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# Macroeconomic Aspects of Social Security Reform

UNDER CURRENT LEGISLATION, the U.S. social security system has a long-run financial problem. The intermediate (central) projection of the Office of the Actuary of the Social Security Administration (SSA) shows that the payroll tax would have to be increased by 2.23 percent immediately to restore actuarial balance to the Old-Age, Survivors, and Disability Insurance (OASDI) program for the seventy-five-year projection period. As shown in figure 1 (which presents the high- and low-cost projections in addition to the intermediate), the long-run deficit is made up of an excess of revenues over costs, followed by the reverse.[1] Under current law, the excess of OASDI costs over revenues would be paid out of the interest earnings of the trust funds and then out of the trust funds themselves. If the intermediate projection is correct, the trust funds will reach zero in 2029 (see figures 2 and 3). At this date, the projected flow of revenue is roughly three-quarters of projected benefits. The commonly voiced fear that social security "will not be there for me" reflects a widespread lack of awareness that substantial

1. Revenue comes from a payroll tax of 12.4 percent and from income taxation of benefits, which currently equals 0.23 percent of taxable payroll.

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Figure 1. OASDI Income and Costs as a Percentage of Taxable Payroll, 1985–2075[a]

Percent
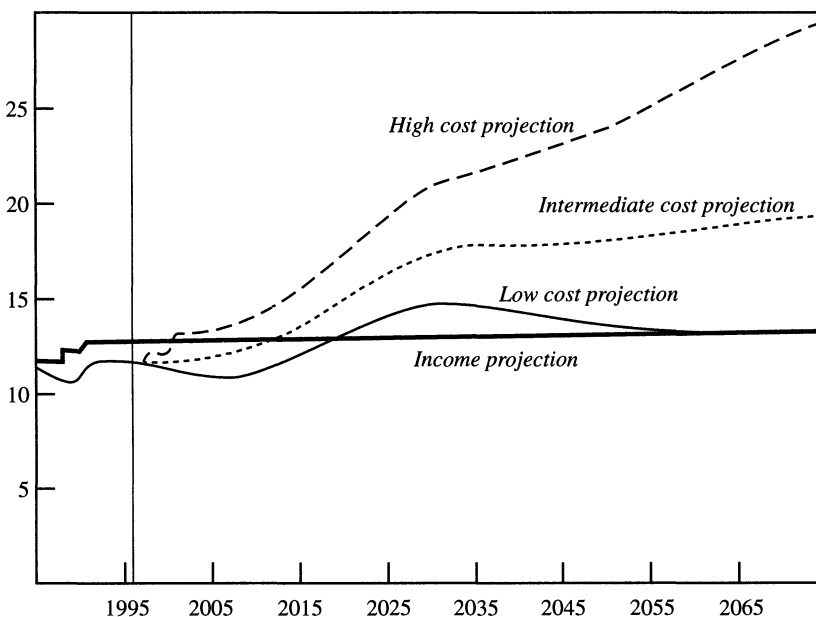
revenue will still flow to social security after the trust funds are depleted.

Following the historical pattern of social security legislation in the United States, the intermediate projection could be made to balance by a combination of tax increases, benefit cuts, and the expansion of coverage to uncovered state and local government workers. However, for a variety of reasons more basic changes have been proposed. This paper first considers the idea of building a large permanent trust fund, rather than one that rises and then falls to an end-of-projection-period reserve fund target of 100 percent of annual expenditures.[2] While having a

2. The long-range estimates include the cost of ending the seventy-five-year projection period with a trust fund equal to 100 percent of the following year's expenditures. A test of financial adequacy over the ten-year short-range projection period is applied

Figure 2. Estimated OASDI Income and Outgo, Based on Intermediate Cost Projection, 1997–2027

Billions of 1997 dollars
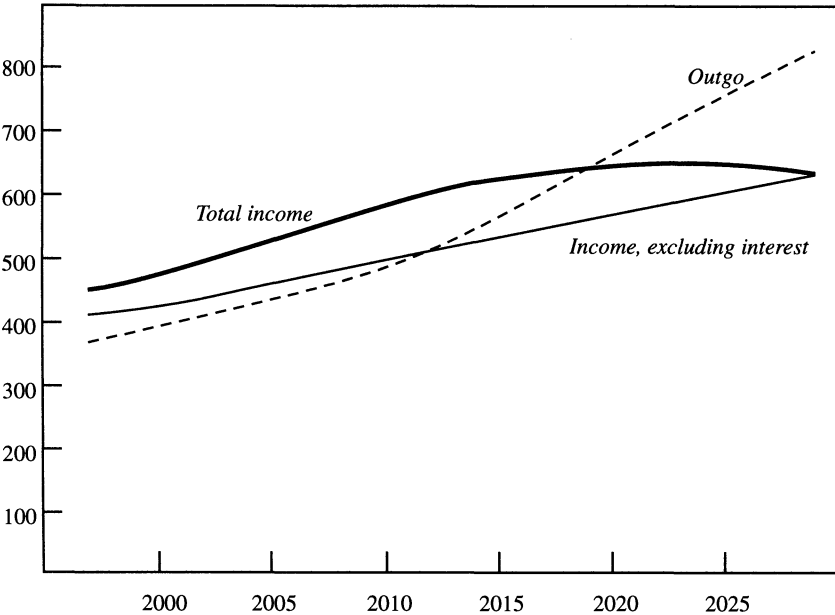
Source: Board of Trustees (1997, p. 181).

larger trust fund is advantageous (just as being wealthy has its pluses), building a larger or longer lasting trust fund requires that the economy bear "transition costs," a term that does not convey the central issue

to the Old-Age and Survivors Insurance (OASI) and Disability Insurance (DI) trust funds, separately and combined. "The requirements of this test are as follows: If the estimated trust fund ratio for a fund is at least 100 percent at the beginning of the projection period, then it must be projected to remain at or above 100 percent throughout the 10-year projection period. Alternatively, if the ratio is initially less than 100 percent, then it must be projected to reach a level of at least 100 percent by the beginning of the sixth year and to remain at or above 100 percent throughout the remainder of the 10-year period. . . . Failure to meet this test by either trust fund is an indication that solvency of the program over the next 10 years is in question and that Congressional action is needed to improve the short-range financial adequacy of the program." (Board of Trustees, 1997, p 73.)

**Figure 3. Combined OASI and DI Trust Fund Assets as a Percentage of
Annual Expenditures, 1985–2075[a]**

Percent
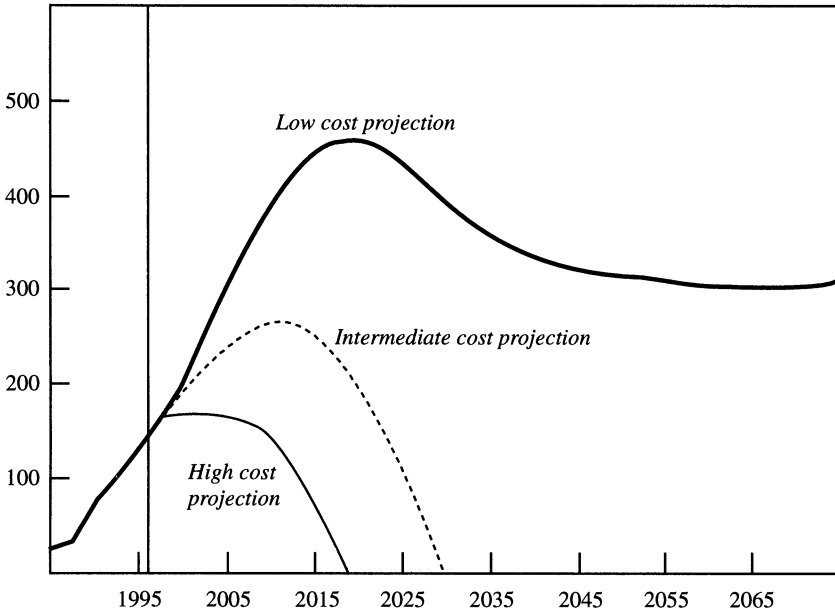
Source: Board of Trustees (1997, p. 26).
a. For years to the left of the vertical line, figure gives historical data; for years to the right of the line, it gives projections.

of intergenerational equity implicit in the timing of tax payments.

The paper also explores changing the trust fund portfolio to include private securities along with federal debt, while leaving the basic structure of social security benefits unchanged. A portfolio change would alter both the expected return and the risk of the trust fund. The paper then considers a more fundamental change: substituting a defined contribution system for part of the defined benefit structure of OASDI. The paper relates these issues to proposals made by different groups on the the 1994–96 Advisory Council on Social Security and modifications of those proposals.[3] Table 1 outlines the retirement portions of the proposals discussed. The Maintain Benefits (MB) proposal is a standard

3. See Advisory Council on Social Security (1997).

Table 1. Summary of Retirement Program Proposals Discussed

Maintain Benefits	
Endorsed	Expand coverage, cut benefits (short and long runs), raise taxes (long run only).
Recommended for study	As "endorsed," plus investment in private securities.
Possible	As "recommended for study," plus tax increase now.
Individual Accounts	
Proposed	Expand coverage; cut benefits (in short and long runs); raise taxes by 1.6 percent, with the money going into defined contribution accounts: 401(k)-style government selection of available investments, mandatory annuitization.
Personal Security Accounts	
Proposed	Expand coverage, raise benefits (short run); transition to a flat benefit; transition tax of 1.52 percent for 72 years (plus borrowing); 5 percent of payroll go to defined contribution accounts: IRA–style private selection of investments, funds available at age 62.
Possible	As "proposed," plus restricted individual portfolio choice: only approved portfolios (as Chile); restricted access to funds: limited rate of spending if no annuitizaion (as Chile).

package of coverage expansion, short- and long-run benefit cuts, and a long-run tax increase, together with a change in trust fund investment practice. In the report, the MB group endorsed the traditional elements and recommended the innovation for study. Recognizing the possibility of adding an early tax increase permits a more convenient comparison with the other proposals. The Individual Accounts (IA) proposal includes a defined contribution element with rules modeled on current 401(k) rules, whereas the Personal Security Accounts (PSA) proposal includes a defined contribution element with rules modeled on current rules for individual retirement accounts (IRAs). The paper also considers a more heavily regulated version of the IRA model, which would be closer to the privatization of social security implemented in Chile. Although the focus is on the capital market, the paper briefly considers the implications of such changes for the labor market.

The paper concentrates on alternative proposals that preserve the basic role of social security, rather than the logic of filling such a role.[4]

4. For a discussion of the economic basis for a program like social security, see Diamond (1977).

It does not consider proposals that would eliminate redistribution within social security. It does not consider proposals to means-test (or affluence-test) social security. Such proposals, which relate social security benefits to annual income with large implicit taxes, represent taxation of individual savings and therefore would not seem to be a useful part of proposals to increase national saving. Moreover, such proposals would change the basic political status of social security. As noted by the General Account-ing Office, "persons losing benefits would tend to be those who pay the highest Social Security taxes and already implicitly receive the lowest rates of return on their contributions. Means-testing would further reduce benefit equity for them and could diminish whatever political support they give to the system. Means-testing could raise perceptions of Social Se-curity as a welfare program rather than a program that ensures a basic retirement income to persons who work and contribute to the system their entire working lives." [5]

A number of different motivations have been expressed for the pro-posals discussed in this paper. Several of the reform ideas aim to reduce the frequency of necessary adjustments to social security. As shown in figure 1, the projected net cash flow of social security is positive in the short run and then becomes negative. A traditional reform of social se-curity would be likely to preserve such a structure, so that actuarial im-balance would recur merely as a result of the passage of time—as finan-cially good early years are succeeded by financially poor years later in the rolling projection—even if the projections were exactly right. As shown in table 2, roughly one-third of the actuarial deficit that has reappeared since the 1983 reform of social security is due to the passage of time; that is, the change in the seventy-five-year period covered by the projection. In part, the reappearance of the deficit is also due to changes in the workings of the disability program and to changes in underlying actuarial methodology as a result of the availability of new data. With a rolling seventy-five-year forecast and projected trend improvements in mortality, either automatic adjustment or an actuarial surplus is needed if frequent adjustments are to be avoided.

Another motivation is to use social security reform as a device for increasing national saving beyond what would occur with a tradi-tional reform. Also, the proposals express a general concern for inter-

5. U.S. General Accounting Office (1997, p. 34).

Table 2. Change in the OASDI Actuarial Balance from 1983 to 1997ᵃ

Percentage points

Balance in 1983 report	0.02
Balance in 1997 report	−2.23
Change	−2.25
Reason for change	
Legislation	0.16
Valuation period	−0.71
Economic assumptions	−0.77
Demographic assumptions	0.76
Disability assumptions	−0.75
Methods	−0.79
All other	−0.15

Source: Unpublished data provided by the Office of the Actuary of the Social Security Administration.

a. Table gives seventy-five-year actuarial balance in 1983 and 1997, the percentage point difference between these projections, and the relative importance of various reasons for the difference.

generational equity; in particular, the "moneysworth" calculations of how social security will affect the net financial position of future generations.[6]

The interest in switching from a defined benefit to a partially defined contribution structure is, in part, a response to political concerns raised by the proposal to change trust fund investment policy within the traditional social security structure. There is also an independent interest in defined contribution accounts, which differ from a defined benefit system in both the accumulation and retirement income phases. However, there is concern that even a small defined contribution program will create political forces that will ultimately dismantle the structure of social security, leaving only a small antipoverty program—like supplemental security income (SSI)—and nonredistributive mandatory saving. The paper discusses the connection between these motivations and the reform proposals.

The paper begins by discussing some implications of restoring actuarial balance by means of a standard legislative package. It then considers increasing taxes in order to build up a larger permanent trust fund. This section is followed by a discussion of portfolio choice by the trust funds, focusing on the question of whether the funds should hold equities. The paper then turns to issues around individual accounts and the introduction of a defined contribution element into benefit de-

6. For a discussion of moneysworth calculations and the difficulties in their interpretation, see Geanakoplos, Mitchell, and Zeldes (forthcoming).

termination. The following section addresses the annuitization of individual accounts. The next pulls together some of the discussion on the politics of social security. A discussion of the labor market issues frequently cited in the debate is followed by some concluding remarks.

Restoring Actuarial Balance

If it is to fulfill its role of providing a floor around which to plan retirement for the entire working population (and its dependents), social security must avoid large, abrupt changes in benefits. Given the magnitude of the program and the need for change to be gradual, policymakers must take a forward-looking approach to legislation required for actuarial balance, and social security must be insulated from the short-term fiscal needs of the government. The political mechanisms that contribute to these outcomes are an earmarked tax and a trust fund for social security and a highly visible, professional annual projection of the program's financial position, over both the short and the long terms. A target of actuarial balance over the next seventy-five years is the touchstone of this mechanism (at least, at times when short-run financing difficulties are not critical). The Office of the Actuary, which makes the forecast, plays a similar role in the political process to that of the Congressional Budget Office in the regular budget process. Thus restoring actuarial balance is both the "standard" political goal and a way of continuing with a system that, to date, has been successful at adapting to demographic and economic change.

Many combinations of benefit cuts and tax increases could restore actuarial balance.[7] Alternative proposals have different patterns of intergenerational redistribution as a result of the particular timing of tax and benefit changes. In addition, differences in benefits and taxes yield different estimated impacts on national saving. Economists are accustomed to comparing alternative equilibriums in comparative static exercises. In contrast, the problem under discussion starts from actuarial imbalance—staying on the currently legislated path is not projected to be an equilibrium. Comparing a nonequilibrium with an equilibrium

7. For a comparison of various alternative combinations, see Technical Panel on Trends and Issues in Retirement Saving (1997).

seems inappropriate. Yet the contrast can easily be overdrawn. Legislation is not fixed in place forever; legislation could change social security even without actuarial imbalance. Individual responses to legislation include recognition of the possibility of future changes. Actuarial imbalance just presents a higher probability of legislated change in the near term. And individual behavior in the presence of actuarial imbalance is based on expectations of how future legislation might evolve.

Consider the elements of a typical package of reform (all taken from the various reform proposals of the advisory council): an immediate benefit cut, such as increased taxation of benefits; a delayed benefit cut, such as an increase in the number of years used to calculate the average indexed monthly earnings or a speedup of the currently legislated increase in the normal retirement age; a future payroll tax increase; and inclusion of all future new state and local government employees in social security. These measures would have the effect of increasing the net flow of revenues to social security in both the short and the intermediate runs (I do not consider the long run, for which the actuarial imbalance makes the comparison unsatisfactory; something would have to have changed by then). Such changes should increase national saving in the short and intermediate runs, unless the offsetting responses to the legislation were very large.

Three possible responses are of interest here (without considering a full general-equilibrium model that includes wage and interest rate changes): individual savers might change their saving behavior, firms might change pension saving, and the federal government might alter the rest of its budget. First, while the theory of individual saving is somewhat unsettled, the qualitative predictions seem uncontroversial.[8] Lowering the net-of-tax benefits of current retirees will lower their consumption. Legislating lower benefits for future retirees (as opposed to projecting that some such legislation would eventually have to be passed) might increase saving somewhat, but it is not expected to have a large effect. The impact of far future changes is of little immediate consequence for the usual reason of overlapping generations, that those consumers are not yet alive. Thus the buildup in social security should

8. For an analysis of individual saving, see Poterba (1996).

more than offset any lower saving by private households. This would hold also for a near-term tax increase that was used to finance a permanently larger trust fund.

Second, although many studies of individual saving behavior have found some sensitivity to future conditions, there are no comparable studies of corporate pension saving behavior.[9] The issue arises at two levels.[10] Many corporate pension plans are integrated with social security in some form.[11] For those integrated on the benefit side, any decrease in social security is somewhat offset by an increase in private pension benefits; an increase that must be funded, if the benefit remains part of the corporate plan. But firms may cut back on pension offerings relative to the full acceptance of the implications of integration. Net, one would again expect an increase in private saving, since one would not expect a cut in social security benefits to result in less funding for private pensions. However on the contribution side, an increase in taxes to fund social security might induce a partially offsetting reduction in the corporate funding of retirement benefits.[12]

Third, if exact balance of the unified federal budget in 2002 and thereafter were the behavioral model of Congress, and if budget balance included the surplus in social security, then any increase in net revenues to social security would be matched by higher spending, or tax cuts, or both elsewhere in the budget. However, it is likely that alternative rules would be relevant in the budget process, such as the current prescription that spending elsewhere in the budget cannot be financed by changes in social security.[13] In this case, the rest of the budget would not change in response to a change in social security.

