NUMBER 22

SOCIAL SECURITY AND PRIVATE SAVING: NEW TIME SERIES EVIDENCE WITH ALTERNATIVE SPECIFICATIONS

Selig D. Lesnoy and Dean R. Leimer

Division of Economic Research

SEPTEMBER 1981

Social Security Administration
Office of Policy
Office of Research and Statistics

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by
Selig D. Lesnoy and Dean R. Leimer *

1. Introduction

Does the social security system discourage private saving in the United States? This question has been the focus of an ongoing debate since the publication in 1974 of a provocative article by Martin Feldstein in the Journal of Political Economy. Based on a consumer expenditure function estimated with U.S. time series data, Feldstein estimated that the introduction of the social security system had reduced personal saving by 50 percent, with serious consequences for capital formation and output. The debate was joined by Alicia Munnell [1974], Robert Barro [1978], Michael Darby [1979] and others. These authors used different specifications but the same social security variable constructed by Feldstein. Their conclusions variously supported and contradicted Feldstein's results.

In a paper given at the AEA meetings last fall, we presented new evidence that cast considerable doubt on Feldstein's conclusion. First, we found that the social security wealth variable used by Feldstein was seriously flawed as a result of a computer programming error, and that simply correcting this error substantially changed the estimated effect of social security on saving. Second, his statistical evidence depends upon assumptions which are embedded in the construction of the social security wealth variable. These assumptions relate, first, to how individuals form their expectations about the social security benefits they expect to receive and the social security taxes they expect to pay, and second, to estimates of the number of workers, dependent wives, and surviving widows who will receive benefits. Adopting reasonable alternative assumptions leads to generally weaker estimates of the relationship between social security and saving. Finally, the estimated relationship between social security and saving is acutely sensitive to the period of estimation examined.

In concluding our AEA paper, we emphasized that our empirical investigation was limited to the specification of the consumer expenditure function estimated by Feldstein and cautioned that results might differ if alternative specifications were considered. The purpose of this paper is to consider several alternative specifications of the consumer expenditure function. In particular, we will examine the specifications suggested by Munnell, Barro, and Darby. In addition, we will consider a modification of the Feldstein specification which includes the unemployment rate.

1.1 A Review of the Theoretical Arguments

The argument that social security reduces saving is based on the life cycle theory of saving. The simple life cycle model assumes that accumulated savings is the only source of spending for consumption during retirement, and thus providing for retirement is the major motive for saving. Individuals smooth the pattern of consumption over their lifetime by saving during their working years and dis-saving during their retirement years. With no social security system, individuals accumulate retirement savings in the form of real assets or financial assets such as stocks and bonds, which are claims against real assets. With a social security system, individuals accumulate retirement "savings" in the form of "social security wealth"—rights to future retirement benefits. The social security system is financed on a "pay-as-you-go" basis. That is, benefits each year are paid from current contributions.[1/] Because there is no accumulation of real assets in the economy corresponding to the wealth held by individuals in the form of accumulated benefits, real saving in the economy is reduced.

Following Feldstein, we refer to this negative effect on saving as the "asset substitution" effect.

If the behavior of most individuals is described by the simple life cycle model, it is clear that social security would reduce national saving. But this view of the world is overly simplified.

First, as Feldstein has pointed out, social security can affect the decision to retire. The receipt of social security retirement benefits is conditional on retirement.[2/] Thus, for an individual who, in the absence of social security, might plan to work beyond age 65, there is some inducement to retire earlier. Earlier retirement implies a shorter working life and longer period of retirement. Thus there is an incentive for such individuals to increase their saving during their working years. Because this "retirement effect" works in the opposite direction of the asset substitution effect, the social security system has an ambiguous effect on saving.

Second, the life cycle model assumes that the only source of financing consumption during retirement is accumulated saving. Barro [1974, 1978] points out that before the introduction of social security, there was a system of private intergenerational transfers. In many families, working children provided support for their retired parents. Barro argues that the introduction of social security largely institutionalized this voluntary system of intergenerational transfers. That is, instead of making direct transfers to parents, transfers are made indirectly by paying taxes to the government.[3/] To the extent that the social security system substitutes for private intergenerational transfers, the reduction of saving implied by the life cycle model is lessened.[4/]

Third, the simple life cycle model assumes that the only motive for saving is to smooth consumption over the life cycle. Darby [1979] points out that there are other motives for saving, in particular, to provide for contingencies or to leave a bequest. Assets held can fulfill both motives. Savings accumulated to meet contingencies become unplanned bequests at death.[5/] Darby estimates that only 20-30 percent of saving can be explained by life cycle saving. Kotlikoff and Summers [1980] reach a similar conclusion.

To the extent that life-cycle saving does not play the major role in personal saving, the potential negative impact of social security on saving is reduced. That is, assume social security does replace 50 percent of life cycle saving. If life cycle saving represents 90 percent of total personal saving, the potential reduction of saving is 45 percent. But if life cycle saving represents 30 percent of total saving, then the potential reduction of saving is 15 percent. Thus, the magnitude of life cycle saving in total saving is very important.

Two additional possible effects of social security on saving have been raised by Darby. First, to the extent that the implicit rate of return on contributions differs from the market rate of return, there is a wealth effect associated with social security. If the implicit return exceeds the market rate, as was true in the early years of the social security program, wealth is increased, implying higher consumption. If the implicit return is less than the market rate, wealth is reduced, implying lower consumption. In a pay-as-you-go social security system, the high implicit rates of return possible in the early years of the program necessarily fall over time. Therefore, any negative wealth effect of social security on saving would show a downward trend over time.

Second, the fact that social security benefits are in the form of an annuity has an ambiguous effect on saving for contingencies. On the one hand, there is no need for saving to protect against the risk of living too long.[6/] On the other hand, the social security asset is illiquid and non-transferable, and cannot be used for purposes other than retirement consumption, necessitating increased saving for contingencies. In addition, since the benefit cannot be transferred at death, there may be some inducement to increase saving for bequests.

Finally, some economists are skeptical about the life cycle model as a description of behavior. Ackley [1971], for example, questions whether individuals have a definite, conscious vision of their economic future and make rational, conscious, complex choices about lifetime consumption. Katona [1965] has argued that by making retirement feasible, the effort to retire may be intensified and the level of consumption desired may be altered. This hypothesis about human behavior suggests that social security may have increased saving.

Thus, although the hypothesis that social security has reduced personal saving is plausible, the issue is more complex than appears at first glance. We now turn to the empirical evidence. We first summarize our reexamination of Feldstein's evidence. We then reexamine the evidence of Munnell, Barro, and Darby.

1.2 A Review of Feldstein's Time Series Evidence

The principal evidence that the social security program has reduced personal saving was presented in Feldstein's 1974 article, in which he estimated a consumer expenditure function estimated using U.S. time series data. The specification was

$$C_t = \beta_o + \beta_1 YD_t + \beta_2 YD_{t-1} + \beta_3 RE_t + \beta_4 W_t + \beta_5 SSW_t \qquad (1)$$

where C_t is consumer expenditures, YD_t is disposable personal income, RE_t is retained earnings, W_t is ordinary household wealth at the beginning of the year, and SSW_t is social security wealth. The expected signs of the coefficients are β_1, β_2, β_3, $\beta_4>0$ and $\beta_5 \gtrless 0$.

The unique contribution of this model is the introduction and measurement of the social security wealth variable. There are two social security wealth concepts. Gross social security wealth is the actuarial value of perceived future benefits expected by individuals. Net social security wealth is gross social security wealth less the actuarial value of future payroll taxes that individuals expect to pay. Details of the construction of these variables can be found in Feldstein [1974], Munnell [1974], or Leimer and Lesnoy [1980].

Feldstein has focused on gross social security wealth. Our position is that net social security wealth is the preferred variable, particularly if the purpose is to compare social security wealth with other forms of accumulated wealth.

For an actuarially fair annuity, it can be shown that

$$AVPC = PVFB - PVFC$$

where AVPC is the accumulated value of past contributions, PVFB is the present value of future benefits, and PVFC is the present value of future contributions. It seems clear that if individuals saved privately, the relevant accumulated wealth concept would be AVPC. The social security analogue of this concept is net social security wealth.

The difference in magnitude of the net and gross concepts is substantial. Net social security wealth is approximately two-thirds as large as gross social security wealth.

In estimating the consumer expenditure function, however, the choice of social security variable is less than clear. The individual's lifetime wealth constraint can be written as

LW = PVE - PVPIT - PVSCC + PVSSB + OW

where LW is lifetime wealth, PVE is the present value of future labor income, PVPIT is the present value of future personal income taxes, PVSSC is the present value of social security contributions, PVSSB is the present value of future social security benefits, and OW is ordinary wealth. (Clearly, PVSSB is gross social security wealth and PVSSB - PVSSC is net social security wealth.) This suggests that the specification should include gross social security wealth in conjunction with labor income after both personal income and social security taxes, or net social security wealth in conjunction with labor income after personal income taxes but before deducting social security contributions. The income variable used, however, is not a measure of labor income, but disposable personal income.[7/] In constructing current disposable income, current social security contributions are deducted, which suggests the use of gross social security wealth. But current social security benefits, which are approximately equal to current contributions, are added, which suggests the use of net social security wealth. Our approach, like that of other researchers, is to present results using both gross and net social security wealth. Fortunately, our conclusions do not generally depend upon the social security wealth concept used.

Before turning to our reexamination of the Munnell, Barro and Darby specifications, we will review the evidence using the Feldstein specification. This evidence, which we presented at the AEA meeting this past September, is summarized in Tables 1, 2 and 3. Table 1 compares regressions using the original Feldstein variable, a replica of the Feldstein variable, and an alternative variable using the same benefit and tax perception, but a new construction algorithm which we designed. All regressions presented in this paper have been reestimated using recently revised national accounts data.

Equation 1.1 presents regression results for 1930-1974 (excluding 1941-46) using the original Feldstein gross social security wealth variable. The coefficient of SSW is .024 and significant. Because of a programming error, the Feldstein series was incorrect, growing too rapidly after 1956. Equation 1.2 presents regression results using a correct replica of the Feldstein variable. The coefficient of SSW falls in size and becomes insignificant. Because we were not satisfied with certain assumptions underlying Feldstein's algorithm, we developed a new algorithm.[8/] Equation 1.3 uses a social security variable based on this new algorithm which uses the same benefit and tax assumptions as the Feldstein variable. For simplicity, we refer to this variable as the Leimer-Lesnoy replica. The coefficient of SSW now becomes negative and small. The t-ratio is very small. A similar pattern emerges in equations (1.4) to (1.6), which use net social security wealth.

Regression results for the post-war period, 1947-74, are surprising. In equation (1.7), which uses the original Feldstein variable, the coefficient of SSW is negative and insignificant. When the correct Feldstein replica is used (equation (1.8)), the SSW coefficient becomes negative, large, and significant. In equation (1.9), the Leimer-Lesnoy replica is used. Again, the SSW coefficient is negative, large and significant. Similar results are obtained if net social security wealth is used. (See equations (1.10) to (1.12).) The absolute values of the negative SSW coefficients are suspect. Clearly, however, the results do not support the hypothesis that social security reduces saving.

1.3 Which Time Period?

Comparison of the equations for 1930-74 and 1947-74 suggests that there are differences between the pre-war and post-war periods. Regressions for the period 1930-40 which use the Feldstein replica and Leimer-Lesnoy replica are shown in Table 2. To facilitate comparison, we also include regressions for 1947-74. For the pre-war period, the coefficients of SSW are positive and approach significance; for the post-war period, the coefficients are negative and significant. The coefficients of household wealth also change signs between the pre-war and post-war periods, always being opposite in sign to the coefficients of SSW. A formal test for stability of coefficients over the 1930-40 and 1947-74 periods leads to rejection of the hypothesis that the coefficients are equal in the two subperiods.[9/]

Feldstein has argued that the full period results should be used.[10/] From an econometric standpoint, however, the post-war period provides more consistent estimates. That is, the post-war estimates are much less sensitive to the specific years included than are the full period estimates. It is unlikely that people had enough information about the social security system in the pre-war period to develop accurate impressions of the value of social security wealth. It is not even clear whether the social security wealth series should begin in 1935, when the law was passed, or in 1937, when participation began. The difficulty of using pre-war data is illustrated by equations (2.9) to (2.12), which use the Feldstein replica and Leimer-Lesnoy replica but begin in 1932. In all equations, the coefficients of SSW become negative, and for the Leimer-Lesnoy replica, are significant. The coefficients resemble those obtained for the 1947-74 period, and a test for stability of coefficients over the 1932-40 and 1947-74 periods leads to acceptance of the hypothesis that coefficients are equal in the two subperiods.[11/]

We will continue to present results for both the full period, 1930-74, and the post-war period, 1947-74. But given the sensitivity of results to the particular pre-war years included, we are inclined to give more weight to the results for the post-war period.

1.4 Benefit and Tax Perceptions

A major aspect of our AEA paper was an examination of how individuals formed their expectations of future benefits and taxes. Feldstein had assumed a constant benefit ratio, based on the historical average benefit ratio, and a perfectly forecast tax ratio.[12/] These assumptions appeared unrealistic and unnecessarily limiting. The benefit perception assumption, in particular, ignored substantial historical variation in the benefit ratio associated with changing economic conditions and amendments to the social security laws, including major amendments in 1939, 1950 and 1972.

