FEDERAL RESERVE BANK OF RICHMOND
ECONOMIC QUARTERLY

CONTENTS

Investing in Equities: Can it Help Social Security?

Michael Dotsey

Social Security is in trouble. A recent report by the U.S. General Accounting Office (1997) indicates that absent any changes to the current system, payments to beneficiaries will exceed revenues from payroll taxes in 2012, and by 2029 the Social Security Trust Fund will be depleted. That Social Security is in trouble is not really news. The system has a long history of being underfinanced and the current difficulties are not historically large. Recently, the 1994-1996 Advisory Council on Social Security issued its report with various recommendations for putting the system on firm financial footing. From an economic perspective, making the Social Security System sound is not a difficult task. There exist a multitude of ways for doing so, but most involve either increases in taxes, reductions in benefits, or both. Thus, any plan inherently involves difficult political decisions. However, one part of the solution that is included in each of the three separate plans that were presented to the Commissioner of Social Security was the recommendation that some portion of the current Trust Fund be invested in the stock market. By taking advantage of the higher returns earned by equities, this recommendation would seemingly reduce the increases in taxes or the reduction in benefits that would be needed to return the Social Security System to financial viability.

In this article I address the economic merits of this recommendation. My analysis suggests that the ownership of the capital stock has very few consequences for the government's budget. The economic opportunities available to society are not increased by a transfer of capital from the private sector to the government. In short, there is no free lunch.

I wish to thank Douglas Diamond, Andreas Hornstein, Thomas Humphrey, Kent Smetters, and Alex Wolman for many useful suggestions and comments. The views expressed herein are the author's and do not represent the views of the Federal Reserve Bank of Richmond or the Federal Reserve System.

1. A BRIEF HISTORY

The Inception of Social Security

Social Security was created in 1935 as an intergenerational transfer program from workers to retirees. Its design also provided for income redistribution among the elderly, because replacement rates (the ratio of the benefit paid in the first year of retirement to taxable earnings in the preceding year) are higher for low-income workers than for high-income workers. Social Security is a pay-as-you-go system.

A History of Problems

Over its history the Social Security System probably has never been sound. The chief reason is that benefits were made more generous than originally intended and tax rates were not raised as fast as the 1939 Act prescribed.

2. INTERPRETING STRUCTURAL VARs: TECHNOLOGY SHOCKS AND AGGREGATE EMPLOYMENT FLUCTUATIONS

Tax rates did not reach 6 percent until 1960. Also, economic factors that interacted with the methodology for calculating benefits increased the level of benefits in unintended ways during the 1970s and placed the system under tremendous strain. Corrections to the methodology were not made quickly enough, and tax rates were not raised sufficiently, so that the system almost defaulted in the early 1980s.

Actuarial Soundness

These calculations explicitly take into account interest payments and payments on principal from the fictitious trust fund. To make these payments, the government would have to increase the level of the debt, reduce spending, or increase tax revenue from other sources.[1] Thus, total tax payments could be substantially higher if all forms of taxes are considered.

[1] If the payments promised by Social Security are equivalent to payments promised on government bonds, then increasing the level of the measured debt to pay off these claims does not affect the overall indebtedness of the U.S. government. It just transfers a promise into an explicit security. Treating the promised Social Security benefits in a similar way to any other government IOU implies that the true level of the government debt is closer to $17 trillion instead of the $5 trillion currently calculated.

Individual Decisions

To start the analysis, consider the problem of the individual agent who wishes to maximize lifetime well-being or utility subject to a budget constraint.

> The individual owns some capital that earns $\rho(s_t)$ in state s at time t. That is, the return to capital is stochastic and, while one observes the actual return in any given period, future returns are uncertain and depend on the state of the economy in that period.

Individuals also receive transfer payments from the government $Tr(s_t)$ and pay taxes $T(s_t)$. These transfers and taxes may, but need not, depend on the state of the economy. Individuals also own government bonds, $b(s_t)$, that pay $r(s_t)$ units of consumption in all states in period $t+1$. Finally, given a capital stock at the beginning of period t, agents choose how much capital to bring into next period, $k(s_t)$ and how much to consume this period $c(s_t)$.

Formally, the representative agent maximizes discounted expected lifetime utility

$$\max \sum_{t,S^t} \beta^t u[c(s^t)]\pi(s^t)$$

subject to per-period budget constraints in each possible state s_t.

$$c(s^t) + b^d(s^t) + k(s^t) \leq w(s^t)n + \rho(s^t)k(s^{t-1}) \\ +(1 + r(s^{t-1}))b(s^{t-1}) + Tr(s^t) - T(s^t),$$

where w is the real wage rate, n is exogenous labor supply, and ρ is the rate of return on capital.

> For simplicity, I assume that capital fully depreciates each period. Thus, agents are maximizing their utility, taking into account expectations of all possible future events.
>
> In the notation above, s_t is the realization of one of finitely many states of the economy at time t. s^t represents a particular history of realizations up to time t. That is, $s^t = (s_0, s_1, ...s_t)$ is a particular history of events up to time t. The set S^t represents all the possible histories that can occur.