9. Citro and Hanushek (1997).

10. Gregory (forthcoming).

11. Among employees in medium and large private establishments with defined benefit plans, 63 percent have integrated plans. The comparable figure for state and local government employees is only 8 percent. Of state and local government employees with defined benefit plans, 29 percent are not covered by social security. For details, see Piacentini and Foley (1992, table 4.15, p. 145).

12. For example, this seems to be part of the thinking surrounding the proposal of the Committee for Economic Development (1997).

13. Koitz (1993, 1997); Keith (1997). In particular, Koitz notes: "Two key elements of the budget process are explicit dollar limits on discretionary spending . . . and a 'pay-as-you-go' rule that requires that increases in direct spending . . . and/or cuts in revenues must be offset by other changes so as not to increase the deficit. . . . If the explicit

Recognizing that the year 2002 was chosen for political convenience, budget balance targets should be viewed as endogenous to politically chosen expenditure and tax targets. The decision to include social security surpluses in the budget target was part of the decision to choose balance in 2002, rather than another budget target, such as some particular imbalance in 2002 (as with the Gramm-Rudman targets) or balance in a different year. Given that there is concern about national saving in general, and concern about social security relative to the rest of the budget (as indicated by the dispute over whether it should be included in the proposed balanced budget amendment), one must expect that any social security reform will be linked to the rest of the federal budget by some political compromise, and that such a compromise will preserve much, but possibly not all, of the increase in national saving included in social security reform.[14] Some theory of political response is needed in order to estimate the impact of proposed social security legislation on national saving.

Taken together, these elements of response imply that restoring actuarial balance with a traditional reform is likely to increase national saving, although the net amount is difficult to estimate. In any event, any increase in annual net surpluses accruing to social security in the near term will increase the magnitude of the social security trust funds. Therefore one must examine the relationship between the trust funds and national saving, and in particular, the possibility of a permanently enlarged trust fund.

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spending limits or 'pay-as-you-go' rules are violated during this period, the President may be required to sequester funds (i.e., cut spending). Social Security is not to be included in these calculations and is exempt from any potential sequestration, with the exception of administrative expenses (which are counted as discretionary spending). The law further permits floor objections to be raised against budget bills (so-called 'reconciliation' bills) that contain Social Security measures.'' (1997, p. CRS-2.)

14. For example, budget measurements might include the currently projected social security net surplus, calculated before the incremental changes from proposed legislation (or vice versa, include the actual surplus less the projected change from the proposed legislation). Alternatively, part of social security revenue could be moved to the general budget, while taking social security completely out of all budget measurements. In this case, the part of the revenue from the income taxation of social security benefits that now goes to social security might be moved to the medicare program (which currently gets the balance of this revenue), while removing social security, but not medicare, from the budget.

The Consequences of More Funding

In a steady state, the rate of return to participants in a strictly pay-as-you-go social security system is the rate of growth of the economy, whereas the rate of return in a fully funded system is the rate of interest. With a funded system, if the rate of economic growth exceeds the rate of interest and is expected to remain higher indefinitely, the economy is oversaving and can have a Pareto gain by decreasing funding of the system. It is important to note that the reverse is not true. A rate of growth less than the rate of interest does not imply an opportunity for a Pareto gain by increasing funding. Indeed, in this case, the simple comparison of the rate of growth and the rate of interest is not sufficient to evaluate the advantages of increased funding. The rate of interest is an important part of calculating the implications of increased taxes, while the rate of growth, together with the elasticity of the marginal utility of income, evaluate the relative social welfare of the consumption given up by an earlier generation and that enjoyed by a later one. All of this is familiar from the analysis of changes in the level of public debt, which is equivalent to consideration of the funding of social security at the level of a certainty model with a rational representative agent in each cohort. Whatever changes one makes in the detailed rules of social security—whether they affect labor supply, or the degree of annuitization, or intracohort distribution—there remains the independent policy question of distribution across generations.[15] It is this intergenerational aspect of the reform proposals that is considered in the present section. The analysis is confined to steady states, which illustrates intergenerational effects but does not permit a full accounting of them.

The main element of building up a fund is taxing present workers to benefit future workers. This tax-transfer mechanism makes social security financially more valuable to future workers at a cost of making it less valuable to those who pay the tax to build the trust fund. Note that it is the building of a trust fund that is relevant here, rather than the form of social security or asset management, issues that arise in more complicated models but do not affect the basic message of this analysis. In order to concentrate on this redistribution, one must con-

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15. As is laid out clearly by Rangel (1997).

sider how much one can lower the steady-state payroll tax rate as a result of the temporary tax increase (''transition cost'') that is used to make a permanent increase in the trust fund. The natural starting place is a two-period overlapping generations model.

In this model, with taxation of inelastic labor financing both social security and the rest of the budget, one can calculate the derivative of the steady-state tax revenue with respect to a permanent increase in the trust fund (assuming no change in other government spending). In the simple model with fixed wages and interest rates—as would follow with a linear technology or in a small open economy—steady-state taxes are lower (per dollar of additional trust fund) by the excess of the rate of interest over the growth rate of the economy. This trade-off holds for both the social security budget and the unified budget. Moreover, in this economy, since some of the payroll tax reduction is saved, capital increases by more than one for one with the increase in the trust fund.

Recognizing that technology is not linear, and that the United States is large in the world economy and the world capital market is imperfect, one has to incorporate into the analysis an increase in the wage and a decrease in the interest rate.[16] These feedbacks change saving levels. They also change the cost of servicing government debt and the cost on a young person of financing a given wage replacement rate in old age. Depending on the relative size of these two effects, the impact on taxes may be larger or smaller than in the model with a linear technology; I do not attempt to quantify it. Moreover, this discussion brings out the critical distinction between the social security budget and the unified budget emphasized by Barry Bosworth.[17] A decline in the interest rate lowers the return on the social security trust fund while it is lowering the interest burden on the rest of the government budget. Since social security is a system with an earmarked revenue and since the burdens of social security taxes and other taxes are distributed differently, this distinction is important and is discussed in more detail below.

Three additional issues arise in considering the relevance of the simple model. First, a major part of the justification of social security is the belief that some fraction of the population will not save adequately on its own. This is not captured in a model with a single rational

16. On the imperfect capital market, see Feldstein and Horioka (1980).
17. Bosworth (1996).

representative agent. The second issue is taxation of the return to capital, which is relevant for intertemporal trade-offs and highlights the distinction between the social security budget and the rest of the federal budget. The third issue is uncertainty.

If one uses a model where part of the population does not save at all, while the rest behaves in accord with the standard model, the presence of nonsavers does not affect the impact of a larger trust fund on needed tax revenues with wages and interest rates fixed.[18] The presence of nonsavers does reduce the additional capital accumulated in response to the long-run cut in taxes, since some people consume all of this tax cut. With a nonlinear technology, when wages and interest rates vary, the lower capital stock would generate feedback effects in needed tax revenues.

These formal models prevent one from considering the effects of having a trust fund without also considering the effects of building the fund (and so changing the level of capital in the economy). Looking only at the presence of a trust fund leads to statements that might be misinterpreted.[19]

18. While analytically convenient, a model in which part of the population does not save is not the only model of inadequate saving. One could have low private saving without a low response of private saving to mandated saving. For example, consumers with a high discount rate (that is, judged too high for normative purposes) would undo mandatory savings, dollar for dollar, until a liquidity constraint was binding.

19. For example, from an analysis of increasing the trust fund (in expectation) by alternative portfolio policy rather than higher taxes: "Social Security benefits must be financed using resources from the economy. Whether those resources are obtained from current taxes or from earnings on assets does not matter much." (U.S. Congressional Budget Office, 1994, p. 25.) And, "the economic impact of the Social Security deficit would be the same after 2015 whether or not such a fund exists" (Feldstein and Samwick, 1997, p. 5).

Some statements also draw large distinctions on the basis of the assets in the trust fund. For example: *"The 'trust fund' is a mirage*. To withdraw money from the fund, the government must cash in its assets. The assets, however, are government bonds. To pay off those bonds, the government must either sell more bonds or raise revenue through taxes—which is exactly what it would do if there were no trust fund at all. Merely building up the fund per se makes no difference.

The fund would matter only if it held assets in the private economy: stocks, bank accounts, buildings, whatever. Then cashing in the fund would reduce the need to tax or to borrow. . . . This is not to say that building up the fund has no effect; it just doesn't mean what it is supposed to mean. Each year's surplus, made up of real cash contributions, reduces the unified budget deficit. It thus would reduce federal borrowing, increase the national savings rate, and, by that logic, increase long-run productivity and

In the next subsection, I consider formally the two-period overlapping generations model, first with a linear technology, next with a possibly nonlinear technology, and then with a fraction of nonsavers. These formal presentations can be skipped without loss of continuity. The discussion continues with the issue of earmarked taxes and the model with a tax on the return to capital. Uncertainty in the return to capital is also addressed.

Formal Models

What is the payoff in steady state from a one-time increase in taxes that is used to finance a permanently higher level of trust fund (or equivalently, a permanently lower level of government debt held by the public), when none of the increased taxes result in increased government expenditures? While privatization plans call for extended periods of higher taxes, focusing on a one-period tax increase makes the argument easier to follow.

Consider the two-period overlapping generations model with inelastic labor supply. Let n denote the growth in the labor supply (taken as constant) and a the growth in labor-augmenting technical progress. L denotes *effective* labor supply:

$$(1) \qquad L_t = L_0(1 + n)^t(1 + a)^t.$$

The wage per effective hour is w; the proportional tax on earnings, t_w; and the benefit as a proportion of the individual wage, b. Thus lifetime income for a member of the generation born in period t satisfies

$$(2) \qquad I_t = (1 + a)^t \left\{ w_t(1 - t_{wt}) + \frac{b_{t+1}w_t}{1 + r_{t+1}} \right\},$$

where r_{t+1} is the rate of return on savings carried from period t to period $t + 1$.[20]

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growth.

    But, as far as cumulating resources over time is concerned, the trust fund is empty.'' (White and Wildavsky, 1989, p. 316.)

    20. Implicit in this setup is a real social security system rather than a wage-indexed system which might relate benefits to current wages instead of last period's wage. For analysis of the steady state of a deterministic economy, these two models are the same. OASDI benefits are determined by a mix of price-indexed, wage-indexed, and unindexed calculations.

Consumption in the first period is a function of lifetime income and the interest rate. Assume that preferences are homothetic, so that consumption is proportional to lifetime income for a given interest rate and can be written—here and elsewhere, [·] indicates the argument of a function—as $c[r]I$.

The capital in a period is the savings of the previous period less the government debt net of the funding of social security:

$$(3) \qquad K_{t+1} + G_{t+1} = L_t \left\{ (1 - c[r])w_t(1 - t_{wt}) - \frac{c[r]b_{t+1}w_t}{1 + r_{t+1}} \right\},$$

where K is capital and G is government debt held by the public.

The ratios of capital and government debt to effective labor are denoted, respectively, by k and g. Thus equation 3 can be written as

$$(4) \quad (k_{t+1} + g_{t+1})(1 + n)(1 + a)$$

$$= (1 - c[r])w_t(1 - t_{wt}) - \frac{c[r]b_{t+1}w_t}{1 + r_{t+1}}.$$

Assuming constant returns to scale, with no depreciation and perfect competition, and denoting output per unit of effective labor by $f[k]$,

$$(5) \qquad\qquad w_t = f[k_t] - k_t f'[k_t];$$

$$r_t = f'[k_t].$$

The remaining equation of the dynamic system is the evolution of government debt. Denote by e the ratio of government expenditures other than social security to effective labor supply (which ratio is assumed to be constant). Then

$$(6) \qquad G_{t+1} = G_t(1 + r_t) + b_t w_{t-1} L_{t-1} + e_t L_t - t_{wt} w_t L_t.$$

Debt is equal to the previous level of debt plus interest plus expenditures less tax revenue. Putting this into units per effective labor gives

$$(7) \quad g_{t+1}(1 + n)(1 + a)$$

$$= g_t(1 + r_t) + \frac{b_t w_{t-1}}{(1 + n)(1 + a)} + e_t - t_{wt} w_t.$$

Assume a unique, stable, steady-state equilibrium, with the proper-

ties that a rise in planned consumption would lead to a fall in equilibrium saving and the rate of growth is less than the marginal product of capital. Equations 4, 5, and 7 give the full dynamics of this simple economy and, dropping time subscripts, provide the equations for a steady state, assuming constant tax and benefit rates and a constant level of public debt per effective worker. The equations for this steady state are

$$(8) \quad (k + g)(1 + n)(1 + a) = (1 - c[r])w(1 - t_w) - \frac{c[r]bw}{1 + r};$$

$$(9) \quad g(r - a - n - an) = t_w w - \frac{bw}{(1 + n)(1 + a)} - e;$$

$$(10) \quad w = f[k] - kf'[k]; \quad r = f'[k].$$

Assume that a temporary tax increase is used to lower permanently the stock of outstanding debt per effective worker, and that none of it is used to finance other government expenditures. One needs to select the variable that will be endogenous in equilibrium. For this purpose, consider a decrease in steady-state taxation to respond to the increased funding, holding benefits constant as a multiple of the wage. The process has two steps. First, consider the derivative under the assumption that the production function is linear, so that w and r are parameters; second, add the feedback that comes from the impact of capital deepening on the wage and rate of return.

LINEAR TECHNOLOGY. To consider the formal model with fixed wage and interest rate, denote payroll tax revenue by T, which is equal to $t_w w$. With w and r given, the relationship between debt and the tax revenue needed to maintain equilibrium is given by equation 9. Differentiating this equation (and remembering that an increase in the trust fund is equivalent to a decrease in public debt), one obtains the response of the steady-state tax revenue to a permanent increase in the ratio of the trust fund to expenditures:

$$(11) \quad -\frac{dT}{dg} = -(r - a - n - an).$$

Equation 11 gives the trade-off among parameters of the social security system: raising tax revenue in period 0 by 1 per unit of effective labor

lowers the ratio of debt to effective labor in period 1 (and thereafter) by $(1 + n)$. Thus the decline in tax revenue needed per dollar of increased trust fund is equal to the excess of the rate of return over the rate of growth.

One should also note the impact on the steady-state capital stock:

$$(12) \qquad -\frac{dk}{dg} = 1 + \frac{(r - a - n - an)(1 - c[r])}{(1 + n)(1 + a)}.$$

Increasing the trust fund increases capital by more than one for one, with the wage and interest rate fixed. This can be interpreted as the additional income from the additional capital being partially saved; or the lower taxes, a result of the larger trust fund, being partially saved.

NONLINEAR TECHNOLOGY. In the formal model with endogenous wage and interest rate, adding the feedbacks of changing capital on the wage and interest rate gives equation 11 the more complicated form

$$(13) \qquad -\frac{dT}{dg} = -(r - a - n - an) - \left\{ \frac{g - bk}{(1 + n)(1 + a)} \right\} f''[k] \left(\frac{dk}{dg} \right).$$

Thus, in addition to the direct effect of a larger trust fund $(r - a - n - an)$, the increase in capital raises the wage and lowers the interest rate. For the government budget as a whole, the lower interest rate decreases the revenue needed to pay interest on the national debt and the higher wage raises the cost of preserving a given replacement ratio in social security. For the social security budget, the lower interest rate decreases the revenue from the trust fund and the higher wage raises the cost of preserving a given replacement ratio in social security. The higher wage raises tax revenue at a given payroll tax rate. Thus the calculations for the entire government budget and the social security budget look different. A fall in the interest rate lowers the cost of government debt held by the public and lowers the revenue on the trust fund. For a change in the trust fund that is larger than a derivative, the declining interest rate is relevant for the direct effect as well.

Turning to the impact on capital, equation 12 becomes

$$(14) \qquad -\frac{dk}{dg} = \frac{1 + \dfrac{(r - a - n - an)(1 - c[r])}{(1 + n)(1 + a)}}{1 + \dfrac{c'[r]f''[k]Y_1 + f''[k]Y_2}{(1 + n)(1 + a)}},$$

where

$$Y_1 = w - e - g(r - a - n - an) - \frac{bw(r - a - n - an)}{(1 + r)(1 + a)(1 + n)}$$

and

$$Y_2 = (1 - c[r])(k + g) - \frac{bwc[r]}{(1 + r)^2}$$

$$- \left\{ \frac{bk}{(1 + a)(1 + n)} \right\} \left\{ 1 - \frac{c[r](r - a - n - an)}{(1 + r)(1 + n)(1 + a)} \right\}.$$

With the assumptions of a stable steady state where an increased propensity to consume increases consumption, an increase in the social security trust fund increases capital. If one were considering a large change in the trust fund (rather than a derivative), the decline in the interest rate resulting from increased capital would be important for the calculation. For a full policy analysis, one should consider all the periods affected by a temporary increase in taxation that is used to build the fund. The response of steady state illustrates the elements that matter for this calculation.

WITH SOME NONSAVERS. The provision of retirement benefits or the mandating of retirement savings is closely tied to the idea that many people will not save adequately for retirement otherwise. Therefore one might ask what happens to the calculations if some fraction of the workers behave as modeled, while the rest do not save at all.[21] This leads to a straightforward modification of the equilibrium conditions, since the saving of just the fraction (σ) of workers who do save determines the following period's capital stock. For simplicity, I show the analysis for a linear technology—so that the wage and interest rate are given; the additional terms are like those above. Thus the two steady-state equations, (8) and (9), become, respectively,

$$(15) \quad (k + g)(1 + n)(1 + a) = \sigma \left\{ (1 - c[r])w(1 - t_w) - \frac{c[r]bw}{(1 + r)} \right\}$$

and

21. This analysis follows Feldstein (1985).

(16) $$g(r - a - n - an) = t_w w - \frac{bw}{(1 + n)(1 + a)} - e.$$

That is, the changed assumptions about saving affect capital accumulation but not the evolution of the government debt. Thus with this modification of the model, there is no change in the steady-state derivative of the taxes needed when the interest rate and wage are given:

(17) $$-\frac{dT}{dg} = -(r - a - n - an).$$

But the impact on the steady-state capital stock does change, getting closer to one for one:

(18) $$-\frac{dk}{dg} = 1 + \frac{\sigma(1 - c[r])(r - a - n - an)}{(1 + n)(1 + a)}.$$

The smaller impact on the capital stock follows because the decline in taxes is fully consumed by the nonsavers, rather than being partially saved. By lowering taxes without changing benefits, this transfer makes social security financially more valuable for later generations, as a natural implication of making it less valuable for earlier ones.