Our approach was to consider a number of reasonable and consistent alternative assumptions about how individuals form their estimates of the future benefit and tax ratios. The expected future rates were alternatively assumed to equal the current ratio, an adaptive expectations ratio, perfectly forecast ratios, and the current ratio modified according to actuarial projections (or, in the case of taxes, currently legislated changes in future tax rates).[13/] Regressions using these alternative perceptions are presented in Table 3 for the full period, and in Table 4 for the post-war period. Social security wealth is estimated using the Leimer-Lesnoy algorithm. Regressions estimated using social security wealth constructed using the Feldstein algorithm appear in the Appendix, Tables B.1 and B.2. All regressions have been updated to 1976.

For the full period, 1930-76, if gross wealth is used, the coefficient of SSW ranges from -.006 to approximately zero. None of the coefficients is significant. If net wealth is used, the results are similar. The coefficient of SSW ranges from -.010 to -.0001. The largest t-ratio (in absolute value) is -1.24.

For the post-war period, 1947-76, the coefficient of both gross and net SSW is negative for all perceptions. For both the constant and perfect forecast perceptions, the coefficient of SSW ratios is significant but of implausible magnitude.

If anything, the evidence suggests that social security may have increased saving. Although we are skeptical about this result, it is clear that the evidence does not support the hypothesis that social security has reduced saving.

2. New Evidence by Feldstein

Feldstein [1980] has recently presented new evidence, based on a revision of his corrected variable, which supports his original conclusion. He argues that the 1972 social security amendments, which raised benefits levels by 20 percent and indexed benefits to rise automatically with the price level, implied increases in social security wealth not reflected in his "corrected" wealth variable. Consequently, he computes a "revised" social security wealth series using the following benefit perception assumption: from 1937 through 1971, individuals assumed the benefit ratio would be constant and equal to the actual average benefit ratio over that period; for 1972 and later years, individuals assumed the benefit ratio would be constant and equal to the 1937-71 average, increased by 20 percent. That is, Feldstein's revised gross series is simply equal to his corrected series for 1937-71 and equal to 120 percent of his corrected series from 1972 on.[14/]

Using his revised series, and extending the period of analysis to 1930-76, Feldstein estimates the coefficient of social security wealth to be .018, with a t-ratio of 2.0.[15/] Since our data differ somewhat for the other variables, we have reestimated this equation using his revised series for SSW and our data for the other variables. Our results, which are shown as equation (5.1) in Table 5, are similar to Feldstein's results, but weaker: the coefficient of SSW is .014, and the t-ratio is 1.61. This weaker result arises from our use of the recently revised NIPA data. Using data published before the revision, we had estimated the SSW coefficient to be .019, with a t-ratio of 2.17. This sensitivity of parameter estimates to the NIPA data revisions is quite disturbing.

Feldstein's new results show that one can conceive of a benefit perception assumption that generates large positive empirical estimates of social security's effect on consumer expenditures. (Although not significant at the 5 percent level, the coefficient of Feldstein's revised SSW variable is almost significant at the 10 percent level.) But we have examined a number of reasonable and internally consistent alternative benefit perceptions (in the context of both the Feldstein and Leimer-Lesnoy algorithms for constructing social security wealth) which suggest no significant positive effect on consumption. (See Tables 3 and 4 and Appendix, Tables B.1 and B.2.) Indeed, we obtain negative estimated effects on consumption for the post-war period. Except for those perceptions which replicate Feldstein's original constant benefit ratio assumption, all of the alternatives which we examined assume that individuals adjust not only to the 1972 amendments, but to all other social security amendments as well. Moreover, unlike Feldstein's ad hoc procedure, a variety of consistent adjustment mechanisms were explored, including extreme myopia, adaptive expectations, incorporation of benefit projections, and perfect foresight. Thus, even if we accept Feldstein's revised perception assumption as reasonable, and even if his revised SSW coefficient was significant, the time series evidence as a whole would have to be viewed as inconclusive since we do not know which assumption best describes how people perceive social security wealth. Feldstein has not addressed this broader range of results.

We now turn to the details of Feldstein's revision. (See Table 5.) First, we question the rationale of Feldstein's benefit perception. Why would individuals' perceptions be affected immediately by the 1972 amendments (which were effective September 1972), but not by other major changes in social security legislation, such as those passed in 1939 and 1950?[16/] For example, suppose we assume that individuals predicted the benefit ratio for 1937-49, modified this ratio following the 1950 amendments, and then modified the ratio again following the 1972 amendments. Equation (5.2) presents the results for 1930-74 using this modified revised series: the coefficient of SSW falls to .0005, and the t-ratio to .06. Thus, Feldstein's results are extremely sensitive to the perception he has adopted.

Second, turning to the post-war period, 1947-74, equation (4.3) shows our estimate for that period using Feldstein's revised series and our data for the other variables. The results are weaker than those reported by Feldstein; the coefficient of SSW is .001 with a t-ratio of .11. If we substitute the modified revised series described above for Feldstein's revised series, as shown in equation (5.4), the coefficient of SSW becomes -.012, and the t-ratio becomes -1.28. Thus, the post-war evidence is clearly inconsistent with the hypothesis that social security reduces saving.

Feldstein focuses on the results for the full period as most relevant. We have argued above that there are many reasons for maintaining a degree of skepticism about results based on data including the pre-war period. Perhaps the most important is the sensitivity of the results to the specific years included. For example, if we use Feldstein's own revised series but use 1932 as the initial year, we obtain equation (5.5). The coefficient of SSW falls to .007 and, with a t-statistic of .70, is not significantly different from zero at conventional significance levels.[17/]

Finally, Feldstein's conclusion depends not only upon a weak benefit perception rationale, but also upon the assumptions incorporated into his algorithm for constructing social security wealth. If we use the Leimer-Lesnoy algorithm to construct a social security wealth variable parallel to Feldstein's revised variable, we obtain results quite different from his. That is, following Feldstein's procedure, we modify the Leimer-Lesnoy constant ratio series as follows:[18] for 1937-71, the "revised" series is identical to the constant ratio series, beginning in 1972, we increase the average ratio series by 20 percent to obtain the "revised" series. Equations (5.6) and (5.7) present the results using the Leimer-Lesnoy version of the "revised" SSW series. For 1930-76 (equation (5.6)), the coefficient of SSW is only .001 with a t-ratio of .14; for 1947-76 (equation (4.7)), the coefficient of SSW is -.010 with a t-ratio of -1.07. Thus, Feldstein's revised result depends not only upon a peculiar benefit perception assumption but also upon his particular construction of the social security wealth variable.

In this section, we have focussed on the results with the period of analysis extended to 1976. If we end the period in 1974, the results are similar.

To summarize, Feldstein's revised results lend little support to the hypothesis that social security has reduced personal saving. The revised perception assumption he presents is open to question. His revised empirical results are quite sensitive to minor modifications in that assumption, to changes in the analysis period, and to assumptions embedded in his algorithm for constructing social security wealth.

We next turn to an examination of alternative specifications.

3. The Unemployment Rate

In his 1974 JPE article and in an antecedent article in the Journal of Public Economics [1973], Feldstein considered a specification which included the unemployment rate. As discussed below, Munnell and Barro have also included the unemployment rate in their specifications. Subsequently, Feldstein [1974, 1978] has deemphasized the role of the unemployment rate arguing that its collinearity with the social security wealth variable distorts the results. In this section we will examine the rationale for including the unemployment rate and the empirical effect of including this variable.

Inclusion of the unemployment rate in the consumer expenditure function was suggested by Ando and Modigliani [1963]. They argued that the future level of expected permanent income would be positively correlated with the unemployment rate.

In Table 6 we examine the effect of including the unemployment rate in the consumer expenditure function. The specification is

$$C_t = \beta_o + \beta_1 YD_t + \beta_2 YD_{t-1} + \beta_3 RE_t + \beta_4 W_t + \beta_5 SSW_t + \beta_6 RU_t \cdot YD_t \qquad (2)$$

where C_t, YD_t, RE_t, W_t and SSW_t are as previously defined, and RU_t is the unemployment rate.[19/] The hypothesis is that $\beta_6 > 0$.

Consumer expenditure functions were estimated using the original (incorrect) Feldstein SSW variable, our Feldstein replica SSW variable, and the Leimer-Lesnoy replica SSW variable. If we compare these results with those in Table 1, the most striking result is that the estimated coefficients of social security wealth are largely unaffected by the introduction of the unemployment rate variable. The unemployment rate coefficients are not significant, although for the full period, the t-ratios for both the Feldstein replica and Leimer-Lesnoy replica equations, approach the critical value.[20/] The most important effect of introducing the unemployment rate is that the estimated coefficients and t-ratios for retained earnings increase, and those for household wealth decrease.

Tables 7 and 8 examine the effect of using alternative perceptions of social security wealth. Regressions for the full period, 1930-76, appear in Table 7; those for 1947-76 appear in Table 8. (Note that the period of estimation has been extended to 1976.) Comparing Table 7 to Table 3, the most important result is that for the full period, the estimated coefficients of social security wealth remain small, negative, and insignificant. The unemployment rate is significant in all equations.[21/] Again, what changes are the coefficients for retained earnings and household wealth. The estimated coefficients of retained earnings increase in value and become significant; both the coefficient values and t-ratios become smaller for household wealth.

Comparing Tables 4 and 8, which consider the post-war period, 1947-76, inclusion of the unemployment rate does affect the SSW coefficient. The absolute values of both the estimated coefficients and the t-ratios increase. For eight of the eleven perceptions considered, the SSW coefficient is significant. Thus, using this specification, the post-war evidence suggests that, if anything, social security has increased personal saving.[22/]

For the unemployment term itself, five of the estimated coefficients in Table 8 are significant at the usual level of significance of 5 percent. The remaining coefficients are significant only at the 10 percent level.[23/] On statistical grounds, therefore, the inclusion of the unemployment rate is somewhat uncertain. The retained earnings variable remains insignificant. Unlike the results for the full period, the coefficient values and t-ratios for household wealth increase, but only one coefficient that had been insignificant becomes significant.

4. The Retirement Effect: Munnell

As noted earlier, Feldstein hypothesizes that social security has a dual effect on consumption. On the one hand, the asset substitution effect tends to increase consumption. On the other hand, the retirement effect tends to decrease consumption. That is, to the extent that social security induces earlier retirement, workers decrease consumption (increase saving) over their shorter work span in order to maintain consumption in the longer retirement period.[24]

Although Feldstein's theoretical development of the extended life cycle model introduced the retirement effect of social security on saving, his econometric specification did not explicitly include a variable to measure this effect. He argued [Feldstein, 1974, p. 913] that by measuring the SSW variable conditional on individuals retiring at age 65, the SSW variable represents both the asset substitution and retirement effect of social security.

A major contribution of Alicia Munnell [1974] was to explicitly incorporate the retirement effect in the econometric specification. In addition, Munnell used a saving variable derived from SEC-Goldsmith-Flow of Funds data and also constructed a retirement saving series. We will not reestimate the specific equation used by Munnell. Rather, we will use a specification which is in the spirit of Munnell's work, but which continues to focus on consumer expenditures as the dependent variable.

We develop the specification non-rigorously. The Ando-Modigliani aggregate consumption function assumes that consumption is a function, Ω_t, of total resources: These resources consist of human wealth, represented as a function of earnings, $f(E_t)$, and household wealth, W_t. Thus

$$C_t = \Omega_t[f(E_t) + W_t]$$

Ω_t depends on the age distribution, the distribution of income and wealth, the rate of return, and individual preferences. In particular, Ω_t depends upon the ratio of working years to total life-span, N_t/L_t. As a proxy for this ratio we use the labor force participation of the aged, LF65. If the age of retirement is at least 65 for some workers, N_t/L_t will be related to LF65. Thus we assume that

$$\Omega_t = \Omega_1 + \Omega_2 LF65$$

or

$$C_t = \Omega_1 f(E_t) + \Omega_1 W_t + \Omega_2 f(E_t)\cdot LF65 + \Omega_2 W_t \cdot LF65$$

Assuming that interactions with variables other than income are of second-order importance, we modify the specification of the previous section as follows:

$$C_t = \beta_0 + \beta_1 YD_t + \beta_2 YD_{t-1} + \beta_3 RE_t + \beta_4 W_t + \beta_5 SSW_t + \beta_6 RU_t \cdot YD_t + \beta_7 LF65_t \cdot YD_t \quad (3)$$

We refer to this equation as the "Munnell" specification.[25] Following Munnell, we also include an unemployment variable. The expected sign of the added variable, $LF65_t \cdot YD_t$, is $\beta_7 > 0$; that of SSW_t is now $\beta_5 > 0$.

Table 9 compares consumer expenditure functions estimated using the Feldstein original, Feldstein replica, and Leimer-Lesnoy replica SSW variables. For the full period, when we use the incorrect Feldstein original SSW variable, the results are consistent with the extended life cycle theory. The coefficient of SSW increases in value and is significant: the coefficient of LF65·YD is significant when gross SSW is used, and approaches the critical value when net SSW is used.[26] But when the Feldstein replica is used, the estimated coefficients of both SSW and LF65·YD decrease and are no longer significant. Using the Leimer-Lesnoy replica, the coefficient and t-ratio of SSW becomes negligible, and the coefficient and t-ratio of LF65·YD become smaller.

