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SOCIAL SECURITY, INDUCED RETIREMENT AND AGGREGATE CAPITAL ACCUMULATION: A CORRECTION AND UPDATE

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ABSTRACT

In a 1974 paper in the Journal of Political Economy I discussed the theoretical ambiguity of the effect of social security on private saving and presented statistical evidence that social security does on balance depress saving. Recently, an error was detected in the computer program that was used to construct the "social security wealth" variable. I have now corrected that error and reestimated the original consumer expenditure equation. I have also updated the analysis by including the five years of additional data that have become available since the original study was completed. The new estimates, presented in the current note, continue to indicate that social security substantially depresses private saving. The point estimates of this effect are somewhat lower than before but nevertheless imply that social security depresses saving by about fifty percent of its current value. The estimated reduction in saving is more than two-thirds of the concurrent "contributions" of employees and employers to the social security retirement and survivors fund.

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Social Security, Induced Retirement, and Aggregate Capital Accumulation: A Correction and Updating

Martin Feldstein*

"The reports of my death are greatly exaggerated."

Cable from Mark Twain to
the Associated Press, 1897.

In a 1974 paper in the Journal of Political Economy (Feldstein, 1974), I discussed the theoretical ambiguity of the effect of social security on private saving and presented statistical evidence that social security does on balance depress saving. Recently, an error was detected in the computer program that was used to construct the "social security wealth" variable.[1] I have now corrected that error and reestimated the original consumer expenditure equation. I have also updated the analysis by including the five years of additional data that have become available since the original study was completed. The new estimates, presented in the current note, continue to indicate that social security substantially depresses private saving. The point estimates of this effect are somewhat lower than before but nevertheless imply that social security depresses saving by about fifty percent of its current value. The estimated reduction in saving is more than two-thirds of the concurrent "contributions" of employees and employers to the social security retirement and survivors fund.

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[1] The error was discovered by Dean Leimer and Selig Lesnoy and is discussed in Leimer and Lesnoy (1980).

1. Social Security Wealth

Social security reduces private saving because individuals substitute the social security benefits that they expect to receive for the private wealth that they would otherwise accumulate - directly as well as through private pensions and life insurance - to finance their consumption after they are retired. However the social security program not only replaces ordinary saving as a means of financing retirement consumption but also induces earlier retirement and therefore increases the amount of retirement consumption to be financed.[1] The net impact of social security on saving depends on the balance between the wealth replacement effect and the induced retirement effect and can therefore only be determined empirically.

The principal difficulty in any econometric study of the effect of social security on private saving is measuring the level of benefits that individuals expect to receive in the future. The actual benefits are revised periodically by Congress and, until 1972, were subject to the uncertainties of inflation. Moreover, individuals differ in their understanding of the social security program and in their confidence or optimism about Congress' willingness to maintain or increase future real benefit levels. In my 1974 paper, I used the actuarial present value of the future benefits to which the current working-

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[1] This idea is developed more fully in Feldstein (1974) and shown formally in Feldstein (1977). Additional aspects of ambiguity are discussed by Barro (1978) and Feldstein and Pellechio (1979).

age population was entitled, a variable that I called "social security wealth."[1]

The constructed annual time series of this "social security wealth" for the years since the inception of the social security program reflected every change in coverage and in the rules used to compute the benefits of retirees and dependents. Each annual value of social security wealth also reflected the demographic structure of the population, the employment pattern, and the age-sex specific mortality rates. The calculation assumed that Congress would maintain a constant ratio of benefits to average earnings and that real earnings would grow at 2 percent a year for the indefinite future.

This complicated actuarial calculation of social security wealth was both too complex and not complex enough. It was too complex to be a realistic description of the way that individuals actually think about future benefits. It is an overly precise way of estimating the intuitive judgements about the levels of benefits on which individuals make decisions about saving and retirement.[2] And at the same time, the algorithm used to calculate social

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[1] Social security wealth is, of course, not a perfect substitute for ordinary wealth for several reasons: social security wealth is in the form of an annuity; it cannot be used as collateral for a loan; its value depends on future Congressional action; etc. These issues are discussed in Feldstein and Pellechio (1979) and Feldstein (1979b).