Earmarking and Taxation of the Return to Capital

The modeling above focuses on the unified federal budget, assuming one representative agent (or two). But social security is a program with an earmarked tax, the distributional incidence of which is different from that of the sum of all other taxes paid to the federal government. Thus it is not sufficient to consider the unified budget. By considering the social security budget as well, one moves toward a richer analysis that would address the distributional issues between the social security system and the rest of the government budget. In this setting, one should be explicit about the transfers between parts of the government budget. In particular, one needs to pay attention to the political implications of transferring general revenue to social security. Such a transfer has already been legislated: the rule that the revenue collected by the income taxation of social security benefits accrues to the social security and medicare trust funds. Extending this to the corporate income tax revenue generated by the buildup of a trust fund might alter the nature of

earmarking.[22] And the nature of earmarking is integral to the current political equilibrium. As Allen Schick notes:

> Even though trust funds are not inviolable, earmarking taxes to them influences budget outcomes. Trust funds establish a strong expectation, bordering in some cases on an entitlement, that the money will be used only for the prescribed purposes. Moreover, when revenues are set aside in a trust fund, any groups that are affected can easily monitor the budget to ensure that money is not diverted. But a trust fund is only as influential as its clientele. When the clientele is powerful, the government is not likely to risk the political costs of diverting funds; when it is weak, there may be little risk. With more than 40 million Americans drawing monthly benefits from social security and most current workers expecting to be paid from it in the future, this fund is virtually inviolable.[23]

Changes in wages will affect income tax revenues as well as payroll tax revenues, and changes in interest rates will affect the cost of government debt as well as the return on the trust fund. In addition, changing the quantity of capital will affect capital income tax revenue, even if interest rates do not change. This point is made by Bosworth, who estimates that the real return on capital in the domestic economy is 6.2 percent, made up of 7.8 percent in the corporate sector and lower rates in the housing and noncorporate business sectors.[24] In thinking about policy, it makes sense to consider the impact on both the social security and the unified budgets.

22. Feldstein and Samwick (1997) propose such a measure.
23. Schick (1995, p. 106).
24. Bosworth (1996, p. 98). Feldstein and Samwick (1997) use a 9 percent real rate of return on capital in their calculations. Described as the analysis of individual accounts, their analysis applies as well to the buildup of a trust fund, with the exception that a central trust fund would have lower administrative costs, and so a higher rate of return. They estimate that a temporary increase in the payroll tax to fully fund the system would permanently lower the payroll tax rate to 2.02 percent. One can quarrel with their quantitative estimates. It seems unreasonable to make the combination of assumptions that all of marginal savings end up in the corporate sector, that a 34 percent increase in the capital stock has no effect on the rate of interest, that there is no market power in the corporate sector (so that the average and marginal returns to capital are the same), that the federal government can obtain the property tax revenues of local government for social security, that the administrative costs of individual accounts (under the IRA model) would be only 30 basis points, and that real annuitization can be accomplished by the private market using average mortality and the same 9 percent interest rate. Their calculations ignore disability, both disability benefits and the payment of OAI benefits to retired workers who were previously receiving DI benefits.

To examine how taxation of capital income changes the trade-off between current and future wage taxation for the unified budget, one can extend the model described above—with a linear technology and some nonsavers—to include interest income taxation. Just as it was assumed that there was no leakage of increased wage taxation into increased government expenditure, it is now assumed that there is no leakage into decreased taxation of capital. The calculated trade-off in the unified budget is found to be improved by the presence of such taxation, as is the impact on capital accumulation. The following exposition of the formal model can be skipped without loss of continuity.

If the purpose were to analyze all the effects of having a tax on the return to capital, it would be important to have a model with heterogeneous agents; since income distribution issues are a major reason for such taxation, a model that did not include these issues could not come to grips with the pluses and minuses of changing the level of taxation. For the present purpose, however, one can take the taxation of the return to capital as given, at rate t_r, and examine the implications of changing wage taxes in order to reduce the national debt (or partially fund social security).[25] Again, the model allows for some fraction of nonsavers. One must modify the equation that reflects the government budget and recognize that it is the after-tax rate of interest that matters for savings. The budget equation, (6), becomes

$$(19) \quad G_{t+1} = G_t(1 + r_t) + b_t w_{t-1} L_{t-1} + e_t L_t$$
$$- t_{wt} w_t L_t - t_r r_t (K_t + G_t).$$

Thus the two steady-state equations, (15) and (16), become, respectively,

$$(20) \quad (k + g)(1 + n)(1 + a)$$
$$= \sigma \left(\{1 - c[r(1 - t_r)]\} w(1 - t_w) - \frac{c[r(1 - t_r)]bw}{1 + r(1 - t_r)} \right)$$

and

25. For a discussion of interest income taxes in an overlapping generations model with representative agents, see Diamond (1970).

(21) $g(r - a - n - an)$

$$= t_w w + t_r r(k + g) - \frac{bw}{(1 + n)(1 + a)} - e.$$

Differentiating gives

(22) $$-\frac{dT}{dg} = \frac{-(r - a - n - an)}{1 - \dfrac{rt_r\sigma\{1 - c[r(1 - t_r)]\}}{(1 + n)(1 + a)}}.$$

Thus the presence of taxes on the return to capital improves the trade-off between current and future taxes in the unified budget. Also,

(23) $$-\frac{dk}{dg} = \frac{N}{(1 + a)(1 + n) - \sigma\{1 - c[r(1 - t_r)]\}t_r r},$$

where

$$N = (1 + a)(1 + n) + \sigma\{1 - c[r(1 - t_r)]\}(r - a - n - an)$$

$$- \sigma\{1 - c[r(1 - t_r)]\}t_r r,$$

which is larger than the derivative given in equation 18. As regards the effects of changes in the wage and interest rate, the decline in the interest rate would have an impact on revenue that was not present above.

Portfolio Choice for the Trust Fund

If one decided to build a substantial permanent trust fund, would one want the entire fund to be in long-term Treasury debt, as at present?[26] No private corporation would select such a portfolio. In addition to the extreme inflation risk, the risk-return trade-off does not seem appropriate (however one accounts for the equity premium puzzle). Insofar as

26. The advisory council's Maintain Benefits proposal considers investing approximately 40 percent of the trust fund in equities. This portfolio change would be phased in slowly, from 2000 to 2014. The advisory council estimates that in the year 2015, the trust funds would hold approximately $1 trillion, while, with 10 percent growth per year, the total value of equities would be roughly $60 trillion. (Advisory Council on Social Security, 1997, p. 100.)

the premium of private over government securities comes from the greater short-run liquidity of the Treasury market, such a portfolio seems inappropriate for a long-run fund that is unlikely to have much in the way of liquidity problems. If one wanted to analyze the trust fund portfolio as one would a corporate portfolio, one would be interested in the relationship between asset returns and the revenue and cost determinants of social security. Since the distribution of payroll taxes is very different from the distribution of total financial wealth and that of equity holdings, the risk and return characteristics of such an earmarked program are important. In other words, there would be distributional issues between payroll taxpayers and wealth holders, even if, counterfactually, an open market operation by the trust fund has no real effects. But it is not sufficient to analyze social security in the same way as a private pension fund. In part it is too large, and in part it is the responsibility of the government, which has to consider the entire economy. Examining portfolio choice also involves economic analysis of the behavior of the economy under different portfolio policies and political analysis of how a more flexible portfolio policy would evolve.

Any change in portfolio policy has implications for benefits, or taxes, or both (in some states of nature). Therefore in order to evaluate a change in portfolio policy, one must specify what else changes. For this purpose, I discuss models where risky portfolio outcomes are reflected in changes in taxes on workers; I use a two-period overlapping generations model to consider stochastic taxes on the young to balance a government budget that includes stochastic returns on assets. Next, I examine the issue of intergenerational redistribution associated with the politics of portfolio choice, drawing on the analysis of Kent Smetters.[27]

In order to examine risk-sharing over generations, one can use a two-period overlapping generations model with aggregate technological uncertainty (but no demographic uncertainty).[28] With a representative agent, competitive market model with aggregate uncertainty, the (endogenous) equilibrium returns to different assets depend solely on marginal utilities of consumption in different states of nature. Neither liq-

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27. Smetters, 1997.
28. There is some, but not a great deal of, literature on the overlapping generations model with stochastic technology and physical capital. A central paper is Gale (1990), which focuses on the term structure of public debt as a risk-sharing device.

uidity nor other factors (for example, myopic loss aversion) affect the willingness of some of the population to hold different assets.

The two-period overlapping generations model has two polar versions with a simple capital structure. Either capital can last for just one period, so all the risk is in the returns (net of physical depreciation), or capital can be infinitely lived, so there is risk in the future price of the capital. Each of these models is briefly considered below. For the former model, the analysis follows that of Henning Bohn.[29] The latter model becomes more complicated when investment is positive in some periods but not in others.[30] Since the central issue here is risk-sharing, it seems adequate to consider a model where there is no opportunity for additional investment. Therefore I analyze an overlapping generations version of Robert Lucas's model, where infinitely lived assets give random returns period by period and population is constant, so that there is a steady state with zero investment.[31] I consider an open market operation where the government issues debt in order to purchase (and hold) some real asset and imposes taxes on the young in order to preserve government budget balance, with constant government holdings of real assets and constant government debt outstanding. For clarity, this is analyzed in an economy without a social security system. All expected values are calculated from time zero.[32] In this setting, no market device can harmonize the ratios of marginal utilities of income in different states at birth with the ratios of marginal utilities of income of the older generation with whom the young overlap.[33] Thus the market structure is incomplete and one would expect to be able to make Pareto improvements generically.[34] That is, the market has no way to allocate risk in the return to assets to people who are not available to trade (nor to those who have no assets). The question addressed here is not

29. Bohn (1997a, 1997b).

30. The other model would be similarly complicated without the assumption that one could convert capital back into consumption on a one-for-one basis.

31. Lucas (1978).

32. Alternatively, one could consider the expected utilities of individuals conditional on their birth. In this case, the "same" individual born in different states of nature is considered a different person. This distinction is very important. Under this alternative, the search for Pareto improvements is much more difficult.

33. This market incompleteness (or participation incompleteness) will extend to that part of the life span without significant wealth accumulation if there are significant limitations on the ability to borrow.

34. Geanakoplos (1990).

whether there is scope for improvement, but how the policies under consideration affect risk-sharing.

Both versions of the model give the same message. Government ownership of assets through the social security system means that future wage earners share the risk in the rate of return. To evaluate this risk-sharing, one must consider how it is financed. If it is financed by more government debt, one might be concerned that the level of debt is already too high for good risk-sharing—government debt is already a means of offering safe assets to asset owners, financed by taxes on the young. By itself, government debt does not reallocate risk in the return to capital, so there is an opportunity for better risk-sharing even if the debt level is high. If the debt level is not so high, an open market operation that substitutes private capital for debt in the trust fund improves risk-sharing. The model does not include taxes on the return to assets, which also share these risks. The models consider the effect on the representative agent and so do not reflect the distinction between the social security and unified budgets discussed above. This proposal introduces a series of questions that have not received much theoretical analysis and would benefit from more systematic further study. They are laid out in the following presentation of two stripped-down—but still complicated—models (which can be skipped without loss of continuity). The issue of intragenerational distribution is then considered by assuming some nonsavers.

A Formal Model of Risk-Sharing with One-Period Capital

This is a simplified version of the model analyzed by Bohn, which generalizes the certainty model analyzed above.[35] Assume a two-period lifetime, with inelastic labor supply (normalized to be 1) in the first period. Assume a constant population but a varying effective labor supply:

$$(24) \qquad\qquad L_t = A_t.$$

Below, I specify a stochastic structure for A_t. Assume Cobb-Douglas production, with capital coefficient x. Assume also that the only sources of uncertainty are the multiplicative factor for effective labor in the

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35. Bohn (1997a, 1997b).

production function and the depreciation rate of capital. Thus the marginal products of effective labor and capital satisfy, respectively,

(25)
$$w_t = (1 - x)\left(\frac{K_t}{A_t}\right)^x;$$

$$r_t = x\left(\frac{K_t}{A_t}\right)^{x-1}.$$

The total capital stock is the sum of private and government capital:

(26)
$$K_t = K_{pt} + K_{gt},$$

where the subscripts p and g refer to private and government ownership, respectively.

For simplicity, assume Cobb-Douglas preferences in log form for expected utility. The utility of the generation born at the start of period t is

(27)
$$u_t = \ln[c_{1,t}] + \ln[c_{2,t+1}],$$

where $c_{1,t}$ is the generation's consumption in year t and $c_{2,t+1}$ is its consumption in period $t + 1$. Savings are divided between government (real) debt that pays the safe rate of interest, s_{t+1}, and physical capital that pays the net of depreciation return, $r_{t+1} - d_{t+1}$. In equilibrium, workers hold all of the outstanding government debt, G_{t+1}. Thus consumption satisfies

(28)
$$\frac{c_{2,t+1}}{A_t} = \frac{G_{t+1}(s_{t+1} - r_{t+1} + d_{t+1})}{A_t}$$

$$+ \{w_t(1 - t_{wt}) - c_{1,t}\}(1 + r_{t+1} - d_{t+1}).$$

The first order conditions for the saving and portfolio decisions are

(29)
$$\frac{1}{c_{1,t}} = E_{r,d}\left\{\frac{1 + r_{t+1} - d_{t+1}}{c_{2,t+1}}\right\}$$

$$0 = E_{r,d}\left\{\frac{r_{t+1} - d_{t+1} - s_{t+1}}{c_{2,t+1}}\right\},$$

where the expectations are taken over r_{t+1} and d_{t+1}, given A_t and K_{t+1}.

The capital market equilibrium has private savings equal to privately owned capital plus the public debt:

$$(30) \qquad K_{p,t+1} + G_{t+1} = A_t\{w_t(1 - t_{wt}) - c_{1,t}\}.$$

Assuming constant government expenditures per unit of effective labor, the government budget constraint gives

$$(31) \quad G_{t+1} = G_t(1 + s_t) + eA_t - t_{wt}w_tA_t$$

$$- K_{gt}(1 + r_t - d_t) + K_{g,t+1}.$$

Assume that taxes adjust so that both the debt and the government-owned capital are constant fractions—g and k_g, respectively—of effective labor in the current period (a slightly different notation from that used above). Thus the government budget constraint becomes

$$(32) \quad g = \frac{g(1 + s_t)A_{t-1}}{A_t} + e - t_{wt}w_t + \frac{k_g(1 + r_t - d_t)A_{t-1}}{A_t} - k_g.$$

With everything else predetermined, this equation gives the tax rate. For feasibility, I assume that the minimum wage is large enough to finance this government policy with a tax rate below 100 percent. As is usual with the two-period overlapping generations model with inelastic labor and short-lived capital, this economy can be solved one period at a time. That is, the only dealings that a given generation has with the future is through the employment of the next generation's inelastic labor supply—no future decisions matter to the saving decision.

To examine risk-sharing within a period in this economy, one needs to examine the pattern across states of nature of the marginal rate of substitution of the young relative to that of the old. With perfect risk-sharing, these rates would be the same. With logarithmic utility, examining the patterns of marginal rates of substitution is the same as examining the patterns of consumption across states of nature. Therefore I focus on the ratio of the consumption of the old to that of the young across states of nature in a given period. Given identical within-period logarithmic preferences, perfect risk-sharing would have a constant consumption ratio.

With no government debt and no government ownership of capital,

the model is simplified, since both first-period consumption and the capital stock are half the wage. This gives

$$(33) \quad \frac{c_{2,t}}{c_{1,t}} = \frac{w_{t-1}A_{t-1}(1 + r_t - d_t)}{w_t A_t} = \frac{w_{t-1}A_{t-1}\left\{x\left(\frac{K_t}{A_t}\right)^{x-1} + 1 - d_t\right\}}{(1 - x)A_t\left(\frac{K_t}{A_t}\right)^x}.$$

The simplest case is complete depreciation, $d_t = 1$. In this case, the consumption ratio is indeed a constant, $2x/(1 - x)$, independent of the realization of A_t. The high correlation will survive many changes in preferences, although the equality of marginal rates of substitution will not. If depreciation is nonstochastic and less than complete, the old have a safe source of consumption (undepreciated capital) as well as a risky one (dividends), although in the aggregate they do not have the ability to vary the proportions of the two patterns of consumption. The presence of a nonvarying source of consumption would yield better risk allocation if the old were more risk averse than the young—as is plausible, given the ability of the young to adjust labor supply.

Interest rate and wage risk are perfectly correlated by the multiplicative factor in the Cobb-Douglas production function. But there is also risk, presumably not perfectly correlated, modeled here as the stochastic nature of depreciation. This risk is fully borne by the old, not at all by the young: $c_{2,t}$ varies with d_t but $c_{1,t}$ does not. Some sharing of this risk would improve efficiency.

