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ABSTRACT

Feldstein (1996) added the present value of future Social Security benefits (*SSW*) to the life-cycle consumption function and found that Social Security reduced private saving in 1992 by more than half. I show that this finding is significant, with a standard error ranging from 35% to 65% of actual savings in 1992. The large reduction in savings also holds when the (rejected) restrictions implied by disposable income are relaxed. But this reduction is neither robust nor significant if the sample excludes either the 1930s or the data subsequent to the 1972 legislated changes in Social Security, or if income is GNP instead of NNP.

Keywords: Social Security, private savings, Consolidated Approach, aggregate consumption, specification choice.

* I thank Robert Gregory, Aaron Smith and seminar participants at the University of Canterbury for their judicious advice, which I have not always followed.

1 Introduction

Feldstein (1974) calculated the actuarial present value of Social Security old age pensions (*SSW*) for each year through 1971. When he added *SSW* to a standard life-cycle consumption function, his estimates seemed to imply that Social Security reduced aggregate private savings in 1971 by about $60 billion, equal to actual net private savings in that year. Using a corrected algorithm for *SSW* and data updated through 1992, Feldstein (1996) reestimated his consumption function and found that the coefficient on *SSW* was about .03 and significant. Given that *SSW* in 1992 was about $14 trillion, he concluded that Social Security reduced net private saving in 1992 by .03×$14 trillion or roughly $400 billion. Since actual net private saving in 1992 was $342 billion, Social Security appears to have reduced net private saving in that year by nearly 60%.

The life-cycle consumption function implicitly restricts the effects of current Social Security revenues and outlays to equal (except for sign) those of total product and of other taxes and transfer payments. Hence his conclusion that Social Security punishes private saving should be reexamined. I begin by suggesting ground rules for this exchange, outlining those aspects of Feldstein's data and estimates I do not wish to debate. I then present and estimate an alternative specification of the consumption function that encompasses Feldstein's and releases the implicit restrictions on the Social Security variables. I then use these new estimates to recalculate the effect of Social Security on private savings in 1992. Finally, I derive and calculate the standard error of this effect.

2 Ground Rules

In a critical exercise of this nature, it is important that the margin of disagreement be well-defined and strictly delimited. Otherwise differences between my results and Feldstein's will be difficult to interpret. I do not take exception to the theoretical analysis of Social Security and saving presented in Feldstein (1974), and agree that the implications of this, or any other, theory for savings can only be determined empirically. I take exception only to certain aspects of Feldstein's estimates and calculations, and the only estimate of his I wish to address here is his equation (2) (reproduced here as (2.1)), his preferred canonical estimate as well as the one he used to calculate the effect on private savings. Before setting out my disagreements with Feldstein, I will first list a number of aspects of his data and specification I am willing to grant him for the sake of argument and simplicity. I do so even though I object in principle to many of these aspects, for the reasons given. The estimates in Tables 2 and 3 below do not differ from those in Feldstein in the following respects:

Dependent variable. I do not challenge Feldstein's choice of dependent variable, consumption expenditures, but only so that my estimates can be directly compared with his. This dependent variable is less than ideal when estimating the effect of fiscal policies on saving. First, some part of expenditure on consumer durables constitutes investment and hence is a form of household saving. Feldstein also does not account for the service flow from the stock of durables, but there is no operational consensus on how to remedy this. A lesser difficulty is that consumption and household saving are not mutually exhaustive; there are other uses for disposable income, namely household interest payments to business and personal transfer payments. Strictly speaking, such payments should be added to consumption if the parameters of the consumption function are to be interpreted as effects on savings.

Deflator. Following Feldstein, I construct all variables by deflating nominal data by the implicit deflator for consumption expenditures. While this deflator corresponds exactly to the dependent variable, that variable is questionable for the reasons just stated. More important, using any uniform deflator means foregoing real NIPA data on disposable income, total product, government purchases and the replacement value of privately owned tangible assets. Real data should not be ignored without considering possible index number problems.

Sample period. Again, to preserve comparability between Feldstein's estimates and mine, and because estimates from short time series can be sensitive to the choice of sample period, the regressions presented here will be estimated only over samples Feldstein has emphasized in his published work to date, namely 1930-40/1947-92 and 1947-92 (Feldstein (1996)), and 1930-40/1947-71 (Feldstein (1974)). Nevertheless, I will subject Feldstein's exclusion of the war years 1941-46 to Chow tests and case diagnostics.[1]

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1. Feldstein does not mention that his Hildreth-Lu correction for AR(1) residuals results in a loss of the first observation in every subsample. Also, assuming that WWII corresponds to the years 1941-46 is not unexceptionable. First, 1941 was a war year only in that defense purchases were a large fraction of product. Second, given that Feldstein's

Per capita variables. This is at once entirely conventional, and also less important than it may seem when the specification is corrected for heteroskedasticity.

W and SSW. I forego raising anew the doubts Leimer and Lesnoy (1982) voiced about the heroic actuarial assumptions needed to calculate *SSW*. Likewise, I grant Feldstein his concept of private wealth, the net worth of households (but not his published data for *W*; see section 4.1), even though it (a) excludes the tangible assets of private businesses, largely owned by domestic households, (b) includes the financial assets and liabilities of households when the financial assets of the private sector should net to 0, transnational ownership excepted, and (c) is taken from the Flow of Funds accounts which value financial assets and liabilities at par instead of market.

Time Series Specification. I take no stand on whether the consumption function is cointegrated, or on whether it should be estimated in levels, differences or with error correction. McCallum (1993) argues that these vexed questions of time series specification are often not of great moment when the estimator corrects for serial correlation in the residuals. Nor do I question the failure to test the common factor restrictions implied by the AR(1) correction.

Consumption Function. I willingly forego objecting to Feldstein's failure to address the possible endogeneity of income, or any of the many substantive and econometric issues pertaining to consumption reviewed in Deaton (1992). I take no position on whether any of the variables shown in Feldstein's Table 3 should be included in the consumption function. Finally, I refrain from subjecting Feldstein's counterfactual exercise to the Lucas critique.

From consumption to savings. I do not question Feldstein's method for calculating the effect on private savings implied by estimates of his specification. In section 5, I derive a method for calculating the effect on savings implied by my preferred specification, as well as its standard error. For all regressions presented here, I follow Feldstein's method for calculating the effect of *SSW* on savings. Parenthetically, I do not take a stand on whether Feldstein was correct in applying coefficients estimated from real per capita data to nominal raw data.

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specification includes lagged income, to remove completely the influence of the very unusual data for the year 1946 would require dropping the year 1947 from the sample.

