IMF Working Paper

WP/97/112 INTERNATIONAL MONETARY FUND

Western Hemisphere

Investing U.S. Social Security Trust Fund Assets in Private Securities

Prepared by Michael Leidy[1]

Authorized for distribution by Steven Dunaway

September 1997

Abstract

This paper examines the macroeconomic and distributional consequences of a policy change, other things being equal, that would allow U.S. Social Security trust fund assets to be invested in private securities. Improving the expected return to trust fund assets, by shifting these from government bonds to private securities, tends to *reduce (increase)* the future claim on national output of the current (future) working population. The effects on aggregate saving and future output depend on whether current workers interpret this policy change as affecting their future Social Security benefits.

JEL Classification Numbers: H5, E6

Keywords: social security, social insurance

Author's E-Mail Address: MLeidy@imf.org

---

[1]My thanks to Steven Dunaway, Charles Kramer, and Victor Valdivia for their many helpful comments and suggestions on earlier drafts of this paper.

Contents **Page**

SUMMARY

Under current legislation, U.S. Social Security trust fund assets must be held entirely in special government securities, resulting in an expected yield lower than otherwise. This paper examines the macroeconomic and intergenerational distributional consequences of a policy change, other things being equal, that would allow Social Security trust fund assets to be invested in private securities. These effects are analyzed with the aid of a simple two-period closed-economy macroeconomic model, with two distinct overlapping generations (young and old).

Because Social Security is essentially a pay-as-you-go system with defined benefits, the current working (and retired) population has no direct stake in improving the financial outlook of the trust fund, unless the sustainability of the system is in doubt. Rather, it is the future worker/taxpayer whose burden in supporting the next generation of recipients would be either reduced or increased according to the performance of the trust fund's portfolio; any shortfall in the system's receipts relative to its benefit payments would have to be made up through future taxation.

Shifting trust fund assets to private securities induces an accommodating adjustment in the structure of private portfolios, which become more heavily weighted toward lower-yielding government bonds. The model suggests that improving the expected return on trust fund assets, by shifting these investments from government bonds to private securities, tends to *reduce* (*increase*) the future claim on national output of the current (future) working population. The effects on aggregate saving and the level of future output depend on whether current workers interpret this policy change as affecting their future Social Security benefits. Various special cases are examined, and the distributional and macroeconomic effects are compared with those under an increase in the current payroll tax.

I. INTRODUCTION

Under current legislation, U.S. Social Security trust fund assets must be held entirely in special government securities.[2] As a result, the expected yield on trust fund assets is lower than it might be otherwise. Recently, the Advisory Commission on Social Security proposed a number of options for improving the long-term viability of the system.[3] While the members of the Commission could not agree on a single approach, all members agreed that some redirection of assets toward equities and other private securities would be one element in improving the actuarial outlook for the system. [4]

This paper examines a very narrowly defined question, but one that has been largely ignored in analytical work on social security financing. Specifically, what are the macroeconomic and distributional consequences of a policy change, *ceteris paribus*, that would allow Social Security trust fund assets to be invested in equities and other private securities?[5] All other aspects of the system, particularly its *pay-as-you-go*[6] nature, will be assumed to be unchanged.[7] While it is taken as given that holding private assets, by increasing expected returns, will improve the actuarial balance of the system, it is less clear how this might affect

---

[2] There are two Social Security Trust Funds: The trust fund for Old-Age and Survivors Insurance (OASI pays retirement and survivors benefits); and Disability Insurance (DI pays disability benefits).The Medicare system also has established two trust funds that must be invested entirely in special government securities: Hospital Insurance (HI); and Supplementary Medical Insurance (SMI).

[3] See "Report of the 1994-1996 Advisory Council on Social Security", volumes I and II, January 1997.

[4] Only the plan identified as "Maintain Benefits" calls specifically for a fraction of trust fund reserves to be invested in equities. However, the other two plans (Individual Accounts and Personal Security Accounts) include provisions to establish individual savings accounts, some amount of which could be invested in equities.

[5] In what follows, the term "equities" will be used to denote any composite of private-sector securities.

[6] A "pay-as-you-go" system implies that the current benefits of retirees are financed out of current payroll tax receipts. Under such a system, benefits are defined. In the United States, Social Security is a partially funded system, so that the financing burden facing current workers depends on the size of the guaranteed benefits to current retirees relative to current payroll tax receipts and trust fund assets that have been accumulated from past contributions in excess of benefit payouts.

[7] Currently, more than 90 percent of Social Security payroll tax receipts are used to service obligations to current beneficiaries.

national saving, future national income, and its intergenerational distribution. With the aid of a simple two-period closed-economy macroeconomic model, with two distinct overlapping generations (young and old), an analysis of these effects is presented.

Because Social Security is essentially a pay-as-you-go system, rather than a fully funded system, there is no direct stake of the current working population in improving the financial outlook of the trust fund, provided that the sustainability of the pay-as-you-go system is not in doubt. Under a variety of assumptions, it is shown that improving the expected return to trust fund assets, by shifting these assets from government bonds to private securities, tends to *reduce (increase)* the future claim on national output of the current (future) working population. Whether aggregate saving is affected, and so future output, depends on whether current households interpret this policy change as affecting their future Social Security benefits.

II. A Simple Macroeconomic Model with Social Security Financing

Consider a discrete-time, two-period, closed-economy macroeconomic model in which the economic agents consist of the young (workers), the old (retirees), and the government. In the initial period, the young expend their disposable (after tax) income on consumption and saving. In the terminal period, the young workers expend their entire disposable income on consumption and the old finance consumption out of past savings and current social security benefits. The government purchases goods and services and accumulates "trust fund" assets using current taxes. As under the current Social Security system, these trust fund assets, and the income they generate, defray part of the cost of future Social Security benefits, but the system is not a fully funded system.

A. The Initial Period

Let τ_0^{ss} denote social security taxes and τ_0^{ns} denote nonsocial security taxes, both in the initial period. The *Social Security trust fund's accumulation of assets* in the initial period (R_0^{ss}) is given by the excess of social security taxes over current benefits (SS_0):

$$R_0^{ss} = \tau_0^{ss} - SS_0. \tag{1}$$

Excluding the social security surplus, the *central government's fiscal deficit* in the initial period is:

$$D_0 = g_0 - \tau_0^{ns}, \tag{2}$$

where D_0 also denotes the stock of initial period government debt. The *unified fiscal deficit* (which includes the social security surplus) is given by:

$$D_0^{unified} = g_0 + SS_0 - \tau_0^{ns} - \tau_0^{ss} = D_0 - R_0^{ss}. \tag{3}$$

In order to finance the initial-period deficit, the government sells bonds to the public and, under current law, to the Social Security trust. The total government debt held by the public depends on how much of the government budget deficit will be financed by the social security surplus. Because a central goal of this paper is to determine the effects of investing some amount of the Social Security trust in equities, the assets of the trust will be parameterized so that the fraction ρ is invested in equities and the remainder $(1-\rho)$ is invested in government bonds. Current law is represented by $\rho=0$. Total government debt held by the public is given by:

$$\begin{aligned} B_0^p &= D_0 - (1-\rho)\cdot(\tau_0^{ss} - SS_0) \\ &= (g_0 - \tau_0^{ns}) - (1-\rho)\cdot(\tau_0^{ss} - SS_0). \end{aligned} \tag{4}$$

Under current law, B_0^p equals the unified fiscal deficit.