[2] Of course, to the extent that these decisions are part of the process of private pension planning, the complex actuarial evaluation may be a reasonable approximation.

security wealth was not complex enough because it did not take into account such things as the variation of individual wages around the general growth trend, the remarriage of surviving spouses, the presence of dependent children, etc. Although a more precise variable could have been defined, such extra precision would not necessarily correspond to a more realistic approximation of individual expectations.[1]

The social security wealth variable defined in this way was added to a conventional consumer expenditure function of the type that had previously been estimated by Ando and Modigliani (1963). The estimated coefficient of the social security wealth variable was 0.021 (with a standard error of 0.006), implying that each dollar of social security wealth reduced personal saving by approximately 2.1 cents.

I recently discovered that an error was made by the programmer who converted the specification of social security wealth into Fortran. The error occurs in the section of the program that incorporates the 1957 change in the benefits paid to surviving spouses. Because the program failed to reset the initial value in a "do loop" operation each year, the calculated value of social security grew faster that the correct specification implied. It is worth stressing that this was a pure programming error and did not reflect a

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[1] The initial specification of social security wealth in my 1974 paper and in subsequent analysis was not the result of a search procedure. I defined one set of assumptions before any regressions were estimated and they have remained unchanged. Alternative discount rates were tried but this variation did not alter the estimated effect of social security on aggregate saving.

misunderstanding of the law or a misspecification of social security wealth.

Section 2 of the present paper examines the implications of correcting the error and reestimating the original equation. Updates of the sample period to 1974 and 1976 are also presented. A final section comments on some extension of the basic specification and on the relation of the time series estimate to other evidence.

2. Reestimating the Basic Specification

The basic specification in my 1974 paper relates consumer expenditure to disposable income (YD), lagged disposable income (YD_{-1}), corporate retained earnings (RE), the value of wealth at the end of the previous year (W_{-1}), social security wealth (SSW), and a constant term. All variables are real per capita values and the equation was estimated with annual data from 1929 through 1971 with 1941 -46 excluded.[1] The estimated coefficients of that equation are reproduced as equation 1.1 of Table 1.[2] Standard errors are shown in parentheses. The key social security wealth variable has a coefficient of 0.021. The other coefficients are a plausible size and all are significantly different from zero. The sum of squared residuals and Durbin-Watson statistic are presented in the

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[1] Since the official national income account data are only available since 1929, the value for 1929 corresponds to the one year lag of YD_{-1}. All other variables begin in 1930.

[2] To facilitate comparison with the other equations in this paper, the original variables in equation 1.1 are rescaled by 1000; this changes only the constant term and the sum of squared residuals.

Table 1

Consumption Functions with Social Security Wealth

Equal	Period	SSW Variable	SSW	W_{-1}	YD	YD_{-1}	RE	Const.	SSR DWS
1.1	1929-71	Old	0.021	0.014	0.530	0.120	0.356	0.228	0.004
			(0.006)	(0.004)	(0.047)	(0.035)	(0.074)	(0.031)	1.82
1.2	1929-71	Old	0.024	0.005	0.595	0.123	0.209	0.351	0.012
			(0.009)	(0.005)	(0.061)	(0.042)	(0.086)	(0.078)	1.40
1.3	1929-71	Program Corrected	0.015	0.011	0.648	0.109	0.118	0.236	0.014
			(0.010)	(0.005)	(0.058)	(0.045)	(0.089)	(0.055)	1.23
1.4	1929-74	Old	0.025	0.004	0.606	0.112	0.183	0.355	0.014
			(0.009)	(0.005)	(0.061)	(0.040)	(0.075)	(0.080)	1.55
1.5	1929-74	Program Corrected	0.011	0.009	0.686	0.100	0.066	0.198	0.017
			(0.010)	(0.006)	(0.057)	(0.044)	(0.078)	(0.055)	1.40
1.6	1929-74	Revised	0.017	0.011	0.645	0.103	0.132	0.247	0.015
			(0.008)	(0.005)	(0.057)	(0.041)	(0.072)	(0.050)	1.31
1.7	1929-76	Program Corrected	0.002	0.007	0.743	0.094	0.024	0.139	0.024
			(0.011)	(0.006)	(0.062)	(0.052)	(0.088)	(0.060)	1.37
1.8	1929-76	Revised	0.018	0.009	0.671	0.090	0.067	0.240	0.022
			(0.009)	(0.006)	(0.065)	(0.048)	(0.077)	(0.058)	1.29

final column; since all of the equations reported in this paper have $\overline{R}^2$ values of more than 0.99, this statistic is not reported.

After the original research was completed, the Department of Commerce released its major revision of the national income accounts. This changed all of the annual data for consumer expenditure and for income. An even more substantial revision of the retained earnings variable was made by using economic depreciation instead of historic cost tax depreciation. Equation 1.2 presents the estimates based on these new data but retaining the original social security wealth variable. These changes cause the coefficient of the social security wealth variable to rise slightly (from 0.021 to 0.024) and its standard error to increase (from 0.006 to 0.009).