Government debt represents a source of safe consumption for the old, conditional on the realization of random variables in the first year of their lives. In general, however, the safe rate of interest is random when measured from time zero. If the stochastic structure of the economy has effective labor as a random walk and depreciation as an independent random variable, the homotheticity of the economy will result in a safe interest rate that does not vary with the realization of the stochastic production parameters. In this case, the lack of uncertainty in depreciation means nondepreciated capital serves the same role as government debt in providing for safe consumption. Within a period, the safe consumption from depreciation comes from nature, while the safe consumption from government debt comes from the contempora-

neous young. As noted by Douglas Gale, debt has a risk-sharing di-
mension in this economy.[36]

But debt alone does not spread the risk in the depreciation rate
between the young and the old. This risk-sharing can be accomplished
through government ownership of capital, with taxes on the young
adjusting to the return (net of depreciation) of that capital. If the gov-
ernment purchase of capital is financed by debt issue, the provision of
safe consumption of the old financed by taxes on the young will increase
simultaneously. Depending on how much debt is outstanding, this
might or might not be good from a risk-sharing perspective, although
there would remain a case for sharing the depreciation risk with financ-
ing from some other source. There is scope for much more analysis of
these complicated questions than there has been to date. Bohn provides
calculations of log-linear approximations to the effects of trust fund
asset swaps in a setting with an explicit social security system.[37] By
extending this model to lives with more periods, one could consider
additional risk-sharing issues.

A Formal Model of Risk-Sharing with Infinitely Lived Capital and No Investment

In the preceding model, the price of capital goods is tied down by
the production condition: since a unit of capital and a unit of consump-
tion are interchangeable, capital goods always have a price of one in
consumption good units. Alternatively, one can consider an equilibrium
with infinitely lived assets that cannot be reproduced.[38] This polar op-
posite sheds some light on circumstances where there are both repro-
ducible assets and unreproducible assets (in land and some corporate
structures), at least for a long time and at a reasonable cost. This model
is closest to a setting where a change in trust fund portfolio is simply
an asset swap, with the character that it cannot affect national saving.
Even so, it has effects on equilibrium; in particular, on equilibrium
risk-sharing.

It is interesting that even in the absence of real investment, this model
displays all the usual properties of public debt: a rise in public debt

36. Gale (1990).
37. See Bohn (1997a, 1997b).
38. As in Lucas (1978).

helps the generation receiving the transfer financed by that debt and hurts all later generations; the interest rate increases. To analyze this model, the capital-to-labor ratio becomes a parameter.

As above, I assume a two-period overlapping generations model with inelastic labor in the first period only and Cobb-Douglas preferences. For simplicity, I assume a stable population, normalized to one. However, I now assume that the (stochastic) wage and return to capital are independent of decisions in the economy.

A unit measure of infinitely lived assets gives a (stochastic) dividend each period of r_t. The consumer good is assumed to be nonstorable, so there is no net investment; the stock of capital is simply maintained through time, units of capital are purchased by the young from the old each period. Let p_t denote by the price at which units of capital are sold to the generation born in period t.

To start with, consider equilibrium with no government involvement whatsoever. In period t, the young earn w_t, eliminating the distinction between effective labor and actual labor. With Cobb-Douglas preferences, they consume half of their wage and use the other half to purchase the (inelastically supplied) stock of capital. The old consume the dividend, r_t, and the proceeds from the sale of capital to the young, $w_t/2$. Thus in equilibrium expected utility is

$$(34) \qquad E\left\{\ln\left[\frac{w_t}{2}\right] + \ln\left[\frac{r_{t+1} + w_{t+1}}{2}\right]\right\}.$$

If the returns to capital and to labor are perfectly correlated, then, as in the model above, in any period there is perfect correlation between the consumption of the young and that of the old across the states of nature. If the correlation is not perfect, although wage risk is shared between the young and the old, the orthogonal portion of the return risk is not shared at all, so that risk-sharing is inefficient.

Next, introduce government debt and government ownership of capital. For convenience, assume that one-period government bonds are sold at discount at price q_t, with a bond paying 1 in each state of nature. The budget constraint for a consumer purchasing g units of debt is now

$$(35) \quad c_{2,t+1} = g\left\{1 - (p_{t+1} + r_{t+1})\left(\frac{q_t}{p_t}\right)\right\}$$

$$+ \frac{\{w_t(1 - t_{wt}) - c_{1,t}\}(p_{t+1} + r_{t+1})}{p_t}.$$

The first order conditions for the saving and portfolio decisions are

$$(36) \qquad \frac{p_t}{c_{1,t}} = E_{p,r}\left\{\frac{p_{t+1} + r_{t+1}}{c_{2,t+1}}\right\} = \left(\frac{p_t}{q_t}\right)E_{p,r}\left\{\frac{1}{c_{2,t+1}}\right\},$$

where the expectations are taken over p_{t+1} and r_{t+1}.

Assume that taxes adjust so that both the debt and the government-owned capital carried forward are constants: g and k_g, respectively. The government budget constraint gives

$$(37) \qquad\qquad q_t g = g + e - t_{wt}w_t - k_g r_t.$$

With everything else predetermined, this equation relates the needed tax rate to the simultaneous price of government debt. In addition, the market clearance condition, that savings equal the value of debt plus privately held capital and that debt held equals debt supplied, is

$$(38) \qquad\qquad w_t(1 - t_{wt}) - c_{1,t} = q_t g + p_t(1 - k_g).$$

Eliminating tax revenue from equations 37 and 38 gives

$$(39) \qquad\qquad w_t - c_{1,t} = p_t(1 - k_g) + g + e - k_g r_t.$$

Next, assume that the joint distribution of wages and return to capital is independent and identical over time. Then the endogenous prices are functions of contemporaneous wages and dividends on capital. Therefore expectations are always the same, which simplifies the analysis. The variables X and Z are defined as

$$(40) \qquad\qquad X = E_{p,r}\left\{\frac{(1 - k_g)(p + r)}{g + (1 - k_g)(p + r)}\right\};$$

$$Z = E_{p,r}\left\{\frac{(1 - k_g)}{g + (1 - k_g)(p + r)}\right\}.$$

One can now state the endogenous prices of assets (as functions of the contemporaneous wage and dividend from capital) as

(41)
$$(1 - k_g)p_t = \frac{X(w_t + k_g r_t - g - e)}{1 + X};$$

$$\frac{q_t}{p_t} = \frac{Z}{X}.$$

Note that the derivative of the value of privately owned capital with respect to the wage is $X/(1 + X)$, whereas the derivative of the value of privately owned capital with respect to the dividend on capital is $Xk_g/(1 + X)$.

As above, the pattern of risk-bearing is examined by calculating the ratios of consumption of the young and old in the same period:

(42)
$$\frac{c_{1,t}}{c_{2,t}} = \frac{w_t - p_t(1 - k_g) - g - e + k_g r_t}{(1 - k_g)(p_t + r_t) + g}$$

$$= \frac{w_t - \dfrac{X(w_t + k_g r_t - g - e)}{1 + X} - g - e + k_g r_t}{(1 - k_g)r_t + \dfrac{X(w_t + k_g r_t - g - e)}{1 + X} + g}$$

$$= \frac{\dfrac{w_t + k_g r_t - g - e}{1 + X}}{\dfrac{X(w_t + k_g r_t - g - e)}{1 + X} + (1 - k_g)_{rt} + g}.$$

In response to a higher wage, the consumption of the young increases by $1/(1 + X)$, whereas the consumption of the old increases by $X/(1 + X)$. With a higher dividend on capital, the consumption of the young increases by $k_g/(1 + X)$, whereas the consumption of the old increases by $1 - k_g + k_g X/(1 + X)$. Government ownership of assets is essential for sharing the risk in the dividend on capital with the young. In addition to this direct effect, both government debt and government ownership of real assets affect risk-sharing through their effect on X. Substituting from equation 41 into equation 40 gives an implicit equation for X:

(43)
$$X = E_{p,r}\left\{\frac{(w - e)X + r(1 + X - k_g) - gX}{(w - e)X + r(1 + X - k_g) + g}\right\}.$$

With the simple preferences, technology, and stochastic structure, one could relate the equilibrium values to the government asset position.

With Nonsavers

In the formal models presented above in this section, there is a representative agent and all of the portfolio risk of the trust fund falls on future workers. Yet a large fraction of the public has no investment in equities and a sizable fraction has little or no personally controlled financial assets.[39] Moreover, if portfolio performance is poor over a long period, it is likely to affect benefits as well as taxes. To examine the issue of nonsavers, I briefly consider the implications of portfolio choice if the return on assets were reflected in variations in benefits; that is, if social security were a mandatory defined contribution system. In the representative agent setting, the portfolio choice of a mandatory system would simply be undone in the voluntary portion of portfolio choice, assuming that the mandate was less than desired savings. As pointed out by Smetters, there would be no real effects—and thus no change in equilibrium market prices.[40]

The presence of nonsavers changes this analysis. There are two issues: the direct effects on nonsavers and the indirect effects on everyone from changes in equilibrium. Both the size of a saving mandate and the designated portfolio matter for normative evaluation of forcing people who do not save to save and hold some particular portfolio.[41] The key is to determine why so few savers hold equities and how risk averse are the nonsavers.[42] The question is whether risk aversion (together with the correlation of equity returns with other risks) is sufficient to justify the current holdings and the extension of this portfolio behavior to nonsavers. Given that financial education for workers with 401(k) plans has had real effects on portfolio choice, it seems likely that a mixed portfolio would be appropriate.[43]

If the mandatory portfolio shifts from being solely government debt

39. For the lack of investment in equities, see Poterba and Samwick (1997).
40. Smetters (1997).
41. I do not discuss the size of the saving mandate in the present paper, but see Diamond (1995).
42. Haliassos and Bertaut (1995) argue that inertia and departures from expected-utility maximization are the most promising explanations of zero equity holdings.
43. On financial education and 401(k) plans, see Bernheim and Garrett (1996).

to including some proportion of private securities, there will effectively be a trade of assets between savers (who hold them in voluntary accounts) and nonsavers. With perfectly elastic supply of both safe and risky assets, there will be no price effects. Without perfectly elastic supply, the exchange of assets is likely to decrease the equity premium, as savers respond to the greater quantity of safe assets relative to risky ones. In turn, the change in the pattern of available returns may affect saving. In effect, the pool of individuals who are sharing the risks in the economy is increased. With either safe or risky assets, or both, in less than perfectly elastic supply, one would expect the exchange of assets to lower the expected return on private securities relative to that of government debt. In a full-equilibrium model, this, in turn, would affect tax revenues and savings.

Intergenerational Distribution

Consider some package of reforms that results in actuarial balance without modifying portfolio practice. Then consider adding to this package a change in portfolio that increases equity while decreasing debt, with no other legislated changes, under the expectation that future taxes will be higher or lower than in the originally legislated package as returns on the actual portfolio are higher or lower than on a portfolio comprising only Treasury debt. Such a change fits with the modeling described above and locates the risk squarely on future generations (along with part of the risks of responding to other social factors such as demographic change and technical progress). But notice the actuarial calculation after such a change. A projection with the new portfolio, using historical returns, would show higher returns and thus an actuarial surplus rather than actuarial balance. The magnitude of the effect would depend on the size of the trust funds built up.

One response to this change would be to restore actuarial balance by changing benefits or taxes. Such a change might include near-term as well as long-term benefit and tax changes and thus would imply intergenerational redistribution in response to the portfolio change. Smetters has considered the situation where the higher expected return on the riskier portfolio is guaranteed out of future taxes.[44] In other words, in the two-step process described above, the projected actuarial surplus

44. Smetters (1997).

from the change in portfolio is used to benefit current generations. Then future generations will bear the risk, which can be priced using option values. Smetters does this in a model that assumes that prices do not change, and so ignores the change in risk-sharing between generations, which, in turn, alters equilibrium prices. But his partial-equilibrium analysis does make the point that the pattern of intergenerational redistribution depends on risk allocation as well as expected tax allocation. Insofar as inflation risk is reduced by the change in the portfolio (which could also be achieved by the purchase of newly issued indexed Treasury debt), the burden of risk on future generations is reduced.

Defined Benefits, Defined Contributions, and Portfolio Choice

I have examined the trade-off between raising taxes in the near term and lowering taxes in the distant future. Such a policy would build up a larger and longer lasting—possibly permanent—trust fund. And I have discussed how the investment policy of such a trust fund (together with the policy responses to different return outcomes) could be used to alter the distribution of risk-bearing in the economy. The economics of such policies, although complicated and not fully worked out, are fairly straightforward and do not seem controversial.

However, these policies raise three important political questions, which lie at the heart of the motivations for introducing defined contribution systems: Will Congress legislate higher taxes or lower benefits in the short run, in order to build up a larger trust fund; and would Congress sustain a larger trust fund or use it to increase benefits, thus essentially reverting to a pay-as-you-go system? Also, will the politics of portfolio choice involve direct government intervention in corporate decisionmaking and the allocation of capital among firms? The advisory council's defined contribution proposals, the Individual Accounts and the Personal Security Accounts plans outlined in table 1, are responses to concerns about one or more of these questions, but raise political issues of their own. Before turning to these questions, it is useful to review the differences between a defined benefit system and a system that combines defined benefits and defined contributions.

At present, U.S. social security is a defined benefit plan: benefits are related to the history of earnings that have been subject to tax and the

age at which benefits are first claimed. The formula includes indexing
to both wages and prices. It does not—but it could—include indexing
to life expectancy at the age of retirement or of entitlement for early
retirement benefits. In contrast with this general approach, the advisory
council's IA and PSA plans replace part of the defined benefit system
with a defined contribution system. In particular, the Individual Ac-
counts plan puts 1.6 percent of payroll into individual accounts, which
are automatically annuitized when the owners reach retirement age. To
preserve roughly the current degree of progressivity in the system, the
remaining defined benefit system is adjusted to recognize the removal
of a linear (nonprogressive) portion.[45]

Many studies have compared defined benefit and defined contribution
systems; here, I highlight some of the differences.[46] The difference
between basing benefits on taxes paid and on earnings subject to tax
depends on the variation in taxes that occurs over the working life of
an individual. Basing benefits on earnings subject to tax has been a
major element in the intergenerational redistribution that has occurred
during the early years of social security.[47] Insofar as the tax rates have
roughly stabilized, this difference is unlikely to be very important in
the future.

The IA proposal calls for the full annuitization of the accumulated
funds at retirement age. Thus the actual benefits will vary with both
cohort life expectancy at the time of retirement and interest rates at that
time. A defined benefit plan with no adjustment—automatic or legis-
lated—provides a benefit relative to earnings history that does not vary
with life expectancy. However, current legislation calls for increasing
the normal retirement age. Increasing the normal retirement age (with-
out also changing the age of early entitlement for benefits) is simply a
benefit cut, one that would be very similar to an adjustment for life
expectancy if the legislated changes mimic the life expectancy adjust-
ment. An optimal system would not load all of the adjustment for

45. Changing to a partially defined contribution system also requires adjustment of
disability benefits. This is complicated, since disability is an unpredictable event that is
not adequately insured against by simple accumulation. Both the IA and the PSA pro-
posals reduce disability benefits relative to retirement benefits, as compared with current
law. It would be good to have a detailed analysis of the merits of such a change.
46. See, for example, Bodie, Marcus, and Merton (1988) and Diamond (1995).
47. Basing benefits on average earnings over the latter years of a career has been
another such element.

increased life expectancy on reduced benefits, unless the ability, desire, and opportunity to work all increased proportionally with life expectancy.[48] Responding to lower mortality by increasing the contribution rate in order to allocate more resources to retirement years is economically easy, but may be politically difficult.

Interest rate risk, both at the time of annuitization and during the accumulation process, is put squarely on the individual retiree in a defined contribution system. Interest rate risk does not disappear just because one has a defined benefit system. Rather, it is dealt with by adjustment in taxes or in the benefit formula when the cumulated outcomes are sufficiently far from the projection implicit in the design of an actuarially balanced system. So a key question in assessing how defined benefit and mixed defined benefit-defined contribution systems handle risk is the quality of the adjustments to the benefit formulas. Ideally, benefit formulas are moved gradually and with considerable lead time. A large defined benefit system, such as social security, is capable of responding this way. To date, Congress has cut benefits significantly twice. The 1977 legislation did not give much lead time for those reaching early retirement age shortly thereafter, but the 1983 legislation did, apart from the small benefit cut implicit in the delay in the cost of living adjustment and subjecting the benefits of higher income families to taxation. A large trust fund makes it easier to adapt smoothly to changing circumstances, but does not guarantee that that will happen. (Interest rate risk, as opposed to other risks, is not important for a defined benefit system, unless the trust fund is large.) The economics of well-designed systems are clear: defined benefit systems have greater ability to smooth interest rate risk over successive cohorts of retirees, and, so far, social security has done reasonably well.

The Politics of a Tax Increase and of Maintaining a Mixed System

Proponents of individual accounts, wanting more fund accumulation than would occur without an immediate tax increase, argue that individual accounts would make a tax increase more likely. At the outset, one should recognize that there are five possible outcomes in the near term: the restoration of actuarial balance within the current defined benefit system, with and without a tax increase; the restoration of ac-

48. See, for example, Baily (1987).

tuarial balance by substituting a defined contribution system for part of the current defined benefit system, with and without a tax increase; and failure to restore actuarial balance. Then, to assess the strength of this as a political argument, one needs to consider both the popularity of social security (which makes an earmarked tax increase more likely than tax increases are generally) and the risk of delaying legislation as a consequence of trying simultaneously to raise taxes and to make a major change in the structure of the system. On balance there seems to be a case—but, in light of the risk of delay, not a very strong one—that pursuing an individual accounts plan would raise national saving.

In regard to pressures for benefit increases when the fund balance was high, there probably would be greater resistance to using the trust fund to finance a benefit expansion if part of it were individually, rather than collectively, earmarked. The question is how much political insulation would be provided by a refined definition of actuarial balance that included a larger target trust fund at the end of the projection period. In the current fiscal climate, this risk does not seem large, since a benefit increase would increase the measured deficit in the unified budget. But political and economic circumstances and commonly quoted budget measures may well change once the baby-boom generation has retired. Thus the possibility of benefit increases as a result of a buildup of the trust fund appears to be the most significant question raised by proponents of individual accounts. Nevertheless, a temporary rather than a permanent buildup of the trust fund, although it would contribute less to national savings, would not seem to be a terrible political outcome.