If government bonds and private-sector equities provide the only two vehicles for storing financial wealth, then the stock of government bonds held by the public plus the value of outstanding equities not held by the Social Security trust must equal total private savings in the initial period. Letting $s(\bullet)$ denote the aggregate personal saving function, and E_0 the value of equities in the initial period [8], the saving of the young in the initial period must equal the value of outstanding government bonds plus private-sector equities not held by the Social Security trust:

$$\begin{aligned} s(y_0 - \tau_0, SS^p) &= B_0^p + (E_0 - \rho\cdot(\tau_0^{ss} - SS_0)) \\ &= B_0^p + E_0^p, \end{aligned} \tag{5}$$

where $\tau_0 = \tau_0^{ss} + \tau_0^{ns}$ is total taxes, $y_0 - \tau_0$ is disposable income, SS^p denotes *perceived* future benefits under Social Security, and E_0^p denotes equities held by the public. The postulated structure of the aggregate saving function allows aggregate saving to depend positively on disposable income and negatively on expected future Social Security benefits.[9] The associated

---

[8] E_0 can be thought of as a composite of private sector bonds and equities.

[9]The expected yield is not included in the aggregate saving function in the model. The response of private saving to a change in the expected yield is ambiguous theoretically and

(continued...)

partial derivatives are such that the marginal propensity to save out of disposable income is strictly between zero and one ($0<\partial s/\partial(y_0-\tau_0)<1$), and the marginal effect on savings of a dollar increase in perceived future social security benefits is strictly negative—indeed it can be argued that $-1<\partial s/\partial SS_1^p\leq 0$, since the present value of a one dollar increase in future social security benefits is equivalent to a fraction of that in current savings.[10]

Rather than working through the complexities of full asset market equilibrium, it will be assumed that equities, E_0, are supplied perfectly elastically so that any incipient excess of private savings over the stock of government bonds held by the public ($D_0-(1-\rho)\cdot(\tau_0^{ss}-SS_0)$) would be met by an increase in E_0, and conversely for any incipient shortage of private savings. In this way, the rates of return to equities ($R^e=1+r^e$) and government bonds ($R=1+r$) can be treated as exogenous and the value of equities in the initial period is then determined by solving (5) for E_0:

$$\begin{aligned} E_0 &= s(y_0-\tau_0, SS^p) - B_0^p + \rho\cdot(\tau_0^{ss}-SS_0) \\ &= s(y_0-\tau_0, SS^p) -[\,(g_0-\tau_0^{ns}) - (1-\rho)\cdot(\tau_0^{ss}-SS_0)\,] + \rho\cdot(\tau_0^{ss}-SS_0) \\ &= s(y_0-\tau_0, SS^p) - [\,(g_0-\tau_0^{ns})-(\tau_0^{ss}-SS_0)] \\ &= s(y_0-\tau_0, SS^p)-D_0^{unified}. \end{aligned} \tag{6}$$

where the right-hand side indicates that the supply of equities is independent of the investment policy of the Social Security trust. The flow of savings into equities is simply the excess of aggregate private saving less aggregate government borrowing net of the social security surplus. Thus standard notions of "crowding out" take place in the model despite the assumption of constant interest rates. As long as the unified deficit is unchanged and private savings is unaffected, the supply of equities remains constant. The allocation of equities across the private sector and the trust fund may be affected, however.

---

[9](...continued)
empirical work on aggregate savings in the United States typically indicates that the income and substitution effects induced by a change in yield are largely offsetting.

[10] This assumption is consistent with the substitution hypothesis advanced by Diamond (1977), that rational decision makers will substitute expected future social security benefits for private wealth accumulation. As pointed out by Feldstein (1996a, p.17), a number of empirical studies present evidence for the substitution hypothesis. The possibility that a change in perceived future social security benefits has no effect on private saving behavior, the case of myopic nonplanners (Feldstein and Pellechio, 1979, p.361), is not ruled out, however. Leimer and Lesnoy (1982) presented empirical evidence that social security may have no effect on private saving.

B. The Terminal Period

In the terminal period (period one)—the period in which the results of a period-zero policy shock would be realized—economic agents face the usual budget constraints and goods market equilibrium is satisfied. The aggregate supply of goods and services available in the terminal period is determined by aggregate savings in the initial period. The vertical aggregate supply equation for the terminal period is:

$$y_1 = f\left(s(y_0 - \tau_0, SS^P) - D_0^{unified} \right), \tag{7}$$

where $f(\bullet)$ is an economy-wide production function showing future output as a function of initial-period aggregate savings, private plus public.[11] It is also clear from (6) that the aggregate production function for terminal period output can be expressed as:

$$y_1 = f(E_0), \tag{8}$$

indicating that future output is a function of the flow of aggregate savings to finance private-sector economic activity.[12]

Goods market equilibrium in the terminal period can be expressed as:

$$y_1 = g_1 + c_1^{old} + c_1^{young}, \tag{9}$$

where g_1 is government spending on goods and services and aggregate private-sector consumption has been decomposed into that of the young and old generation in the terminal period.[13] As detailed below, the old are retired, receiving social security benefits and spending out of previously accumulated savings. The government budget constraint in the terminal period restricts government spending on goods and services to tax revenues, less total debt service/repayment, plus the excess (or deficit) of trust fund assets over social security

---

[11] Aggregate production also depends, of course, on the supply of labor which is assumed to be inelastically supplied and equal to the stock of second-period young.

[12] Implicitly, all initial-period government spending is treated as ordinary consumption, i.e, as not having an investment component.

[13] Goods market equilibrium in the initial period would include a term for investment expenditures.

payments (R_1^{ss}–SS_1)—which under the current underfunded system would be negative—where R_1^{ss} is the terminal period value of the trust fund, and SS_1 is the level of *actual* aggregate social security payments. The future value of the Social Security trust fund can be written as:

$$R_1^{ss} = \rho\cdot(\tau_0^{ss}-SS_0)\cdot(1+r^e)+(1-\rho)\cdot(\tau_0^{ss}-SS_0)\cdot(1+r), \tag{10}$$

where the return to government bonds is $1+r$ and the return to equities is $1+r^e$. The unified government budget constraint (i.e., including social security assets and obligations) in the terminal period is:

$$\begin{aligned} g_1 &= \tau_1 + \rho\cdot R_0^{ss}\cdot(1+r^e) - [\,D_0 - (1-\rho)\cdot R_0^{ss}\,]\cdot(1+r) - SS_1 \\ &= \tau_1 + \rho\cdot(\tau_0^{ss}-SS_0)\cdot(1+r^e) - [\,(g_0-\tau_0^{ns}) - (1-\rho)\cdot(\tau_0^{ss}-SS_0)\,]\cdot(1+r) - SS_1 \end{aligned} \tag{11}$$

where the middle two terms capture repayment of debt held by the public less the total value of the Social Security trust. Recall that D_0 is the initial-period value of total outstanding government debt and the bracketed difference is outstanding government debt held by the public. Thus the government budget constraint reflects, as it should, the fact that trust fund assets held as government securities imply equal and offsetting assets and liabilities in the central government accounts. Also observe that future tax revenues available to finance future government spending are reduced by both the repayment of debt held by the public and the excess of social security obligations over trust fund assets held as private securities.