For the post-war period, although the SSW coefficients are insignificant, the extended life cycle theory again appears supported if we use the Feldstein original variables. And again, this conclusion is radically changed if we use the Feldstein replica or Leimer-Lesnoy replica variables. Although SSW is not significant, it is negative and large. These results hold whether we use gross or net SSW.

Tables 10 and 11 examine the effect of using alternative perceptions of social security wealth. Regressions for the full period, 1930-76, appear in Table 10; regressions for the post-war period, 1947-76, appear in Table 11.

Comparing Table 10 with Table 7, we again find little change in the estimated value of the SSW coefficients. Consistent with the extended life cycle theory, there is an (algebraic) increase in coefficient values, but the change is miniscule and the coefficients remain negative, small, and insignificant. The coefficients of LF65·YD, although positive, are not close to being significant, with t-ratios less than one. The t-ratios of the RU·YD variable fall somewhat, so RU·YD is no longer significant at the 5 percent significance level (except in equation (10.10)).[27] As in Table 7, coefficients for retained earnings are significant and those for household wealth are not significant. Again, the gross and net SSW variables yield similar conclusions.

Comparing Tables 8 and 11, which examine the post-war period, the estimated effect of SSW is affected by the inclusion of the LF65·YD variable. The absolute values of all coefficients fall (algebraic values increase); t-ratios fall so that no SSW coefficients are significant at the conventional 5 percent significance level. These post-war results suggest that there is no statistically significant evidence of an asset substitution effect.

The coefficients of LF65·YD in Table 11, although positive, are not significant. The coefficients of RU·YD, depending upon the perception considered, are sometimes significant, sometimes insignificant. Unlike the results for the full period, the RE coefficients are all insignificant. On the other hand, for household wealth, four of the coefficients are now significant.[28/]

In sum, the "Munnell" specification lends no support to the hypothesis that social security has reduced saving. There is little evidence for either the asset substitution or retirement effects of social security.[29/]

5. Measuring Permanent Income: Barro

As discussed above, Barro argues that the effect of the introduction of the social security system may have been to induce offsetting changes in intergenerational transfers rather than reducing saving. Barro does not test this hypothesis directly. Instead, he too estimates a consumer expenditure function which includes a social security wealth variable, but he modifies the Feldstein specification in several ways.

First, in addition to current and lagged disposable income, retained earnings, and household wealth, Barro includes the surplus of the total government sector, SUR, as a variable that proxies for permanent income. He argues that the government surplus has direct and indirect implications for permanent income. The direct effect is that the current and future price levels are inversely related to the government surplus. The indirect effect is that future taxes associated with financing the public debt are also inversely related to the current government surplus. Barro further rationalizes the inclusion of the government surplus by noting that YD+RE+SUR=NNP-G, where NNP is net national product and G is government expenditures on goods and services. NNP-G measures the output available to the private sector for consumer expenditure and saving. Feldstein [1979] argues that the government surplus is endogenous and does not belong in a properly specified consumer expenditure function.

Second, Barro includes the unemployment rate as a predictor of future income.[30/] Third, the stock of household durables, DUR, is included as an explanatory variable. The rationale for including this variable is discussed in the following section, which presents the Darby specification.

The specification of the consumer expenditure function adopted by Barro is therefore

$$C_t = \beta_0 + \beta_1 YD_t + \beta_2 YD_{t-1} + \beta_3 RE_t + \beta_4 W_t + \beta_5 SUR_t + \beta_6 RU_t \cdot YD_t + \beta_7 DUR_t + \beta_8 SSW_t \quad . \tag{4}$$

[31/]

The expected signs of the coefficients are β_1, β_2, β_3, β_4, β_5, $\beta_6 > 0$, $\beta_7 < 0$, and $\beta_8 = 0$.

Table 12 compares Barro-specified consumer expenditure functions estimated using the Feldstein original SSW variable, the Feldstein replica SSW variable, and the Leimer-Lesnoy replica SSW variable. For 1930-74, when the Feldstein original SSW variable is used, the coefficient of gross SSW is .015 with a t-ratio of 1.64. The coefficients of SUR and RU·YD are positive and significant. This result is quite similar to that obtained by Barro. When the Feldstein replica variable is used, the coefficient of SSW falls to .007 with a t-ratio of .73. Using the Leimer-Lesnoy replica variable, the coefficient of SSW falls further to .003 with a t-ratio of .56. The coefficients of SUR and RU·YD remain significant in the latter regressions. A similar pattern is observed for net SSW.

For 1947-74, when the Feldstein original SSW variable is used, the coefficient of gross SSW is -.020 with a t-ratio of -.54. The coefficients of SUR and RU·YD are again positive and significant. Barro had obtained a positive, insignificant coefficient for SSW. Using the Feldstein replica variable, the coefficient of SSW falls to -.039 with a t-ratio of -1.20. When the Leimer-Lesnoy replica variable is used, the coefficient of SSW becomes -.003 with a t-ratio of only -.26. For the latter regressions, SUR is significant, but RU·YD is not significantly different from zero. A similar pattern of results obtains when net SSW is used.[32/]

Tables 13 and 14 examine the effect of using alternative perceptions of social security wealth in conjunction with the Barro specification. Table 13 presents results for the full period, 1930-76. Whether we consider gross wealth or net wealth, the coefficients of SSW are quite small, sometimes positive and sometimes negative, with very small t-ratios. The RE variable is at the margin of significance--barely above in four regressions, and below in the remainder.[33/] The coefficient of DUR is negative in all regressions, as predicted, but is never significant. Household wealth has a miniscule coefficient and t-ratio in all regressions.

Results for the post-war period, 1947-76, appear in Table 14. For all regressions except those using the gross and net SSW variables based on the actuarial projection perception, the coefficient of SSW is negative. None of the coefficients is significant. The SUR variable is again significant in all regressions, but RU·YD is (marginally) insignificant for three regressions. The RE variable is again at the margin of significance. For five equations, the t-ratio is above the critical value.[34/] DUR is negative but never significant. The estimated coefficients for W are positive but insignificant.

It is clear that the Barro specification lends no support to the hypothesis that social security reduces saving.

6. Measuring Permanent Income: Darby

The last specification to be examined is that of Michael Darby. As noted earlier, Darby points out that saving may be for the purposes of protecting against contingencies or providing a bequest, as well as for providing for retirement. To the extent that social security primarily replaces life-cycle saving, the potential effect on total saving is reduced.

Darby's empirical work is based on an extension of the permanent income model of consumer expenditures which is presented in Darby [1978]. Pure consumption, the consumption of services, is assumed to depend on permanent income. Expenditures on consumer durables depend on the discrepancy between the stock of durables desired and held, unexpected windfalls (transitory income), and the difference between money balances desired and held. The desired stock of durable goods is assumed to be a function of permanent income, the long term interest rate, and the relative price of durable goods. The desired stock of money balances is assumed to be a function of permanent income, transitory income, and the long term interest rate. Ignoring social security, the specification implied by the theoretical development is

$$C_t = \beta_0 + \beta_1 YP_t + \beta_2 YT_t + \beta_3 M_t + \beta_4 DUR_t + \beta_5 \left(\frac{P_D}{P_{ND}}\right)_t + \beta_6 R_t \qquad (5)$$

where C_t is consumer expenditures, YP_t is permanent income, YT_t is transitory income, M_t is money balances, DUR_t is the stock of durables at the beginning of the period, $(P_D/P_{ND})_t$ is the relative price of durable goods, and R_t is the long term interest rate. The expected signs of the coefficients are $\beta_1>0$, $\beta_2>0$, $\beta_3>0$, $\beta_4<0$, $\beta_5<0$, $\beta_6 \lessgtr 0$.

Permanent income is constructed using an adaptive expectations model, where $YP_t = \delta Y_t + (1-\delta)(1+g)YP_{t-1}$, where δ is selected to be .1, and g measures the rate of growth of income over the estimation period. The income measure, Y, is private income (essentially the sum of disposable income and retained earnings) plus the imputed yield on durables.

To examine the effect of social security on consumer expenditures, Darby adds a term $\beta_7 SSW_t$ to equation (5). The social security wealth variable may be interpreted as measuring the perceived increase in permanent income represented by social security. Following Darby, the equation is estimated using aggregate data.[35/] The first set of regressions, Tables 15-17, uses M1 (currency plus demand deposits) as the measure of money balances.

Table 15 compares Darby-specified consumer expenditure functions estimated using the Feldstein original SSW variable, the Feldstein replica SSW variable, and the Leimer-Lesnoy replica variable. For the full period, 1930-74, if Feldstein's original SSW variable is used, the coefficient of gross SSW is .027 and is significant. This result is similar to that originally obtained by Darby. If we substitute the correct Feldstein replica variable, the coefficient of SSW becomes negative and insignificant. With the Leimer-Lesnoy variable, the SSW coefficient is again significant, but negative, with a value of -.024. A similar pattern is noted if we use net social security wealth, except that the coefficient of SSW is significantly negative if we use either the Feldstein replica or the Leimer-Lesnoy replica variable.

For the post-war period, 1947-74, if we use the Feldstein original SSW variable, the coefficient of SSW is -.016 with a t-ratio of -1.13, which is again similar to the result obtained by Darby. If we substitute the Feldstein replica variable, the absolute size of the SSW coefficient increases, but it is again not significant. With the Leimer-Lesnoy replica variable, the coefficient of SSW becomes positive but only .002, and the t-ratio is miniscule. If we use net social security wealth, a similar pattern is observed. It is clear that when we use a correct version of the Feldstein SSW variable, whether in the context of the Feldstein algorithm or Leimer-Lesnoy algorithm, there is no significant evidence of a reduction in saving associated with the social security program.

Tables 16 and 17 examine the effect of using alternative social security wealth perceptions estimated using the Darby specification. Table 16 presents the results for the full period, 1930-76. With the exception of the gross and net SSW variables based on actuarial projections, the coefficients of SSW are negative and fairly large. Using gross wealth, the coefficients are not significant at the conventional 5 percent level. Using net wealth, the SSW coefficients are significant or nearly significant, except in equation (16.10), which uses the SSW variable based on actuarial/legislated projections. For this perception, the SSW coefficients and t-ratios, although negative, are very small.

The coefficients of permanent and transitory income appear to be of reasonable magnitude and are highly significant. The coefficients for money balances are significant only in equation (16.7).[36/] The coefficients for the stock of durable goods and for relative prices are not significant. The coefficients for the interest rate are positive, and except in those equations using SSW variables based on current and adaptively formed benefit and tax ratios, are significant.

Table 17 presents results for the post-war period, 1947-76. All of the SSW coefficients are small, falling in the range -.004 to .004. The t-ratios are also quite small; the largest value is .72. The coefficients of permanent income and transitory income are significant and seem reasonable in size. Compared to the full period, the coefficients of money are much larger and highly significant. This increase in the size of the money coefficients is accompanied by declines in the coefficients of transitory income, the interest rate, and the constant term. These results are similar to those obtained by Darby.

The coefficients of durable goods stocks have the correct sign, but are insignificant. The relative price variable is now positive and significant. Finally, the coefficients of the interest rate are all insignificant. The most important result is that there is no support for the hypothesis that social security reduces saving.

Because all other regressions were specified in per capita rather than aggregate terms, we reestimated all equations using per capita values of variables to make certain that the results did not depend upon the scale of variables. We constructed a per capita permanent income series using an adaptive expectations model estimated with per capita income, i.e.,

$$y_p(t) = \beta y(t) + (1-\beta)(1+g)y_p(t-1) \ ,$$

where y_p is permanent income per capita, y is current income per capita, g is the growth rate of per capita income, and β is the adjustment weight. Regressions using the per capita specification are presented in Appendix Tables C.1 and C.2. The results are similar to those using the aggregate variables. For the full period, the estimated SSW coefficients suggest that, if anything, social security has increased saving. For the post-war period, the results suggest that social security has had little or no effect on saving. There is no support in either period for the hypothesis that social security has decreased saving.

The results discussed thus far under the Darby specification have used M1 as the measure of money balances. Darby [1979] presents results using both M1 and M2. (M2 equals M1 plus time deposits at commercial banks exclusive of large negotiable certificates of deposit.) He states that M1 has performed better than M2 in post-war estimates of the consumer expenditure function. Because the classification of demand deposits was largely arbitrary before the prohibition of interest payments on such deposits in the pre-war period, however, he also examines results using M2 as an imperfect but consistent proxy for money balances over the full period.

We also examined the use of M2 as a measure of money balances. In particular, we wanted to make certain that our conclusions for the full period were not altered by the substitution of M2 for M1. Quite surprisingly, we found that the results differed substantially for both the full and the post-war periods depending on which measure of M was used. Tables 18 and 19 examine the effect of using M2 under the Darby specification with alternative social security wealth perceptions.