Correcting the computer programming error and reestimating with the new national income and wealth data yields equation 1.3. The coefficient of the social security wealth variable is reduced to 0.015 with a standard error of 0.0095. The corresponding t-statistic implies that the probability of observing such a large value if the true value were not positive is less than 0.08. The point estimate of 0.015 and the 1971 value of social security wealth[1] of $1,664 billion imply that social security reduced 1971 personal saving by $25 billion.

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[1] Social security wealth, like all of the other variables, is measured in 1972 dollars. The 1971 value of SSW is $1,734 billion; using the consumer expenditure deflator implies that the corresponding value in 1971 dollars is $1,664 billion.

By comparison, the actual 1971 value of personal saving was $57 billion and total private saving was $74 billion. The implied reduction in saving is thus 44 percent of personal saving and 34 percent of private saving. In short, correcting the programming error (as well as accepting the Department of Commerce's corrections in the national income data) reduces the coefficient of social security wealth from the original published value but implies an effect that is both statistically significant and economically very large.

In a short note published after my 1974 paper (Feldstein, 1979a), I used the updated national income data and extended the old social security wealth calculation for an additional three years to 1974. Those results, presented in equation 1.4, were generally consistent with my earlier estimates, indicating in fact a slightly larger social security wealth coefficient (0.025 with a standard error of 0.009). Dean Leimer and Selig Lesnoy (1980) used the corrected social security wealth variable through 1974 and reestimated this equation. They found a much smaller regression coefficient that was barely larger than its standard error and concluded that the evidence is consistent with the hypothesis that social security does not depress saving. Equation 1.5 presents the equation with the corrected SSW for the period until 1974. Two things should be noted. First, even if the low coefficient of 0.011 were correct, it would still imply a quite substantial effect on saving. Since the corrected 1974 value of SSW was $2,342 billion, the implied reduction in saving would be $26 billion; by comparison, private saving was $72 billion. Second, the standard error implies that the probability of observing such a

coefficient if the true coefficient were not positive is less than 0.15; while this is greater than the usual level of significance, it still represents substantial odds that there is a positive effect of social security wealth on consumption.

There is however good reason to be skeptical about the estimate in equation 1.5. Beginning in 1972, there was a major change in social security benefits. The level of benefits was raised 20 percent and benefits were indexed to rise automatically with the price level. This increase in benefits implies a corresponding increase in social security wealth that is not reflected in the "corrected" social security wealth variable. Making this change for the years 1972 through 1974 (as well as correcting the programming error) produces the coefficients in equation 1.6. Taking this major legislative change into account makes the results through 1974 similar to the results through 1971 (before the legislative change) that were presented in equation 1.3. The coefficient of SSW rises slightly to 0.017; the addition of three years' data no longer produces a large and otherwise unexplained reduction. The standard error of 0.0066 implies a t-statistic of 2.3, indicating that the effect of social security wealth is statistically significant at any conventional level. A comparison of the sum of squared residuals in equations 1.5 and 1.6 shows that taking the legislative revision into account significantly improves the explanatory power of the model.

Extending the analysis to 1976 confirms the importance of taking the legislative revision into account.[1] Equation 1.7 is based on the corrected

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[1] At present, 1976 is the most recent year for which all of the social security information that is needed to construct SSW is available.

series while equation 1.8 uses the revised series that differs for the five year interval beginning in 1972. With the revised series, the parameter estimates are quite similar to the values for the samples ending in 1971 and 1974. By contrast, when the legislative change is ignored, the addition of two extra years causes the social security wealth coefficient to drop virtually to zero. The sum of squared residuals also indicates that the revised series explains the variation substantially better than the series that ignores the legislative change.

The best estimate of the effect of social security wealth, based on evidence for all of the available years, is therefore approximately 0.017. The variations in the coefficient from sample to sample and the standard error of 0.008 indicate that it would be inappropriate to give too much weight to the precise value of this coefficient. It is nevertheless interesting to consider the implication of this parameter value. In 1976, the value of social security wealth (in 1976 dollars) was $3,238 billion. The coefficient of 0.017 implies that social security reduced personal saving in 1976 by $55 billion. For comparison, in 1976 personal saving was $69 billion and total private saving was $95 billion. The implied reduction of $55 billion is thus 58 percent of the actual total private saving and 37 percent of the potential total private saving of $150 billion (the sum of $55 billion and $95 billion). Since the 1976 GNP was $1,702 billion, the implied reduction in saving is equivalent to 3.2 percent of GNP; by comparison, total private saving in the 1970's averaged 5.9 percent of GNP. Finally, it is interesting to compare the reduction in saving to the

$63 billion in taxes that employers and employees paid in 1976 in social security taxes for the Old Age and Survivors Insurance program; each dollar of contribution corresponds to an 87 cent reduction in private saving.