The budget constraint facing the future old can be written as:

$$\begin{aligned} c_1^{old} &= B_0^p\cdot(1+r) + E_0^p\cdot(1+r^e) + SS_1 \\ &= [\,D_0 - (1-\rho)\cdot(\tau_0^{ss}-SS_0)\,]\cdot(1+r) + [\,E_0 - \rho\cdot(\tau_0^{ss}-SS_0)\,]\cdot(1+r^e) + SS_1 \\ &= [(g_0-\tau_0^{ns}) - (1-\rho)\cdot(\tau_0^{ss}-SS_0)\,]\cdot(1+r) + [\,E_0 - \rho\cdot(\tau_0^{ss}-SS_0)\,]\cdot(1+r^e) + SS_1. \end{aligned} \tag{12}$$

This says that the consumption of the future old is constrained by the value of their portfolio of government bonds and private equities, plus their social security receipts.

The budget constraint facing the "future young" is determined by the residual claim of labor, net of taxes, on future output. Using equations (9), (11) and (12), the budget constraint of the future young can be written as:

$$\begin{aligned} c_1^{young} &= y_1 - g_1 - c_1^{old} \\ &= y_1 - \tau_1 - E_0\cdot(1+r^e), \end{aligned} \tag{13}$$

where it is easy to show that the sum of future government spending plus the consumption of the future old equals terminal period tax revenues plus the total return to equities. This relationship holds regardless of how the Social Security trust is invested. The income, and so consumption, of the future young equals total output less the claim of capital (held by the old and possibly by the Social Security trust fund) and less taxes. Equation (13), combined with the budget constraints in (11) and (12) amounts to imposing Say's Law (an adding-up constraint), in which aggregate supply is constrained to equal aggregate demand. The budget constraints in (11), (12), and (13) ensure that the terminal period financial resources are just sufficient to finance expenditures on aggregate output.

Current policy

Under current policy (ρ=0), equation (12) can be expressed explicitly in terms of exogenous or predetermined variables as:

$$c_1^{old} = [g_0 + SS_0 - \tau_0^{ns} - \tau_0^{ss}]\cdot(1+r) + [s(y_0 - \tau_0, SS^p) - (g_0 + SS_0 - \tau_0^{ns} - \tau_0^{ss})]\cdot(1+r^e) + SS_1, \quad (14)$$

where (6) was used to express equity holdings in terms of personal savings less bond holdings.

Similarly, equation (13) can be expressed explicitly in terms of exogenous or pre-determined variables by deciding whether future taxes or future government spending is an endogenous variable. If government spending is assumed exogenous, then (11) implies that:

$$\begin{aligned} \tau_1 &= g_1 + (D_0 - R_0^{ss})\cdot(1+r) + SS_1 \\ &= g_1 + (g_0 + SS_0 - \tau_0^{ns} - \tau_0^{ss})\cdot(1+r) + SS_1. \end{aligned} \quad (15)$$

Thus (13) can be written as:

$$c_1^{young} = y_1 - [g_1 + (g_0 + SS_0 - \tau_0^{ns} - \tau_0^{ss})\cdot(1+r) + SS_1] - [s(y_0 - \tau_0, SS^p) - B_0^p]\cdot(1+r^e), \quad (16)$$

and future output is such that:

$$y_1 = f(s(y_0 - \tau_0, SS^p) - [g_0 + SS_0 - \tau_0^{ns} - \tau_0^{ss}]). \quad (17)$$

When future government spending is treated as endogenous (i.e, future period government spending adjusts to the amount of exogenous tax revenues, and the value of the Social Security trust, net of debt repayment), then the reduced form equation for the future young's consumption is:

$$c_1^{young} = f(\, s(y_0-\tau_0, SS^p)-[g_0+SS_0-\tau_0^{ns}-\tau_0^{ss}]\,)-\tau_1-[s(y_0-\tau_0, SS^p)-B_0^p\,]\cdot(1+r^e), \quad (18)$$

where B_0^p equals the expression for the unified deficit in (3).

III. Analysis

A. An Initial-Period Tax Increase Under Current Policy

Before investigating the effects of shifting trust fund assets to equities, this section analyzes the effects of an increase in current taxes as an alternative means of improving the outlook for the Social Security system.

The pure pay-as-you-go case

The pure pay-as-you-go case is interpreted to mean that perceived future social security benefits are de-coupled from the size of the trust fund; regardless of the size of the trust fund, predetermined benefits are assured through the taxation of workers. When the Social Security trust is invested entirely in government bonds, it is clear that whether social security taxes or nonsocial security taxes are increased in the initial period makes no difference to aggregate savings or to the stock of debt held by the public. Both affect saving identically in each case. An initial-period tax increase induces a fall in the private saving of the future old because it reduces their initial-period disposable income. Aggregate saving increases (i.e., $1-\partial s/\partial(y_0-\tau_0)>0$), because the tax, whether or not it is designated for the Social Security trust, is perceived as an ordinary tax, rather than a fee-for-service.[14]

It is clear from (4) and (5), and given that the marginal propensity to save is strictly between zero and one, that an initial period tax increase, *ceteris paribus*, implies two things:

---

[14] This, of course, is the nonRicardian equivalence case. If instead, utility functions were structured as if individuals were infinitely lived through bequests, the increased current tax burden would imply an equivalent reduction in the future tax burden. This would induce an offsetting reduction in current saving equivalent to the full amount of the tax increase so that there would be no effect on aggregate saving, public plus private. Feldstein (1996, p.16), however, surmises that "very few individuals who are affected by social security have operative bequest motives." More generally, if it was appropriate in this context to treat individuals as infinitely lived, then the whole issue of the intergenerational distributional effects of any proposed fix of the Social Security system would vanish.