Table 18 presents regressions for the full period, 1930-76. With the exception of equation (18.5), the coefficients of SSW are all insignificant. The SSW coefficients are all algebraically larger, however, than in the corresponding equations using M1 (see Table 16). Equation (18.5), which uses a gross SSW variable based on the actuarial projection perception, has a significant SSW coefficient which implies a reduction in saving of $35.3 billion (in 1972 dollars) for 1976. As noted above, actual real saving in 1976 was $62.6 billion. For the other variables, the most important differences noted (compared to Table 16) are that the coefficients of YP fall from a range of .79 to .88 for the M1 regressions to a relatively low range of .66 to .75 for the M2 regressions, while the coefficients of M increase from a range of .09 to .13 to a range of .18 to .23.

Table 19 presents regressions for the post-war period, 1947-76. A comparison with the corresponding regressions using M1 (Table 17) yields some striking differences. The coefficients of gross and net SSW which use current ratio and adaptive expectations perceptions are again insignificant, but the coefficients based on constant ratio, perfect foresight, and actuarial/legislated perceptions are now large, positive, and significant. The significant coefficients imply reductions in 1976 saving ranging from $38.4 billion (in 1972 dollars) using the actuarial projection perception for gross SSW to $80.8 billion using the perfect foresight perception for gross SSW. For the other variables, the most important differences (compared to Table 17) are that the coefficients of YP fall from a range of .86 to .88 for the M1 regressions to a relatively low range of .55 to .76 for the M2 regressions, while the coefficients of M also fall from a range of .73 to .78 to a range of .21 to .39.

If we use the per capita specification, the results are somewhat different. For the full period (see Appendix, Table C.3), the coefficients of SSW range from -.011 for net wealth using the constant ratio/perfect foresight perception to .005 for gross wealth using the actuarial projection perception. For the post-war period (see Appendix, Table C.4), the coefficients of SSW range from -.003 for gross and net SSW using the current ratio perception to .020 for net SSW using the perfect foresight/perfect foresight or constant ratio/perfect foresight perceptions. Although none of the coefficients is significant at the conventional 5 percent level, several postive coefficients approach the critical value. The per capita regressions, then, provide less support for the hypothesis that social security reduces saving than do the aggregate regressions. Nevertheless, the results using the Darby specification with M2 as an estimate of money balances suggest a much different picture than the results using any of the other specifications considered or the results using the Darby specification with M1 as the measure of money balances.

There is some disagreement about whether or not a money balances variable belongs in a correctly specified consumer expenditure function. Table 20 presents regressions for the Darby specification with the money variable omitted, estimated for the total period, 1930-76, and Table 21 present results for the post-war period, 1947-76. It is striking that, unlike the other specifications we have examined in this paper, the estimated coefficients for all variables are quite similar in both periods for corresponding perceptions.

The coefficients of YP range from .84 to .92 in the full period, and between .83 and .91 in the post-war period and are highly significant. The coefficients of YT range from .55 to .60 in the full period, and between .51 and .62 in the post-war period, and are also highly significant. The coefficients of DUR, PCD/PCN, and R, although insignificant, are consistent in sign and magnitude between periods.

For both periods, the coefficients of gross SSW, with the exception of the actuarial perception, are negative, large, and have t-ratios well over one. The coefficients of net SSW, again with the exception of the actuarial/legislated perception, are negative, large and are significant or approach significance. The increases in saving implied by the negative coefficients range from $31.9 billion (in 1972 dollars) for the gross constant ratio perception in the full period to $57.8 billion for the gross adaptive expectations perception in the post-war period. We are skeptical that the social security program had so large an effect on saving; however, if the money balances variable is excluded from the Darby specification, the results suggest, if anything, that social security has increased saving.

The sensitivity of results under the Darby specification raises a number of important questions. First, does a money balances variable belong in the consumer expenditure function? Darby's position is that the individual's portfolio consists of money, securities, and real assets, and that the adjustment to the disequilibrium resulting from a change in money balances will be partially reflected in expenditures on consumer durables. The Keynesian position generally is that portfolio adjustments will take place only in financial instruments. Feldstein [1979] argues that it is inappropriate to include a measure of real money balances as an exogenous variable because the desired level of such balances is chosen by households and the money balances of firms are irrelevant in the determination of consumption expenditures.

Second, if a money balances variable is included in the specification, which measure is most appropriate? Neither M1 nor M2 is considered "correct." Indeed, dissatisfaction with these measures has led to a recent redefinition of the monetary aggregates by the Fed. As noted above, M1 includes currency and demand deposits. Besides the earlier noted difficulty of classifying demand deposits in the early pre-war period, it has been argued that some portion of savings deposits functions as money balances for households and should be included in the money balances measure. At the same time, it is clear that M2 is too broadly defined for this purpose in the sense that it includes all savings and time deposits at commercial banks (excluding only negotiable certificates of deposit over $100,000) but too narrowly defined in the sense that it excludes all accounts at savings and loan institutions and mutual savings banks. The argument for lumping together passbook and time accounts in M2 because their liquidity is approximately the same has been considerably weakened over the past decade with the introduction of various long-term time deposits subject to early withdrawal penalties.

From a purely statistical standpoint, the sums of squared residuals are somewhat smaller in the post-war period if M1 is used, but with $\bar{R}^2$'s of about .9995, it is difficult to attached much significance to this measure.[37/]

Third, the conclusions suggested by the regressions using the M2 variable differ depending upon the period examined. For the full period, except for the actuarial/legislated perception, the results suggest little or no effect on saving. For the post-war period, a majority of perceptions imply a large, significant reduction in saving.

Our earlier analysis suggests that the post-war evidence is more reliable. However, Feldstein [1974, 1979] has argued that, because of the shorter period, less variation in all variables, and inability to accurately measure the perceived changes in the public's expectations about future social security benefits, data for the post-war period alone are inadequate for providing useful information about the effect of the social security system on saving.

Fourth, even the conclusions based on the post-war period differ depending upon the assumed perception of social security wealth. A priori, we believe that the adaptive expectations perception--which implies no significant effect on saving--or the actuarial/legislated perception--which implies a significant reduction in saving using M2--are most reasonable. The former parallels the construction of permanent income and takes into account both current and past information; the latter uses periodic projections made by social security actuaries to adjust current benefit ratios and currently legislated changes in tax rates to adjust current tax ratios.[38/] But it must be emphasized that we simply do not know how--or whether--individuals develop their perceptions of social security benefits, taxes, and wealth.

In summary, the Darby specification can be used to support any reasonable hypothesis concerning the effect of social security on personal saving as well as some which we consider implausible in either direction. Our personal priors are that net social security wealth is the more appropriate concept, that the post-war period is more reliable (although statistically less fertile) than the full period, and that, in the context of the Darby specification, M1 is preferable to M2 as a measure of money balances in the post-war period. The results consistent with these priors (equations (17.6) to (17.11)) suggest that social security has had no effect on personal saving. In contrast, if we choose to focus on the full period instead (equations (16.6)-(16.11)), we might well conclude that social security has had a strong, positive influence on saving. Alternatively, if we stick to the post-war period but favor M2 over M1 (equations (19.6) to (19.11)), we would be forced to consider the opposite conclusion that social security has had a strong, negative effect on saving. To further cloud the issue, if we exclude the money balances variable from the Darby specification, the evidence for both periods suggests that, if anything, social security has increased personal saving.

Again, we are particularly skeptical about the absolute magnitude of the effect on saving, whether positive or negative, implied by the significant coefficients of social security wealth. Whatever one's prior beliefs, however, the sensitivity of results under the Darby specification to the variables included, the definition of variables, and period of analysis is disturbing.

7. Summary and Conclusions

7.1. Summary

An examination of alternative specifications of the consumer expenditure function estimated using time series data does not in general support the hypothesis that the introduction of social security substantially reduced personal saving in the United States, but there are exceptions to this finding. A reexamination of the Feldstein specification with data updated to 1976 confirms our earlier results. For all periods, for all perceptions, the coefficient of social security wealth is generally negative and insignificant. The only significant coefficients are negative but of implausible magnitude. Although Feldstein has, using a revised SSW variable, presented new results that support his original conclusions, we find that the rationale underlying his revised perception assumption is open to question and that his new results are highly sensitive to minor changes in that assumption, to the construction of the revised variable, to the period of estimation, and even to revisions of NIPA data.

If we add a variable incorporating the unemployment rate to the Feldstein specification, the evidence against the hypothesis that social security has reduced personal saving becomes somewhat stronger. For the full period, the coefficient of social security wealth is negative and insignificant for all perceptions. For the postwar period, the coefficient of SSW is negative for all perceptions and significant for most. The unemployment variable is always significant for the full period, and significant for half the perceptions in the postwar period.[39/]

If we estimate a consumer expenditure function which is the analogue of Munnell's specification, we find that for both the full and postwar periods, for all perceptions, the coefficient of SSW is negative and insignificant. The coefficient of labor force participation of the aged, although positive, approaches the critical level of significance only for the actuarial/legislated perceptions in the postwar period. This specification provides no support for either the asset substitution or retirement effects of social security.

Using the Barro specification, we again find that the coefficient of SSW is never significant. For the full period, the coefficient is small, positive for some perceptions and negative for others. For the postwar period, the SSW coefficient is generally negative, and approaches significance for some of the negative values. The coefficient of RU•YD is positive and generally significant for both periods of estimation. The coefficient of SUR is positive and significant for all perceptions for both periods. The coefficient of DUR is insignificant, and for the postwar period, has the wrong sign. Clearly, the Barro specification provides no support for the hypothesis that social security has reduced saving.

The final specification considered is that of Darby. The results differ depending upon the measure of money balances used. Using the M1 measure, the results provide no evidence that social security has reduced saving. Using aggregate data, in the full period, the coefficient of SSW is negative for all perceptions and significant for some. In the postwar period, depending upon the perception used, the SSW coefficient is sometimes positive, sometimes negative, but always small and insignificant. The per capita specification yields results that are consistent with those of the aggregate specification.

The results using the M2 measure of money balances present a different picture. Using aggregate data, in the full period, the coefficient of gross SSW for the actuarial perception is positive, large, and significant. The remaining

SSW coefficients are insignificant. In the postwar period, the coefficient of SSW is positive and significant for three of the perceptions but small and insignificant for the remaining two perceptions. The per capita results are weaker in the sense that none of the estimated coefficients of SSW are significant.

Conclusions under the Darby specification are further confused by the results with the money balances variable excluded. These results are remarkably consistent between the full and postwar periods and suggest that, if anything, social security has increased personal saving.

Results using the Darby specification are therefore sensitive to whether or not a money balances variable is included and, if included, what measure is used. In addition, the results using the M2 measure are sensitive to the period of analysis and the perception examined. Our own view is that the M1 measure is conceptually superior to the M2 measure in the context of the Darby specification and is the preferred variable, particularly in the postwar period. This view, coupled with the preponderance of evidence under all of the other specifications examined, lead us to discount the results using the M2 measure. It seems likely that if social security had a sizeable negative effect on personal saving that such an effect would have been evidenced more consistently in our results. Other analysts, of course, are free to form their own conclusions.

To summarize, most of our results provide no statistically significant evidence that social security has had an effect--either positive or negative--on personal saving. A conclusion of no effect is consistent with Feldstein's extended life cycle theory if the retirement effect has been about equal to the asset substitution effect, but the regression results using the "Munnell" specification do not support this interpretation. A conclusion of no effect is also consistent with the Barro hypothesis that private, voluntary intergenerational transfers offset any potential effect of social security on saving. It is also consistent with the view that, quantitatively, retirement saving is a relatively unimportant motive for saving. The specifications examined do not explicitly model the Barro-effect or other saving motives, hence cast no light on competing hypotheses.

The potential usefulness of further time series investigations is questionable. Even if further examination of perception assumptions, specifications, variable definitions, or time periods produced significant, positive coefficients of social security wealth, the total body of time series evidence would be inconclusive. This is partly due to our lack of knowledge about how (or even whether) individuals develop their perceptions of social security wealth. In addition, the aggregation of microeconomic relations is fraught with difficulty. The collinearity of variables and the resultant difficulty of estimating the contribution of a particular variable with precision are well known. We have seen the sensitivity of results to changes in the period of estimation, definitions of variables, and revisions of data. And finally, there is the question of interpreting hypothesis tests based on non-experimental data. Since history cannot be replicated, the choice among competing hypotheses is often a matter of judgement.

7.2. Other Research

If we acknowledge that further investigations using time series data may be unproductive, where do we turn? One body of data that has been used consists of aggregate data for a cross-section of countries. Studies using such cross-country data have been completed by Feldstein [1977, 1980], Barro and MacDonald [1979], and Kopits and Gotur [1980].

The results of such international comparisons are contradictory. Feldstein finds that social security has a significant negative effect on the saving ratio. Barro and MacDonald find that the effect of social security depends on the specification used. Using a simple cross-section specification, social security increases saving; using a time series-cross-section specification, social security has a negative effect on saving. Kopits and Gotur find that saving is positively related to retirement social security, but negatively related to other social security programs.

There appears to be little point in further investigating this body of evidence. The sample of industrialized countries is quite small, and lacks homogeneity with respect to economic structure and institutions, as well as social security systems (particularly programs other than retirement). The best data have substantial weaknesses and lack comparability. There are questions of causality and simultaneity that simply cannot be addressed with the limited data available.