3 An Alternative Specification

Feldstein's conventional life-cycle specification tacitly assumes that disposable personal income (*PY*) properly measures the private sector's command over resources available for consumption. This assumption is questionable because *PY* places a host of restrictions on the way fiscal variables can affect consumption. These restrictions stem from the following approximate identity:

$$PY \approx NNP - TX + TR + GINT - RE\,, \qquad (1)$$

where *NNP* is net national product; *TX*, total government revenues; *TR*, transfer payments to domestic households; *GINT*, net interest on government debt paid to the domestic private sector; and *RE*, the retained earnings of corporations net of interest paid by households to business.[2] Hence *PY* constrains the absolute values of the effects on consumption of the fiscal variables, *TX*, *TR* and *GINT*, to be equal, and equal in turn to the effect of *NNP*. There is no theoretical reason to expect such equality. And in fact, a series of studies, beginning with Kormendi (1983), has shown that the annual time series data for the U.S.A. grossly violate these implicit restrictions. A consumption function that measures income as *PY* is therefore misspecified, especially when one is seeking, as Feldstein did, to estimate the effects of a subset of all taxes and transfer payments, such as those attributable to Social Security.[3]

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2. The difference between *GNP* and national income is approximately *DEP plus* indirect taxes. Personal income equals national income *plus TR minus* contributions to social insurances (part of *TX*) *plus* adjustment to net interest *minus* taxes paid by corporations (part of *TX*) *minus* the undistributed earnings of corporations (part of *RE*). The adjustment to net interest is net interest received from the government by the private sector (*GINT*) *plus* interest paid by consumers to business (included in *RE*). Disposable income is personal income *minus* personal tax liabilities (part of *TX*) *minus* user fees (part of *TX*). Since *TX* is the sum of indirect taxes, user fees, and direct taxes on households and corporations, (1) follows. See the discussion of *YD%* in Table 1 below for evidence bearing on the accuracy of the approximation (1).
3. For a survey of this controversial literature, see Seater (1993, pp. 164-71). Any regression model that includes one or more regressors that are sums or differences of more basic quantities that are not mutually orthogonal, may yield estimates subject to large biases and sign reversals. Disposable income and the government budget deficit are cases in point. See Haynes and Stone (1982) for a discussion of this point in an international finance context. Meguire (1995, pp. 10-11) discusses this point with specific reference to aggregate consumption, fiscal policy and disposable income.

The life-cycle specification also does not allow government purchases, G, to substitute for or complement private consumption expenditures.[4] An alternative specification of the consumption function that at once releases the restrictions implied by disposable personal income and allows government purchases to affect consumption, is Kormendi's (1983) Augmented Consolidated Approach (ACA), or:

$$CON = a_0 + a_1(L)Y + a_2G + a_3TX + a_4TR + a_5GINT + a_6RE + a_7W \, , \qquad (2)$$

where CON is a measure of private consumption, Y is gross or net product, $a_1(L)$ is a lag polynomial in Y of degree 0 or 1, and W is some measure of private wealth.[5] a_2 measures the extent to which government purchases substitute for or complement private consumption.[6] Kormendi assumed that Y equals NNP, but this is not logically required. If Y were GNP instead, then (2) is a model of gross rather than net saving. Recasting the analysis in terms of gross saving should be taken seriously, because of the well-known difficulty of estimating economic depreciation, and because gross saving is arguably more relevant from a policy perspective.

Let the proceeds from the Social Security payroll and self-employment taxes be $FICA$, and let total payments by Social Security be $SSTR$.[7] Then (2) can be modified to include the effects of Social Security by breaking out $FICA$ from TX and $SSTR$ from TR, and

4. Darby and Malley (1996) summarize and extend extant studies on the effects of government purchases on consumption and saving in the U.S.A.

5. The specification in Kormendi (1983) differed from (2) in two ways: (a) his dependent variable included an estimate of the flow of services from the stock of consumer durables in place of consumption expenditures on durables; and (b) his regressors included the value of government debt whose effects, if any, on consumption are not at issue here.

6. Disposable personal income includes all revenues and outlays of the public sector except transfers and interest paid to foreigners, asset sales, and government purchases, G. Of these, only G is material; I ignore the others. Other public sector inflows and outflows that (2) ignores are: dividends received by government, the surplus of government enterprises and business subsidies; these are all minor and impounded in RE. The variables in (2) are chosen to account for all material revenues and expenditures of the public sector other than the "deficit". This is to prevent an included fiscal variables from proxying for the effects of any omitted revenue or expenditure.

7. NIPA data on self-employment tax collections do not break out the implied contribution to Medicare. The Data Appendix describes how I correct $FICA$ for this contribution.

by adding Feldstein's *SSW* to the specification. I further allow expenditures for national defense, *DX*, to have an effect distinct from that of other government purchases, *G–DX*, on the grounds that defense expenditures may be unrelated to private consumption. The result is:

$$CON = a_0 + a_1(L)Y + a_{21}(G-DX) + a_{22}DX + a_{31}(TX-FICA) + a_{32}FICA + a_{41}(TR-SSTR) + a_{42}SSTR + a_5GINT + a_6RE + a_7W + a_8SSW \,. \quad (3)$$

In the estimates reported below, *RE* is not derived from NIPA data but is instead defined as the residual $NNP - PY - TX + TR + GINT$, so that the identity (1) holds exactly.[8] Hence the only data present in (3) and absent from Feldstein's (2) are *G*, *DX*, $Y_{t-1} - PY_{t-1}$, and (if *Y*= GNP) GNP – NNP. All other variables in (3), *W* and *SSW* excepted, result from releasing the restrictions on the fiscal (and in particular, Social Security) variables implied by (1).[9]

What is commonly referred to as Social Security is in fact three administratively and conceptually distinct social insurance programs: payments to widows and orphans beginning in 1937, old age pensions first paid in 1940, and payments to the disabled starting in 1956.[10] Feldstein's (1974, 1996) analysis and policy concerns center on a possible effect on private savings of Social Security old age pensions alone. Strictly speaking, this effect cannot be estimated using (3) because no part of FICA tax revenues is earmarked for old age pensions, in

8. *RE* includes some minor items whose mean value as a percent of *PY* is less than .1%. See Table 1 and the discussion of *YD%*.

9. The NIPA treatment of the earned income credit and of the Federal Reserve system are debatable. First, the NIPA assume that the earned income credit (EIC) is a transfer payment. I assume instead that the EIC is a reduction in personal tax liabilities and thus net it from both *TX* and *TR*. My assumption requires that the EIC not result in a negative (income plus FICA) tax liability for any household, which was very nearly correct until 1993; see Meguire (1995, pp. 126-27). Second, the NIPA treat Federal Reserve banks as private corporations "owned" by their member banks, to whom they pay (nominal) dividends. Hence *TX* includes payments by Federal Reserve banks to the Treasury. I would prefer to treat Federal Reserve banks as part of the Federal government, and hence to net the interest they receive on the Treasury securities they hold from *GINT* and to include this interest in *TX*. The amount of this interest will be included in the benchmark revision of the NIPA currently in progress.

10. Payments under survivors' and disability insurance amounted to $85 billion or 30% of total Social Security payments in 1992. Both revenues and payments under Medicare are accounted for separately in the NIPA and do not play a part in either Feldstein's story or mine.

a manner comparable to the available breakdown of benefits by program. Hence the data for *FICA* and *SSTR* are aggregated over all three insurance programs, so that one cannot be fully confident that the coefficients on these variables are mainly due to the effects of Social Security old age pensions on saving over the life cycle.

I also take exception to Feldstein's inadequate treatment of residual autocorrelation and heteroskedasticity. His many reported OLS regressions can all be ignored because of low values of the Durbin-Watson statistic. While his remaining estimates are corrected for AR(1) disturbances, he does so using the Hildreth-Lu grid search procedure, obsolete since Beach and MacKinnon (1978) derived the corresponding maximum likelihood (ML) estimator. I will use this ML estimator for all but two of the regressions reported here.[11] I do so even though I agree that residual autocorrelation is often not so much intrinsic as evidence of one or more types of misspecification—e.g., omitted variables, bad dynamics, incorrect functional form—in which case the misspecification should be identified and corrected.

Any time series regression in which the dependent variable is neither logged nor weighted is likely to have a residual variance that increases with time, simply by virtue of economic growth. Feldstein's estimates do not allow for this possibility. I correct for any heteroskedasticity of this nature by weighting the regression by the lagged level of the dependent variable. The dependent variable then becomes the ordinary growth rate of consumption plus 1, so that this transformation also attenuates residual autocorrelation.

In brief, all specifications reported below are estimated in levels with a correction for AR(1) disturbances, and can be classified along the following three dimensions:

- Sample period: 1930-40/1947-71, 1930-40/1947-92, and 1947-92;
- Income *cum* fiscal variables: disposable income, ACA with *NNP*, and ACA with *GNP*;
- Weighting: lagged *CON*, and unweighted.