(i) the value of government debt held by the public falls by the amount of the tax increase; and (ii) aggregate personal savings falls by a fraction of the reduction in outstanding government bonds. Together these two conditions imply that the reduced stock of private savings (wealth) must become more heavily weighted in nongovernment securities (all of which are being identified as equities). Specifically, a one dollar tax increase implies private-sector bond holdings decline by one dollar while holdings of nongovernment securities must increase by (1– *mps*), where *mps* is the marginal propensity to save out of disposable income. Because the yield on nongovernment securities (stocks and bonds) exceeds that on the "risk-free" government bonds, it is possible that an initial-period tax increase, while implying a drop in aggregate private saving, could nevertheless imply an *increase* in the future value of private savings.[15] This relationship is captured implicitly in (14). Differentiating (14) with respect to τ_0 (i.e., either τ_0^{ns} or τ_0^{ss}) yields:

$$\frac{\partial c_1^{old}}{\partial \tau_0} = -(1+r) + (1-s_1)\cdot(1+r^e), \tag{19}$$

where s_1 denotes the marginal propensity to save out of disposable income, $\partial s(y-\tau,SS^p)/\partial(y-\tau)$. From this expression, it is clear that:

$$\frac{\partial c_1^{old}}{\partial \tau_0} < 0 \quad \textit{iff} \quad s_1 > \frac{r^e - r}{1+r^e} \approx r^e - r \tag{20}$$

It is approximately true that, as long as the marginal propensity to save exceeds the yield differential between equities and government bonds, the financial resources available to the future old, and thus their purchasing power, declines in response to an initial-period tax increase. In the model with asset yields treated as exogenous, when the tax increase makes government bonds less available it is as if an incipient adjustment in asset yields is sufficient to induce the public to hold the new aggregate portfolio, now more heavily weighted in equities. If $s_1 > r^e - r$, then the improved outlook for the Social Security trust achieved through an initial-period tax increase comes at the expense of the initial-period young (future old). This is true in the sense that both their initial-period and future consumption must fall. However, this effect is mitigated, and could be reversed entirely, the higher is the yield differential between government bonds and private equities relative to the marginal propensity to save. Thus the

---

[15] It is also noteworthy that, if asset returns were treated as endogenous in the model, this possibility would become somewhat more likely. This is because the increased scarcity of risk-free government bonds following the tax increase would cause all bond prices to rise and their yields to decline. This, in turn, would help raise the return to equities by raising the profitability of firms as their borrowing costs decline.

possibility that $\partial c_1/\partial\tau_0>0$ cannot be ruled out. In such a case, the tax increase would cause period zero personal savings to decline by a relatively small amount, the future value of which would be more than offset by the higher yield on the new private portfolio.

When future government spending is exogenous, the implications for the future young can be deduced from (16). Intuitively, the initial-period tax increase shifts some of the future social security financing burden from the future young to the current young. With future output up and the future tax burden reduced, the future young stand to consume more, as long as the claim of the future old falls, or does not rise by very much. Differentiating (13) with respect to τ_0 yields:

$$\begin{aligned}\frac{\partial c_1^{young}}{\partial\tau_0} &= \frac{\partial y_1}{\partial\tau_0} - \frac{\partial c_1^{old}}{\partial\tau_0} \\ &= f'\cdot(1-s_1) - \frac{\partial c_1^{old}}{\partial\tau_0} \\ &= f'\cdot(1-s_1) + (1+r) - (1-s_1)\cdot(1+r^e).\end{aligned} \tag{21}$$

This says that the future young's consumption tends to rise by the full amount of the increase in output (induced by higher aggregate—government plus private—saving), plus an adjustment for any decline (or increase) in the purchasing power of the future old. Effectively, the full increment to output from the induced government saving in the initial period is captured by the future young because it implies an equivalent reduction in the future tax burden.

If, for example, capital is priced competitively, so that the marginal future value of a dollar of new physical capital (f') just equals the return to equities ($1+r^e$), then the future young's increase in consumption exactly equals the future value of the initial-period tax increase ($1+r$). That is, setting $f' = (1+r^e)$ and substituting into (21) yields:

$$\frac{\partial c_1^{young}}{\partial\tau_0} = (1+r) > 0. \tag{22}$$

In this case, the future young's consumption rises by the full amount of the future value of the initial period tax increase. In other words, an initial-period tax increase implies a future tax cut of equivalent value, and that tax cut accrues to future workers when government spending is predetermined. Whether the increased total return to equities results in an increased claim on future output for the older generation depends on its size relative to the induced future tax break.

The system is perceived to be partially or fully funded

In this section, an increase in the social security tax is analyzed when the size of the trust fund affects perceptions of future benefits. That is, suppose the Social Security system is perceived to be a funded system, in the sense that future benefits are believed to depend on the size of the trust fund. Unlike the previous section, it now matters whether the social security tax (τ_0^{ss}) or the nonsocial security tax (τ_0^{ns}) is increased, since only the former has an effect on the size of the trust fund. Moreover, perceptions of future benefits, SS^p, would no longer be invariant to changes in social security taxes.

Since perceptions of future benefits are determined, in part, by the future size of the trust fund, the personal saving function can be written as:

$$s = s(y_0 - \tau_0^{ss} - \tau_0^{ns}, SS^p([\tau_0^{ss} - SS_0]\cdot(1+r))), \tag{23}$$

where SS^p is expressed as a function of the future value of the trust. Let the second partial derivative of s be denoted by s_2 (the marginal change in aggregate personal savings in response to an increase in perceived future social security benefits).

In the case of an economy populated by myopic nonplanners (i.e, s_2=0), the results of the previous section remain applicable. It is reasonable, however, to assume that $-1<s_2<0$, and this is supported by a number of empirical studies.[16] That is, a dollar increase in perceived future social security benefits would induce a decline in personal saving of something less than a dollar. Indeed, it might be argued that the marginal effect on personal saving would simply reflect the present value of the increase in perceived benefits.

The final relationship to be considered in (23) is the derivative of SS^p with respect to the future size of the trust fund. If the system were perceived to be fully funded, a dollar increase in the future value of the trust fund would lead to a dollar increase in perceived future benefits, so that $SS^{p\prime}$=1, where the prime denotes the first derivative. This is, of course, a special case, but it will prove useful as part of a benchmark case in the analysis.

Consider the effect of a tax increase on aggregate savings (government plus private). Aggregate savings is personal savings less the unified budget deficit:

---

[16] See, for example, the studies cited in Feldstein (1996a, p.17). Because the empirical evidence is largely supportive of the substitution hypothesis ($s_2<0$), the possibility that $s_2>0$ is not considered here. However, Feldstein (1977) has noted that it is theoretically possible that social security benefits might induce higher private saving through an "induced retirement effect," suggesting that social security benefits may induce savers to target an earlier retirement date, and thus to set a higher rate of private saving during the working years.

$$S = s(y_0 - \tau_0^{ss} - \tau_0^{ns}, SS^p([\tau_0^{ss} - SS_0]\cdot(1+r))) - [g_0 + SS_0 - \tau_0^{ns} - \tau_0^{ss}]. \quad (24)$$

An increase in the social security tax in the initial period has the following effect on aggregate savings:

$$\frac{\partial S}{\partial \tau_0^{ss}} = 1 - s_1 + s_2 \cdot SS^{p\prime} \cdot (1+r). \quad (25)$$

Whereas aggregate savings unambiguously increased by $(1 - s_1)$ when perceptions of future benefits were treated as invariant to changes in social security taxes (the pure pay-as-you-go case), since $-1<s_2<0$, aggregate savings could now decline. A dollar tax increase designated for the Social Security trust causes personal savings to fall through two channels: (i) personal savings falls via the drop in disposable income; and (ii) personal savings falls because the perceived accumulation of future social security benefits reduces the need to accumulate nonsocial security wealth for retirement. Together these effects could exceed the increase in government saving.