The other major body of evidence that has been examined consists of cross-sections of individual households. Feldstein [1980], Blinder, Gordon and Wise [1981], and Friedman [1980] have specified asset accumulation models which were estimated using data from the Retirement History Study. Feldstein finds that the value and significance of the coefficient measuring the substitution of social security wealth for private asset accumulation depends upon the specification and method of estimation, but concludes that the results provide strong support for the hypothesis that social security reduces saving. Blinder, Gordon and Wise develop a very sophisticated theoretical model and, using a nonlinear estimation technique, estimate that each dollar of social security wealth replaces 50 cents of privately accumulated assets. The standard error, however, is larger than the estimated coefficient. Further doubt about this result is raised by the fact that the (insignificant) coefficient on pension wealth is positive, implying that pension saving and private saving are complementary. Friedman, using Zellner's seemingly unrelated regression technique, obtains positive coefficients for social security wealth, suggesting that social security has increased asset accumulation. None of the coefficients, however, are significantly different from zero. Thus, although these studies use the same body of data, the results differ depending upon the specification and method of estimation.[40/]

Feldstein and Pellechio [1979] estimated an asset accumulation model using data from the Survey of Financial Characteristics. They find that social security wealth substitutes for privately accumulated wealth, with the coefficient not significantly different from one. Again, the estimated effect is sensitive to the specification.

Kotlikoff [1979] has estimated an asset accumulation model using the National Longitudinal Surveys (commonly referred to as the Parnes data). He finds that private accumulation is significantly reduced by the accumulated value of contributions, but is unaffected by wealth in the form of intergenerational transfers.

Thus, the microeconomic evidence is quite mixed, depending on the data source used, the specification of the models, and the choice of econometric methods. All of the data sets have weaknesses stemming, in part, from the fact that the surveys were not designed to address the issue of asset accumulation determinants, particularly the effect of social security. Good data on wealth holdings, social security wealth, pension wealth, and intergenerational transfers are generally lacking. Since studies using microdata are undoubtedly the wave of the future, it is important that new surveys be designed to address competing theories of asset accumulation, and that particular attention be paid to collecting better data on ordinary wealth, social security wealth, pension wealth, and intergenerational transfers.[41/]

It is also important that a largely overlooked issue raised by Robert Barro be addressed. Barro [1978] argues that micro cross-section estimates of the effect of social security wealth on saving have no implications for the impact of the social security program on aggregate saving. He argues that tests of aggregate saving effects require data reflecting variation in the scale of the social security program and that such variation is absent if we examine a cross-section of individuals. The validity of Barro's assertion depends on how (and whether) individuals perceive the tax liability accruing to future generations as a result of the existence of the social security program. This issue is developed more fully in Appendix D. The interpretation of microeconomic cross-section estimates requires resolution of this issue.

7.3. Policy Implications

Those who argue that social security retards saving have proposed two solutions. One solution is to directly increase public saving by building up a large trust fund so that the social security trust funds are "actuarially sound". An alternative solution is to gradually reduce the scale of the social security system, which it is argued will induce greater private saving. An extreme version of the latter proposal is that of Peter Ferarra [1980] to phase out the social security system, replacing it with private saving-retirement mechanisms. It is clear that to the extent that these proposals are based on the belief that social security reduces private saving, the available evidence is totally inadequate to support such policy measures.

Even if subsequent studies demonstrate that social security does reduce private saving, it is by no means self-evident that the social security system should be the instrument for increasing saving.[42/] For example, accumulating a large trust fund wil not increase national saving unless there is a corresponding increase in public saving--that is, there must be a surplus (or a smaller deficit) in the unified budget. By purchasing outstanding debt, funds would be made available to private capital markets. If the funding of the social security system is simply offset by a corresponding deficit in the general budget, we would in effect be substituting payroll tax financing for general revenue financing of the general budget now, and substituting general revenue financing for payroll tax financing of the social security trust funds in the future. Real capital accumulation and growth requires public saving. But public saving does not require funding the social security system.

Funding the social security system raises questions of equity. We do not now have a large trust fund in part because taxes collected early in the social security program's history were used to pay full benefits to the initial generations of beneficiaries. These early beneficiaries received benefits far in excess of the actuarial value of their contributions. The current younger generations will receive benefits which approximate the actuarial value of their contribution.[43/] Middle-aged workers will receive benefits somewhat above the actuarial value of their contributions. Accepting for the moment the argument that pay-as-you-go financing has reduced saving and led to a reduction in the capital stock,[44/] funding the system now would impose a dual burden on the current generation of workers. They have a smaller capital stock because their contributions were used to finance the consumption of the initial generation of retirees. In addition, they are asked to sacrifice current consumption to accumulate a fund and make up the capital deficiency so that future generations will be better off.

Similar comments apply to reductions in the scale of the social security program, again assuming that social security reduces saving. The economic and equity implications of such reductions depend critically on the timing of the reductions and the extent to which workers foresee and adjust to them.[45/] Even if we find that social security does reduce saving so that future workers would be better off under a funded system or privately providing for their own retirement, the transition to such alternatives raises complex equity issues which must be addressed. Social security has sizeable obligations to workers who contributed and made saving decisions in anticipation of future benefits, and the analysis of changes in policy must account for the effects on current as well as future workers.[46/]

To summarize, the empirical evidence does not support intervention in the social security program for the purpose of increasing national saving. Furthermore, it does not follow, even if the evidence did support the hypothesis that social security has reduced private saving, that this would imply that the social security program should be the instrument of policy to increase saving. If the current rate of capital formation is inadequate, there are other policy approaches to influence the rate of saving and investment.

Footnotes

* This paper was presented at the 56th Annual Conference of the Western Economic Association held in San Francisco, California, July 2-6, 1981 at the session "Should We Phase Out Social Security? A Symposium on Peter J. Ferrara's 'Social Security: The Inherent Contradication'." The authors thank Suzanne Worth for her assistance.

1/ This is an oversimplification. There is a social security trust fund. In recent years, the trust fund has been maintained as a contingency fund at a level less than one year's benefits. But in the early years of the social security system, the fund was several times as large as benefits.

2/ The test for retirement which determines eligibility to receive a retirement benefit is based on earnings and is complex. Between the ages of 65 and 72, an individual may have limited earnings and still receive a full benefit. Above this limit, the benefit is reduced by 50 cents for each dollar earned. Between the ages of 62 and 65, the earnings limit is smaller. At ages 72 and older, individuals may receive full benefits regardless of earnings. There have been many changes in this test since the beginning of the social security system.

3/ There is an element of insurance in this institutionalization. The risk of having too few children to provide support in old age is insured against. This may give rise to an element of moral hazard. Individuals may have fewer children, increasing the cost to future generations of supporting the retired elderly.

4/ For some families, parents provide gifts and bequests to children. Barro argues that in such cases, the introduction of social security simply leads to increased bequests by parents to offset the liability imposed on their children. Since such bequests may be in-kind, such as providing education for children, they may be difficult to measure.

5/ Other motives for saving, such as the utility derived from asset accumulation per se, may also lead to unplanned bequests.

6/ Recent legislation to index post-retirement benefits for price changes protects against the risk of inflation, and may also reduce saving for contingencies.

7/ In their seminal study, Ando and Modigliani [1963] did use estimated labor income. This required partitioning self-employment income into labor and property components, a conceptually difficult task. Subsequent studies have used disposable personal income.

8/ See Leimer and Lesnoy [1980], pp. 23-29.

9/ The computed F statistic is 3.24 for equations (2.1)-(2.2), 2.91 for equations (2.3)-(2.4), 3.45 for equations (2.5)-(2.6) and 3.01 for equations (2.7)-(2.8). The critical value of F at the .05 significance level is 2.46.

10/ For example, see Feldstein [1979, pp. 37 and 39].

11/ The computed F statistic is 1.49 for equation (2.9), .79 for equation (2.10), 1.36 for equation (2.11) and .79 for equation (2.12). The critical value of F is 2.49 at the .05 significance level.

12/ The benefit (tax) ratio is the ratio of the benefit per recipient (tax per worker) to disposable personal income per capita. The expected benefit (tax) is computed as the product of the benefit (tax) ratio and expected future disposable income per capita. Expected future disposable income is equal to current disposable income per capita projected to the future period at a constant growth rate, assumed to be 2 percent per year.

13/ We also considered benefit perceptions which assumed that post-retirement benefits were maintained in real terms instead of growing at the same rate as per capita income. The main effect of this perception was to reduce the size of social security wealth. Parameter estimates were essentially unchanged. See Leimer and Lesnoy [1980].

14/ This description is based on information made available by Martin Feldstein.

15/ Feldstein refers to this equation as reflecting the period 1929-74 since 1929 data is used for lagged disposable income in the 1930 observation. We refer to this period as 1930-74.

16/ The 1950 amendments increased benefit levels by more than 50 percent, compared to the 20 percent increase of the 1972 amendments.

17/ The sensitivity of Feldstein's results to small changes in the period of analysis is also evident in the post-war period. For example, if we use Feldstein's own revised series but restrict the analysis to 1947-71, the coefficient of SSW falls to -.053 with a significant t-ratio of -3.1.

18/ The Leimer-Lesnoy average ratio SSW series is based on average benefit ratios for 1940-77; the Feldstein SSW series is based on average benefit ratios for 1940-71. For comparability, we adjusted the Leimer-Lesnoy series to correspond to 1940-71 average ratios. The adjustment factor used was .926, which was derived as a weighted average of the adjustment factors for 13 beneficiary subcategories.

19/ Regressions were also estimated with the unemployment rate entered linearly instead of interactively with disposable income. The results were generally similar and are not reported in this paper.

20/ If a one-tailed test is used, all coefficients are significant for the full period.

21/ This result is associated with extending the period of estimation from 1974 to 1976. Compare, for example, equation (7.1) with equation (6.3).

22/ These post-war coefficients imply increases in saving in 1976 of from $15.8 billion to $52.2 billion (in 1972 dollars). Actual real personal saving in 1976 was $62.6 billion.

23/ This corresponds to a 5 percent significance level using a one-tailed test.

24/ A general mathematical analysis of the effect of social security in the extended life cycle model is provided in Feldstein [1977].

25/ Munnell's basic specification is

$$S_t = \beta_0 + \beta_1 YD_t + \beta_2 W_t + \beta_3 SSW_t + \beta_4 RU_t + \beta_5 LF65_t \cdot YD_t$$

where S_t is personal saving based on SEC-Goldsmith-Flow of Funds data. Munnell did not include either lagged disposable income or retained earnings, and entered the unemployment rate linearly.

26/ The estimated coefficient of LF65·YD in equation (9.4) is significant using a one-tailed test.

27/ If a one-tailed test is used, six of the estimated coefficients of RU·YD remain significant.

28/ Using a one-tailed test, two of the RE coefficients and all of the W coefficients estimated for the post-war period are significant.

29/ The net effect of social security on consumption cannot be determined from an equation such as (3) since the labor force participation variable is endogenous. That is, labor participation of aged workers also depends on social security wealth.

To clarify, assume that we have the following simple model: Consumption is a function of social security wealth, labor force participation of the aged, and a set of exogenous variables, XC. Labor force participation of the aged depends on social security wealth and a different set of exogenous variables, XL. That is

$$\text{(i)} \quad \begin{aligned} C &= C\,(SSW, LF65, XC) \\ LF65 &= L\,(SSW, XL) \end{aligned}$$

Holding the exogenous variables constant but allowing the other variables to change, we have

$$\text{(ii)} \quad \begin{aligned} dC &= \frac{\partial C}{\partial SSW}\, dSSW + \frac{\partial C}{\partial LF65}\, dLF65 \\ dLF65 &= \frac{\partial L}{\partial SSW}\, dSSW \end{aligned}$$

and solving we obtain

$$\text{(iii)} \quad dC = \left(\frac{\partial C}{\partial SSW} + \frac{\partial C}{\partial LF65} \cdot \frac{\partial L}{\partial SSW} \right) dSSW$$

Thus, to find the net effect of social security we must know how social security affects labor participation of the aged. This requires specification and estimation of a labor supply model.

30/ Barro follows Michael Darby [1976] by adjusting unemployment data for 1931-42 to treat government "emergency workers" (those on relief projects such as the W.P.A.) as employed.

31/ We have followed Barro in using Darby's adjusted unemployment rate. Regressions using the unadjusted unemployment rate were generally similar and are not reported in this paper. Barro also considers a specification with the constant term constrained to zero. Equations estimated with this specification have the same implications as those estimated with an unrestricted constant term, and are not reported in this paper.

32/ The coefficients of RU·YD estimated for the post-war period are significant in the regressions using the Leimer-Lesnoy replica of we use a one-tailed test.

33/ Using a one-tailed test, the RE variable is significant in all of the regressions of Table 13.

34/ Using a one-tailed test, the RU·YD coefficients are significant in all but one regression, and the RE coefficients in all but two regressions of Table 14.

35/ Several variables differ from those used by Darby. We have reconstructed the permanent and transitory income series using the recently revised national income accounts data. We have also used the BEA's consumer durables stock series, rather than the series constructed by Darby.

36/ Using a one-tailed test, all but one of the M coefficients are significant.

37/ It should be noted that the correct variable should reflect household money balances, not total money balances. Data on household money balances is available only for the post-war period. Regressions using these data yield results that are qualitatively similar to those presented and are not reported.