Each event occurs with probability $\pi(s_t)$ and each history occurs with probability $\pi(s^t)$. Each agent rents out labor and capital to firms in competitive rental markets and earns the appropriate marginal product of each factor.

The Government

Each period the government makes some transfers, collects some taxes, and adjusts its portfolio by either issuing or repurchasing some government bonds or buying or selling some capital, x, (or claims to the capital, which amount

to the same thing). In each state, the government's net holding of assets obeys

$$b^s(s^t) - x(s^t)b(s^{t-1})[1 + r(s^{t-1})] + Tr(s^t) - T(s^t) - \rho(s^t)x(s^{t-1}). \quad (2)$$

It is clear from this expression that, all other things equal, an increase in the capital stock held by the government at time t-1 reduces the taxes that are necessary to maintain the same net asset position. The experiment we are interested in, however, is not what happens if someone donates an extra unit of capital to the government but what happens when the government increases its holdings of capital by issuing additional debt.

$$c(s^t) + k(s^t) + x(s^t) = A(s_t)(k(s^{t-1}) + x(s^{t-1}))^{\alpha} n^{1-\alpha} \quad (3)$$

and

$$b^s(s^t) = b^d(s^t). \quad (4)$$

Equation (3) indicates that the amount consumed plus invested must equal the output produced in the current period, and equation (4) requires that the supply of bonds issued by the government must be equal to the demand for these bonds by the public.

Table 1 Unit Root Statistics

			95 Percent Confidence Intervals for ρ			
Variable	**ADF $\hat{\tau}^{\tau}$**	**ADF $\hat{\tau}\mu$**	**Detrended Data**		**Demeaned Data**	
y_t	−2.53	—	(0.89	1.02)		—
m_t	−2.40	—	(0.90	1.03)		—
Δm_t	−2.76	−2.90	(0.86	1.02)	(0.84	1.01)

Notes: The regression used to calculate the ADF statistics included six lagged differences of the variable. All regressions were carried out over the period 1949:1 to 1990:4 using quarterly data except those involving μ_t, which began in 1950:1.

Tablenotes that don't have an argument in square brackets format without a title.

3. CONCLUSIONS

Current proposals for modifying Social Security have one key feature in common: namely, investing part of the trust fund in equities. It is hoped that such a reallocation of the trust fund's portfolio will make the system more viable, and maintain the level of benefits without resorting to large increases in taxes. In this article, I analyze the effects of doing so in some basic economic models. The results are not encouraging. Even though capital on average earns a higher rate of return than bonds, the government is not able to take much advantage of this differential, because only the ability to shift risk matters. The results in

Table 2 Effects of Government Ownership of Capital (only labor is taxed)

Fraction of capital owned	0	2.5	5	10
Average tax rate	0.1059	0.1054	0.1049	0.1041
Standard deviation of tax rate	0.0074	0.0082	0.0089	0.0105
Average capital stock	0.1059	0.1061	0.1063	0.1066
Standard deviation of capital stock	0.0139	0.0141	0.0143	0.0147

Table 3 Effects of Government Ownership of Capital (all income is taxed)

Fraction of capital owned	0	2.5	5	10
Average tax rate	0.0610	0.0606	0.0603	0.0596
Standard deviation of the tax rate	0.0042	0.0048	0.0053	0.0064
Average capital stock	0.1420	0.1421	0.1422	0.1425
Standard deviation of the capital stock	0.0163	0.0165	0.0166	0.0169

Table 4 Example showing compound numbers lining up on the decimal point

First Column	Second Column	Third Column
23.5559	356.33	34.9
423.59	3.234	4.999
1.201	66.4	466.99

Table 5 Example showing the same table as above but using `\narrowtable` to keep the table from spreading out to the width of the page

First Column	Second Column	Third Column
23.5559	356.33	34.9
423.59	3.234	4.999
1.201	66.4	466.99

Zero Inflation and the Friedman Rule: A Welfare Comparison

Alexander L. Wolman

Moral Hazard—*The effect of insurance on insureds' behavior.*

There has been a distinct trend in recent years for central banks to emphasize low and stable inflation as their primary goal. In many cases zero inflation—or price stability—is promoted as the ultimate long-run goal (Federal Reserve Bank of Kansas City 1996). Economic theory also stresses the benefits of low inflation. However, in contrast to the current fashion among central banks, one of the most famous—and robust—results in monetary theory is that the optimal rate of inflation is *negative*: in many economic models in which money plays a role, welfare is maximized when the inflation rate is low enough so that the nominal interest rate is zero. Central bankers are certainly aware of this result, yet one never hears them seriously advocating a long-run policy of deflation (negative inflation).