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11. TSP will estimate a regression with a discontinuous sample using the Beach-MacKinnon ML algorithm if the TSCS option is invoked.

4 Estimates

4.1 Data and Summary Statistics

For a complete description of data sources and variable computations, consult the Data Appendix.[12] The values of *SSW* are exactly as published in the Appendix to Feldstein (1996). My data on *W* for the period 1946-92 differ from those published in his Appendix, in that I derive them from household net worth measured as of the end of the *previous* year rather than, as Feldstein did, the *current* one.[13] The data on *CON*, *PY* and the deflator are identical to those used in Feldstein (1996) except for some minor updating of the post-1989 values.

Table 1 presents summary statistics for the variables appearing in this study; all calculations omit the war period 1941-46. With the exception of *SSTR/FICA*, the RPC variables are all weighted by lagged *CON* and so are identical to the variables used to estimate the weighted regressions; statistics for the growth rates of the RPC variables are shown under Growth. With the exception of *RE*, ADF tests show that the RPC variables are all at least *I*(1), and *DX, G–DX*, *GINT* and *SSTR* may even be *I*(2).[14] This nonstationarity increases the risk that Feldstein's (and my) estimates may be subject to the well-known problems of inference with short I(1) time series. It also means that the statistics for the RPC variables are purely descriptive, and only those for the growth rates are statistically meaningful.

YD% in Table 1 is the proportional distance between *PY* and the rhs of (1); hence it is a measure of the quality of (1) as an approximation to *PY*. *YD%* is measured in the same units as a growth rate but, strictly speaking, is not one. The sample mean of *YD%* is a mere –.06% and its values lie within the interval ±2%. Hence the error in the approximation (1) is 0 on average and small in any case.

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12. All calculations were performed using version 4.3 of TSP. The data and program are available over the Internet from the author.
13. Feldstein (1974, 1996) does not explain how he calculates *W* for 1930-40.
14. The ADF results for *CON* and *W* seem to suggest that these variables are I(0), except that the p value under I(1) is *less* than that under I(2). This finding is peculiar to the ADF test; the weighted symmetric test (invoked by the WS option of TSP's COINT command) yields a p value of .17 (.85) under I(1), and .008 (.0003) under I(2) for *CON* (*W*), consistent with both variables being I(1). That *RE* appears to be I(0) suggests that a cointegrating vector lurks in (1).

Fig. 1 is a plot of the logs of the RPC versions of the Social Security variables *FICA*, *SSTR* and *SSW*. This figure should be interpreted in conjunction with the growth rates of these variables by subperiods shown at the bottom of Table 1. The vertical distance between horizontal grid lines is .7, which corresponds to a doubling of magnitude. These data can be divided into three time periods, separated by brief episodes of very rapid growth resulting from the legislated changes of 1950 and 1972.

The first period, 1937-50, was turbulent and atypical, beginning with the 1938 (coincidentally the year of a severe recession) decline in *SSW* and *FICA*, their largest declines over the whole sample.[15] Following hard on the heels of this event was the largest increase in *SSW* and *SSTR* over the sample, in 1940, arguably the first year of the WWII boom. During its earliest years, Social Security paid benefits that were trivial relative to FICA tax proceeds and to the whole economy, beginning in 1937 when $560 million of FICA taxes were collected but only $1 million of benefits paid. During the 1930s, only $17 million of old age benefits were paid, all in 1940. Over 1937-40, the ratio of *SSTR* to *FICA* (*SSTR/FICA* in Table 1) ranged from .002 to .048, while its lowest value over 1947-92 was .31 with a mean value of .88. The omitted years 1941-46 (indicated by "+" in Fig. 1) saw a near 8-fold increase in *SSTR*, and a rise of *FICA* and *SSW* to a 1943 peak followed by a decline lasting until 1949. *FICA* was in fact no higher in 1949 than it was in 1937. Benefits continued to grow much faster than taxes until 1957.

The second period began with two years of very rapid growth, 1950 and 1951, during which *FICA*, *SSTR* and *SSW* grew at annual rates of 30%, 42% and 11%, respectively. This episode was followed by 20 years of slower and steadier growth, excepting the 18% jump of *FICA* in 1966. The third period starts with a 20% jump of *SSW* in 1972 followed by 20 years of very slow growth; the growth rates of *FICA*, *SSTR* and *SSW* over 1972-92 were 1%, .5% and .6%, respectively. Since 1957, *FICA* and *SSTR* grew at annual rates of 2.9% and 2.8%

15. Prewar values of the Social Security variables, in real dollars per capita, are as follows:

	CON	*SSW*	*FICA*	*SSTR*
1937	4283	3461	37	.06
1938	4155	3265	34	.6
1939	4325	3590	37	.9
1940	4489	6082	41	2.0

respectively, so that Social Security has been running a mild surplus on average, especially after 1983 (*SSTR* grew at –1.1% over 1983-92). Incidentally, 52% of the growth in RPC *SSW* over 1936-1992 occured in just four years: 1937, 1940, 1951 and 1972, with only 10% of the growth in *CON* over the same period occuring in those years. Since 4/(92-36)≈ 7%, the growth of *CON* during those four years is not far from the value expected had *SSW* played no role in explaining *CON*.

Table 1 includes summary statistics for the growth of *PY*, *NNP* and *CON* computed with and without the years 1931-40. Including these years in the sample increases the standard deviation of the growth rates by more than half and almost doubles the range thereof. The 1930s were a period in which the behavior of all macro time series, and not just the three Social Security variables of this study, was atypical. The introduction of Social Security coincided with the recovery from the Depression and the transition to wartime prosperity. *SSW* may also proxy for factors other than *PY* that explain why *CON* was higher after the war than before. For all these reasons, I grant more importance to estimates for the period 1947-92 than Feldstein did.

4.2 Disposable Income Specification

Regression (2.1) in Table 2 is a transcription of (2) in Feldstein (1996). I intend (2.2) as a re-estimate of (2.1), except that the AR(1) coefficient ρ is estimated by ML instead of by a grid search; this allows the years 1930 and 1947 to be included in the sample. The estimated MPC is .65 instead of .7, *W* increases from .014 to .026 (consistent with Feldstein's *W* being mismeasured), and the estimated coefficient on *SSW* is .031 instead of .028.[16] A Chow test strongly supports the exclusion of the war years 1941-46.

I then test whether the residuals from (2.2) have constant variance over time. One test is a Breusch-Pagan test conditional on the dependent variable and a time trend. The resulting p value under the null is shown in the row labelled *P*(*BP*). The other test involves regressing the absolute values of the residuals on the fitted values from the regression and computing an F test for 0 slopes. The p value under the null that the slope coefficient in this regression is 0

16. If (2.2) is estimated with the Hildreth-Lu estimator and using Feldstein's exact data for *W*, the result is almost identical to (2.1) except that the coefficient on *SSW* is .032.

is shown in the row *P(fitted)*. Both tests reject (albeit not strongly) the null that the residuals in (2.2) are homoskedastic. As described in section 3, I correct for this by weighting the regression by the lagged level of consumption.

(2.3) is the weighted version of (2.2). Weighting somewhat reduces the standard errors but has little effect on the estimated coefficients. A Chow test for the years 1941-46 still rejects strongly, indicating that heteroskedasticity is not to blame for the analogous rejection in (2.2). The results for the period 1947-92 in (2.4) are very similar to those for the longer sample in (2.3), except that the standard errors are larger.[17] A Chow test cannot reject the null that the years 1930-40 are drawn from the same distribution as the years 1947-92. However this finding should be qualified by the large number of influential observations during the 1930s. (Chow tests are sensitive to outliers and regime shifts, but not to influential observations.) Finally, 1972—a year in which *SSW* experienced a large jump—is influential in two regressions out of the three whose sample periods include it.