38/ The conceptual appeal of this perception assumption is diminished by the fact that projections were not available for all years in which legislation changed. This problem was especially acute for years preceding the early 1960s. In addition, the projections did not distinguish between projected changes in benefit awards (at retirement) and projected changes in benefits in current payment status (during retirement).

39/ If a one-tailed test is used, the coefficient is significant for all perceptions. A one-tailed test is consistent with the hypothesis that the coefficient is positive.

40/ Each researcher screened the full sample differently. Thus, the data used were not identical.

41/ The survey conducted for the President's Commission on Pension Policy attempted to address these problems.

42/ The following discussion draws on Kurz and Avrin [1980], Lesnoy and Hambor [1975], and Leimer and Petri [1981].

43/ Applebaum [1979] estimates that at a real interest rate of 2.5 percent, the normal cost contribution rate for the 19 to 23 year old cohort would be 13.7 percent. (This rate covers old-age, survivors and disability insurance.) Although the contribution rate is now only 10.7 percent, it is scheduled to rise to 12.4 percent in 1990, and will necessarily rise somewhat after 2000. Leimer and Petri [1981] find that the real internal rate of return (assuming no change in benefit structure) for the cohort born in 1960 is about 2.7 percent.

44/ From a historical standpoint, it is not at all clear that the alternative to the present social security program was a private, voluntary system involving no impact on saving. There were strong advocates for a larger income-conditioned program or for a program of unconditional flat payments to the elderly, widowed, and disabled.

45/ For example, such lack of foresight may be a concern under the proposal to use a price index (instead of the present wage index) to adjust the brackets of the benefit formula. This change would result in a gradually declining replacement rate, which may not be recognized by the average worker. See Leimer [1979]. For this reason, it is important that policy proposals which have the effect of altering future benefits (or taxes) be announced and explained well in advance.

46/ See Leimer and Petri [1981] for an analysis of these transitional effects under various policy options including funding and reductions in the scale of the program.

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Table 1.--Consumer Expenditure Functions Estimated Using Feldstein Original, Feldstein Replica and Leimer-Lesnoy Replica Social Security Wealth Variables: Feldstein Specification

Equation	Period	SSW Concept	Source	SSW	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(1.1)	1930-74*	Gross	Feldstein original	.024 (2.47)	.604 (9.48)	.109 (2.55)	.198 (2.50)	.004 (.69)	359 (4.26)	.9989	15,720	1.52
(1.2)	1930-74*	Gross	Feldstein replica	.008 (.75)	.688 (11.72)	.097 (2.03)	.100 (1.15)	.009 (1.51)	199 (3.39)	.9987	18,320	1.38
(1.3)	1930-74*	Gross	Leimer-Lesnoy replica	-.003 (-.49)	.713 (13.57)	.110 (2.33)	.146 (1.63)	.010 (1.52)	142 (3.19)	.9987	18,500	1.40
(1.4)	1930-74*	Net	Feldstein original	.035 (2.58)	.608 (9.90)	.122 (2.84)	.233 (2.77)	.002 (.36)	355 (4.45)	.9989	15,520	1.55
(1.5)	1930-74*	Net	Feldstein replica	.004 (.22)	.704 (12.60)	.103 (2.13)	.115 (1.24)	.009 (1.46)	168 (3.50)	.9987	18,610	1.38
(1.6)	1930-74*	Net	Leimer-Lesnoy replica	-.008 (-.84)	.713 (13.78)	.114 (2.42)	.164 (1.80)	.009 (1.54)	139 (3.80)	.9988	18,240	1.41
(1.7)	1947-74	Gross	Feldstein original	-.019 (-.44)	.698 (4.74)	.203 (1.70)	.227 (1.28)	.013 (1.03)	-32 (-.08)	.9975	13,270	1.40
(1.8)	1947-74	Gross	Feldstein replica	-.061 (-2.83)	.760 (8.83)	.211 (2.71)	.196 (1.29)	.022 (2.35)	-142 (-1.34)	.9981	9,818	1.81
(1.9)	1947-74	Gross	Leimer-Lesnoy replica	-.018 (-2.49)	.660 (8.39)	.169 (2.15)	.208 (1.33)	.023 (2.25)	41 (.81)	.9980	10,450	1.73
(1.10)	1947-74	Net	Feldstein original	.045 (.89)	.578 (4.99)	.105 (.94)	.192 (1.08)	.005 (.49)	420 (1.36)	.9975	12,920	1.57
(1.11)	1947-74	Net	Feldstein replica	-.096 (-2.95)	.723 (9.09)	.203 (2.65)	.230 (1.54)	.021 (2.27)	-52 (-.71)	.9982	9,587	1.76
(1.12)	1947-74	Net	Leimer-Lesnoy replica	-.029 (-2.70)	.656 (8.52)	.164 (2.12)	.189 (1.23)	.022 (2.30)	70 (1.78)	.9981	10,050	1.76

*The years 1941-46 are excluded. The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 2.--Varying the Period of Estimation

Equation	Period	SSW Concept	Perception	SSW	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(2.1)	1930-40	Gross	Feldstein replica	.019 (1.81)	.623 (8.10)	.101 (2.22)	.134 (.71)	-.015 (-.83)	518 (4.51)	.9898	8,363	2.62
(2.2)	1947-74	Gross	Feldstein replica	-.061 (-2.83)	.760 (8.83)	.211 (2.71)	.196 (1.29)	.022 (2.35)	-142 (-1.34)	.9981	9,818	1.81
(2.3)	1930-40	Gross	Leimer-Lesnoy replica	.021 (1.95)	.625 (8.43)	.099 (2.25)	.123 (.66)	-.014 (-.83)	512 (4.59)	.9905	7,856	2.66
(2.4)	1947-74	Gross	Leimer-Lesnoy replica	-.018 (-2.49)	.660 (8.39)	.169 (2.15)	.208 (1.33)	.023 (2.25)	41 (.81)	.9980	10,450	1.73
(2.5)	1930-40	Net	Feldstein replica	.027 (1.51)	.640 (7.97)	.116 (2.53)	.129 (.63)	-.023 (-1.36)	547 (4.62)	.9884	951	2.42
(2.6)	1947-74	Net	Feldstein replica	-.096 (-2.95)	.723 (9.09)	.203 (2.65)	.230 (1.54)	.021 (2.27)	-52 (-.71)	.9982	9,587	1.76
(2.7)	1930-40	Net	Leimer-Lesnoy replica	.027 (1.72)	.637 (8.27)	.111 (2.49)	.120 (.61)	-.021 (-1.24)	535 (4.67)	.9894	872	2.51
(2.8)	1947-74	Net	Leimer-Lesnoy replica	-.029 (-2.70)	.656 (8.52)	.164 (2.12)	.189 (1.23)	.022 (2.30)	70 (1.78)	.9981	10,050	1.76
(2.9)	1932-74*	Gross	Feldstein replica	-.022 (-1.49)	.669 (12.34)	.194 (3.51)	.205 (2.31)	.016 (2.63)	42 (.55)	.9989	14,400	1.59
(2.10)	1932-74*	Gross	Leimer-Lesnoy replica	-.014 (-2.26)	.639 (12.63)	.186 (3.98)	.233 (2.77)	.020 (3.19)	62 (1.37)	.9990	13,240	1.71
(2.11)	1932-74*	Net	Feldstein replica	-.042 (-1.90)	.659 (12.73)	.201 (3.81)	.245 (2.61)	.015 (2.62)	55 (1.00)	.9990	13,810	1.58
(2.12)	1932-74*	Net	Leimer-Lesnoy replica	-.022 (-2.51)	.635 (12.71)	.189 (4.12)	.249 (2.96)	.018 (3.11)	83 (2.36)	.9990	12,810	1.70

* The years 1941-46 are excluded. The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 3.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Feldstein Specification
1930-1976 excluding 1941-1946*

Equation	SSW Concept	Perception	SSW	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(3.1)	Gross	Constant benefit ratio (Feldstein perception)	-.006 (-1.01)	.731 (13.20)	.107 (2.12)	.130 (1.37)	.010 (1.59)	109 (2.38)	.9987	22,760	1.42
(3.2)	Gross	Current benefit ratio	-.001 (-.14)	.728 (12.10)	.098 (1.95)	.075 (.85)	.009 (1.34)	139 (2.48)	.9987	23,420	1.39
(3.3)	Gross	Adaptive expectations	.001 (.16)	.722 (12.31)	.098 (1.94)	.083 (.97)	.008 (1.23)	154 (2.70)	.9987	23,410	1.37
(3.4)	Gross	Perfect foresight	-.005 (-.79)	.733 (13.03)	.105 (2.06)	.111 (1.22)	.010 (1.54)	110 (2.06)	.9987	23,020	1.42
(3.5)	Gross	Actuarial projection	.000 (.02)	.724 (12.14)	.098 (1.94)	.079 (.94)	.009 (1.32)	146 (2.87)	.9987	23,430	1.38
(3.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.010 (-1.24)	.731 (13.33)	.108 (2.15)	.131 (1.44)	.012 (1.73)	97 (2.00)	.9987	22,450	1.43
(3.7)	Net	Benefits: current ratio Taxes: current ratio	-.002 (-.38)	.731 (12.59)	.100 (1.97)	.071 (.84)	.008 (1.32)	135 (3.40)	.9987	23,330	1.40
(3.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.000 (-.09)	.725 (12.74)	.099 (1.94)	.078 (.95)	.009 (1.34)	143 (3.53)	.9987	23,420	1.38
(3.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.007 (-.83)	.732 (13.06)	.106 (2.08)	.111 (1.23)	.010 (1.52)	113 (2.29)	.9987	22,980	1.42
(3.10)	Net	Benefits: actuarial projection Taxes: legislated	-.000 (-.02)	.725 (11.97)	.098 (1.94)	.078 (.89)	.009 (1.33)	145 (3.46)	.9987	23,430	1.38
(3.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.011 (-1.17)	.729 (13.29)	.110 (2.17)	.141 (1.47)	.010 (1.53)	116 (3.02)	.9987	22,550	1.42

*The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 4.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Feldstein Specification
1947-76

Equation	SSW Concept	Perception	SSW	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(4.1)	Gross	Constant benefit ratio (Feldstein perception)	-.022 (-2.80)	.676 (7.89)	.169 (1.99)	.203 (1.20)	.024 (2.30)	7 (.13)	.9981	13,640	1.68
(4.2)	Gross	Current benefit ratio	-.006 (-1.02)	.679 (6.94)	.173 (1.81)	.171 (.87)	.010 (1.01)	71 (1.05)	.9975	17,350	1.48
(4.3)	Gross	Adaptive expectations	-.005 (-.79)	.668 (6.85)	.176 (1.81)	.195 (1.00)	.010 (.99)	82 (1.16)	.9975	17,640	1.46
(4.4)	Gross	Perfect foresight	-.019 (-2.57)	.681 (7.77)	.175 (2.02)	.198 (1.15)	.023 (2.18)	-14 (-.22)	.9980	14,180	1.68
(4.5)	Gross	Actuarial projection	-.004 (-.85)	.678 (6.87)	.169 (1.76)	.192 (.99)	.009 (.93)	87 (1.42)	.9975	17,560	1.55
(4.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.026 (-2.75)	.671 (7.80)	.169 (1.98)	.200 (1.18)	.024 (2.27)	5 (.10)	.9980	13,760	1.66
(4.7)	Net	Benefits: current ratio Taxes: current ratio	-.005 (-.89)	.674 (6.89)	.170 (1.77)	.171 (.86)	.009 (.87)	102 (2.14)	.9975	17,510	1.48
(4.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.004 (-.66)	.665 (6.81)	.171 (1.76)	.192 (.98)	.009 (.90)	108 (2.18)	.9975	17,770	1.45
(4.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.026 (-2.36)	.679 (7.62)	.174 (1.98)	.184 (1.05)	.020 (1.96)	13 (.22)	.9979	14,690	1.64
(4.10)	Net	Benefits: actuarial projection Taxes: legislated	-.003 (-.53)	.677 (6.68)	.165 (1.70)	.194 (.98)	.007 (.75)	112 (2.26)	.9975	17,880	1.49
(4.11)	Net	Benefits: constant ratio Taxes: perfrect foresight (Feldstein perception)	-.033 (-2.68)	.673 (7.77)	.165 (1.93)	.188 (1.10)	.021 (2.10)	48 (1.10)	.9980	13,930	1.64

Figures in parentheses are t-statistics.