To conclude this section, it is useful to note how rapidly social security wealth has grown since the inception of the program. Table 2 shows the ratio of real social security wealth to GNP since 1940. In 1940, social security wealth was 77 percent of GNP. This ratio has grown continually, reaching 100 percent in 1950 and nearly 200 percent in 1975.[1]

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[1] A complete listing of the new social security wealth series is presented in the appendix.

Table 2

The Relation of Social Security Wealth to GNP

Year	SSW (Billions of 1972 dollars)	GNP	SSW/GNP
1940	263	343	0.77
1950	490	534	0.92
1960	946	737	1.28
1965	1288	926	1.39
1970	1679	1075	1.56
1975	2319	1202	1.93

3. Futher Evidence

In addition to the basic equation, I have also estimated a more general specification that tries to separate the wealth replacement effect from the induced retirement effect by explicitly including the current labor force participation rate of men aged 65 and older as an additional variable.[1] In the context of the extended life cycle model of my 1974 paper, this variable should have a positive coefficient (reflecting the fact that a lower planned retirement rate means that less saving is needed to finance retirement consumption) and its presence should increase the coefficient of social security wealth (which then reflects only the wealth replacement effect). That in fact does happen with the new data and with all three sample periods.

In an alternative specification, I have also allowed changes in the unemployment rate to alter the marginal propensity to consume. The coefficient of the additional variable varies in size and statistical significance, depending on the full specification and time period. With the sample ending in 1971, the coefficient of the unemployment variable is less than its standard error. With the full sample (through 1976) the unemployment variable is positive and statistically significant and its presence reduces the coefficient of the social security wealth variable to 0.012 if the labor force participation of older men is excluded and to 0.015 if that variable is included.

In the original 1974 paper, I also tried to estimate the effect of social security wealth in a much smaller sample restricted to the postwar

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[1] This is the specification used with time-series data in Munnell (1978) and with cross-country data in Feldstein (1979).

period. There is much less variation in all the variables in this truncated sample and therefore much more difficulty in estimating any of the coefficients precisely. The coefficient of the social security wealth variable was somewhat lower (0.014 instead of 0.021) but its standard error was also so much larger (0.030 instead of 0.006) that no inference could be made with any confidence. With the corrected social security wealth series, the postwar estimates, like the earlier results, show a positive but insignificant coefficient of social security wealth, 0.009 with a standard error of 0.013.[1]

In conclusion, it is worth emphasizing that the difficulties of measuring expected social security benefits and of separating the effect of social security from the effects of other variables that influence saving will always leave a substantial margin of uncertainty about the precise magnitude of social security's effects. But the new time-series estimates, like the old ones, are all consistent with my other research based on large samples of individual household data and on cross-country evidence.[2] All of these studies support the conclusion that the level of social security benefits has a major influence on individual saving behavior.

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[1] Failure to reflect the 1972 legislative change has the anomalous effect of making the coefficient of social wealth negative.

[2] See Feldstein (1976, 1980b) and Feldstein and Pellechio (1979) for studies based on individual household data and Feldstein (1977, 1980a) for cross-country evidence. None of those studies was affected by the computer program error in the household time series.

Appendix

Social Security Wealth

Revised Series in Billions of 1972 Dollars

1937	160.400	1957	882.000
1938	143.500	1958	880.900
1939	236.300	1959	929.600
1940	262.900	1960	946.400
1941	343.800	1961	973.600
1942	432.600	1962	1,052.000
1943	459.300	1963	1,093.800
1944	456.600	1964	1,188.300
1945	450.400	1965	1,287.700
1946	465.400	1966	1,393.100
1947	443.500	1967	1,470.500
1948	464.100	1968	1,545.900
1949	442.100	1969	1,609.400
1950	489.700	1970	1,679.200
1951	601.100	1971	1,734.200
1952	629.500	1972	2,209.800
1953	662.700	1973	2,422.680
1954	656.300	1974	2,404.560
1955	758.000	1975	2,318.760
1956	814.700	1976	2,438.280

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