How much welfare is lost from a zero inflation policy in comparison to an optimal deflation policy? As we will see, the shape of the economy's money demand function with respect to nominal interest rates holds the key to answering the question. Lucas (1994) argues for a specification where real balances increase toward infinity as the nominal interest rate approaches zero. He finds that zero inflation is not much of an improvement over moderate inflation but that optimal deflation offers sizable benefits. The analysis to be

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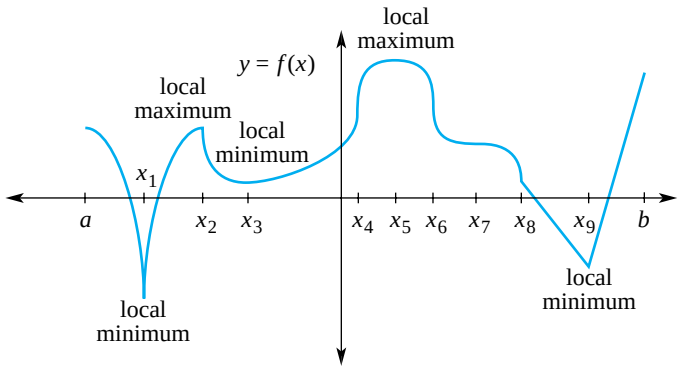
Figure 1 How to Include .eps Files



Notes: The values for the local minimum and local maximum were supplied by a statistical analysis of the financial institutions involved.

Source: Data supplied by McGraw-Hill financial services.

presented supports a different conclusion: reducing inflation from a moderate level to zero entails substantial welfare benefits, and the additional benefit to be achieved by optimal deflation is small. This analysis is based on estimating a general money demand function that nests the one preferred by Lucas. The estimates imply a *satiation* level of real balances, and this proves important for the comparison of zero inflation and optimal deflation.[1]

The original analysis of the relationship between money demand and the welfare cost of inflation is credited to Bailey (1956). In Section 1, I review both Bailey's analysis and Friedman's (1969), whose "Friedman rule" is the famous result previously mentioned. I then describe informally Lucas's (1994) recent work on quantifying the costs of deviating from the Friedman rule. Section 2 discusses the transactions-time approach to modeling money demand, which guides the new money demand estimates given in Section 3. Those estimates are used in Section 4 for welfare analysis similar to Lucas's. Although the analysis suggests that the Friedman rule may not offer much of a benefit in comparison to zero inflation, it does not explain why central banks do not choose to pursue deflation. Section 5 thus points out several channels absent from my analysis through which inflation may have welfare effects. These

[1] Chadha, Haldane, and Janssen (1997) have performed an analysis similar to this article using U.K. data. They emphasize a distinction between short-run and long-run money demand.

Table 1 Evidence on Missing M2 during the 1990's

Year	Actual M2 Growth	Panel A Regression A: Predicted M2 Growth	Panel A Regression A: Error			Panel B Regression B: Predicted M2 Growth	Panel B Regression B: Error		
			Growth	Cumulative			Growth	Cumulative	
				Level (billions)	Percentage			Level (billions)	Percentage
1990Q4	4.0	6.4	−2.3	−71	2.2	6.5	−2.4	−80	2.4
1991Q4	3.0	3.6	−0.5	−91	2.7	3.3	−0.3	−92	2.7
1992Q4	1.8	6.4	−4.5	−257	7.5	5.9	−4.0	−239	6.9
1993Q4	1.4	4.8	−3.4	−392	11.2	5.0	−3.6	−381	10.9
1994Q4	0.6	3.0	−2.4	−489	13.9	2.6	−2.0	−464	13.2
1995Q4	3.8	3.5	0.3	−495	13.6	4.2	−0.4	−500	13.7
1996Q4	4.5	3.9	0.5	−495	13.0	4.0	−0.4	−505	13.3
Mean Error (1990–1996)			−1.78				−1.78		
RMSE			2.52				2.40		

The predicted values are generated using the regressions eported in Table 1. Regressions are estimated from 1960Q4 and dynamically simulated from 1990Q1 to 1966Q4. *RMSE* is the root mean squared error.

APPENDIX: HERE IS AN APPENDIX TITLE THAT IS PRETTY WIDE

For money, from 1915 to 1970 I use the M1 series from Friedman and Schwartz (1963) and the Federal Reserve, reproduced as series B109 and B110 in *LTEG*. From 1970 to 1992 I use FM1 from Citibase. Both series are in billions of dollars and are deflated by the POPM population measure mentioned above. Pre-1946, that population measure is the annual series in the Bureau of the Census's *Historical Statistics* (Series A-6-8, p. 8).

APPENDIX

As mentioned above, I use nominal wage data. Also, since the raw wage data is hourly, I multiply by the number of hours in a quarter (2,184) to get a quarterly wage. From 1915 to 1946, I "reflate" total compensation per hour at work for manufacturing production workers, using the CPI. The former is series B70 from *LTEG*; it is in 1957 dollars. The latter is m04045 from the NBER database. From 1947 to 1992, I use average hourly earnings of production workers in manufacturing, in current dollars. This is series LEHM from Citibase. Finally, since the relevant wage variables from a theoretical perspective are after-tax wages, I multiply wages by the average marginal tax rates provided by Barro and Sahasakul (1983) and updated through 1992 in the manner they describe.[4]

APPENDIX A

Here is a lettered, but not titled appendix.

[4] The conclusions reached above are unchanged if before-tax wage rates are used.

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