Table 5.--Consumer Expenditure Functions: Analysis of Feldstein's Revised Results

Equation	Description of SSW	Period	SSW	$\dot{YD}$	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(5.1)	Feldstein, revised	1930-76*	.014 (1.61)	.667 (10.31)	.093 (1.90)	.097 (1.21)	.010 (1.61)	227 (3.93)	.9988	21,810	1.30
(5.2)	Modified Feldstein, revised	1930-76*	.0005 (.06)	.722 (10.72)	.098 (1.95)	.080 (.95)	.009 (1.34)	149 (2.27)	.9987	23,430	1.37
(5.3)	Feldstein, revised	1947-76	.001 (.11)	.658 (6.18)	.165 (1.67)	.223 (1.14)	.007 (.75)	140 (1.60)	.9974	18,090	1.39
(5.4)	Modified Feldstein, revised	1947-76	-.012 (-1.28)	.728 (6.73)	.151 (1.59)	.147 (.75)	.010 (1.02)	38 (.47)	.9976	16,940	1.67
(5.5)	Feldstein, revised	1932-76*	.007 (.70)	.652 (9.99)	.127 (2.38)	.087 (1.07)	.013 (2.01)	176 (2.68)	.9988	20,260	1.40
(5.6)	Leimer-Lesnoy replica, "revised"	1930-76*	.001 (.14)	.722 (12.24)	.097 (1.91)	.077 (.92)	.008 (1.30)	152 (2.75)	.9987	23,420	1.17
(5.7)	Leimer-Lesnoy replica, "revised"	1947-76	-.010 (-1.07)	.683 (6.96)	.172 (1.80)	.199 (1.04)	.011 (1.10)	67 (.96)	.9975	17,270	1.57

*The years 1941-46 are excluded. The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 6.-- Consumer Expenditure Functions Estimated Using Feldstein Original, Feldstein Replica, and Leimer-Lesnoy Replica SSW Variables: Feldstein Specification with Unemployment Rate

Equation	Period*	SSW Concept	Construction	SSW	RU·YD	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(6.1)	1930-74	Gross	Feldstein original	.020	.058	.611	.125	.243	.003	323	.9989	15,580	1.50
				(1.61)	(.53)	(9.30)	(2.39)	(2.07)	(.45)	(2.95)			
(6.2)	1930-74	Gross	Feldstein replica	.006	.160	.664	.144	.266	.004	178	.9988	16,710	1.44
				(.53)	(1.76)	(11.38)	(2.69)	(2.10)	(.54)	(3.07)			
(6.3)	1930-74	Gross	Leimer-Lesnoy replica	-.003	.168	.682	.157	.315	.004	132	.9988	16,680	1.47
				(-.57)	(1.87)	(12.80)	(3.02)	(2.51)	(.57)	(3.03)			
(6.4)	1930-74	Net	Feldstein original	.032	.033	.612	.129	.255	.002	333	.9989	15,480	1.54
				(1.68)	(.28)	(9.57)	(2.53)	(2.21)	(.27)	(3.00)			
(6.5)	1930-74	Net	Feldstein replica	.003	.166	.674	.150	.282	.003	158	.9988	16,830	1.44
				(.17)	(1.84)	(11.96)	(2.81)	(2.21)	(.48)	(3.37)			
(6.6)	1930-74	Net	Leimer-Lesnoy replica	-.007	.164	.682	.159	.324	.004	132	.9988	16,510	1.47
				(-.81)	(1.83)	(12.93)	(3.07)	(2.61)	(.56)	(3.71)			
(6.7)	1947-74	Gross	Feldstein original	-.021	.131	.703	.204	.271	.011	-38	.9974	12,920	1.47
				(-.47)	(.75)	(4.72)	(1.69)	(1.44)	(.85)	(-.09)			
(6.8)	1947-74	Gross	Feldstein replica	-.060	.093	.759	.209	.228	.021	-132	.9981	9,642	1.89
				(-2.73)	(.62)	(8.70)	(2.65)	(1.40)	(2.04)	(-1.23)			
(6.9)	1947-74	Gross	Leimer-Lesnoy replica	-.019	.170	.663	.168	.266	.021	43	.9980	9,866	1.86
				(-2.61)	(1.11)	(8.47)	(2.14)	(1.62)	(2.00)	(.86)			
(6.10)	1947-74	Net	Feldstein original	.042	.115	.584	.108	.233	.004	408	.9975	12,650	1.61
				(.82)	(.67)	(4.97)	(.95)	(1.23)	(.32)	(1.30)			
(6.11)	1947-74	Net	Feldstein replica	-.095	.101	.723	.201	.265	.019	-44	.9981	9,380	1.85
				(-2.87)	(.68)	(8.98)	(2.60)	(1.65)	(1.95)	(-.60)			
(6.12)	1947-74	Net	Leimer-Lesnoy replica	-.031	.181	.659	.161	.249	.020	74	.9981	9,399	1.91
				(-2.86)	(1.21)	(8.64)	(2.11)	(1.55)	(2.04)	(1.88)			

*1930-74 regressions exclude the years 1941-46. The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 7.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Feldstein Specification with Unemployment Rate Added

1930-1976 excluding 1941-1946*

Equation	SSW Concept	Perception	SSW	RU·YD	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(7.1)	Gross	Constant benefit ratio (Feldstein perception)	-.005 (-.78)	.166 (2.21)	.686 (12.16)	.151 (2.91)	.319 (2.57)	.006 (.97)	113 (2.60)	.9989	19,900	1.53
(7.2)	Gross	Current benefit ratio	-.006 (-1.27)	.217 (2.68)	.697 (12.30)	.160 (3.07)	.302 (2.57)	.005 (.89)	76 (1.34)	.9989	19,340	1.62
(7.3)	Gross	Adaptive expectations	-.005 (-1.04)	.214 (2.56)	.688 (12.28)	.160 (3.02)	.316 (2.62)	.006 (.97)	85 (1.44)	.9989	19,640	1.60
(7.4)	Gross	Perfect foresight	-.004 (-.71)	.171 (2.28)	.687 (12.09)	.151 (2.90)	.314 (2.54)	.006 (.97)	110 (2.17)	.9989	19,960	1.53
(7.5)	Gross	Actuarial projection	-.003 (-.65)	.187 (2.41)	.689 (11.90)	.151 (2.89)	.296 (2.47)	.005 (.82)	113 (2.27)	.9988	20,010	1.59
(7.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.008 (-1.00)	.164 (2.19)	.686 (12.28)	.151 (2.93)	.318 (2.62)	.007 (1.11)	102 (2.22)	.9989	19,680	1.53
(7.7)	Net	Benefits: current ratio Taxes: current ratio	-.006 (-1.24)	.205 (2.63)	.691 (12.38)	.159 (3.07)	.303 (2.57)	.004 (.59)	106 (2.75)	.9989	19,380	1.62
(7.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.005 (-.96)	.200 (2.53)	.683 (12.28)	.158 (2.99)	.315 (2.60)	.005 (.76)	112 (2.81)	.9989	19,720	1.59
(7.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.007 (-.81)	.172 (2.31)	.687 (12.15)	.153 (2.93)	.318 (2.57)	.006 (.96)	109 (2.35)	.9989	19,870	1.54
(7.10)	Net	Benefits: actuarial projection Taxes: legislated	-.004 (-.78)	.192 (2.45)	.692 (11.89)	.151 (2.91)	.289 (2.43)	.004 (.62)	116 (2.84)	.9989	19,900	1.62
(7.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.008 (-.92)	.164 (2.19)	.685 (12.25)	.153 (2.94)	.326 (2.62)	.006 (.93)	118 (3.23)	.9989	19,760	1.53

*The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 8.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Feldstein Specification with Unemployment Rate Added

1947-76

Equation	SSW Concept	Perception	SSW	RU·YD	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(8.1)	Gross	Constant benefit ratio (Feldstein perception)	-.022 (-2.91)	.193 (1.73)	.673 (8.16)	.152 (1.85)	.240 (1.47)	.025 (2.50)	21 (.39)	.9982	12,080	1.88
(8.2)	Gross	Current benefit ratio	-.012 (-2.18)	.337 (2.48)	.692 (7.79)	.152 (1.74)	.175 (.98)	.015 (1.65)	22 (.33)	.9980	13,690	1.98
(8.3)	Gross	Adaptive expectations	-.013 (-2.03)	.346 (2.44)	.671 (7.56)	.162 (1.83)	.217 (1.22)	.017 (1.75)	21 (.30)	.9979	14,010	1.94
(8.4)	Gross	Perfect foresight	-.020 (-2.79)	.209 (1.85)	.677 (8.12)	.157 (1.89)	.238 (1.44)	.025 (2.46)	-5 (-.07)	.9982	12,340	1.91
(8.5)	Gross	Actuarial projection	-.006 (-1.29)	.233 (1.80)	.681 (7.21)	.150 (1.62)	.223 (1.20)	.012 (1.20)	83 (1.39)	.9977	15,400	1.83
(8.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.027 (-2.99)	.211 (1.90)	.668 (8.17)	.150 (1.85)	.241 (1.48)	.026 (2.57)	16 (.30)	.9982	11,890	1.89
(8.7)	Net	Benefits: current ratio Taxes: current ratio	-.012 (-2.04)	.333 (2.41)	.683 (7.65)	.145 (1.64)	.167 (.92)	.012 (1.35)	84 (1.90)	.9979	13,980	1.99
(8.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.013 (-1.91)	.345 (2.38)	.664 (7.42)	.152 (1.70)	.199 (1.10)	.015 (1.56)	82 (1.76)	.9979	14,270	1.94
(8.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.029 (-2.83)	.243 (2.14)	.676 (8.14)	.154 (1.86)	.227 (1.37)	.024 (2.40)	14 (.26)	.9982	12,260	1.95
(8.10)	Net	Benefits: actuarial projection Taxes: legislated	-.007 (-1.18)	.250 (1.84)	.689 (7.11)	.141 (1.51)	.211 (1.11)	.009 (.93)	106 (2.24)	.9977	15,580	1.84
(8.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.035 (-3.01)	.223 (2.01)	.669 (8.21)	.145 (1.78)	.229 (1.41)	.023 (2.44)	58 (1.40)	.9982	11,850	1.92

Figures in parentheses are t-statistics.

Table 9.—Consumer Expenditure Functions Estimated Using Feldstein Original, Feldstein Replica, and Leimer-Lesnoy Replica SSW Variables: "Munnell" Specification

Equation	Period*	SSW Concept	Construction	SSW	LF65·YD	RU·YD	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(9.1)	1930-74	Gross	Feldstein Original	.035 (2.58)	.230 (2.16)	.249 (1.83)	.489 (5.84)	.118 (2.37)	.333 (2.81)	.017 (1.90)	160 (1.25)	.9990	13,540	1.72
(9.2)	1930-74	Gross	Feldstein Replica	.016 (1.26)	.171 (1.44)	.352 (2.19)	.589 (7.56)	.140 (2.65)	.315 (2.44)	.015 (1.45)	9 (.07)	.9989	15,660	1.57
(9.3)	1930-74	Gross	Leimer-Lesnoy Replica	-.000 (-.01)	.086 (.66)	.268 (1.51)	.652 (9.24)	.157 (3.00)	.338 (2.58)	.008 (.87)	40 (.28)	.9988	16,450	1.50
(9.4)	1930-74	Net	Feldstein Original	.045 (2.28)	.176 (1.75)	.186 (1.29)	.531 (6.87)	.130 (2.63)	.336 (2.77)	.012 (1.39)	185 (1.35)	.9990	14,090	1.67
(9.5)	1930-74	Net	Feldstein Replica	.017 (.76)	.135 (1.15)	.325 (1.96)	.619 (8.39)	.148 (2.80)	.321 (2.44)	.012 (1.19)	12 (.09)	.9988	16,150	1.55
(9.6)	1930-74	Net	Leimer-Lesnoy Replica	-.004 (-.34)	.060 (.48)	.237 (1.33)	.662 (9.66)	.159 (3.05)	.342 (2.61)	.007 (.73)	63 (.43)	.9988	16,390	1.50
(9.7)	1947-74	Gross	Feldstein Original	.053 (1.03)	.332 (2.31)	.420 (2.08)	.355 (1.75)	.132 (1.15)	.421 (2.30)	.022 (1.73)	197 (.51)	.9979	10,210	1.97
(9.8)	1947-74	Gross	Feldstein Replica	-.049 (-1.61)	.078 (.53)	.170 (.81)	.703 (5.11)	.216 (2.65)	.274 (1.47)	.024 (1.98)	-184 (-1.25)	.9980	9,509	1.94
(9.9)	1947-74	Gross	Leimer-Lesnoy Replica	-.015 (-1.45)	.084 (.55)	.237 (1.19)	.622 (5.68)	.183 (2.16)	.307 (1.67)	.024 (1.97)	-45 (-.27)	.9980	9,722	1.90
(9.10)	1947-74	Net	Feldstein Original	.076 (1.58)	.290 (2.55)	.368 (2.01)	.404 (3.19)	.116 (1.15)	.349 (1.99)	.022 (1.79)	225 (.78)	.9980	9,553	2.13
(9.11)	1947-74	Net	Feldstein Replica	-.081 (-1.77)	.065 (.44)	.163 (.79)	.683 (5.58)	.208 (2.59)	.297 (1.66)	.022 (1.82)	-102 (-.68)	.9980	9,289	1.89
(9.12)	1947-74	Net	Leimer-Lesnoy Replica	-.028 (-1.72)	.047 (.30)	.218 (1.12)	.636 (5.90)	.171 (2.03)	.274 (1.49)	.022 (1.82)	20 (.11)	.9980	9,356	1.92

*1930-1974 regressions exclude the year 1941-46. The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 10.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: "Munnell" Specification
1930-76 excluding 1941-46*