What more can be said about the sign of the term in (25)? As a benchmark, suppose that the system is perceived to be fully funded so that $SS^{p\prime}=1$. Moreover, suppose that a dollar increase in future social security benefits, other things equal, induces an equivalent present-value reduction in current savings. In terms of (25), this means that $s_2 = -1/(1+r)$.[17] By equation (25), in this benchmark case, the upward pressure on government savings is fully offset by an equivalent downward adjustment in personal savings due to the improved prospect of future social security payments. In effect, savers treat the tax increase as a shift in their own savings from private fund managers to government fund managers. In the benchmark case, only the tendency for savings to decline via the reduction in disposable income remains. The net effect of an increase in the social security tax on aggregate savings in this case is thus:

$$\frac{\partial S}{\partial \tau_0^{ss}} = -s_1 < 0. \quad (26)$$

Because the tax increase was perceived as implying an actuarially fair increase in future benefits, and because households are treated as rational savers, the increase in government saving induced by the tax increase is fully offset by a decrease in personal saving. Aggregate

---

[17] Whether the discount factor should be $(1 + r)$ or $(1 + r^e)$ is an important question that will be re-visited.

saving declines because of the additional direct effect on personal saving of the decline in disposable income.

The benchmark case can be used to examine the effect of an initial-period tax increase on the consumption of the future young and old. Subsuming the personal saving function expressed in (23) into (14), and then differentiating (14) with respect to τ_0^{ss} yields:

$$\frac{\partial c_1^{old}}{\partial \tau_0^{ss}} = -(1+r) + (1-s_1)\cdot(1+r^e) + s_2\cdot SS^{p\prime}\cdot(1+r)\cdot(1+r^e) + SS_1^{\prime}, \tag{27}$$

where the final two terms in (27) reflect the change in future resources due to the higher social security payments, net of the reduction in the future value of savings due to the anticipated increase in social security benefits. Because the reduced private savings must come out of equities, the initial-period drop in savings, $s_2 \bullet SS^{p\prime}\bullet(1+r)$, implies a foregone return determined by the return to equities. In the benchmark case, in which present value was calculated based on $(1+r)$, (27) becomes:

$$\begin{aligned}\frac{\partial c_1^{old}}{\partial \tau_0^{ss}} &= -(1+r) + (1-s_1)\cdot(1+r^e) - (1+r^e) + SS_1^{\prime}, \\ &= -(1+r) + (1-s_1)\cdot(1+r^e) - (1+r^e) + (1+r) \\ &= -(1+r) + (1-s_1)\cdot(1+r^e) - (r^e - r), \\ &= -s_1\cdot(1+r^e) < 0\end{aligned} \tag{28}$$

where $SS_1' = (1+r)$ merely assumes that expectations are borne out; i.e, a dollar increase in social security taxes in the initial period implies $(1+r)$ in additional social security payments in the future period. Comparing the third line of (28) with (19), it is clear that there is additional downward pressure on the consumption of the future old equal to $(r^e - r)$ per dollar of the initial period increase in social security taxes. In the benchmark case, the additional downward pressure on consumption is due to the withdrawal of a portion of savings from investment in equities (when it was undertaken by individuals) to investment in government bonds (when it is undertaken by the Social Security trust).

If the present value conversion factor was $(1 + r^e)$ instead of $(1 + r)$, the effect of the initial-period tax increase on the consumption of the future old would be identical to the pure pay-as-you-go case. That is, in a fully funded system in which a credible commitment to increase future benefits by one dollar induces a cut in current savings determined by $s_2 = -1/(1+r^e)$, an increase in the initial-period social security tax results in a change in the consumption of the future old that is identical to the effect of a general tax increase in the pure pay-as-you-go system.

To verify this, suppose that the marginal decline in personal savings per dollar increase in future social security benefits is given by $s_2 = -1/(1+r^e)$, instead of $s_2 = -1/(1+r)$ (the benchmark case). Looking at (25), the effect of an initial-period increase in the social security tax on aggregate savings can be written as:

$$\begin{aligned} \frac{\partial S}{\partial \tau_0^{ss}} &= 1 - s_1 - \frac{(1+r)}{(1+r^e)} \\ &= \frac{r^e - r}{1+r^e} - s_1 < 0 \quad \textit{iff} \quad s_1 > \frac{r^e - r}{1+r^e} \approx r^e - r. \end{aligned} \tag{29}$$

Using equation (27), the effect on the consumption of the future old is given by:

$$\begin{aligned} \frac{\partial c_1^{old}}{\partial \tau_0^{ss}} &= -(1+r) + (1-s_1)\cdot(1+r^e) + s_2 \cdot SS^{p\prime}\cdot(1+r)\cdot(1+r^e) + SS_1' \\ &= -(1+r) + (1-s_1)\cdot(1+r^e) - \frac{1}{1+r^e}\cdot(1+r)\cdot(1+r^e) + (1+r) \\ &= -(1+r) + (1-s_1)\cdot(1+r^e) < 0 \quad \textit{iff} \quad s_1 > \frac{r^e - r}{1+r^e} \approx r^e - r, \end{aligned} \tag{30}$$

which is exactly the expression obtained in (19). That is, a general tax increase with no implied commitment to increase future social security benefits (the pure pay-as-you-go case in 19) has the same effect on the aggregate consumption of the future old as an increase in the social security tax combined with an equivalent increase in future social security payments, as long as economic agents in the initial period perceive the increase in future benefits to be credible.

While the implications for the consumption of the future old are the same in these two cases, the implications for the future young and for future output are different. Consider the implications for the consumption of the future young in the benchmark case (i.e., s_2=-1/1+r and $SS^{p\prime}$=1). The implications for the future young when government spending is treated as exogenous can be deduced from the goods market equilibrium condition. Specifically:

$$\begin{aligned}\frac{\partial c_1^{young}}{\partial \tau_0^{ss}} &= \frac{\partial y_1}{\partial \tau_0^{ss}} - \frac{\partial c_1^{old}}{\partial \tau_0^{ss}} \\ &= f' \cdot \frac{\partial S}{\partial \tau_0^{ss}} - \frac{\partial c_1^{old}}{\partial \tau_0^{ss}} \\ &= f' \cdot [\, 1 - s_1 + s_2 \cdot SS^{p\prime} \cdot (1+r)] - \frac{\partial c_1^{old}}{\partial \tau_0^{ss}} \\ &= -f' \cdot s_1 - [-\, s_1 \cdot (1+r^e)]\end{aligned} \tag{31}$$

where the second to last line in (31) is the general case and the last line uses the benchmark result for the change in aggregate savings and the change in the consumption of the future old; i.e., when $(1+r)$ is the discount factor and expression (28) is applicable. In the benchmark case, if the value of the marginal product of capital just equals the return to equities, then:

$$\frac{\partial c_1^{young}}{\partial \tau_0^{ss}} = 0. \tag{32}$$

In this case, it is clear that the aggregate consumption of the future young is unaffected by the increase in social security taxes, and the aggregate consumption of the future old changes by the full amount of the change in future output, which occurred as a result of the change in initial-period aggregate savings.