(2.5) is a reestimate, using the data of this paper, of equation (2.1) in Feldstein (1974), repeated here as (2.6). This reestimate requires that the sample period end in 1971,[18] that *RE* include gross instead of net retained earnings, and that the specification be estimated using the Hildreth-Lu procedure over unweighted data. There is no evidence of heteroskedascity, the estimate of ρ is nowhere near 1, and including the war in the sample is strongly rejected. Other than that including the 30s in the sample can also be rejected, Feldstein's (1974) statistical procedure and sample period seem sensible. But in no way does (2.5) resemble (2.6); in particular, *SSW* in (2.5) is negative and insignificant. Also, a Chow test for the years 1972-92 yields a p value of .0001, but (2.2) and (2.3) suggest that this finding is mainly the result of uncorrected heteroskedasticity.

17. Feldstein (eq. (2.2)) found that omitting the 1930-40 period increased the *SSW* coefficient from .028 (.013) to .031 (.017).

18. Feldstein (1974) states that the sample period for (2.1) begins in 1929. Given that the NIPA begin in 1929 and that his specification includes lagged *PY*, this cannot be correct. Feldstein (1996) also does not give a 1929 value for *W*.

4.3 ACA Specification

If the ACA is correct, the specifications estimated in Table 2 are misleading, because of the implicit restrictions disposable income places on the coefficients of the fiscal variables. The regressions reported in Table 3 are estimates of several variants of the ACA specification (3). (3.1) is unweighted and sets *Y*=NNP. As (3.1) has the same dependent variable and sample period as (2.2), the *SER*s of the two regressions can be compared and the comparison clearly favors (3.1). Note that the coefficient on *SSW* is .028, so that the ACA *per se* does not negate the large effect of *SSW* suggested by most disposable income estimates. However the residuals from (3.1) are strongly heteroskedastic. (3.2) is (3.1) estimated without the data for 1972-92 and so can be compared with (2.5). Note that there is no evidence of heteroskedastic residuals in (3.2) and (2.5), so that the heteroskedasticity detected in (2.2) and (3.1) is entirely due to the post-1971 data. Since all remaining regressions in Table 3 include these data, these regressions are weighted in the same manner as are (2.3) and (2.4). *SSW* is now .008 instead of .028 and is insignificant, so that the size and significance of the coefficient on *SSW* also hinge on the post-1971 data.

(3.3) is the weighted version of (3.1) and any suggestion of heteroskedasticity vanishes. Comparing (3.1) and (3.3) reveals that the main consequence of weighting is to reduce the standard errors. The *SER* from (3.3) can be compared to that for (2.3), and the comparison strongly favors (3.3). Although taxes other than *FICA* have a negative effect, the coefficient on *FICA* equals .43, is insignificant, and in no way equals minus the effect of *Y*. The coefficient on *SSTR* is likewise statistically zero. *TR-SSTR*, transfer payments other than Social Security, has an effect that is both highly significant and larger than that of *Y*, consistent with previously published estimates of (2). *GINT* has an unaccountably large, positive and significant effect while *RE* is utterly insignificant. The implications of disposable income for Social Security revenues and payments are clearly rejected.[19] A Chow test for the years 1941-46 also rejects. Most interesting, however, is that the coefficient on *SSW* is now .013,

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19. Feldstein's own results contain a faint hint of the inadequacy of disposable income. Regardless of whether the sample begins in 1930 or 1947, his best fitting specification is simply his (1.2) augmented by gross retained earnings.

less than half its value in (3.1), and with a standard error of .008, as small as, or smaller than, any standard error for *SSW* repored herein.

(3.4) is (3.3) without *SSW* and with the coefficients on *TR–SSTR* and *SSTR* constrained to equality. These restrictions amount to the three-part proposition: *SSW has no effect on consumption, the effect of Social Security benefits is identical to that of other transfers, and the only distinctive effect of Social Security on consumption stems from the FICA tax.* A joint test of these restrictions yields F(2,43)=1.77, p=.18. The equality constraint increases the coefficient on *SSTR* from about .2 to .8 and reduces the coefficient on *W* somewhat; otherwise (3.4) tells the same story as (3.3). (3.5) is (3.3) estimated without the years 1930-40 and with the coefficients of *FICA* and *TX–FICA* constrained equal. An F test of this restriction yields p=.79. Omitting 1930-40 reduces the precision of the estimates (*DX* excepted). But the only materially affected estimated coefficients are those for the Social Security variables. *SSW* rises to .032 and is now significant, while *FICA* falls from .43 to -.35 and *SSTR* from .23 to -.30, with both remaining insignificant.[20]

(3.6) and (3.7) are (3.3) and (3.5) estimated with *Y*=GNP instead of NNP, which results in a slight improvement in the goodness of fit. Comparing (3.6) with (3.3), *FICA* remains about .4 while *SSTR* changes sign; both remain insignificant. A Chow test for the years 1941-46 and a test of the restrictions implied by *PY* both continue to reject.[21] Most interesting, though, is that *SSW* declines from .013 to .007 and is now utterly insignificant. (3.7) is (3.6) estimated without the years 1930-40 and with the coefficients of *FICA* and *TX–FICA* constrained equal (p=.88).

Looking over Table 3, there are many evident regularities. The marginal propensity to consume (the sum of the estimated coefficients on Y_t and Y_{t-1}) is reliably about .45 to .55. *DX* ranges from –.15 to –.22 and is always significant, while *G–DX* is small and insignificant in all cases except (3.7). Hence only defense purchases "crowd out" private consumption. *TX–FICA* ranges from –.2 to –.4 and is significant. *TR-SSTR* lies between .65 and .9 and is very significant. *GINT* is likewise very significant, ranging from 1.8 to 3.1, a finding not pre-

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20. The residuals from unweighted estimates of (3.5) are heteroskedastic.

21. When *Y*=GNP, I add GNP–NNP to *PY* when testing the *PY* restrictions.

dicted by any theory. *RE* is negative (positive) when *Y*=NNP (GNP), and is always insignificant. Finally, *W* ranges from .025 to .036 and is larger than in Table 2. Tests of the restrictions implied by disposable income always reject strongly. In weighted estimates, 1950 is usually influential and 1981 an outlier. Looking over both Tables, Chow tests for the years 1972-92 reject at the 7% level or better in all cases except (2.3). Chow tests for the 1930s fail to reject in all cases except (2.5), where the test rejects at only the 3% level. Tests for the war years 1941-46 reject in all cases except (3.1).

In contrast, the story told by the coefficients on the Social Security variables is not a robust one. *SSTR* ranges from –.93 to .79, being positive when *Y*=NNP, negative when *Y*= GNP, and significant only in (3.7). *FICA* ranges from –.35 to .60, being positive when the sample includes the 1930s, negative otherwise, and never significant. Moreover, no theory predicts a large positive (negative) effect of FICA taxes (transfer payments) on consumption expenditures. The coefficient on *SSW* is either about .01 and insignificant ((3.2), (3.3) and (3.6)), or about .03 and significant ((3.1), (3.5) and (3.7)).