The current structure of social security has been politically stable, and there has been very little pressure for fundamental changes, despite the controversy that surrounded its creation.[49] Would a program that combined defined contribution and defined benefit elements be similarly stable? A number of arguments suggest that the IA proposal would not. In particular, it might be responsive to pressures generated by misperceptions about social security. Given the difficulty of assessing the degree of potential political instability, a move in this direction would involve significant uncertainty.

Part of social security's current financial difficulty comes from the

49. I am grateful to Hugh Heclo for this approach to analysing political responses.

need to pay taxes to substitute for trust fund earnings that would be present if a larger trust fund had been maintained. That is, present generations pay implicit taxes that finance the redistribution to earlier generations. Under the IA plan, all of these implicit taxes are paid out of the part of the payroll tax that goes to the defined benefit system; none are paid out of the portion of the payroll tax that goes to the defined contribution system. Thus to someone who does not fully understand the economics of the two systems, the defined contribution system would appear to offer a superior rate of return. A more balanced approach would deposit only part of the payroll tax allocated to the defined contribution system in those accounts and use the rest to finance a portion of the accrued unfunded liabilities.

A similar issue arises from the different structures of the two systems. For a defined benefit system, the natural method of reporting is in terms of a flow of benefits. This flow might be reported either as a projected benefit given a projected continued earnings history, or as a projected benefit assuming no further earnings. The former alternative would show no growth over time if the projected earnings were correct and the benefit formula did not change. The latter would show growth, but the rate of growth would be decreased by the progressivity of the benefit formula. Thus a defined contribution system, for which the natural method of reporting is in terms of the growth of the account, will tend to show more rapid growth. In addition, people may overvalue the defined contribution stock relative to the defined benefit flow. This relative valuation has been dubbed wealth illusion by Douglas Bernheim.[50] It is present in the allegedly greater responsiveness of workers to pension windows that have lump sum payments than to those with defined benefit supplements, although I am not aware of any studies that document this phenomenon. It is similar to the pennies-a-day marketing strategy, where sellers contrast a large consumer durable with the flow of payments sufficient for its purchase on credit.[51]

To the extent that individuals perceive the defined contribution component as superior, they will generate political pressure to expand that portion and shrink the defined benefit portion of social security. This may have large implications for the redistribution that happens through

50. B. Douglas Bernheim, personal communication, 1997.
51. Gourville (1994).

the system. In addition, responses to future financial needs will likely be focused on the defined benefit portion of the system. That is, future aggregate financial risks to the retirement income system are not eliminated by a partial defined contribution system. Those risks are still present, but the likely political responses to them will be different. While I have been contrasting the IA plan with the current structure, similar issues arise with the PSA plan.

Corporate Governance

In addition, the possibility of investment in private securities within the current system raises the question of corporate governance—specifically, the choice of corporations in which to invest and the voting of corporate shares. These issues have arisen before in the design of portfolios for the pensions of civil servants, most notably in the Thrift Savings Plan (TSP) of the Federal Employees' Retirement System, and also for individual federal agencies (for example, the Federal Reserve System and the Tennessee Valley Authority). The questions are how to design institutions that are insulated from political pressures and how successful these institutions are likely to be.[52]

By law, the TSP is allowed to invest only in privately run index funds (whose managers exercise the voting rights). Moreover, the plan has an independent board with a fiduciary duty to consider only the interests of the workers.[53] Thus there is a double layer of insulation. There have been frequent calls for social security to invest socially (for example, in schools or housing) instead of holding Treasury bonds, but they have not come close to passage. Just as social security benefits were indexed in order to protect Congress from calls for even larger benefit increases (rather than just keeping up with inflation), so too it seems plausible that Congress does not want to be subject to conflicting pressures on investment policy. Moreover, once a system has been set up in this way, one would expect corporations to resist any move away

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52. I am grateful to Douglas Arnold for this analysis.

53. The board has five members, who are appointed by the President with one recommendation from each of the House and the Senate. Members cannot be removed during their terms. One could go even further in the direction of the Board of Governors of the Federal Reserve System to increase their independence. See Schreitmuller (1988) for the board's fiduciary obligations.

from a blanket policy, since policy changes could well affect corporations adversely in the future.

However, there are differences between the TSP and social security. Most obvious, the TSP is smaller, is a defined contribution system, and is only for civil servants, not the entire working population. Size and coverage make social security more attractive as a target for symbolic politics. And under a defined benefit system, the beneficiaries have less direct financial reason to protect the return on the trust funds. Nevertheless, with a doubly insulated structure; a board of trustees that has considerable independence, fiduciary responsibility, and limited powers; and a political culture that endorsed the principle that social security should be protected from political interference for unrelated purposes, the risk of political interference in investment choice would not seem to be large.

State government defined benefit systems for civil servants provide another, less successful, model to consider for lessons. In this case there has been widespread political interference in investment choices.[54] Many states do not have an insulated board of trustees. For example, Florida's decision to divest tobacco stocks from the pension fund for civil servants was made by a board of three elected state officials—the governor, the treasurer, and the comptroller—although the investment rules have a similar legal structure to that of the TSP (Maryland and Vermont have also divested, and still more states are contemplating doing so).[55] I think that the federal experience is more relevant for projecting what social security experience might be. Generally federal and state politics are different. Social security is a very popular universal program. This should make it easy to establish the principle that trying to use it for other purposes is politically dangerous. The effect of low returns could be made salient for everyone, in contrast with a setting where low returns on a fund for civil servants can be made up by taxpayers without much political visibility. Indeed, the underfunding of generous state pensions is sometimes viewed as a natural political

54. Mitchell and Hsin (1996); Romano (1993).

55. As another example, a recent rider attached to the Texas state budget and signed into law holds that the state's retirement funds may not be invested in companies that produce songs with objectionable lyrics; *Dallas Morning News,* June 29, 1997, p. 6J.

equilibrium involving politicians, attentive civil servants, and inattentive future taxpayers.

The issue of the voting rights in shares would also need to be addressed. For a relatively small portfolio, not voting the shares or leaving the voting to portfolio managers would not be a problem. However, with a large fund, nonvoting would compromise existing rules on support for management, while there might be concern about the power of portfolio managers if they could vote the shares. Consequently there has been interest in alternative arrangements.[56] For example, the shares held by the social security trust fund could be removed from the counting process in proxy fights by legislating that they be voted in proportion to other votes or that they be treated as nonvoting shares for proxy purposes. This would change the stakes needed for control. One might consider auctioning the voting rights or leaving them with a large set of portfolio managers who are explicitly given corresponding fiduciary responsibilities.

While the above discussion concentrates on protecting the private economy from this class of government interventions, Andrei Shleifer has pointed out the obverse of the problem.[57] Much of the law regulating corporate governance has been designed to protect minority shareholders from financially disadvantageous corporate restructuring. The presence of nonvoting shares raises the potential return to such restructuring and so increases the incentives that these rules are designed to limit. While the corporate governance restrictions could be made tighter, it would be simpler to limit the fraction of any company that the trust funds could hold. A maximum on the order of 5 percent would probably limit the impact on corporate governance issues. This might curtail investment in equities, but it would probably make sense to start with a more restricted investment proposal, before venturing into the new waters of larger holdings.

The question of corporate governance arises with direct trust fund investment and also, to a slightly lesser extent, with the creation of a 401(k) structure. They do not necessarily arise with the creation of an IRA structure, although they might do so if the system were heavily regulated.

56. Lanoff (1996).
57. Andrei Shleifer, personal communication, 1997.

Individual Accounts: Political Stability

I have considered some political issues associated with the continuation of a defined benefit system. However, there are also political issues associated with individual accounts. In the case of Australia, the magnitude of the future retirement savings mandate was changed shortly after the inception of the program, in response to political changes.[58] In the United States, Congress has repeatedly changed the rules for tax-favored retirement savings, both defined benefit and defined contribution pensions. For example, the rules on allowable tax-deductible contributions to defined benefit plans were tightened in 1987 to help the measured federal deficit, even though this has increased the risk both to workers and to the Pension Benefits Guarantee Corporation. The tax treatment of defined contribution plans was changed most noticeably in 1986, by introducing extra taxation on large withdrawals (this provision was repealed in 1997).[59] There will always be a temptation to change the tax treatment of deposits and benefits, just as the taxation of social security benefits has been altered. The Australian government has also changed the tax treatment of retirement savings accounts, complicating administrative record keeping. Thus the size of defined benefits is at risk from increased taxation and changes to the benefit formula, whereas defined contribution accumulations are at risk from changes to taxation and the rules of access.

Pressures would likely develop to tap individual accounts for other purposes—just as there have been proposals to expand access to IRA funds for nonretirement purposes, such as house purchases and education expenses. While such early access may or may not be seen as good, depending on the perceived need to preserve savings for retirement, it represents a risk for social security as a retirement income system. Moreover, one could imagine a financially strapped government tapping these accounts by allowing withdrawals as a substitute for government-provided benefits in other programs, for example unemployment insurance and medicaid coverage of nursing home expenses. Indeed, the government might be tempted to allow additional reasons for withdrawals, in order to temporarily increase the flow of tax revenue. A tem-

58. For discussions of mandated saving in Australia, see Bateman and Piggott (1993) and Edey and Simon (forthcoming).
59. Shoven and Wise (1996).

porary flow of tax revenue could also be generated by encouraging people to switch from accounts taxed on withdrawal to those taxed on deposit. Although this would not lower the resources held for retirement, it might reduce national saving.

The rules covering annuitization also raise political issues, which are discussed below. The creation of a sense of wealth entitlement, as opposed to retirement income entitlement, is likely to set in train new political forces.

Individual Accounts: Portfolio Choice and Administrative Costs

Individual accounts raise two economic issues: the types of portfolio that people will choose and the magnitude of the administrative costs. Both are more important for a basic IRA model than for a 401(k) or a heavily regulated IRA model. A large fraction of the public has never made sizable portfolio investment choices. Tables 3 and 4 show that individual portfolios are heavily concentrated in interest-bearing accounts. The outcomes shown are based on the portfolio choices of those who do save; one can only speculate about the portfolio choices that the large numbers of people with little or no financial savings would make. Part of the difficulty in prediction lies in the possibility that those without experience would be less good at investing than are current investors. And many current investors are not very knowledgeable about the principles of investing.[60]

The administrative costs of individual accounts with the proposed IRA model would be considerably higher than with either of the other two approaches to managing a fund.[61] The advisory council assumes administrative costs of 0.5 basis points for a central trust fund, 10.5

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60. In a telephone survey of investors, when asked, "From what you know, when interest rates go up, what usually happens to the prices of bonds? Do bond prices usually go up, go down, or do they stay about the same?", only 39 percent answered that bond prices go down (24 percent thought they go up, 19 percent thought they stay the same, while 18 percent did not know). When asked, "As far as you know, when an investor DIVERSIFIES his investments, does his RISK of losing money increase or decrease?", only 51 percent answered decrease (28 percent answered increase, 20 percent did not know, and 1 percent volunteered neither or stays the same). (Princeton Survey Research Associates, 1996.)

61. On administrative costs generally, see Mitchell (forthcoming).

Table 3. Portfolio Shares of Different Asset Types, by Net Worth Category, 1983 and 1992

Percentage of portfolio

Sample and net worth category[a]	Equity			Bonds			Taxable interest-bearing accounts	Other financial assets
	Taxable[b]	Taxable mutual funds	Tax deferred	Taxable	Tax deferred	Tax exempt		
1992 sample								
Less than $50,000	2.0	0.8	6.8	4.3	8.8	0.4	63.5	13.5
$50,000–$100,000	4.2	1.5	8.7	4.3	11.6	1.1	52.3	16.2
$100,000–$250,000	5.5	2.4	13.3	5.1	15.7	2.8	42.2	12.8
$250,000–$1,000,000	9.1	3.6	13.6	5.2	17.0	4.8	35.0	11.3
More than $1,000,000	18.2	3.3	11.6	5.2	12.5	9.2	27.4	12.0
All categories	4.6	1.7	9.5	4.6	12.0	1.9	52.2	13.5
1983 sample								
Less than $50,000	3.0	0.1	4.6	3.2	7.2	0.1	66.2	15.6
$50,000–$100,000	3.1	0.2	6.3	3.4	9.2	0.3	59.1	18.4
$100,000–$250,000	7.0	0.2	7.7	3.3	12.5	0.3	52.5	16.7
$250,000–$1,000,000	12.4	1.1	7.3	6.1	10.1	3.3	45.9	13.8
More than $1,000,000	21.7	0.6	5.0	4.5	11.6	8.4	31.9	16.4
All categories	5.5	0.3	5.9	3.6	9.2	0.8	58.5	16.2

Source: Calculated by Poterba and Samwick (1997), using data from the Federal Reserve's 1983 and 1992 Surveys of Consumer Finances.
a. Net worth in 1992 dollars.
b. Excluding mutual funds.

Table 4. Portfolio Shares of Different Asset Types, by Interest Income Marginal Tax Rate Category, 1983 and 1992

Percentage of portfolio

Sample and marginal tax rate category	Equity Taxable[a]	Equity Taxable mutual funds	Equity Tax deferred	Bonds Taxable	Bonds Tax deferred	Bonds Tax exempt	Taxable interest-bearing accounts	Other financial assets
1992 sample								
Less than 15 percent	3.2	1.1	2.0	4.0	4.9	1.6	70.1	13.1
15–27 percent	4.2	1.7	10.1	5.0	13.3	1.5	60.1	14.2
28–30 percent	5.8	2.2	16.1	4.8	16.2	2.5	39.5	12.5
More than 30 pecent	8.9	2.1	15.5	3.8	18.4	4.0	34.0	13.0
1983 sample								
Less than 15 percent	4.5	0.2	1.5	3.8	1.9	0.5	71.9	15.6
15–27 percent	4.9	0.1	6.5	3.2	11.1	0.4	56.8	16.9
28–30 percent	4.3	0.2	10.4	3.7	14.4	0.7	49.8	16.5
31–39 percent	8.0	0.9	9.3	4.7	13.3	1.4	46.5	16.0
40–44 percent	9.0	1.0	13.0	4.5	16.5	2.2	41.0	12.7
45 percent or more	18.3	0.4	8.2	3.2	16.1	5.1	33.0	15.8

Source: Calculated by Poterba and Samwick (1997), using data from the Federal Reserve's 1983 and 1992 Surveys of Consumer Finances.

a. Excluding mutual funds.

Table 5. Distribution of Annual Earnings of Workers Covered by OASDI, 1993[a]

Earnings	Workers	
category	*Number[b]*	*Percent*
All categories	128.2	100
Less than $8,400	42.1	33
$8,500–$13,199	15.5	12
$13,200–$17,999	14.0	11
$18,000–$22,799	12.2	10
$22,800–$27,599	10.0	8
$27.600–$32,399	7.8	6
$32,400–$37,199	6.2	5
$37,200–$41,999	4.8	4
$42,000–$46,799	3.6	3
$46,800–$51,599	2.7	2
$51,600–$57,599	2.5	2
$57,600 (maximum)	7.0	5

Source: U.S. Social Security Administration (1996, p. 190).
a. Sample includes wage and salary workers.
b. Millions.

basis points for the IA plan, and 100 basis points for the PSA plan.[62] Moreover, it assumes that administrative costs relative to assets would be the same for all workers, across income levels. Yet a large part of the cost is a fixed cost per account. This is true for both record keeping and communication with account holders. The collection and processing of deposits have large fixed cost components as well. The frequency of deposit of withheld mandatory savings would be an important determinant of administrative costs. Thus one would expect that charges would be higher relative to assets for low earners than for high earners, as has been the case in Chile. Currently, many mutual funds stipulate a minimum size for accounts, in order to keep out small ones. Also, some impose higher charges on small accounts, by waiving some fees for larger accounts.

The importance of these fixed costs relative to the size of deposits is illustrated by table 5, which shows that the distribution of social security earnings is considerably weighted toward low earnings compared to the distribution of earnings of full-time adult workers.[63] Under the

62. The charges levied directly by mutual funds currently average about 1 percent, but this does not include costs that are charged separately, such as brokerage commissions on transactions or spreads in purchase and sale prices.

63. To deal with the fixed cost issue, one could consider exempting small earnings or young and old workers from individual accounts.

IA plan, the Social Security Administration would have a single account for each worker (in almost all cases). Under the PSA plan, unless all revenues flow through the government, there is no mechanism to combine accounts that workers might have placed with different intermediaries. Indeed, some have argued that diversification across mutual funds is of value in itself. Thus some workers with a history of multiple jobs would have multiple accounts, which would be considerably smaller on average than one might think from accumulating the deposits based on earnings, as reported in the table. This has been a problem in Australia. To see the magnitude of the potential problem, note that in 1993, 223 million W-2 reports were filed for 128 million wage and salary workers.

For a comparison, one can look to the United Kingdom, where there are optional Appropriate Personal Pensions (APPs) for people who opt out of the earnings-related portion of the government plan (the State Earnings Related Pension Scheme, or "SERPS").[64] The typical range of charges on unit-linked APPs has been described by the U.K. Government Actuary: initial commissions ranging from 5 to 10 percent of deposits, plus management fees of between 0.5 and 1.25 percent of assets, plus monthly flat-rate charges of 1.50 to 3.00 pounds sterling. The Government Actuary takes the charges levied by a typical provider to be 8 percent of deposits (front load) plus 0.9 percent of assets plus 2.50 pounds sterling (although the recent entry of index funds is lowering costs, on average).[65] In addition, there are costs associated with early surrender, which can be very large.[66] Costs are higher than those assumed for the United States by the advisory council and include a sizable fixed component. It is also clear that there would be considerable logic and pressure to regulate the form of charges.[67] This would be

64. An optional defined contribution replacement for part of social security has been suggested in the United States. In the United Kingdom, this has resulted in high-pressure sales tactics, leading some people to switch inappropriately. Some suppliers have been reprimanded and made to pay compensation. (Blake, 1997.)

65. United Kingdom, Government Actuary and Secretary of State for Social Security (1996, sect. 4.7, p. 7).

66. "We also found that surrender values for with-profits endowment schemes were on average 27 percent below maturity values when cashed in just 1 year to maturity"; Blake (1997, p. 289).

67. In the United Kingdom, "charges can be imposed in a bewildering variety of ways"; Blake (1997, p. 289).

similar to the experience that led to regulation of allowable medigap policies.