Is there a difference in the case where the future old adjust their saving using the discount rate $(1+r^e)$ instead of $(1+r)$? In this case, the expression in (31) can be written as:

$$\begin{aligned}\frac{\partial c_1^{young}}{\partial \tau_0^{ss}} &= \frac{\partial y_1}{\partial \tau_0^{ss}} - \frac{\partial c_1^{old}}{\partial \tau_0^{ss}} \\ &= f' \cdot \frac{\partial S}{\partial \tau_0^{ss}} - \frac{\partial c_1^{old}}{\partial \tau_0^{ss}} \\ &= f' \cdot \left[\frac{r^e - r}{1+r^e} - s_1 \right] - [-(1+r) + (1-s_1) \cdot (1+r^e)\,].\end{aligned} \tag{33}$$

Again, if capital is priced competitively so that $f' = (1+r^e)$, it is clear that:

$$\frac{\partial c_1^{young}}{\partial \tau_0^{ss}} = 0. \tag{34}$$

An alternative way of arriving at this result comes from the expressions in (29) and (30). If f equals the return to equities $(1+r^e)$, multiplying both sides of (19) through by $(1+r^e)$ yields the marginal effect of the initial-period tax increase on future output, and the resulting expression is identical to the expression for $\partial c_1^{old}/\partial \tau_0^{ss}$ in (30).

B. Investing The Social Security Trust In Equities: Pay-As-You Go

This section examines the distributional consequences of a policy that specifically requires Social Security trust fund assets to be held in equities rather than government bonds. First, assume that future government spending is predetermined. With $\rho=1$ (i.e, all trust fund assets are invested in equities), future taxes can be expressed as:

$$\hat{\tau}_1 = g_1 + SS_1 - (\tau_0^{ss} - SS_0)\cdot(1+r^e) + (g_0 - \tau_0^{ns})\cdot(1+r), \tag{35}$$

where "^" is used to denote all endogenous variables under a policy prescription of $\rho=1$. Comparing this expression to that in (15), it is clear that the difference, *ceteris paribus*, is:

$$\Delta\tau_1 = \hat{\tau}_1 - \tau_1 = -(\tau_0^{ss} - SS_0)\cdot(r^e - r) < 0. \tag{36}$$

That is, future taxes fall by the full amount of the increase in the return to the Social Security trust.

Setting $\rho=1$ and using (12) to solve for c_1^{old} yields:

$$\begin{aligned}\hat{c}_1^{old} &= (g_0 - \tau_0^{ns})\cdot(1+r) + [\,E_0 - (\tau_0^{ss} - SS_0)\,]\cdot(1+r^e) + SS_1 \\ &= (g_0 - \tau_0^{ns})\cdot(1+r) + [\,s(y_0 - \tau_0, SS^p) - B_0^p + (\tau_0^{ss} - SS_0) - (\tau_0^{ss} - SS_0)\,]\cdot(1+r^e) + SS_1 \quad (37)\\ &= (g_0 - \tau_0^{ns})\cdot(1+r) + [\,s(y_0 - \tau_0, SS^p) - (g_0 - \tau_0^{ns})]\cdot(1+r^e) + SS_1,\end{aligned}$$

Comparing (37) and (14), yields:

$$\Delta c_1^{old} = \hat{c}_1^{old} - c_1^{old} = -(\tau_0^{ss} - SS_0)\cdot(r^e - r) < 0, \tag{38}$$

which indicates that the consumption of the future old falls by the full amount of the increased return to the Social Security trust fund or, equivalently, by the full amount of the cut in terminal-period taxes (36). The improved financial position of Social Security has come entirely at the expense of the future old. In this sense, it is somewhat analogous to a tax increase in the initial period. The central difference between the change in trust-fund investment policy and an ordinary tax increase is that under the former there is no induced increase in aggregate savings and future output. The policy shift has induced initial-period households to hold a portfolio more heavily weighted in low-yielding government bonds, resulting in an equivalent transfer in future wealth to the Social Security trust fund, and this is reflected in reduced future consumption of the current generation of workers/savers. Whether this wealth transfer ultimately accrues to government or to future workers/taxpayers depends on the political economy of government spending and taxing decisions, which is beyond the scope of this analysis.

Pay-as-you-go and future government spending is predetermined

When g_1 is assumed exogenous (or predetermined)—implying that the improvement in the unified deficit in the terminal period does not induce any offsetting increase in government spending—consumption of the future young will increase by the full amount of the increased return to the Social Security trust fund. This can be seen easily by looking at (13) and noting that neither y_1 nor E_0 have changed as a result of the new policy. Alternatively, the total change in consumption of the future young can be determined by using the goods market equilibrium condition (9) which implies:

$$\begin{aligned} \Delta c_1^{young} = \hat{c}_1^{young} - c_1^{young} &= \Delta y_1 - \Delta g_1 - \Delta c_1^{old} \\ &= -\Delta c_1^{old} \\ &= (\tau_0^{ss} - SS_0)\cdot(r^e - r) > 0. \end{aligned} \tag{39}$$

In this case, the policy of investing the Social Security trust fund in equities imposes a loss on the initial-period generation of workers and confers an equivalent gain on future workers. The intuition for this result is simply that under a pay-as-you-go system, the size of the trust fund, rather than determining the generosity of future benefits, primarily determines the extent of future payroll taxation that will be needed to meet the system's obligations. When trust fund assets are invested "more sensibly," this is directly addressing the future financing side of the problem, which is a problem faced not by future recipients but by future workers/taxpayers.

Pay-as-you-go and future taxes are predetermined

If g_1 is treated as endogenous and future taxes are predetermined, then the full amount of the increased return to the trust fund would result in a shift in future expenditures from retirees to the government. In this scenario, the increased resources of the Social Security trust provides government with the financial resources to maintain a higher level of government spending than otherwise.

Broadly, the analysis in this section indicates that when the investment policy of the trust fund has no effect on aggregate saving—the pure pay-as-you-go case—and so no effect on the trajectory of future real output, the result of the change in investment policy is a zero-sum transfer from the current generation of workers/taxpayers to future workers/taxpayers and/or to the government sector.[18]

C. Investing the Social Security Trust in Equities: When the Financial Status of the Trust Affects *Perceptions* of Future Benefits

Now suppose that the size of the Social Security trust does affect perceptions of expected future social-security benefits. It was argued above that under a pure pay-as-you-go system, future benefits are decoupled from the financial status of the Social Security trust. It has been suggested, however, that the weakness in the current actuarial outlook for the U.S. Social Security system has created perceptions among some that they may not receive social security benefits, even though they may be entitled to such benefits under current law regardless of the size of the trust fund.[19]

Under this assumption, (38) and (39) no longer capture the full effect of a policy shift in which trust fund assets would be invested in equities. If the change in policy causes *perceived* future social security benefits to rise, then personal savings (and so aggregate savings) would generally *fall* in response to the policy shift. Applying the expressions in (14) and (37), the change in the consumption of the future old under the policy shift is given by:

---

[18] This is a more precise formulation of what was suggested by Alan Greenspan in his remarks at the Abraham Lincoln Award Ceremony of the Union of Philadelphia (December 6, 1996). Mr. Greenspan said, "But, *if* the Social Security trust funds achieved a higher rate of return investing in equities than in lower yielding U.S. Treasuries, private sector incomes generated by their asset portfolios, including retirement funds, would fall by the same amount, potentially jeopardizing their financial condition."