Comparing (3.3) to (3.5), and (3.6) to (3.7), reveals that the estimated coefficients on the Social Security variables (and only these) are quite sensitive to whether the sample includes the period 1930-40. This is so even though a Chow test for this period yields p=.10 ((3.5)) and .15 ((3.7)). Recall that these variables are all 0 until 1937, so that any nonrobustness of the results for the Social Security variables from adding the 1930s to the 1947-92 period is mostly due to a mere four (albeit peculiar) data points.[22] These data reduce the coefficient on *SSW* from .032 ((3.5), (3.7)) to about .01 and render it insignificant. They likewise increase the coefficient on *FICA* from –.22 or –.35 to about .4, even though FICA tax collections were small and flat over 1937-40 (see Fig. 1). Finally, these data increase the coefficient on *SSTR* by about .5 (and render it insignificant), even though *SSTR* over 1937-40 is arguably zero. A comparison of (2.3) and (2.4) reveals no comparable sensitivity to the prewar data. The dramatic nonrobustness of the coefficients on the Social Security variables

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22. These data are shown in fn 15. However Chow tests for the years 1937-40 (not shown) fail to reject in every instance of Tables 2 and 3.

to the addition of a mere four years of prewar data, clouds inferences and conclusions drawn from the full sample regressions.

5 The Implied Effect of Social Security on Savings

The effect of Social Security on private saving has three components. The first is the negative of the effect of *SSW* on consumption, or $-a_8 SSW$. This effect can be large even if a_8 is small, because *SSW* is many times larger than private saving. The second component stems from the effect of FICA taxes on consumption. Since (3) controls for all income flowing into the household sector as well as for all tax outflows therefrom, households pay FICA taxes by reducing consumption or savings. An estimated coefficient on *FICA* (a_{32}) of 0 implies that FICA taxes are paid entirely by reducing savings. Similarly, if a_{32} were –1, FICA taxes are paid by reducing consumption only. Therefore the effect of FICA taxes on private savings is $-(1+a_{32})FICA$. The same reasoning holds for *SSTR*, except that *SSTR* represents income to households, part of which is saved, so that the third component is $(1-a_{32})SSTR$. Hence the total effect of Social Security on private savings in year *t*, $\Delta Savings_t$, is:

$$\Delta Savings_t = -a_8 SSW_t - (1+a_{32})FICA_t + (1-a_{42})SSTR_t \,. \tag{4}$$

Using the notation of this paper, Feldstein's specification is:

$$CON_t = \beta_0 + \beta_{11} PY_t + \beta_{12} PY_{t-1} + \beta_2 W_t + \beta_3 SSW_t. \tag{5}$$

To obtain an expression for $\Delta Savings_t$ comparable to (4), replace each of $-a_{32}$ and a_{42} in (4) with $\beta_{11}+\beta_{12}$, and a_8 with β_3, to obtain:

$$\Delta Savings_t = -\beta_3 SSW_t - (1-\beta_{11}-\beta_{12})(FICA_t - SSTR_t) \,. \tag{6}$$

The result of applying formulas (4) and (6) to the regression estimates in Tables 2 and 3, and to the data for 1992, can be found in the row $\Delta Savings92$ at the bottom of each column in these Tables. These calculations are based on raw nominal values for *SSW*, *FICA* and *SSTR* in 1992 of \$14246, \$317 and \$282 billion respectively.[23] Keep in mind that the actual

23. Feldstein's calculation is based on an incorrect raw nominal value of \$333 billion for *FICA* in 1992.

1992 values for nominal net and gross private saving are $342 and $981 billion respectively.[24] Table 2 shows that Feldstein's finding that $\Delta Savings92$ is about $400 billion is robust to weighting the regression and to removing the 1930s from the sample, but not to removing the post-1971 data. Table 3 reveals that under the ACA specification, $\Delta Savings92$ ranges from about –$130 to –$450 billion. $\Delta Savings92$ calculated from specifications in which Y=GNP is smaller than the value calculated from specifications that are equivalent except that Y=NNP. This casts doubt on any interpretation of the ACA with Y=GNP as a model of the effect of Social Security on gross saving.

These calculations depend crucially on the estimated coefficients on the Social Security variables, estimates which are subject to significant uncertainty. We can see from (4) and (6) that $\Delta Savings92$ is a linear combination of the coefficients in (3) and (5). Under the Bayesian interpretation of the linear model with normal disturbances, the coefficient of the linear model have a multivariate normal distribution. The estimated coefficients are an estimate of the mean vector of this distribution. Likewise, the covariance matrix of the regression, Σ, estimates the covariance matrix of this distribution. Let $\mathbf{w}$ be a vector of derivatives of (4) ((6)) with respect to the estimated coefficients of (3) ((5)). The elements of $\mathbf{w}$ are either 0 or (except for sign) the 1992 raw nominal values of the Social Security variables. The standard error of $\Delta Savings92$ is then $\sqrt{\mathbf{w}'\Sigma\mathbf{w}}$.[25]

The resulting estimates of $\sqrt{\mathbf{w}'\Sigma\mathbf{w}}$ are shown in the row labeled *S.E.* at the bottom of Tables 2 and 3. First note that *S.E.* ranges from $110 to $150 billion when the regression is both weighted and estimated over the full sample. Otherwise, *S.E.* ranges from $150 to $220 billion. Overall, *S.E.* ranges from 35% to 65% of actual savings in 1992. $\Delta Savings92$ in both Tables is more than twice the corresponding *S.E.* only for the full sample 1930-92 and if Y <>GNP. $\Delta Savings92$ is insignificant when the sample excludes either the peculiar Social

24. Gross private saving is NIPA 5.1.2. Net private saving is household saving of $248 billion (NIPA 5.1.3), *plus* corporate retained earnings, net of depreciation and inventory profits, of $94 billion (NIPA 5.1.4).

25. If $\mathbf{x}$ is a vector of random variables with population covariance matrix Σ, and $\mathbf{w}$ is a vector whose elements are not all 0, then the variance of $\mathbf{w}'\mathbf{x}$ is $\mathbf{w}'\Sigma\mathbf{w}$, from which the result in the text follows. If $\mathbf{x}$ is distributed multivariate normal, then $\mathbf{w}'\mathbf{x}$ is univariate normal and standard confidence intervals for $\mathbf{w}'\mathbf{x}$ can be constructed from $\sqrt{\mathbf{w}'\Sigma\mathbf{w}}$.

Security data for 1937-40 (in which case *S.E.* is also at least \$200 billion), or the data subsequent to the legislated changes of 1972.[26] Moreover, *SSW* is crucial for Δ*Savings92* under the ACA only when the sample begins in 1947; (3.4) shows that omitting *SSW* from the full sample estimates has no material effect on either Δ*Savings92* or *S.E.* Δ*Savings92* for (3.4) is large and highly significant purely because *FICA* has its own coefficient and that coefficient happens to be large and positive (albeit insignificant).[27]

The uncertainty about the coefficient on *SSW* is also large relative to Δ*Savings92*. Across the ten regressions in Tables 2 and 3 that include *SSW* and that are new to this paper, the standard error of the *SSW* coefficient ranges from .007 to .015, with a median value of .011. Hence a medial one standard deviation change in the coefficient on *SSW* implies about a \$160 billion change in savings, 45% of actual net saving in 1992 and 35% to 300% of the reported value of Δ*Savings92*.

A likely explanation for the fragility of the coefficients on the Social Security variables combined with the relative robustness of Δ*Savings92* is collinearity. And in fact, the pairwise correlations among the RPC Social Security variables over the 1947-92 sample all exceed .97. Even after adding the peculiar data for the 1930s (and setting the pre-1937 values

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26. If the estimates in (2.5) are applied to the data for 1971, the result is an *increase* in net savings of \$7 billion with a standard error of \$22 billion. Feldstein (1974) reported that Social Security *reduced* net saving in 1971 by \$61 billion, 63% (32%) of actual net (gross) saving in that year. If this exercise is repeated using the estimates in (3.2), the result is a \$31 billion reduction in savings, with a standard error of \$18 billion.

