of personal retirement accounts in context, it is worth recalling what the world was like when Social Security itself was introduced in 1935. There were no Social Security numbers. Many Americans didn't have a telephone. There were no computers—all records were maintained on paper, all information was entered by hand; all correspondence was sent and delivered by mail; there was no computer-based financial infrastructure. Implementing Social Security under these conditions was hard; by comparison, implementing personal retirement accounts today would be easy.

The advantages of proposals to reform Social Security such as the Two Percent Plan are not that they find a more effective way of financing the liabilities to existing beneficiaries, but that they provide an economical way of financing liabilities to future beneficiaries. Policymakers can surely agree that the Social Security program was from its inception an important policy to relieve poverty and insecurity in old age. They must also recognize that during that period, both the program itself and the demographic and economic circumstances that support it have changed considerably. The program is

much larger in its scope, economic growth is forecasted to be lower, and the number of beneficiaries continues to grow relative to the number of workers. To the extent that future benefits are not reduced, the 6.53 long-term annual deficit implies a 50 percent expansion in the program relative to its current 12.40 percent payroll tax. A decision to use PRAs invested in private securities to finance that expansion is not a statement about whether the PAYGO system was appropriate for the 20th century but a recognition that an investment based system is appropriate in the economic and demographic environment of the 21st century.

Acknowledgments

I am grateful to John Yinger and Doug Holtz-Eakin for editorial suggestions and to Martin Feldstein and Elena Ranguelova for many useful discussions as part of our collaborative work on Social Security reform. Results presented here extend those in Feldstein and Samwick (1998a, 1998b) to be consistent with the forecasts in the 1999 Trustees Report. I thank Katherine Miller for research assistance and the Presidential Scholars Fund at Dartmouth College and the National Institute on Aging for financial support. All views expressed, as well as any errors, are solely my own.

REFERENCES

Aaron, Henry J., and Robert D. Reischauer. *Countdown to Reform: The Great Social Security Debate*. Washington, D.C.: The Brookings Institution, 1998.

Advisory Council on Social Security. Report of the 1994–96 Advisory Council on Social Security, 1996.

Baronian, Maureen M. Testimony Before the Subcommittee on Social Security of the Committee on Ways and Means, U.S. House of Representatives. Washington, D.C., March 3, 1999.

Board of Trustees, Federal Old-Age and Survivors Insurance and Disability Trust Funds. *Annual Report*. Washington, D.C.: U.S. Government Printing Office, 1999 (cited as *1999 Trustees Report*).

Bohn, Henning. "Social Security Reform in Financial Markets." In *Social Security Reform Conference Proceedings: Links to Saving, Investment, and Growth*, edited by Steven A. Sass and Robert K. Triest. Boston: Federal Reserve Bank of Boston, Conference Series No. 41, June, 1997.

Boskin, Michael, Laurence Kotlikoff, Douglas Puffert, and John Shoven. "Social Security: A Financial Appraisal Across and Within Generations." *National Tax Journal* 40 No. 1 (March, 1987): 19–34.

Congressional Budget Office. "The Economic and Budget Outlook: An Update." (Available at www.cbo.gov), July, 1999.

Diamond, Peter A., and John Geanakoplos. "Social Security Investment in Equities I: Linear Case." Manuscript. Cambridge, MA: MIT, April, 1999.

Feldstein, Martin S. "Introduction" In *Privatizing Social Security*, edited by Martin S. Feldstein 19–27. Chicago: University of Chicago Press, 1998.

Feldstein, Martin S., and Elena Ranguelova. "Individual Risk and Intergenerational Risk Sharing in an Investment Based Social Security System." Working Paper No. 6839 Cambridge, MA: National Bureau of Economic Research, December, 1998.

Feldstein, Martin S., Elena Ranguelova, and Andrew A. Samwick. "The Transition to Investment-Based Social Security When Portfolio Returns and Capital Profitability Are Uncertain." Working Paper No. 7016. Cambridge, MA: National Bureau of Economic Research, March, 1999. In *Risk Aspects of Investment Based Social Security Reform*, edited by John Campbell and Martin Feldstein. Chicago: University of Chicago Press, 1999.

Feldstein, Martin S., and Andrew A. Samwick. "Social Security Rules and Marginal Tax Rates." *National Tax Journal* 45 No. 1 (March, 1992): 1–22.