[19] According to a Roper Organization survey, between 1992 and 1996 the percent of respondents expressing little or no confidence in the Social Security system increased from about 45 percent to more than 60 percent (figures cited in Chairman Greenspan's Humphrey-Hawkins testimony before Congress, February 26, 1997).

$$\begin{aligned}\Delta c_1^{old} &= \hat{c}_1^{old} - c_1^{old} \\ &= -(\tau_0^{ss} - SS_0)\cdot(r^e - r) + \Delta s\cdot(1+r^e) + \hat{SS}_1 - SS_1 \\ &= -(\tau_0^{ss} - SS_0)\cdot(r^e - r) + [s(y_0 - \tau_0, \hat{SS}^p) - s(y_0 - \tau_0, SS^p)]\cdot(1+r^e) + \Delta SS_1,\end{aligned} \tag{40}$$

where $\hat{SS}^p > SS^p$, $-1<s_2<0$, and so $\Delta s<0$. Moreover, $\Delta SS_1 \geq 0$. The possibility that actual future social security benefits may be left unchanged leaves open the possibility that perceptions of a linkage between the size of the trust fund and actual future benefits might be mistaken. Comparing (40) to (38), there are two additional terms in (40). The middle term captures the loss in future income induced by the initial-period reduction in personal saving owing to an increase in perceived social security benefits. The final term reflects any increase in realized social security benefits associated with the policy change.

When actual future benefits are unaffected by the size of the trust fund

First, assume that despite perceptions of a linkage between future benefits and the size of the trust fund, actual future benefits are unchanged, $\Delta SS_1=0$ in (40). In effect, this is a one-time policy surprise. This implies:

$$\Delta c_1^{old} = -(\tau_0^{ss} - SS_0)\cdot(r^e - r) + [s(y_0 - \tau_0, \hat{SS}^p) - s(y_0 - \tau_0, SS^p)]\cdot(1+r^e) < 0. \tag{41}$$

Thus when an improvement in the financial status of the Social Security trust causes agents to adjust expected future social security benefits upward, not only is the current young generation induced to hold a lower yielding portfolio when the Social Security trust shifts from government bonds to private equities, but because of the greater sense of certainty regarding future social security benefits, the current generation of savers is also persuaded to save less for retirement. Unlike the effect captured in (38), this additional effect amounts to a trade-off between current and future consumption. In the initial period, there would be a shift in aggregate demand away from investment goods and toward consumer goods.

Future government spending is predetermined

As in (39), when future government spending is treated as predetermined, the change in the consumption of the future young can be deduced from the goods market equilibrium condition (9) as follows:

$$\Delta c_1^{young} = \hat{c}_1^{young} - c_1^{young} = \Delta y_1 - \Delta g_1 - \Delta c_1^{old} = f' \cdot \Delta E_0 - \Delta c_1^{old}. \tag{42}$$

What can be said about the change in equities in the right-hand side of (42)? As indicated in (6), since the unified deficit is unaffected by the policy shift, the change in equities must equal the change in private savings. Thus, using (41), (42) can be expressed as:

$$\Delta c_1^{young} = \hat{c}_1^{young} - c_1^{young} = f' \cdot \Delta s + (\tau_0^{ss} - SS_0) \cdot (r^e - r) - \Delta s \cdot (1 + r^e). \tag{43}$$

In this case, if capital is priced competitively, so that the marginal future value of a dollar of newly employed physical capital (f') equals the return to equity ($1+r^e$), then the two outside terms in (43) cancel, and (43) becomes:

$$\Delta c_1^{young} = \hat{c}_1^{young} - c_1^{young} = (\tau_0^{ss} - SS_0) \cdot (r^e - r) > 0, \tag{44}$$

which is identical to (39). In this case, the increase in the future consumption of the young equals the full amount of the implied future tax cut and the decrease in the future consumption of the old equals the amount of the future tax cut plus the full amount of the decline in output. This makes sense since, in the case of the future old, the reduction in future financial resources equals the amount of the future tax cut plus the full reduction in the value of future output when capital is priced competitively.

Future taxes are predetermined

If instead of treating future government spending as predetermined, future taxes are assumed exogenous and government spending endogenous, then future government spending rises by the full amount of the increased return to the Social Security trust:

$$\Delta g_1 = \hat{g}_1 - g_1 = (\tau_0^{ss} - SS_0) \cdot (r^e - r). \tag{45}$$

Using (41) and (42) yields an expression for the change in consumption of the future young when future taxes are treated as predetermined.

$$\begin{aligned}\Delta c_1^{young} = \hat{c}_1^{young} - c_1^{young} &= \Delta y_1 - \Delta g_1 - \Delta c_1^{old} \\ &= f' \cdot \Delta E_0 - (\tau_0^{ss} - SS_0) \cdot (r^e - r) - \Delta c_1^{old} \\ &= f' \cdot \Delta E_0 - (\tau_0^{ss} - SS_0) \cdot (r^e - r) - [-(\tau_0^{ss} - SS_0) \cdot (r^e - r) + \Delta s \cdot (1 + r^e)] \\ &= f' \cdot \Delta E_0 - \Delta s \cdot (1 + r^e),\end{aligned} \tag{46}$$

where $\Delta E_0 = \Delta s < 0$. From (46) it is clear that only if the value of the marginal product of capital does not equal the return to equities will the future young's consumption be affected by the policy shift when future taxes are predetermined. If for example, there were an excess return to equities $(1+r^e) > f'$, the consumption of the future young would rise. The reason is that the decline in financial resources available to the future old owing strictly to the decrease in initial-period saving would exceed the resulting drop in future output, and the residual claim of labor on output would thus rise.

When actual future benefits are affected by the size of the trust fund

If, instead, the benchmark is $\Delta SS_1 > 0$, then the effect of the policy change relative to the result in (38) clearly hinges on the extent to which the savings adjustment is compensated by the actual change in future benefits. Looking at (40), if the full amount of the improvement in the financial resources of the trust actually is transferred as enhanced social security benefits, and if there is perfect foresight in the initial period, then the savings-adjustment effect would just equal the enhanced future social security benefits. That leaves only the negative effect of the shift to a lower yielding portfolio as in (38). That is:

$$\Delta c_1^{old} = -(\tau_0^{ss} - SS_0) \cdot (r^e - r) < 0 \tag{47}$$

Despite identical expressions in (38) and (47), these cases are not fully analogous. In the current case, the reduction in initial-period saving implies an increase in initial-period consumption that was not present in the pure pay-as-you-go case. Effectively, workers whose saving had been upward adjusted to account for low expected future social security benefits are persuaded to spend more today in the belief that the improved state of the trust fund will result in higher social security benefits.