27. I restrict the coefficient on *FICA* in (3.5) and (3.7) to equal that on *TX–FICA* because doing so increases Δ*Savings92* and decreases *S.E.*. The standard error of the unconstrained *FICA* coefficients are also very large, and the reduction in fit from imposing the constraint is trivial. In the absence of this constraint, Δ*Savings92* and *S.E.* for (3.5) ((3.7)) are -247 (-130) and 214 (217). If (3.5) ((3.7)) is estimated over the period 1937-40/1947-92, the constraint on *FICA* is significant at the .18 (.21) level, and Δ*Savings92* and *S.E.* are -240 (-69) and 159 (159). *S.E.* is lower if *FICA* is constrained, and is not much affected by the sample period or the measure of income. Δ*Savings92* is lower when *Y*=GNP and higher if the sample includes 1930-36. Given that all Social Security variables are 0 over 1930-36, this is difficult to explain.

of the Social Security variables to 0), these correlations all exceed .92.[28] Hence it may not be possible to estimate the effects of the Social Security variables singly with any precision.

6 Conclusion

Feldstein's life-cycle consumption function is strongly rejected when nested in a specification (the ACA) that dispenses with disposable personal income and places no restrictions on the effects of taxes and transfer payments on consumption. Estimates of the ACA reveal that the coefficient on *SSW* is often small and insignificant. Hence the size and significance of Feldstein's preferred estimate of this coefficient stems from his having forced the revenues and outlays of the Social Security system into the disposable personal income straightjacket. Moreover, the findings in Feldstein (1974) for the period 1930-71 cannot be replicated with current data. Hence contrary to his recent claim (Feldstein, 1996), his 1974 results were artifacts of his flawed calculation of *SSW* and of the provisional NIPA data of the time. His results for the 1930-92 period also depend crucially on data subsequent to the 1972 legislated changes in Social Security.

I modify Feldstein's protocol for calculating the effect of Social Security on 1992 private savings to allow for the ACA specification, and derive the standard error of this effect under both specifications. This standard error ranges from one third to two thirds of actual net savings in 1992. Feldstein's finding that Social Security reduced private saving in 1992 by about $400 billion is materially attenuated if data for either the period 1972-92 or 1930-40 are omitted from the sample, or if income is measured as GNP (which results in the best fit) instead of as NNP or as disposable income. Under any of these conditions, the reduction in savings is also "insignificant". Because *SSW* is now about 40 times net private savings, and Social Security revenues and outlays are now roughly the same size as savings, small changes in estimated coefficients imply large proportionate effects on savings.

While full sample estimates of the ACA with *Y*=NNP imply that Social Security has caused a large and significant reduction in private savings, that reduction is mostly due to the

28. For the sample 1930-40/1947-71, the smallest pairwise correlations is .86. The collinearity in samples ending in 1992 is due in part to the relatively small variation in the post-1971 data.

large positive coefficient on FICA tax proceeds, a finding not consistent with the negative coefficient for all other tax revenues. No received theory of pay-as-you-go public pension schemes predicts this. Moreover, the size and significance of the estimated coefficients on each Social Security variables are not robust. This suggests that the Social Security variables are collinear, which would preclude blaming the reduction in saving on any single variable. *FICA* and *SSTR* also include all Social Security revenues and outlays, and not just those relating to old age pensions, the purported present value of which is *SSW*. Finally, the calculated reduction in gross savings is unaccountably less than that in net savings. Hence I cannot claim that the ACA is a fully satisfactory alternative specification for determing the effect of Social Security on private savings. I would rather conclude that the time series consumption function, when specified in accordance with the ground rules of section 2, is not very informative about any such effect. The relaxation of those ground rules I leave to future research.

TABLE 1

SUMMARY STATISTICS FOR VARIABLES

RPC Variables, Scaled by lagged CON

Variable	Sample Begins	Mean	Minimum	Maximum	P value for ADF tests of: $I(1)$	$I(2)$
CON		1.016	.91	1.09	<.0001	.05
DX		.096	.012	.215	.54	.13
FICA	1937	.046	.008	.077	.99	.005
	1947	.049	.009	.077	>.99	.002
G-DX		.18	.10	.23	.93	.08
GINT		.019	.009	.026	.55	.11
GNP		1.53	1.08	1.67	.33	<.0001
NNP		1.38	.93	1.54	.11	<.0001
PY		1.10	.89	1.17	.99	<.0001
RE		.01	-.07	.06	.02	<.0001
SSTR	1938[a]	.043	.00015	.075	.92	.10
	1947	.046	.003	075	.89	.08
SSTR/FICA	1937	.74	.002	1.08		
	1947	.88	.31	1.08		
SSW	1937	2.70	.76	3.71	.02	<.0001
	1947	2.85	1.60	3.71	.57	.0002
TR-SSTR		.07	.013	.13	.70	.002
TX-FICA		.36	.14	.44	.82	.001
W		5.27	4.42	6.95	.0001	.004

Growth Rates of RPC Variables

Variable	Sample Begins	Mean	Standard Deviation	Minimum	Maximum
CON		.017	.027	-.099	.085
	1948	.019	.016	-.016	.044
DX		.023	.149	-.210	.752
FICA	1938	.044	.090	-.131	.441
	1948	.046	.088	-.068	.441
G-DX		.020	.062	-.163	.182
GINT		.010	.114	-.170	.446
GNP		.004	.039	-.108	.093
NNP		.003	.044	-.127	.111
	1948	-.000	.029	-.069	.060
PY		.003	.037	-.111	.094
	1948	.001	.021	-.053	.055
SSTR	1939[a]	.090	.152	-.038	.761
	1948	.069	.108	-.038	.534
SSW	1938	.026	.083	-.089	.487
	1948	.017	.044	-.053	.201
TR-SSTR		.032	.186	-.583	.900
TX-FICA		.012	.054	-.114	.187
W		.001	.041	-.126	.085
YD%		-.0006	.008	-.017	.020
First difference of RPC:					
RE		-.000	.014	-.038	.033

[a] I deem the $1 million of benefits paid in 1937 immaterial and so set them to 0 here and in the regressions.

TABLE 1 (CONT.)

Annual Growth Rates of RPC Social Security Variables, by Period

SSW				*FICA*				*SSTR*			
37-51:	6.2%	37-43:	17%	37-49:	0.0%			38-49:	30%		
51-71:	1.5%	43-57:	0.2%	50-51:	30%	49-73:	8.2%	50-51:	42%	49-83:	8.7%
1972:	20%	57-92:	1.3%	51-65:	6.6%	49-92:	5.0%	51-62:	13%	83-92:	-1.1%
72-92:	0.6%	51-92:	1.5%	1966:	18%			62-69:	1.5%		
				66-73:	3.7%	37-57:	5.6%	69-73:	8.0%	38-57:	27%
				73-92:	1.0%	57-92:	2.9%	73-92:	0.5%	57-92:	2.8%

NOTE TO TABLE 1: Raw: billions of dollars at current prices except *SSW*, which is in 1987 prices. RPC: real (1987) dollars per capita, divided by lagged real per capita *CON*. Growth: first difference of the logs of RPC. The growth of *CON* is $\ln(CON_t / CON_{t-1})$. *YD%* is defined in the Data Appendix. All sample periods omit the years 1941-46 and end in 1992. Unless otherwise indicated, all RPC (Growth) sample periods begin in 1930 (1931).