Another issue is the policing of funds to hold down the levels of misselling and of outright fraud.[68] It is possible that a large influx of inexperienced investors would result in a surge of both. In addition to the impact of misselling and fraud on retirement incomes, there is the effect on the political stability of a proposal for privatization. The first ten years of the voluntary opt-out of the earnings-related portion of the U.K. retirement income scheme has been marked by complaints and lawsuits. Indeed, the British Office of Fair Trading has called for a major overhaul of the system that would decrease the range of individual choice.[69] One of the striking elements of the U.K. market for individual accounts is the complexity of the arrangements that are available. This example goes to the heart of the tension between the market's ability to serve a heterogeneous population well and its capacity to confuse and take advantage of it, relative to restricted choices organized by the government. Naturally, more extensive restrictions would be proposed for the protection of consumers in a setting of mandated purchase than in one of voluntary purchase.

Administrative costs could be held down as a condition of accepting such deposits.[70] Presumably the caps would be placed on administrative charges per account during the year as a fraction of some measure of the size of the account. However, different types of funds have different cost structures and would need different caps; for example, stock versus bond, index versus nonindex, domestic versus foreign investment, and direct investment versus holding financial assets. One would also need to pay attention to the different ways in which charges can be introduced into portfolio management; for example, the charges on certificates of deposit are built into the interest rate offered. Furthermore, the restriction of charges raises the question of whether firms could refuse to accept particular (small) accounts. This is an issue of both economic and political outcomes.

More generally, one must ask whether much tighter regulation of

68. As I was writing this paper, the *New York Times* ran a front page article titled, "Currency Trading Schemes Leave Investors Holding the (Empty) Bag" (August 9, 1997, p. A1).

69. United Kingdom, Office of Fair Trading (1997).

70. Dickson (1997); Goodfellow and Schieber (forthcoming).

portfolios would be a way to solve both the problem of administrative cost and that of poor investment choices. Moving in this direction, however, reintroduces concerns about direct government control of portfolios. In a regulatory environment, would pressures emerge, for example, to regulate the holding of foreign stocks? Or to require prior approval of any acceptable portfolio? And would this open up the issue of the role of social investing (for example, in low-income housing) in getting approval? Would such pressures be larger or smaller than with direct government design of portfolios? Could one insulate a regulatory structure in the same way as an investment authority? Can one impose fiduciary responsibility on a regulatory agency in the same way as on an investment board? One would need to be concerned about pressures from Congress and the choices of the regulatory agency.

My suspicion is that a tight regulatory structure would forfeit some of the political insulation that comes from individual portfolio choice, while it would only partially avoid the high administrative costs. Chile took the heavily regulated route and has high administrative costs relative to well-run social security systems.[71] Although some people have argued that it is the nature of regulation that has caused the high costs in Chile, I am skeptical. I have not seen any formal equilibrium model showing that regulating the structure but not the level of charges would lead to an equilibrium with high charges and high sales costs. Moreover, the charges in Chile are lower than those in the United Kingdom, where there is no such regulation. High costs are inherent in the reliance on individual choice in this kind of market.

While the focus has been on the administrative costs that would be borne by the workers, some costs fall elsewhere.[72] Some administrative structure would be needed to transfer the withheld funds from employers (and the self-employed) to the financial intermediaries. This could be tacked onto the existing framework of 401(k) plans for the roughly one-quarter of the population that is covered by such plans at any time, but new institutions would need to be created for the rest; and in any case, the rules for mandated savings are likely to differ from those of 401(k) plans in terms of worker choice, if nothing else. If the federal government were to deliver deposits to financial intermediaries, consid-

71. Diamond and Valdés-Prieto (1994); Valdés-Prieto (1994); Edwards (forthcoming).
72. Pozen (forthcoming).

erably greater administrative costs would be incurred than at present, when individual records need only be adjusted annually. At present, neither the Social Security Administration nor employers needs to track individual payroll taxes more frequently.[73] If deposits were delivered privately, firms would have to send payments to many sources, although clearinghouses would probably be developed to handle the payments.

Currently, assuring that withheld taxes reach the social security trust funds and that individual taxable earnings are correctly recorded falls to the Internal Revenue Service and the Social Security Administration. Each year, the SSA processes roughly 220 million W-2 returns from about 6.2 million to 6.5 million employers.[74] Over 5 million of these are filed on paper, by employers with, on average, about twelve employees. There are a number of mismatches between employers' reporting of the names and social security numbers of their employees and SSA records. The SSA has computer routines for picking up common mistakes, such as transposed digits in social security numbers or common variations in the spelling of names. After this, the agency is left with 6 million W-2 reports (roughly 3 percent) for which information is missing or does not match. In these cases, the SSA corresponds with either employee or employer. The Internal Revenue Service performs audits to confirm the accuracy of reported tax liability.

If, as sometimes occurs when a firm approaches bankruptcy, tax payments are not made, the cost of the default falls on the federal government rather than the workers, since worker records for benefit determination are based on taxable earnings, not on tax payments received. Presumably a similar guarantee would not exist in private payment mechanisms, so someone would need to police them. Unless the money flowed through the SSA, one would lose some of the economies of scope of the present system.

In addition to the costs of generating and monitoring the flow of money, there is the issue of worker education. Many firms that have 401(k) plans provide education in investment for their workers, to good effect. Where there is portfolio choice, there will be a demand for

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73. Until 1978, individual records had to be reported quarterly. The requirement was changed to annual reporting to ease the administrative burdens on employers.

74. Employers make tax payments more frequently, but they only need to allocate those taxes to individual workers once a year.

education. Who will control the nature of the instruction offered and who will pay for it remain to be determined.

Individual accounts also raise the question of government bailouts. When losses are beyond the control of individuals, as a result of either widespread market problems or extensive fraud, there will be calls for government rescues.

Annuitization and the Poverty of Elderly Widows

Social security can be thought of as generating two separate mandates. One is to pay taxes to finance retirement income. The other is to receive retirement income as a real annuity.[75] Like social security, the Individual Accounts plan includes mandatory annuitization on reaching retirement age. This is to be done by the Social Security Administration, using the same implicit price for annuities for everyone, neither distinguishing by easily measured factors such as gender nor by the more detailed (and more expensive) estimates of life expectancy. The IA plan allows a choice of single or joint life annuities. Thus this plan is similar to the current social security program in requiring annuitization, but differs in that it has automatic adjustment for cohort life expectancy and a choice between single and joint life. In contrast, the Personal Security Accounts plan leaves annuitization (or the rate of withdrawal after retirement) to be determined by the individual and the private annuity market. An intermediate position on annuitization, similar to the approach taken in Chile, could limit the size of monthly withdrawals on any part of the retirement account that is not annuitized. Whatever the details proposed, there is a possibility that the political outcome

75. The question of varying benefits with family structure, although not considered here, has received repeated attention without any widely accepted resolution; see, for example, U.S. Department of Health, Education, and Welfare (1979), U.S. House of Representatives, Committee on Ways and Means (1985), U.S. Congressional Budget Office (1986), and U.S. House of Representatives, Select Committee on Aging (1992). Proposals to average earnings between husband and wife on an annual basis undercut the fundamental purpose of a retirement income system. With husbands and wives of systematically different ages and gender-neutral retirement rules, many workers, on reaching retirement age, would have access to only a fraction (sometimes as low as one-half) of the level of retirement income thought to be appropriate. Varying the retirement age by gender could ease this particular problem, but would not make it go away. And gender-varying rules bring problems of their own.

Table 6. Poverty Rates of the Elderly by Age, Sex, and Maritial Status, 1992
Percent

Sex and	Age			
marital satus	65 and over	65–74	75–84	85 and over
Male				
Total	8.9	8.1	9.7	13.2
Married	6.6	6.0	7.5	10.5
Widowed	15.0	13.7	15.7	16.7
Divorced, separated, never married	17.6	18.1	16.5	. . .
Female				
Total	15.7	12.7	18.9	22.7
Married	6.4	5.6	8.0	. . .
Widowed	21.5	18.9	23.2	23.8
Divorced, separated, never married	26.0	25.6	27.0	. . .
Total	12.9	10.7	15.3	19.8

Source: U.S. House of Representatives, Committee on Ways and Means (1994, p. 860).

with regard to individually ''owned'' accumulations would mirror cur-
rent IRA rules, allowing lump sum withdrawals and hence not restrict-
ing rates of spending. In order to evaluate how such a plan would work,
one needs to estimate the shape of equilibrium.

A regime with more choice about annuitization raises both positive
and normative questions. On the positive side, to what extent would
individuals annuitize? For those who did annuitize, how would equilib-
rium annuities be priced and what types of annuities would be se-
lected—single or joint life (or in some ratio); nominal, variable, or real;
with or without a guaranteed minimum number of payments? To the
extent that people did not annuitize, how quickly would they spend out
of wealth? How would this affect the long-lived elderly, widows and
widowers, and other recipients of bequests? This last is of particular
concern given that the poverty rate of elderly widows is so high (see
table 6), higher even than among children.[76]

On the normative side, there are questions about the shortcomings
of the annuities market due to adverse selection and delay in the pur-
chase of annuities until retirement age.[77] And there is the more basic
issue of the quality of individual decisionmaking about annuities.

76. The IA plan calls for higher survivors' benefits, financed by reduced spouse
benefits, as proposed by Burkhauser and Smeeding (1994).
77. Brugiavini (1993).

Currently, the individual annuities market in the United States is extremely small.[78] It is smaller than can be explained by adverse selection alone, and given the insurance advantages of annuitization, its size has been viewed as a puzzle.[79] Real annuities have not been regularly marketed in the United States until this year. In the United Kingdom, where real government bonds have been available for some time and real annuities are offered, the market for individual annuities is overwhelmingly for nominal annuities.[80]

Comparison of this behavior with theoretical models of expected utility maximization (especially without a bequest motive) suggests significant lack of public understanding about stochastic events and insurance, the difference between real and nominal contracts, and this particular insurance product.[81] If the thinness of the individual annuity market could be explained by adverse selection alone, there would be high levels of annuitization by groups with sufficiently high life expectancy. But the market is so small that no such group can have sizable annuitization. Existing annuities (social security and private pensions) and bequest motives do limit the benefit of further annuitization, but some mandatory annuitization may be needed, as is mandatory saving for retirement, for paternalistic reasons.

78. Poterba (1997). It is important to distinguish between the actual purchase of a payment flow conditional on survival and "variable annuities," which are tax-favored saving vehicles with insurance companies that include an option to annuitize. It appears that this option is rarely taken, although I know of no published data.

79. Friedman and Warshawsky (1990); Mitchell, Poterba, and Warshawsky (1997).

80. "The majority of annuities sold in the United Kingdom are fixed-rate. Contacts of the Bank of England have told them that while there are no aggregate data, it is likely that more than 90 percent are fixed-rate. In particular, where individuals have discretion as to the type of annuity to buy, they appear to prefer fixed-rate annuities. Legal and General, one of the United Kingdom's largest insurers, sold no index-linked annuities to individuals in 1996, and less than 1 percent of their individual annuities in force are index-linked." (Alex Bowen, Bank of England, personal communication, August 5, 1997.)

81. On stochastic events and insurance, see Kahneman and Tversky (1979, 1982); on real versus nominal contracts, see Shafir, Diamond, and Tversky (1997).

The popularity of a "years-certain" annuity contract (which guarantees a minimum number of years of payments, even if the annuitant dies sooner) is also difficult to understand. It is hard to explain such a choice with bequest motives—why would such motives only be present if life is short rather than long; or equivalently, why would people use this particular pattern of age-specific life insurance to supplement an annuity? It makes more sense to consider this as part of the common desire to do well with a gamble, whatever the outcome of the stochastic process.

Family Decisionmaking

While it is common to treat the household as a decisionmaking unit with a single (joint) lifetime utility function, this model has been questioned.[82] Analysis of annuitization decisions provides strong evidence that such decisions do not conform to single (joint) lifetime maximization.

Single life annuities were popular in employer-provided retirement plans before the introduction of the Employee Retirement Income Security Act of 1974 (ERISA).[83] There was a sharp drop in the extent of single life annuitization as a result of the ERISA provision for a 50 percent joint life annuity as a default, even though this did not restrict individual choice. Karen Holden estimates that 48 per cent of men with pensions beginning before 1974 had joint-and-survivor pensions, whereas 64 percent of those with pensions beginning after 1974 did so.[84] The extent of single life annuitization dropped sharply again as a result of the 1984 Retirement Equity Act, which required notarized spousal approval before selection of a single life annuity (but not before a lump sum withdrawal). The General Accounting Office estimates that the percentage selecting a single life annuity dropped by 15 percentage points after this requirement took effect.[85] Using data from the Teachers Insurance and Annuity Association and College Retirement Equities Fund, Francis King finds that the proportion of people who selected single life annuities fell from 44 percent in 1978 to 26 percent in 1994, with nearly half of the decline occurring between 1984 and 1986.[86] Although some of the parameter estimates, while large, are not statistically significant, Karen Tegen finds drops in single life annuitization resulting both from ERISA and the Retirement Equity Act.[87]

If there were a single household maximization, the Retirement Equity

82. See, for example, Lundberg, Pollak, and Wales (1997).
83. Single life annuities are also popular in individually purchased single premium immediate annuities. An unpublished LIMRA (Life Insurance Marketing Research Associates) International survey of twenty-six U.S. companies selling these products in 1993 found that only 7 percent of clients elected a joint-and-survivor option; see Mitchell, Poterba, and Warshawsky (1997).
84. Holden (forthcoming).
85. U.S. General Accounting Office (1992).
86. Francis P. King, "Trends in Selection of TIAA-CREF Life-Annuity Income Options, 1978-1994," *TIAA-CREF Research Dialogues* 48, July 1996.
87. Tegen (1997).

Act would not have had any effect on the choice between single and joint life annuities. Presumably game theoretic approaches to family decisionmaking include considerable elements of reality, at least for some couples. Concern for widows, who already have a high poverty rate, argues for mandatory joint-life annuitization.[88] Undersaving by the young is a motivation for social security. No access to these funds is allowed until age sixty-two. It seems odd to assume that no further restrictions on saving decisions are needed after people reach sixty-two.[89]

Mandatory Annuitization

To the extent that some people genuinely do not want annuities, mandatory annuitization is a source of inefficiency. Insofar as people desire to use their resources for bequests, the cost of overannuitization is limited by the ability to purchase life insurance (with an additional administrative cost). The elderly do hold life insurance.[90] How much of that life insurance is due to overannuitization and how much to inertia from lifetime policies, to tax advantages gained when arranging bequests, and to the desire to finance burial is unclear. To the extent that less annuitization is desired in order to have a larger buffer stock for random events, there is inefficiency, the solution to which is more saving. Thus overannuitization is particularly an issue when there is also mandatory oversaving.

To the extent that some people genuinely do want annuities, one can compare how the market for annuities works (with or without mandated annuitization) relative to government provision. And one can also consider the set of people who do not annuitize but should do so. Exploring

88. Long-standing policies protect a widow's interest in a share of her husband's estate.

89. Research on saving decisions has been exploring the use of multiple selves and nonexponential discounting (referred to as quasi-hyperbolic discounting) to model the actual behavior of people who do not simply have zero savings (or a small precautionary balance) as a rule of thumb; see, for example, Ainslie (1992), Loewenstein and Elster (1992), and Laibson (1996, 1997). While the degree of time consistency no doubt varies with age (at least through childhood), it would seem that similar behavior is likely to be present in people in their sixties. Moreover, annuitization would appear to be an excellent commitment device for solving problems of time consistency. This adds to the puzzle of their low use.

90. Bernheim (1991).

such models in detail would stray too far from the macroeconomic focus of this paper. But it is worth noting the presence of such a literature, examining how the annuities market would work under the assumptions that the set of people who enter the market conform with theoretical models and of adverse selection.[91] The magnitude of the problem of adverse selection depends on the legal restrictions on pricing variation.[92] If race and gender are forbidden as categories for pricing differentials, then a larger fraction of the population will find annuities poorly priced for their life expectancy. Mandatory annuitization still leaves the selection problem of insurance companies scrambling for good (unhealthy) risks. Mandatory annuitization, with uniform pricing, provides insurance for everyone and involves redistribution across categories with ex ante different life expectancies. To evaluate whether the gains in insurance efficiency were more or less important than the redistributions involved would require a detailed simulation model. If individual variation were smaller than it is, a Pareto gain would be possible from a suitable mandated annuitization.[93] And these results hold in models with zero loads. There are sizable administrative costs to the private provision of annuities, larger than those of social security.

Politics

It is sometimes argued that while changing to a defined contribution system would shift investment risk to workers, it would reduce "political risk." Implicit in this line of argument is the idea that individual accounts will be given the same protections as other private property, whereas social security is "merely" a legislated entitlement that can be taken away by legislation at any moment. But legislation is not an exogenous random event; it is the outcome of a political process that has been much studied.[94] It is necessary to put this line of argument into context.[95] This involves three steps: First, to identify more clearly

91. See, for example, Eckstein, Eichenbaum, and Peled (1985) and Brugiavini (1993).
92. I do not examine the moral hazard issue of people living healthier lives because they have annuities; see Davies and Kuhn (1992)
93. Eckstein, Eichenbaum, and Peled (1985).
94. See, for example, Derthick (1979), Light (1985), and Arnold (1990).
95. I am grateful to Hugh Heclo for this approach to analyzing political responses.

the political risks associated with continuing, more or less, the current structure. Second, to identify more thoroughly the risks associated with individual accounts. And third, recognizing that individual accounts are only one part of the retirement income system, to identify more broadly the political risks associated with all parts of such a system. My focus here is on the ongoing political forces in play after the creation of a new system (or the decision to continue the current one). I do not address the other important issue of what might happen to particular proposals in the political arena while new legislation is under discussion.