Future government spending is predetermined

What can be said about the consumption of the future young? If it is assumed that future government spending is predetermined, the consumption of the future young is:

$$\Delta c_1^{young} = \hat{c}_1^{young} - c_1^{young} = \Delta y_1 - \Delta c_1^{old}$$
$$= f' \cdot \Delta s + (\tau_0^{ss} - SS_0) \cdot (r^e - r). \tag{48}$$

That is, in the absence of the output effect, the loss in real resources available to the future old attributable to holding a lower yielding portfolio would be transferred to the future young as tax cuts. However, assuming that the value of the marginal product of capital equals the return to equities, (48) becomes:

$$\Delta c_1^{young} = (1+r^e) \cdot \Delta s + (\tau_0^{ss} - SS_0) \cdot (r^e - r), \tag{49}$$

and if, as is assumed above, the future value of the reduced savings just equals the increased future value of the trust, the two terms on the right-hand side cancel. So that:

$$\Delta c_1^{young} = 0. \tag{50}$$

In this case, the increased return to the Social Security trust is fully transferred to the future old as increased benefits. Thus there is no implied tax cut for the future young. Because the resources of the future old fall by the full amount of the decline in output when capital is priced competitively ($f'\Delta s = (1+r^e)\Delta s$), the change in social security investment policy induced the initial-period young to substitute current consumption for future consumption with no transfer to the future young.

Future taxes are predetermined

When it is assumed that the full value of the improved return to the Social Security trust will be transferred as benefits to the future old, the increased value of the Social Security trust is fully offset in the government budget constraint by increased social security payments and thus there is no transfer to government. The results of the preceding section continue to apply.

IV. Summary and Conclusions

Because Social Security is essentially a pay-as-you-go system with defined benefits, the current working (and retired) population has no direct stake in improving the financial outlook of the trust fund, unless the sustainability of the system is in doubt. Rather, it is the future worker/taxpayer whose burden in supporting the next generation of recipients would either be reduced or increased according to the performance of the trust fund's portfolio. This

is because any shortfall in the system's receipts relative to its benefit payments would have to be made up through future taxation. Under a variety of assumptions, the model suggests that improving the expected return on trust fund assets, by shifting these investments from government bonds to private securities, tends to *reduce* the future claim on national output of the current working population (i.e., future retirees). Whether aggregate saving would be affected, and thereby the level of future output, depends on whether current workers interpret this policy change as affecting their future Social Security benefits.

By investing in private securities, Social Security's longer-term financial position would be improved at the expense of expected returns on the private portfolios of the current working population. The model suggests that shifting trust fund assets to private securities induces an accommodating adjustment in the structure of private portfolios, which become more heavily weighted toward lower-yielding government bonds. The aggregate saving function in the model treats saving as depending positively on current disposable income and negatively on expected future Social Security benefits. If Social Security is perceived as providing defined benefits to retirees, aggregate saving may be unaffected by a shift in the composition of trust fund assets.

If aggregate saving is unaffected when trust fund assets are invested in private securities, future real output would remain on the same trajectory as before the policy change, but the future real resources available to current workers would be reduced because the return on the aggregate private portfolio declines. In contrast, the resources available to future workers would increase as their burden of financing the retirement benefits of current workers (future retirees) would be diminished by the higher returns on trust fund assets invested in private securities. This raises an important issue of intergenerational equity.[20]

If, instead, the improvement in the financial position of the Social Security system from investing in private securities leads current workers to feel more secure about the prospect of receiving future benefits, a reduction in aggregate saving may result, since concerns regarding the possible demise of the system may have been helping to support higher levels of saving than otherwise. As a result of lower current saving, the path of future output would be lower. The combination of reduced saving and lower returns on private portfolios would again imply that the future real resources available to the current workers (future retirees) would be significantly lower. The effect on the future generation of workers is, however, less clear. While the level of future real output may be lower as a result of depressed current saving, the obligations of future workers to finance the retirement benefits of current workers (future retirees) would be diminished by the higher returns on trust fund assets invested in private

---

[20]It should also be pointed out that current retirees under the pay-as-you-go system may not have fully contributed to the benefits that they are receiving, depending on when the system was established and how the defined benefits may have been modified over time. In such circumstances, current workers would pay for the benefits of current retirees, as well as for a larger part of their own future benefits, if trust fund assets were invested in private securities.

securities. The model suggests that the net impact on the real resources available to future workers will depend on the extent to which the government actually reduces the future tax burden following the improvement in the Social Security system's finances and on the return to equities relative to the real marginal product of capital.

The model was also used to examine how the effects of a shift in Social Security trust fund assets toward private securities might differ from a current increase in the Social Security payroll tax as a means to improve the longer-term finances of the system. When future benefits are perceived to be decoupled from the value of trust fund assets, it can be shown that an increase in current taxes increases aggregate saving and, thus, stimulates future real output. It can be shown that while future workers clearly benefit if capital is priced competitively, the impact on current workers depends on several factors. Specifically, it can be shown that, if the marginal propensity to save out of disposable income exceeds the differential rates of return between private securities and government bonds, then the future consumption of current workers (future retirees) would decline. However, if the marginal propensity to save out of disposable income is smaller than the return differential, then future consumption of current workers would increase. The reason for this is that a tax increase in the pure pay-as-you-go case induces two opposing effects. First, it induces current workers to save less, since the tax increase reduces disposable income, tending to reduce the future income stream of current workers, *ceteris paribus*. Second, because it reduces government borrowing, the tax increase also sets in motion market forces that induce current workers to hold an aggregate portfolio that is more heavily weighted in private securities. This factor, *ceteris paribus*, raises the yield on private portfolios, tending to increase the future income stream of current workers. On balance, if the induced effect on personal saving is small (i.e., the marginal propensity to save is small) relative to the portfolio effect (reflected in the yield differential between government bonds and private securities), the current generation of workers would capture a share of the increase in future output.

An issue that was not formally modeled but that warrants comment involves the question of how capital will be allocated across sectors should a policy change allow Social Security assets to be invested in private securities. When capital is allocated privately, there is a tendency for it to flow toward those sectors with the highest return. Consequently, in the absence of distortions, the resulting allocation of resources tends to maximize national product. In assessing the possible macroeconomic effects of investing Social Security trust fund assets in private securities, it is critical to consider whether financial capital would continue to pursue the highest rate of return, or whether the allocation of these assets might be influenced by noneconomic considerations. If investment decisions were to become politicized, the efficient allocation of capital may be undermined and the level of national output reduced.

List of References

Congressional Budget Office, "Implications of Revising Social Security's Investment Policies," (September) 1994.

Diamond, Peter, "A Framework for Social Security Analysis," *Journal of Public Economics*, vol. 8, pp. 275–98, 1977.

Feldstein, Martin, "The Missing Piece in Policy Analysis: Social Security reform," National Bureau of Economic Research, Working Paper no.5413, January 1996a.

———, "Social Security and Saving: New Time Series Evidence," *National Tax Journal*, vol. 49(2), June 1996b.

———, "Social Security and Private Savings: International Evidence in an Extended Life Cycle Model," in Martin Feldstein and Robert Inman (eds.), *The Economics of Public Services*, (New York: Halsted Press) 1977.

———, and Anthony Pellechio, "Social Security and Household Wealth Accumulation: New Microeconomic Evidence," *Review of Economics and Statistics*, vol.61(3), (August) 1979.

Leimer, Dean R. And Selig D. Lesnoy, "Social Security and Private Saving: New Time-Series Evidence," *Journal of Political Economy*, vol. 90(3), 1982.

Report of the 1994–96 Advisory Council on Social Security, "Findings and Recommendations," Washington, DC (January) 1997.