NOTE TO TABLES 2 & 3: The dependent variable is consumption expenditures, *CON*. All regressions are estimated with either a Hildreth-Lu (H-L) or maximum likelihood (ML) correction for AR(1) disturbances. Weighted regressions are divided by CON_{t-1}. Standard errors are in parentheses. Variable names are defined in section 3 of the text. ρ is the estimated first order serial correlation coefficient of the residuals. *DW* is the Durbin-Watson statistic. *SER* is the standard deviation of the residuals. R^2 is adjusted for degrees of freedom. *SSR* is the sum of squared residuals. *P(BP)* is the value for a Breusch-Pagan test of heteroskedasticity conditional on the dependent variable and time. *P*(fitted) is the p value from an F test for 0 slopes of the regression of the absolute residuals on the fitted values. *P(m-n)* is the p value for a Chow test of the addition or removal of the years *m* through *n* to the sample. An influential observation is one for which the corresponding diagonal element of $X(X'X)X'$ is 3 or more times the number of coefficients divided by the number of observations. Outliers are externally studentized residuals exceeding 2.7 in absolute value. *ΔSavings92* is the implied effect of Social Security on private savings in 1992 and is in billions of nominal dollars; *S.E.* is the corresponding standard error. The calculation of *ΔSavings92* and *S.E.* is described in section 5 of the text.

TABLE 2
FELDSTEIN SPECIFICATION: DISPOSABLE INCOME

	2.1[a]	2.2	2.3	2.4	2.5	2.6[b]
Sample:	1931-40; 1948-92	1930-40; 1947-92	1930-40; 1947-92	1947-92	1931-40 1948-71	1931-40 1948-71
Weighted:	No	No	Yes	Yes	No	No
Estimator:	H-L	ML	ML	ML	H-L	H-L
SSW	.028	.031	.026	.024	-.004	.021
	(.013)	(.011)	(.008)	(.015)	(.012)	(.006)
PY	.63	.57	.59	.58	.61	.53
	(.06)	(.06)	(.04)	(.07)	(.05)	(.05)
PY_{-1}	.07	.08	.09	.10	.15	.12
	(.05)	(.05)	(.04)	(.06)	(.05)	(.04)
RE[c]	---	---	---	---	.21	.36
					(.13)	(.07)
W	.014	.026	.020	.022	.022	.014
	(.008)	(.007)	(.007)	(.009)	(.007)	(.004)
Constant	641	628	666	638	332	228
	nr	(228)	(153)	(310)	(158)	(31)
ρ	.80	.74	.71	.79	.46	
DW	1.89	1.54	1.67	1.63	1.86	1.82
SER	nr	78.3	.0099	.0096	42.6	
R^2	---	---	.893	.675	---	
SSR	339935	318507	.0051	.0038	50881	3618[d]
P(BP)	---	.05	.89	>.99	>.99	
P(fitted)	---	.02	>.99	.71	.23	
P(1941-46)	---	<.0001	<.0001	---	<.0001	
P(1930-40)	---	.99	.30	---	.03	
P(1972-92)	---	.0001	.20	.07	.0001	
Observations:						
- Influential	---	1972	1932-33 1935-39	1948-50 1972,1974	1936	
- Outliers	---	1973	----	1951	----	
Δ*Savings92*	-409	-454	-382	-353	48	-311
S.E.	---	161	112	222	171	---

nr Not reported in source.
[a]Source: Feldstein (1996), (2).
[b]Source: Feldstein (1974), (2.1).
[c]Includes corporate depreciation.
[d]Denominated in 1958 prices and hence not comparable with *SSR* in other columns. Feldstein reported no regression statistics other than those shown.

TABLE 3
AUGMENTED CONSOLIDATED APPROACH

	3.1	3.2	3.3	3.4	3.5	3.6	3.7
Sample:	1930-40; 1947-92	1930-40; 1947-71	1930-40; 1947-92	1930-40; 1947-92	1947-92	1930-40; 1947-92	1947-92
Weighted:	No	No	Yes	Yes	Yes	Yes	Yes
Y:	NNP	NNP	NNP	NNP	NNP	GNP	GNP
SSW	.028	.008	.013	---	.032	.007	.032
	(.011)	(.007)	(.008)		(.012)	(.008)	(.012)
Y	.45	.44	.45	.46	.48	.43	.40
	(.07)	(.06)	(.05)	(.05)	(.07)	(.05)	(.06)
Y_{-1}	.05	.11	.08	.09	.06	.08	.06
	(.03)	(.02)	(.02)	(.02)	(.04)	(.02)	(.04)
DX	-.17	-.15	-.16	-.16	-.15	-.22	-.21
	(.09)	(.05)	(.07)	(.07)	(.06)	(.07)	(.06)
G-DX	.12	.04	-.01	-.08	.09	.07	.28
	(.17)	(.11)	(.12)	(.12)	(.19)	(.12)	(.16)
TX-FICA	-.40	-.34	-.37	-.35	-.35*	-.30	-.22*
	(.12)	(.13)	(.09)	(.10)	(.13)	(.09)	(.11)
FICA	.16	.10	.43	.60	-.35*	.40	-.22*
	(.59)	(.41)	(.54)	(.42)		(.52)	
TR-SSTR	.82	.79	.83	.79*	.89	.70	.65
	(.17)	(.13)	(.13)	(.11)	(.17)	(.13)	(.16)
SSTR	-.18	.32	.23	.79*	-.30	-.38	-.93
	(.45)	(.25)	(.39)		(.41)	(.38)	(.37)
GINT	2.08	1.85	2.28	2.51	2.64	2.43	3.13
	(.60)	(.79)	(.55)	(.55)	(.60)	(.54)	(.56)
RE	-.04	-.15	-.08	-.03	-.02	.01	.11
	(.16)	(.12)	(.14)	(.13)	(.15)	(.13)	(.14)
W	.036	.027	.031	.025	.033	.031	.032
	(.007)	(.007)	(.007)	(.006)	(.008)	(.007)	(.008)
Constant	720	784	816	930	381	511	311
	(258)	(153)	(195)	(192)	(288)	(198)	(275)

* Constrained equal.