Two different types of scenario can lead to new legislation. Economic events might force a response by the social security system, whether modified or not. Or political pressures might develop in the adjustment to a new system, causing a change in the political equilibrium. The current social security system is of long standing, mature, and very popular. It is reasonable to think of it as being in political equilibrium and likely to change only in response to changed circumstances, rather than endogenously responding to political forces that evolve as a result of the presence of the system. While changing labor force participation by women has put pressure on the system, the difficulty of designing a satisfactory reform has impeded movement on this front. Currently, the main force for change is financial need. Future tax rates and benefit formulas are the prime candidates for change. To evaluate the importance of the risk associated with such changes, it is important to ask whether this risk is concentrated or diffuse. That is, are people at risk for large changes in expected financial position—in particular, large changes with limited advance notice—or are the changes more likely to be small and spread over a wide population? The latter seems more likely, given the history of social security legislation to date.

Next, one should consider the political forces relative to the individual accounts and relative to the rest of the retirement income system. The accounts are likely to have private property protections, particularly if they are invested with private firms, but there will still be political risks. Most obvious is the risk of changed tax treatment. As described above, there has been a history of changes in the tax treatment of tax-favored retirement accounts. A large pool of tax-favored accumulation will always represent a potential target for increased taxation. The risk

from increased taxation—as with the risks in the current system—is likely to be of moderately reduced wealth relative to expectations, not massive change. Another potential risk as a result of government financial needs is that the accounts might be tapped to substitute for other government spending. For example, one could consider adjusting unemployment benefits by allowing (and requiring) that potential recipients spend out of individual accounts before they are eligible for government money. The IA plan has room for adjusting how the accumulations are converted into annuities, as a relatively unobtrusive way of tapping resources. Conversely, future taxpayers may be at risk if the returns to the accounts are very poor. A sharp collapse in the stock market will lead to calls for compensation.

Both the PSA and IA plans retain a significant defined benefit component in the retirement income system. Thus the vagaries of future demographics and economic growth would remain highly relevant for the financing of social security. For example, low wage growth might decrease the flow of revenue available for the defined benefit portion of the system. Insofar as the individual accounts are insulated from this financial need, the shortfall will be made up by the rest of the system. Adjusting the flat benefit in response to financing shortfalls would represent a different distributional response than proportional cuts in the current benefit formula. The risks associated with demographics and economic growth do not go away; rather, they are allocated differently and thus represent a different pattern of political risk.

Political forces are also generated by change in public perceptions of the system. Social security is thought of as a retirement income system. It is not widely seen to be inappropriate that some people pay taxes and do not live to collect benefits. Individual accounts would create a different sense of ownership. Since the accounts would end up in the holders' estates in the event of death before retirement age, accounts owners would naturally call for early access to these funds under certain circumstances: terminal illness is an obvious case in point, as are also medical expenses, home purchase, and education. This already occurs with voluntary tax-favored accounts, and one would expect stronger calls with mandatory ones. The merits of opening up accounts for other purposes depend on how one judges the need to preserve funds for retirement relative to liquidity problems earlier in life. The current social security system is one particular solution to this

trade-off. It is likely that a different solution would evolve from the different concept of individual accounts.

Labor Supply

Although the macroeconomic discussion of social security reform is centered on the capital market, the labor market also enters the discussion. It is said that switching from a defined benefit to a partially defined contribution system improves the efficiency of the labor market by "tightening the link" between taxes and benefits. This link has two aspects: the financial (that is, the expected return to work) and the perceptual.

Because of asymmetric information, it is impossible to have either redistribution or insurance without distorting the labor market. Thus social policy does not aim to avoid all distortions but, rather, to achieve an appropriate balance between redistribution and insurance on the one hand and labor market distortion on the other. In the PSA plan, for example, half of the retirement portion of the payroll tax goes into individual accounts and half finances a flat benefit that is added to the accumulated return. Thus half of the tax is purely distortionary—the same fraction for everyone. (Recognizing the possibility of death before retirement age, more than half of the tax is distortionary and the excess varies with age, as discussed below.) A system with a guaranteed minimum pension amount, as that in Chile, has 100 percent marginal taxation on the pension accounts of low earners and a lower distortion for the rest of the population. In the U.S., the progressive benefit formula for social security means that the redistribution comes from marginal subsidies on low-income people and marginal taxes on high-income people.[96]

It is difficult to determine the optimal way to balance the distortions imposed at different places in the income distribution with a one-period model, since such a model depends on both income distribution needs and elasticities of labor supply at different places in the income distri-

96. I do not consider the distortions introduced by dependents' and survivors' benefits or by the way in which social security treats families,which I think could be improved.

bution, and so allows no simple assertions as to which system is better.[97] To extend this analysis to a multiperiod setting would be even more complicated.

With a defined benefit system, redistribution involves different distortions at different ages and also different distortions on people with different earnings profiles.[98] Thus the balance between distortions and redistribution may be more complicated to analyze than for a defined contribution system.

Another issue arises from the difference in the timing of annuitization between defined benefit and defined contribution systems. Consider an individual with no interest in bequests. The accumulation in a mandatory savings account will be of no value to such an individual if he or she dies before reaching retirement age. By contrast, a defined benefit system gives larger benefits to those reaching retirement age, financed by the "estates" of those who do not reach retirement age. Thus a defined contribution system involves distorting taxation of those without interest (or with lesser interest) in bequests, because of the failure to convert the value of their estates, should they die, into something of value to them.[99] To see the magnitude of this effect and its age-varying structure, consider table 7, which shows the probabilities of survival from given ages to age sixty-two. A thirty-year-old male has an 18 percent probability of receiving no retirement benefits from mandated savings. In recognition of this aspect of the defined contribution system, the PSA proposal involves a tax in excess of the one-half of the OASI payroll tax rate used to finance the flat benefit.[100]

97. See, for example, Mirrlees (1971) and Diamond (forthcoming).

98. For calculations based on the current social security system, see Feldstein and Samwick (1992).

99. Relative to the complete market Arrow-Debreu model, an economy without annuities has distortions in both the consumption-saving decision and the labor-leisure decision. A defined benefit system provides annuitization on a rolling basis, which should have less labor market distortion for the young than a defined contribution system that annuitizes at retirement age. Brugiavini (1993) analyzes issues in the timing of annuitization relative to the consumption-saving decision, but does not consider the labor-leisure decision. As is standard in second-best analysis, distortion of one decision margin affects the efficiency of decisions on other margins.

100. In addition to the labor market implications, death before retirement age affects the cost of providing defined retirement benefits. Since mortality rates rise with age, the bulk of these early deaths occur at advanced ages. Thus the values of the accumulations of workers who die before retirement age are substantial.

Table 7. Probability of Surviving to Age Sixty-Two Based on the 1991 Period Life Table

Age	Males	Females
20	0.81	0.89
30	0.82	0.90
40	0.84	0.91
50	0.88	0.93
60	0.97	0.98

Source: Author's calculations, using data from U.S. Social Security Administration (1996, p. 199).

For those workers whose utility from assets in their estates is lower than their utility from their own consumption in retirement if they survive, the defined benefit structure lowers the implicit tax relative to that in a defined contribution system. Since a defined benefit system uses the same benefit formula for everyone, the actuarial adjustment will not be correct for everyone; those with different life expectancies will have different implicit taxes.

A defined contribution system offers a choice between annual redistributions and redistribution at retirement age, based on lifetime accumulation. For example, Michael Boskin, Laurence Kotlikoff, and John Shoven propose a system of "personal security accounts" with annual redistributions based on annual earnings.[101] This involves distortions arising from the age-earnings profile (and from nonuniformities in that profile). Any given level of redistribution will have both taxes on and subsidies to many people, at different stages in their earnings profile.

The guaranteed minimum pension in Chile is an example of a system with redistribution based on lifetime accumulation. One could obtain a smoother redistribution pattern with a different implicit tax structure, for example, by moving all accumulations toward a fixed level. However, basing redistribution on lifetime accumulation in a setting with individual portfolio choice will distort portfolio choice as well as labor supply. With a guaranteed minimum pension, individuals have a particularly strong incentive to take very risky portfolio positions if they are below, or only moderately above, the level that would finance the minimum pension. In Chile, the heavy regulation of portfolios has prevented this problem. It is more of an issue with an IRA than a 401(k) approach.

101. Boskin, Kotlikoff, and Shoven (1988).

The same considerations that enter into analysis of redistribution also apply to the provision of insurance against the length of working life and earnings uncertainty.[102] Enormous variation in lengths of working life is associated with both ex ante individual differences and ex post realizations of stochastic elements of health, job satisfaction, and job opportunity. Thus a retirement system has considerable scope for providing valuable insurance.

In addition to variation in the actual links between earnings and future benefits, the form of pension provision may affect the perceptions of implicit marginal taxation. If the benefit formula is complicated, peoples' perceptions will not be very accurate. Workers may well undervalue the return to work at some ages and overvalue it at others—especially if they think that social security is like those private pensions that are based on earnings over a short period at the end of the working life.

Even if there were no redistribution and no death before retirement, a mandatory defined contribution system would distort labor supply if the mandate were needed. That is, if people need to be forced to save because they value retirement income too little, forcing them to save will, to some degree, lead to undervaluation of the return to working, since they undervalue the mandated saving. Although there may not be consistency in shadow prices across different decisions, one would expect some of the distortion to carry over.[103] If people have high discount rates (whether from myopia or liquidity constraints), a dollar set aside for future benefits that earns a market return is worth considerably less than a dollar. For example, one dollar compounded for twenty years at an 8 percent market rate and discounted back at an 18 percent subjective rate is only worth 17 cents.

The considerations raised above are relevant for the impact of social security at any age, but the proposals also differ from the current system in how they employ the earnings test. Both the IA and PSA proposals provide defined contribution benefits at a given age but still apply the earnings test to defined benefits. (They would also alter the earliest age of eligibility for retirement benefits and the relationship between disability and retirement benefits.) In a way, this scheme parallels my

102. Diamond and Mirrlees (1978, 1986, forthcoming).
103. On mental accounting, see Thaler (1985).

proposal to provide a steadily increasing part of benefits independent of the earnings test, while the rest is still subject to the test.[104] An earnings test involves labor market distortions.[105] It also provides redistribution and insurance. The patterns of these depend on life expectancies and annuitization factors. Some people, for example, delay claiming retirement benefits and, as a consequence, receive larger benefits from a later age.[106] To explore how best to balance the effects of a different minimum age of eligibility and of using the earnings test differently would take another paper. As with some of the other parameters that try to balance complex behaviors and effects, there is no simple analysis leading to the right answer, but there must be detailed calculation and careful balancing.

Concluding Remarks

The paper begins by noting that a traditional legislative package to restore actuarial balance in the social security system would increase national saving, relative to the absence of any new legislation. Estimates of the magnitude of such an effect depend on the details of the reform—in particular, the timing of tax and benefit changes—and the responses of private savers, pension plans, and the rest of the federal government budget. I argue that a near-term tax increase to build and maintain a permanently larger trust fund would increase national saving.

A large permanent trust fund raises several questions. Would maintaining such a fund be a political equilibrium, if it were part of the traditional social security structure? And what portfolio should be held by such a trust fund? I suggest that investing some of the trust fund in private securities has advantages. In turn, this raises the question of the management of the portfolio. I argue that the government could probably invest, while insulating the fund's investment decisions from political pressures, along the lines of the Thrift Savings Plan of the Federal Employees' Retirement System, although such insulation could not be guaranteed.

The paper examines the contention that replacing part of the present

104. Diamond (1980).
105. Friedberg (forthcoming).
106. Coile and others (1997).

defined benefit system by a government-managed defined contribution system would better insulate investment policies from political pressures and increase the probability of legislating additional taxes. However, to introduce such a system would change political pressures, increasing the possibility of larger changes in the future—changes that one might like or dislike. Government management of the system is felt by some to offer inadequate insulation from political pressures on investment decisions, even with individual accounts. Therefore the paper also considers the IRA model, where individuals have a wide choice of investments in the current market. This type of system would be very expensive to administer, would involve individual portfolio decisions that are hard to predict, and would naturally lead to political pressures for greater regulation of these markets (for example, to lower administrative costs and to restrict individual choice to approved portfolios). Enhanced regulatory oversight, in turn, can become a channel for political pressures on investments. Moreover, such a system has political risks of its own, different from those of the current system but no less real.

Allowing individuals to choose the form of benefit receipt would likely lead to significant change in the pattern of income among the elderly. Given the present high levels of poverty among elderly widows, this is a source of great concern. Social security currently provides more than 90 percent of income for 30 percent of the elderly and more than 50 percent of income for 66 percent of the elderly.[107] Major reform should not be undertaken without careful study of the likely outcomes.

107. U.S. Social Security Administration (1997).

Comments
and Discussion

Alan J. Auerbach: It has often been said that the genius of those who designed the U.S. social security system lay in the way they bundled different functions together in a single program, so as to ensure the continued support of a coalition of voters of different ages and income classes. Their success is evident in the growth and relative stability of the OASDI system over a period of six decades, the last three of which saw the rise and fall of the Great Society. But this success has also presented a significant barrier to the reform of the social security system, even as the system's finances have deteriorated to the point that change is inevitable. One knows there must be change, but one is unsure what form it should take or, politically, how it could happen.

In his very thoughtful paper, Peter Diamond correctly emphasizes the central role that politics plays in this context, not only in steering the reform process, but also in determining the viability of alternative reform proposals. Indeed, as is implicit in his presentation, privatization, a key component of many reform proposals, is as much a matter of politics as of economics.

The ''crisis'' in social security arises from the fact that under current rules, taxes will eventually be inadequate to finance benefits, even with projected trust fund accumulations. The simplest, least disruptive solution would be to accumulate a larger trust fund through higher taxes, lower benefits, or both. Diamond first considers the macroeconomic effects of faster trust fund accumulation. Without absolute Ricardian equivalence, this policy will increase saving, and the paper explains how the outcome depends on general equilibrium effects, the presence

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of nonsavers, and the taxation of capital income. Some see investing
the trust fund in higher-yielding equity as another part of the solution.
Diamond explores the implications of this portfolio shift on risk-sharing
and intergenerational redistribution. He notes that the shift to an equity
portfolio may help to spread risk from the old, who hold risky assets,
to the young and unborn, who cannot. He observes, perhaps with-
out enough emphasis, that this policy will also induce further inter-
generational transfers to near-term beneficiaries if the market's
reward for higher risk—the equity premium—does not go implicitly
to those who are being forced to bear that risk—the taxpayers of the
future. Put bluntly, using a higher projected return on equity to stave
off benefit cuts or tax increases involves significant intergenerational
redistribution.

Many criticize this proposed portfolio shift for a different reason: that
it will be difficult for government, as a huge shareholder, credibly to cede
its power to meddle in the affairs of the corporate sector. Such critics
favor instead a shift toward a more private system, possibly still one that
is quite regulated in regard to the choice and management of investments.
Diamond is skeptical that the credibility problem cannot be overcome. He
also cautions that the shift toward a more private system may impose
higher administrative costs and may fail to meet one of the current sys-
tem's major objectives: to protect people from their own irrationality by
providing them with adequate retirement wealth and ensuring that this
wealth is sufficiently annuitized. He concludes that making such a fun-
damental change to so important a program requires careful study, a
conclusion that does not speak well of the various radical reform schemes.

As I have little dispute with Diamond's analysis or his conclusions, I
try to amplify some of the points that he makes and fill in some of those
that he does not. My comments are organized around two themes. First,
the current method of assessing the stability of the OASDI system is flawed
and provides an overly optimistic picture of the system's financial status.
Second, it is important to distinguish form from substance. Our first
concern, as economists, should be to understand how proposals allocate
risk, distort saving and labor supply, and redistribute burdens within and
across generations. We risk being sidetracked if we focus on more super-
ficial questions, such as how big the trust fund is, who "owns" it, or
whether the government's unfunded liabilities are implicit or explicit.
While appearances may carry considerable political weight in this world

of limited rationality and understanding, it is still necessary to approach the reform process with eyes open to the economic consequences.

Measuring the Fiscal Imbalance in the OASDI System

The trustees of the OASDI system measure actuarial imbalance with a seventy-five-year horizon, calculating it as the constant additional share of payroll needed to ensure that a minimal trust fund balance remains at the end of the period. Their 1997 report lists an imbalance of 2.23 percent of payroll, or 0.84 percent of GDP. Whether this is big or small depends on one's perspective. Some take comfort in observing how many macroeconomic and policy fluctuations are of equal or greater magnitude. But this is the wrong percentage to use in assessing the viability of the social security system. The estimate itself may well be very optimistic, and truncating the horizon surely imparts further downward bias.

Consider, first, the question of whether current projections are accurate; that is, whether they provide a reasonable indication of the central tendency of the system's imbalance. Diamond notes that the estimated seventy-five-year imbalance has deteriorated considerably since the last "permanent" adjustment to the OASDI system, in 1983, led to the projection of virtually exact balance—0.02 percent of payroll—over the period (under the intermediate assumptions). According to calculations reported in table 2, almost one-third of this deterioration is attributable to the rolling sample period—some "bad" years have been added to the end of the sample. Put another way, a deterioration by 1.54 percent of payroll would have arisen if there had been no change in the period of valuation. I am not sure how this decomposition has been done, but it seems to understate the optimism of the 1983 projections. As table A1 shows, if one looks at the years in the overlapping sample period of the 1983 and 1997 trustees' reports, the downward revisions in annual net income have generally been much larger than 1.54 percent of payroll. Some independent projections suggest that one has not seen the last of these optimistic forecasts. For example, Ronald Lee and Shripad Tuljapurkar estimate an expected actuarial imbalance of −3.33 percent of payroll, over 1 percentage point higher than that estimated by the Social Security Administration.[1]

1. Lee and Tuljapurkar (1997).

Table A1. OASDI Net Income as a Percentage of Payroll, 1997–2060

Percent

Year	1983	1997	Gap[a]
1997	2.42	1.14	1.28
2000	2.71	0.91	1.80
2010	2.51	0.26	2.25
2020	0.19	−2.22	2.41
2030	−1.65	−4.38	2.73
2040	−2.03	−4.61	2.58
2050	−2.11	−4.76	2.65
2060	−2.27	−5.45	3.18

Source: Board of Trustees (1983, 1997).
a. Percentage point difference: 1983 less 1997.