Feldstein, Martin S., and Andrew A. Samwick. "The Economics of Prefunding Social Security and Medicare Benefits." In *NBER Macroeconomics Annual 1997*, edited by B. Bernanke and J. Rotemberg 115–48. Cambridge: MIT Press, 1997.

Feldstein, Martin S., and Andrew A. Samwick. "Potential Effects of Two Percent Personal Retirement Accounts." *Tax Notes* 79 No. 5 (May 4, 1998a), 615–20.

Feldstein, Martin S., and Andrew A. Samwick. "Maintaining Social Security Benefits and Tax Rates Through Personal Retirement Accounts: An Update Based on the 1998 Social Security Trustees Report." Manuscript presented at the Association for Public Policy Analysis and Management Annual Research Conference, October, 1998b.

Feldstein, Martin S., and Andrew A. Samwick. "The Transition Path in Privatizing Social Security." In *Privatizing Social Security*, edited by Martin Feldstein 215–60. Chicago: University of Chicago Press, 1998c.

Geanakoplos, John, Olivia S. Mitchell, and Stephen P. Zeldes.
"Would a Privatized Social Security System Really Pay a Higher Rate of Return?" In *Framing the Social Security Debate*, edited by R. Douglas Arnold, Michael J. Graetz, and Alicia H. Munnell, 137–56. National Academy of Social Insurance, Washington, D.C.: The Brookings Institution, 1998.

Goldberg, Fred T., and Michael J. Graetz.
"Reforming Social Security: A Practical and Workable System of Personal Retirement Accounts." NBER, Working Paper No. 6970. Cambridge, MA: National Bureau of Economic Research, February, 1999.

Greenspan, Alan.
Testimony Before the Subcommittee on Finance and Hazardous Materials of the House Committee on Commerce, U.S. House of Representatives. Washington, D.C., March 3, 1999.

Kotlikoff, Laurence J.
Testimony Before the Subcommittee on Social Security of the Committee on Ways and Means, U.S. House of Representatives. Washington, D.C., March 3, 1999.

Kunkel, Jeffrey.
"Social Security Trust Fund Investment Policies and Practices." Social Security Administration, Office of the Chief Actuary, Actuarial Note No. 142. Available at http:www.ssa.gov/OACT/NOTES/note142.html.

Mehra, Rajnish, and Edward C. Prescott.
"The Equity Premium: A Puzzle." *Journal of Monetary Economics* 15 No. 2 (March, 1985): 145–61.

Mitchell, Olivia S., James M. Poterba, Mark Warshawksy, and Jeffrey R. Brown.
"New Evidence on the Money's Worth of Individual Annuities." *American Economic Review* (forthcoming).

National Academy of Social Insurance.
Evaluating Issues in Privatizing Social Security: Report of the Panel on Privatization of Social Security, 1998.

Poterba, James M.
"The Rate of Return to Corporate Capital and Factor Shares: New Estimates Using Revised National Income Accounts and Capital Stock Data." *Carnegie-Rochester Conference Series on Public Policy* 48 No. 0 (June, 1998): 211–46.

Samwick, Andrew A.
"The Impact of Social Security Reform on Saving." *National Tax Association Proceedings–1997*, 178–86. Washington, D.C.: National Tax Association, 1997.

Smetters, Kent.
"Investing the Social Security Trust Fund in Equity: An Options Pricing Approach." Congressional Budget Office, Macroeconomic Analysis and Tax Analysis Divisions, Technical Paper No. 1997-1. Washington, D.C.: Government Printing Office, 1997.

Smetters, Kent.
"Arbitrage Pricing of Unfunded Benefit Guarantees: Rationale and Computation." In *Risk Aspects of Investment Based Social*

Security Reform, edited by John Campbell and Martin Feldstein. Chicago: University of Chicago Press, 1999.

Social Security Administration.
Income of the Population 55 or Older, 1996. Washington, D.C.: Office of Research, Evaluation and Statistics, 1996.

Summers, Lawrence M.
Testimony Before the Subcommittee on Social Security of the Committee on Ways and Means, U.S. House of Representatives. Washington, D.C., March 3, 1999.

Walliser, Jan.
"Understanding Adverse Selection in the Annuities Market and the Impact of Privatizing Social Security." Congressional Budget Office, Technical Paper. Washington, D.C.: Government Printing Office, August, 1997.

Weaver, Carolyn L.
Social Security and Its Reform. Washington, D.C.: American Enterprise Institute, 1999.

World Bank.
Averting the Old-Age Crisis: Policies to Protect the Old and Promote Growth. New York: Oxford University Press, 1994.