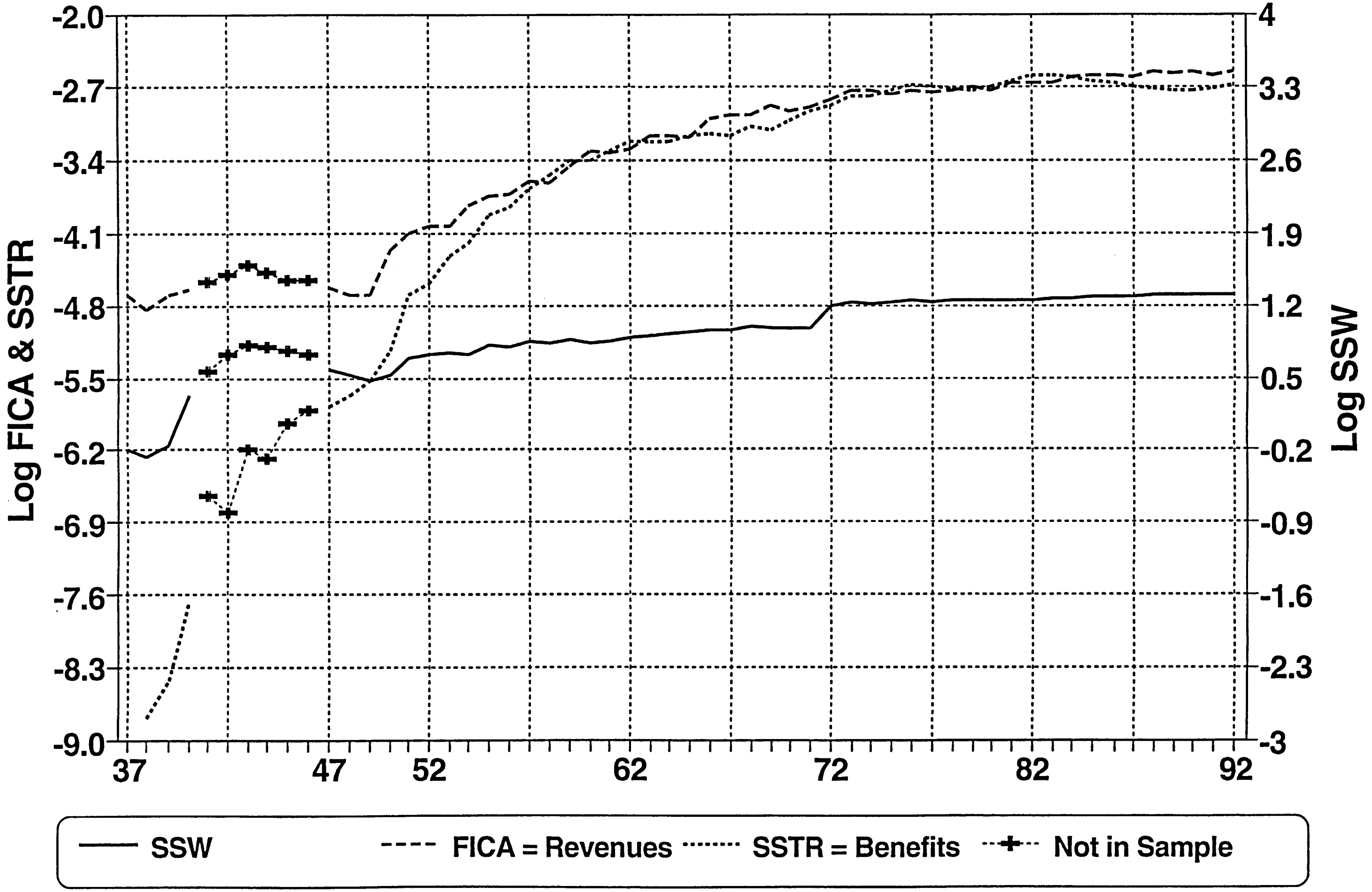
ρ	.56	-.27	.43	.53	.40	.45	.31
DW	1.64	2.06	1.76	1.82	1.80	1.84	1.85
SER	65.5	27.8	.0075	.0076	.0067	.0073	.0067
R^2	---	---	.938	.935	.837	.941	.838
SSR	188841	17735	.0025	.0027	.0015	.0023	.0015

TABLE 3 (CONT.)

	3.1	3.2	3.3	3.4	3.5	3.6	3.7
P(BP)	.015	>.99	.47	.18	.17	.48	.62
P(fitted)	.0001	.81	.36	.18	.36	.59	.54
P(1941-46)	.28	.002	.02	.02	---	.01	---
P(1930-40)	---	.53	---	.31	.10	---	.15
P(1972-92)	---	<.0001	.002	.0008	.02	.0002	.02
P(*PY* holds)	.002	.0001	.001	<.0001	.0004	<.0001	.0001
P(*restrictions*)		---	---	.18	.79	---	.88
Influential:	----	----	1950	1950	----	1950	----
Outliers:	1973	1955	1930	1981	----	1981	1981
	1981		1940				
			1981				
Δ*Savings92*	-420	-271	-421	-448	-295	-154	-159
S.E.	186	148	139	133	159	142	162

NOTE TO TABLE 3: All regressions are estimated with a ML correction for AR(1) residuals. *P*(*PY* holds) is the p value for an F test of the coefficient restriction $Y = -TX = TR = GINT = -RE$. Other aspects of this Table are described in the Note to Tables 2 and 3.

Fig. 1
Social Security Variables / CON(t-1)



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Data Appendix

Sources

BALSH	*Balance Sheets for the U.S. Economy, 1945-94.* Board of Governors of the Federal Reserve System, Flow of Funds release *C.9* dated 6/8/95.
NIPA	National Income and Product Accounts of the U.S.A. Data obtained from the Bureau of Economic Analysis (U.S. Department of Commerce) on diskette and last revised in 7/95. These data do not reflect the benchmark revision of the NIPA that began in 11/95. *NIPA x.y.z* denotes the series in line *z* in NIPA Table *x.y*. An additional digit for *FICA*, *GINT*, *SSTR* and *TR* prior to 1950 is from the volume *NIPA Statistical Tables, 1929-76.*
SA	*Statistical Abstract of the U.S.* Various issues.
SSB	*Social Security Bulletin, Annual Statistical Supplement*, 1994.

Data and Variable Definitions

All data are annual. Unless otherwise indicated, the data are in current prices, series span the period 1930-92, and series spanning fewer years are ratio spliced when the source changes. All variables are divided by .001×*POP* and (the data from Feldstein's Appendix excepted) *P* so as to be denominated in real per capita dollars.

CMED	Employer (NIPA 3.6.6) and employee (NIPA 3.6.29) contributions to Medicare.
CON	Personal consumption expenditure (1929-92: NIPA Table 1.1, sum of lines 3, 4 and 5).
CSSN	Employer (NIPA 3.6.5) and employee (NIPA 3.6.28) contributions to OASDI.
DX	Federal outlays for national defense. (1939-92: NIPA 1.1.20; 1930-38 (no splice in 1939): Kendrick (1961), Table A-I, col. 8).
EICN	Earned income credit, not netted from total tax receipts but included in *TR* (NIPA 3.12.27; 0 before 1976).
FICA	That part of *TX* consisting of *CSSN* + (*CSSN*/(*CSSN*+*CMED*))×(Social Security tax on self-employed (NIPA 3.6.30)).
G	Purchases of goods and services by all government (NIPA 1.1.18).
GINT	Net interest paid by all government (NIPA 3.1.13) – interest paid by Federal government to foreigners (NIPA 3.1.16).
GNP	Gross national product (NIPA 1.9.4).
HHNW	Net worth of households, including consumer durables and owner-occupied real estate (1946-92: BALSH, Table B.100, row 47, yearend values for preceding year).
NNP	Net national product (NIPA 1.9.8).
P	Implicit deflator for *C* (1929-92: NIPA 7.1.16. 1987=1).
POP	Population at midyear, rounded to the nearest 100,000. Includes Armed Forces stationed overseas (except in 1929) and Alaska & Hawaii starting in 1940. (SA, Table 2, col. "Total Population." 1950-92: 1995 ed.; 1940-49 (no splice in 1950): 1984 ed.; 1930-39: 1960 ed.; 1929: SA, Table 2, col. "Resident Population").
PY	Disposable personal income (1929-92: NIPA 2.1.25).
RE	*NNP* - *TX* + *TR* + *GINT* - *PY* except in (2.5) and (2.6), where *RE* is the gross retained earnings of corporations (NIPA Table 5.1, lines 4 + 8).

SSTR	Part of *TR* consisting of Social Security payments to the retired, survivors (widows and orphans) and the disabled. (1941-92: NIPA 3.12.4. 1937-40 (no splice in 1941): SSB, Table 4.A5, payments to retired (cols. 3+12) and to survivors (cols. 7+13)).
SSW	Social Security wealth at 1987 prices (Feldstein (1996), Appendix table).
TR	Transfer payments by all government to domestic persons (NIPA 3.1.11) - *EICN*.
TX	Total tax and nontax receipts by all government (NIPA 3.1.1) - *EICN*.
W	Household wealth at 1987 prices (1946-92: *HHNW/P*. 1930-45: Feldstein (1996), Appendix table).
YD%	ln(*NNP* - *TX* + *TR* + *GINT* - retained earnings of corporations net of IVA and CCA (NIPA 1.14.32) + interest paid by households to business (NIPA 2.1.28))/*PY*.

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