Further, as Diamond points out, the rolling sample period, combined with the presence of a downward trend in annual balances, means that the seventy-five-year measure can be expected to worsen over time, even without any changes in projections. This highlights the basic problem with the seventy-five-year approach. While certainly superior to the one-year approach implicit in looking at the current year's cash flow surplus, it still provides an inaccurate assessment of the system's financial stability. Because long-run imbalances are so large, this is not a case in which sample truncation involves a small error. Using the trustees' most recent projections and assuming that the imbalance remains at its 2070 level in subsequent years, I calculate that the full annual imbalance—the permanent annual change needed to sustain the OASDI system permanently, not for only seventy-five years—is 3.25 percent of payroll.[2] This change, too, adds more than 1 percent of payroll to the Social Security Administration's estimate.

Thus the imbalance in the social security system is probably much greater than is commonly believed. There is also considerable uncertainty about what will actually happen to longevity, interest rates, productivity growth, and other factors that influence the system's financial health. But the presence of this uncertainty does not, in itself, tell one how or how fast one should deal with existing imbalances. The choice of policy response affects not only how the burden of paying for social security is distributed among generations, but also how risk is spread. Presumably, one should respond differently to an imbalance arising

2. Auerbach (1997).

from a permanent increase in longevity (which makes everyone better off) than to one caused by a permanent decline in productivity growth (which makes future generations progressively worse off). This is the same issue as arises in Diamond's consideration of how the trust fund should be invested, and it highlights why it makes little sense to focus on the trust fund in isolation. The social security system, with or without a trust fund, spreads risk across generations; so do other government policies, like medicare and pollution restrictions. It is not clear why one should focus specifically on the OASDI trust fund, as opposed to government policy as a whole, when considering the allocation of risk.

Form versus Substance

Much of the current excitement about privatization stems from a misunderstanding about what it can do. Diamond cites as an example the common comparison between the market rate of return available through private individual accounts and the much lower ''biological'' rate of return offered by a pay-as-you-go unfunded social security system. It is simple economics that the same market rate of return could be delivered by a funded public system, and that the difference being measured arises from the size of the unfunded liability already in existence, which privatization will not alter. Ultimately, many of the differences between a private system and the current U.S. system, important though they may be, are political. For example, privatization may facilitate the erosion of current commitments by breaking up the pro-social security coalition. As a result, the United States might—or might not—be better off under a private system than under a public one. But one should not confuse the issue by suggesting that this is a Pareto-improving policy change.

Some see another key political advantage in the protection that privatization will provide trust fund accumulations from potential government meddling. Diamond argues that this issue is overstated, and that the protections incorporated in the existing Federal Employees' Retirement System can serve as a model for the future equity investments of the OASDI trust fund. However, he does recognize the potential problem, citing recent divestiture decisions by state pension funds. It is worth noting, though, that public involvement may also be positive, from the perspective of beneficiaries. A case in point is the California

Public Employees' Retirement System, which seeks to increase its market returns by putting shareholder pressure on poorly performing companies. One issue that is not raised in the paper is the impact of the trust fund's size on its investment performance. Those managing Fidelity's Magellan Fund apparently felt it necessary to exclude new investors because of the adverse effects of the fund's size on transaction prices. The problem facing a single OASDI trust fund must be considerably greater, even if it tries simply to conduct those transactions needed to maintain a balanced portfolio.

Another alleged advantage of a private social security system is that it permits greater linkage between contributions and benefits, thereby reducing the taxes on labor supply implicit in the present system. Diamond points out, however, that the incomplete linkage and associated distortions in the current public system are inherent in any system that seeks to redistribute and insure in the presence of asymmetric information. A more subtle question is whether the current system is so incomprehensible to participants that they perceive less linkage than really exists, but it is hard to see privatization as the best solution to such confusion.

Appearances aside, the first job is to decide how to trade off the insurance and redistributive functions of the social security system against the associated distortions. It may be that a public system, or a private-public combination, offers the best administrative structure for whatever it is one wishes to achieve. In this regard, it is worth noting one major proposal on which Diamond does not dwell. The Concord Coalition, among others, would subject old-age benefits to means-testing.[3] As has been suggested by Glenn Hubbard, Jonathan Skinner, and Stephen Zeldes, for instance, such wealth-dependent social insurance would present those who expect to be near the benefit ceiling with a potentially powerful disincentive to save.[4] Those who are fairly certain to be above the ceiling would face no saving disincentive, but would accurately view the payroll tax as not linked to any future benefits. Thus, compared with the present system, means-testing would increase the saving disincentive for some and the labor supply disincentive for others. It is hard to believe that there are not less distortionary ways to achieve a

3. See Peterson (1995).
4. Hubbard, Skinner, and Zeldes (1995).

viable and yet still progressive social insurance system. In particular, it seems unnecessary to introduce the distortions of means-testing on an ongoing basis simply to impose a benefit reduction on more affluent present and near-term beneficiaries. But if alternative solutions continue to be presented primarily in the context of privatization, policymakers averse to what they perceive as radical reform may not realize the full range of options available to them.

William G. Gale: Peter Diamond's paper provides an extensive and insightful discussion of the economics of social security reform. It also highlights the role of political factors and points out numerous areas on which further information is required before there can be a full assessment of social security reform. I do not have serious disagreements with any of the major conclusions. Several items, however, merit further discussion.[1]

One of the great attractions of social security reform is its potential to address two major issues simultaneously: to repair the long-term financial problems of social security and to raise the national saving rate. It is easy to understand this potential. The U.S. social security system, as currently designed, is usually thought to depress national saving. And fixing the long-term financial imbalance of the system requires benefit cuts, or tax increases, or some combination of the two.[2] As Diamond indicates, immediate and permanent across-the-board benefit cuts or tax increases should raise national saving. Thus a range of reforms could presumably be designed to restore financial balance to social security and simultaneously raise national saving. However, that presumption about the saving issue comes with several caveats.

First, raising national saving via social security reform is primarily an issue of improving the funding status of the program. There is broad, but not universal, consensus that moving toward a more permanent, fully funded system would raise national saving, provided that the change were not offset by other changes in government spending or taxes.

Second, privatizing social security is neither necessary nor sufficient

1. Much of this discussion is based on Engen and Gale (1997).
2. For political purposes, these changes are often cleverly disguised, but there should be no analytical debate about the fact that the proposals do increase taxes and cut benefits.

to improve its funding status or to raise national saving. To see this, consider a stark version of privatization that would immediately replace the current mandatory defined benefit pension plan with a mandatory defined contribution plan. Workers would have to switch their contributions to private saving accounts, without any change in benefits already earned, while the government would have to borrow to meet already promised benefit payments. This would make explicit the previously implicit liability created by future benefits. Thus privatization would adjust the structure of the program, but would not necessarily alter the government's total (explicit and implicit) liabilities. Only if policies were changed to reduce total government explicit and implicit debt would the funding status of social security actually improve.[3]

Third, national saving will be affected in roughly the same way, regardless of whether social security is prefunded as a private or as a public program. Specifically, the social return to an additional dollar of saving is the same, whether that saving accrues through private saving or through improving social security's funding status. Private saving makes the dollar available for private investment; the social gain is the pretax rate of return on the investment. In a pure pay-as-you-go system, a worker's return on a social security contribution is productivity plus population growth; this is typically less than the return available in the private economy. But the social gain from improving the funding status by a dollar exactly equals the gain through private saving: the dollar reduces the amount that the federal government has to borrow from the public, leaving an additional dollar of private saving for new private investment.[4]

Fourth, investing trust fund assets in private equities, to a large extent, simply shifts the ownership of existing assets, rather than raising national saving. Currently, the trust fund invests its surpluses in government bonds. Moving part of that investment to private securities would raise the relative demand for private securities and reduce the relative demand for government bonds. The shift in demand would reduce the relative yield on private securities and raise the relative yield on government bonds. This, in turn, would induce private investors to shift out of equities and private bonds into government bonds. Total

3. See Mitchell and Zeldes (1996).
4. See Bosworth (1996).

debt and equity would remain the same, as would the productive capacity of the economy, but owners would have exchanged assets. In particular, funds that the federal government formerly borrowed from the social security trust fund would instead be borrowed from private investors. This would increase the government debt held by the public and could possibly raise government borrowing rates, which would increase government borrowing further.

One justification for investing the trust fund in private securities stems from the fact that, as noted above, the social returns on an added dollar of prefunded social security and an added dollar of private saving are equal. Thus investing in private securities permits the social security trust fund to collect a return that more closely approximates the social returns that its reserve accumulation generates. But this gain clearly comes at the expense of the rest of the government budget and of other investors.

As Diamond discusses, the gain may also come at the expense of future generations. They would bear the risks associated with uncertain returns on trust fund investments, if current benefits are not adjusted to reflect that risk. In addition, the change would affect intragenerational risk-sharing. Investing part of the trust fund in equities would allow risk-sharing with the many households that currently hold no equities. The shifts in risk-bearing across and within generations could also influence saving.

Fifth, raising the saving rate is distinct from making households better off. Saving involves sacrificing consumption today in exchange for increased consumption in the future. It is not necessarily the case that all increases in saving—that is, increases in future living standards—are worth the cost in foregone current consumption. In addition, households often save more (or consume less) because they have become worse off, and save less (or consume more) because they have become better off.

The transition from an unfunded to a funded social security system provides a prominent example of the distinction. In a pay-as-you-go system, the social security contributions of one generation of workers pay for the retirement of the preceding generation, whereas in a fully funded system, a generation's contributions pay for its own retirement. Thus to switch from an unfunded to a funded system would, absent other changes, require either that one generation of workers pay for two

retirements—their own and that of the generation before them—or that several generations bear the transition costs. Such a process could well raise national saving, by reducing the consumption of the transitional generations, but it would also make workers in those generations worse off.[5]

The dichotomy between making people save more and making them better off leads directly into the political economy issues that Diamond highlights so clearly. For example, a proposal must be voted on to become law, and only generations that are alive can vote. Thus even if a proposal for social security reform could ensure large long-term gains in exchange for relatively small ''short-term'' (thirty-year) tax increases, it might not be enacted, because voters might systematically discount the long-term gains, which they would not receive. Any adjustment to accommodate the interests of the generations alive at the time of the vote will likely reduce saving, by limiting the extent to which transition costs reduce current consumption.

Concern about the viability of a current tax increase is exacerbated by the fact that the payroll tax hits most households with income of up to $50,000 (or more) much more heavily than does the income tax. Therefore the politics of raising payroll taxes may prove difficult; some recent proposals have actually suggested *reducing* them.

A related issue is that in order for trust fund accumulation to raise national saving, government must not spend it on other transfers, government consumption, or tax cuts. There is certainly no guarantee that a surplus could be accumulated safely. Washington is already flooded with proposals for how to spend the unified budget surpluses that are currently projected to emerge in the next few years.

The advent of personal, defined contribution accounts may make workers more willing to accept the added sacrifice of higher payroll taxes, since the marginal personal (as opposed to social) return on such accounts is generally higher than that on social security contributions. The development of private personal accounts raises a host of other issues, however. Will there be political support to annuitize the balances, or will workers want the right to withdraw the funds in a lump sum? Will, or should, Congress be able to resist demands to allow early

5. In a way, it is misleading to call these transition effects. Under some of the proposals, they are expected to persist for upward of seventy years, a period longer than social security has existed to date.

withdrawals from the accumulated funds, for example, to pay for health expenses, college, or a new business? In the past twenty years, accumulations of wealth in the form of housing equity, IRAs and 401(k)s have faced these kinds of pressure. Moreover, although to enforce annuitization and bar early withdrawals makes sense as a matter of retirement income security, from a broader policy perspective, it is not at all obvious that this is the right choice. Suppose that a family faces default on its mortgage but has accumulated $200,000 in a mandatory retirement account. The extent to which good public policy would allow withdrawal of funds to pay off the mortgage is unclear. It is clear, however, that households may put tremendous pressure on the political system to "undo" the forced saving and annuitization aspects of social security.

It is also worth considering the effect of long-term declines or stagnation in market returns. When it was created in the 1930s, social security could be said to have replaced a completely voluntary system of retirement provision that existed before the economy and the stock market collapsed. Should market returns decline again, even by amounts much smaller than during the Great Depression, similar pressures to compensate investors or raise public benefits would likely arise.

A key point is that consideration of political economy factors will tend to reduce the estimated impact of reforms on saving, and hence on growth. This should not be surprising.[6] To save more requires a reduction in current living standards, which most people naturally resist. To the extent that forced saving plans raise saving, they do so by making people save more (or consume less) than they would like. Thus political pressure will most likely focus on precisely those features of reform that enhance saving. As Diamond emphasizes, these and related considerations indicate the importance of analyzing social security reform proposals as they are likely to evolve, rather than as they initially appear on paper.

Diamond's paper provides a superb examination of the issues involved in social security reform. It thus lays a firm foundation for the next step in informed policy analysis: quantitative estimates of the costs

6. The same effect arises in considerations of fundamental tax reform. Auerbach (1996), for example, shows that providing transition relief to owners of capital in the implementation of a consumption tax would significantly reduce the reform's impact on saving and economic growth.

and benefits of reform. Modeling the impact of social security reform in a formal and plausible manner has proven difficult for a number of reasons that Diamond highlights, including uncertainty about why people save and how they make decisions about saving, the complexity of social security rules, and the role of political economy issues, among others. To date, none of the quantitative studies has seriously addressed these issues. Embedding them in more formal models of social security reform is an important task for future research.

General discussion: Henry Aaron commended the paper for making explicit the interaction of politics and economics in considering social security reform. In Aaron's view, economists should be clear about what assumptions they make regarding compensatory changes, how long reforms will endure, and, perhaps, how Congress might respond to stock market fluctuations were the trust fund invested in stocks. Gary Burtless agreed, noting that it is worthwhile to ask how a future Congress would deal with a market contraction like that of 1929–33. The political pressures might be very different with a system of individual accounts than with a unitary trust fund. James Tobin warned that economists should be wary of giving political advice to politicians, particularly when it assumes that politicians should not trust themselves. He thought it peculiar to say, ''We are telling you don't do X, because if you do, you will probably do Y sometime later, and Y would be foolish,'' which is telling them something about their own behavior, rather than, ''We think X is a good thing to do, and Y bad.'' However, it may be appropriate to include such predictions about political behavior when economists are expressing a detached, positive view, without any normative or policy recommendations. Alan Blinder added that economists know much less than politicians about short-run political considerations, but are more able to predict the long-run economic consequences of policy. Economists are thus in a good position to counter the myopia of the public and Congress. Since future economic outcomes will be important in determining future political behavior, he thought it appropriate for economists to point out how current policies may affect the actions of politicians or voters ten or twenty years from now.

Several participants discussed the uncertainty implicit in forecasting the distant future. Robert Gordon noted that the many difficulties of extrapolating seventy-five years ahead included uncertainty about infla-

tion, productivity, immigration, birth, and death rates, and even about the wedge between CPI inflation and the GDP deflator. He suggested that one way to reduce uncertainty about the financial health of social security would be to index the retirement age to life expectancy, though he recognized that this begs the question of what fraction of increased life expectancy will correspond to a productive and active life and what fraction will be spent in the hospital. Aaron noted that it is an odd feature of the official projections that the percent of payroll going to social security keeps rising even though the ratio of social security benefits to GDP flattens after 2030. This simply reflects the actuaries' assumption that the fraction of compensation that is sheltered from tax will rise after 2030, and Aaron questioned whether one should accept that assumption. Burtless, who had played a part in selecting the technical assumptions underlying the projections, said that many disagreements about the assumptions arose, but that, overall, he believed the ones chosen are not biased. For example, in comparison with the assumptions used in 1983, the actual trends in demographics and economics have subsequently turned out to be more favorable in some respects and less favorable in others, so that the net impact on the projections has come out about a wash. Alan Blinder recalled that with risk aversion, uncertainty about the response to present actions calls for making cautious policy changes.

On the issue of whether to invest social security in the stock market, Gordon noted that if the U.S. market is currently overvalued, rates of return in the future will be lower than we have been accustomed to in the past. The same logic as leads to investing social security funds in stocks leads to investing the trust fund partly in international stocks. Blinder questioned whether it was reasonable to expect the equity premium to continue at its historical level. If the stock market continued to rise 3 percent faster than GDP, stock wealth would rise from approximately 100 percent of GDP today to nineteen times GDP a century from now. That probably cannot happen, even with investment overseas, so a lower rate of return would be a more reasonable projection for the long run.

Christopher Sims noted that many proposals to "privatize" social security by investing in the stock market could also be viewed as proposals for the public ownership of a large fraction of the capital stock. While some analysts are concerned that public ownership might lead

the government to interfere with sound management, it is also possible that as stock owners, governments would do too little. Many are already concerned that too much passive ownership leaves managers unaccountable. If a large fraction of the capital stock were in the hands of an owner who, by legislative mandate, was passive, this problem would worsen. James Tobin pointed out that until recently, the social security system has prospered because of fortuitous demographic and productivity shocks. Had it been a defined contribution plan, instead of the actual defined benefit plan, social security would not have been exposed to the dangers of relying on this lucky combination of shocks to continue. He suggested that if a defined contribution plan were adopted, the government could supplement low-earners' contributions so as to preserve the progressivity and social insurance character of the system.

Robert Hall observed that the paper raised three big issues related to economists' limited belief in consumer sovereignty. We apparently want to force individuals to fund later consumption; to force them to fund the consumption of dependent family members, especially widows, after their own deaths; and to protect people from sharp practices by the providers of private financial products. Hall was sympathetic to such paternalism. He agreed with Diamond that it would be odd to continue to force saving by the young but to allow a consumption binge at age sixty-two or thereafter, and so he regarded forced annuitization as appropriate. And he viewed the poverty of widows as persuasive evidence in favor of requiring individuals to make provisions for their dependents. Hall also found staggering the evidence of excessive charges on retirement accounts in Britain, but noted that these were similar to the large up-front loads and annual expenses that people pay on many U.S. financial products. Given the typical magnitude of private sector charges, he noted that social security has a large cost advantage and suggested the need for broader reforms in the financial products industry before considering turning over the trust fund to the private financial sector.

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