Equation	SSW Concept	Perception	SSW	LF65·YD	RU·YD	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(10.1)	Gross	Constant benefit ratio (Feldstein perception)	-.001 (-.17)	.086 (.63)	.263 (1.54)	.656 (8.83)	.150 (2.86)	.339 (2.62)	.011 (1.11)	22 (.15)	.9988	19,660	1.57
(10.2)	Gross	Current benefit ratio	-.005 (-.82)	.037 (.28)	.249 (1.80)	.683 (9.04)	.158 (3.00)	.317 (2.43)	.008 (.75)	41 (.30)	.9989	19,290	1.63
(10.3)	Gross	Adaptive expectations	-.003 (-.52)	.059 (.44)	.262 (1.90)	.668 (9.15)	.157 (2.91)	.335 (2.59)	.010 (.95)	30 (.21)	.9988	19,520	1.61
(10.4)	Gross	Perfect foresight	-.000 (-.07)	.095 (.69)	.275 (1.63)	.652 (8.55)	.150 (2.85)	.338 (2.61)	.011 (1.16)	15 (.10)	.9988	19,680	1.58
(10.5)	Gross	Actuarial projection	-.001 (-.17)	.091 (.77)	.275 (1.99)	.655 (9.00)	.150 (2.86)	.335 (2.56)	.011 (1.11)	15 (.11)	.9988	19,660	1.60
(10.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.005 (-.46)	.061 (.45)	.233 (1.36)	.666 (9.09)	.151 (2.89)	.336 (2.61)	.011 (1.09)	39 (.27)	.9988	19,550	1.56
(10.7)	Net	Benefits: current ratio Taxes: current ratio	-.005 (-.85)	.053 (.45)	.255 (1.88)	.673 (9.74)	.158 (3.00)	.325 (2.52)	.007 (.71)	45 (.33)	.9989	19,260	1.63
(10.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.003 (-.52)	.070 (.59)	.265 (1.94)	.661 (9.79)	.156 (2.91)	.339 (2.63)	.010 (.93)	33 (.23)	.9988	19,520	1.60
(10.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.002 (-.21)	.083 (.61)	.261 (1.59)	.657 (8.80)	.151 (2.86)	.339 (2.62)	.011 (1.08)	24 (.16)	.9988	19,650	1.57
(10.10)	Net	Benefits: actuarial projection Taxes: legislated	-.002 (-.45)	.084 (.76)	.275 (2.06)	.662 (9.44)	.152 (2.90)	.329 (2.51)	.010 (.98)	18 (.14)	.9988	19,560	1.63
(10.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.005 (-.38)	.070 (.54)	.243 (1.46)	.662 (9.23)	.152 (2.89)	.343 (2.64)	.010 (.99)	38 (.25)	.9988	19,590	1.57

*The Durbin-Watson statistic has been adjusted for this gap.
Figures in parentheses are t-statistics.

Table 11.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: "Munnell" Specification

1947-76

Equation	SSW Concept	Perception	SSW	LF65·YD	RU·YD	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(11.1)	Gross	Constant benefit ratio (Feldstein perception)	-.019 (-1.79)	.058 (.36)	.242 (1.36)	.644 (5.60)	.162 (1.83)	.270 (1.45)	.027 (2.26)	-42 (-.23)	.9981	12,010	1.91
(11.2)	Gross	Current benefit ratio	-.008 (-.92)	.149 (.86)	.405 (2.56)	.611 (4.70)	.179 (1.92)	.278 (1.29)	.024 (1.75)	-126 (-.68)	.9979	13,250	1.97
(11.3)	Gross	Adaptive expectations	-.006 (-.70)	.170 (.95)	.414 (2.60)	.588 (4.69)	.188 (2.02)	.318 (1.54)	.026 (1.93)	-143 (-.77)	.9979	13,460	1.94
(11.4)	Gross	Perfect foresight	-.017 (-1.65)	.070 (.42)	.266 (1.51)	.642 (5.45)	.169 (1.89)	.274 (1.45)	.028 (2.28)	-75 (-.42)	.9981	12,240	1.93
(11.5)	Gross	Actuarial projection	-.002 (-.36)	.237 (1.67)	.405 (2.50)	.558 (4.75)	.194 (2.08)	.359 (1.82)	.027 (2.06)	-188 (-1.10)	.9979	13,680	1.91
(11.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.025 (-1.87)	.040 (.24)	.243 (1.39)	.649 (5.67)	.158 (1.78)	.261 (1.40)	.027 (2.25)	-26 (-.14)	.9982	11,860	1.90
(11.7)	Net	Benefits: current ratio Taxes: current ratio	-.007 (-.90)	.172 (1.09)	.417 (2.64)	.595 (4.92)	.179 (1.92)	.288 (1.35)	.023 (1.71)	-117 (-.62)	.9979	13,270	1.98
(11.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.006 (-.67)	.188 (1.13)	.422 (2.64)	.576 (4.87)	.186 (1.98)	.319 (1.53)	.026 (1.91)	-133 (-.68)	.9979	13,490	1.94
(11.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.026 (-1.67)	.054 (.32)	.283 (1.66)	.650 (5.43)	.163 (1.82)	.256 (1.33)	.026 (2.11)	-42 (-.23)	.9981	12,200	1.96
(11.10)	Net	Benefits: actuarial projection Taxes: legislated	-.002 (-.39)	.240 (1.76)	.415 (2.59)	.560 (4.75)	.191 (2.04)	.355 (1.78)	.027 (1.96)	-187 (-1.08)	.9979	13,660	1.93
(11.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.032 (-1.90)	.033 (.20)	.249 (1.45)	.653 (5.67)	.152 (1.70)	.247 (1.31)	.025 (2.03)	20 (.10)	.9982	11,820	1.93

Figures in parentheses are t-statistics.

Table 12.--Consumer Expenditure Functions Estimated Using Feldstein Original, Feldstein Replica, and Leimer-Lesnoy Replica SSW Variables: Barro Specification

Equation	Period*	SSW Concept	Construction	SSW	RU·YD	SUR	DUR	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(12.1)	1930-74	Gross	Feldstein Original	.015 (1.64)	.301 (2.57)	.162 (2.42)	-.076 (-1.32)	.697 (11.21)	.111 (2.93)	.201 (1.53)	.001 (.21)	226 (2.56)	.999	10,310	2.11
(12.2)	1930-74	Gross	Feldstein Replica	.007 (.73)	.377 (3.47)	.170 (2.45)	-.082 (-1.31)	.750 (14.38)	.106 (2.62)	.181 (1.18)	.002 (.34)	128 (2.17)	.999	11,030	2.09
(12.3)	1930-74	Gross	Leimer-Lesnoy Replica	.003 (.56)	.391 (3.62)	.180 (2.63)	-.084 (-1.27)	.766 (15.34)	.109 (2.72)	.184 (1.13)	.001 (.15)	112 (2.16)	.999	11,110	2.07
(12.4)	1930-74	Net	Feldstein Original	.020 (1.49)	.298 (2.47)	.168 (2.52)	-.064 (-1.11)	.701 (11.08)	.117 (3.05)	.236 (1.80)	-.000 (-.002)	220 (2.42)	.999	10,450	2.04
(12.5)	1930-74	Net	Feldstein Replica	.004 (.25)	.386 (3.55)	.176 (2.52)	-.073 (-1.16)	.760 (14.98)	.110 (2.70)	.214 (1.35)	.001 (.21)	111 (2.03)	.999	11,200	2.04
(12.6)	1930-74	Net	Leimer-Lesnoy Replica	.001 (.14)	.390 (3.58)	.179 (2.59)	-.073 (-1.08)	.764 (15.08)	.112 (2.78)	.222 (1.34)	.001 (.15)	106 (2.08)	.999	11,220	2.03
(12.7)	1947-74	Gross	Feldstein Original	-.020 (-.54)	.315 (2.08)	.182 (2.29)	-.074 (-1.02)	.755 (6.04)	.207 (2.08)	.240 (1.25)	.008 (.76)	-95 (-.29)	.998	7,765	1.89
(12.8)	1947-74	Gross	Feldstein Replica	-.039 (-1.20)	.227 (1.40)	.177 (2.31)	.010 (.10)	.721 (8.64)	.200 (2.66)	.322 (1.59)	.012 (1.14)	-37 (-.32)	.998	7,330	1.81
(12.9)	1947-74	Gross	Leimer-Lesnoy Replica	-.003 (-.26)	.300 (1.89)	.171 (2.07)	-.058 (-.52)	.694 (7.22)	.171 (2.33)	.254 (1.17)	.007 (.58)	78 (1.31)	.998	7,854	1.86
(12.10)	1947-74	Net	Feldstein Original	-.014 (-.30)	.322 (2.07)	.179 (2.25)	-.087 (-1.15)	.731 (6.05)	.190 (1.94)	.229 (1.19)	.006 (.62)	-9 (-.03)	.998	7,847	1.89
(12.11)	1947-74	Net	Feldstein Replica	-.064 (-1.35)	.228 (1.44)	.174 (2.28)	.012 (.12)	.698 (8.54)	.196 (2.69)	.346 (1.70)	.011 (1.14)	18 (.25)	.998	7,191	1.80
(12.12)	1947-74	Net	Leimer-Lesnoy Replica	-.015 (-.70)	.281 (1.79)	.164 (2.03)	-.011 (-.09)	.667 (6.62)	.169 (2.32)	.305 (1.39)	.010 (.88)	96 (1.53)	.998	7,683	1.81

*1930-1974 regressions exclude the years 1941-46. The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 13.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Barro Specification

1930-76 excluding 1941-46*

Equation	SSW Concept	Perception	SSW	RU·YD	SUR	DUR	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(13.1)	Gross	Constant benefit ratio (Feldstein perception)	.003 (.32)	.432 (4.36)	.206 (2.80)	-.046 (-.71)	.752 (13.40)	.102 (2.39)	.277 (1.88)	-.000 (-.07)	129 (2.01)	.999	13,800	1.98
(13.2)	Gross	Current benefit ratio	-.001 (-.21)	.432 (4.36)	.213 (2.89)	-.031 (-.38)	.758 (14.15)	.105 (2.50)	.311 (2.06)	-.001 (-.17)	115 (2.05)	.999	13,820	1.96
(13.3)	Gross	Adaptive expectations	-.002 (-.31)	.436 (4.34)	.215 (2.91)	-.027 (-.34)	.758 (14.18)	.105 (2.50)	.322 (2.05)	-.001 (-.15)	111 (1.93)	.999	13,800	1.95
(13.4)	Gross	Perfect foresight	.004 (.55)	.430 (4.36)	.202 (2.76)	-.051 (-.78)	.748 (13.24)	.100 (2.35)	.265 (1.81)	-.000 (-.03)	139 (2.09)	.999	13,710	1.99
(13.5)	Gross	Actuarial projection	.004 (.90)	.443 (4.49)	.203 (2.83)	-.075 (-1.03)	.755 (14.27)	.107 (2.58)	.252 (1.77)	.000 (.03)	125 (2.32)	.999	13,500	1.93
(13.6)	Net	Benefits:constant ratio Taxes:constant ratio	-.001 (-.07)	.430 (4.31)	.211 (2.90)	-.040 (-.59)	.758 (13.99)	.106 (2.47)	.301 (2.02)	-.001 (-.11)	115 (1.77)	.999	13,840	1.95
(13.7)	Net	Benefits:current ratio Taxes:current ratio	-.002 (-.33)	.429 (4.33)	.214 (2.92)	-.026 (-.32)	.756 (14.08)	.106 (2.52)	.321 (2.09)	-.002 (-.25)	121 (2.20)	.999	13,800	1.96
(13.8)	Net	Benefits:adaptive exp. Taxes:adaptive exp.	-.002 (-.40)	.432 (4.37)	.216 (2.93)	-.023 (-.30)	.754 (13.95)	.106 (2.53)	.333 (2.06)	-.002 (-.24)	120 (2.21)	.999	13,770	1.95
(13.9)	Net	Benefits:perf. foresight Taxes:perf. foresight	.005 (.38)	.431 (4.36)	.205 (2.79)	-.049 (-.73)	.752 (13.58)	.101 (2.36)	.272 (1.81)	-.000 (-.05)	130 (2.05)	.999	13,780	1.97
(13.10)	Net	Benefits:actuarial proj. Taxes: legislated	.004 (.67)	.440 (4.43)	.203 (2.79)	-.074 (-.93)	.757 (14.24)	.108 (2.57)	.256 (1.75)	.001 (.20)	111 (2.04)	.999	13,650	1.92
(13.11)	Net	Benefits:constant ratio Taxes:perf. foresight (Feldstein perception)	-.001 (-.07)	.430 (4.33)	.211 (2.88)	-.040 (-.61)	.759 (13.93)	.106 (2.46)	.302 (1.98)	-.001 (-.13)	116 (1.98)	.999	13,840	1.95

*The Durbin-Watson statistic has been adjusted for this gap.
Figures in parentheses are t-statistics.

Table 14.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Barro Specification

1947-76

Equation	SSW Concept	Perception	SSW	RU·YD	SUR	DUR	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(14.1)	Gross	Constant benefit ratio (Feldstein perception)	-.059 (-1.74)	.263 (1.71)	.212 (2.62)	.087 (.84)	.721 (8.01)	.207 (2.57)	.431 (2.14)	.014 (1.31)	-79 (-.66)	.999	9,410	1.74
(14.2)	Gross	Current benefit ratio	-.014 (-1.45)	.434 (3.43)	.255 (2.96)	.120 (.90)	.637 (6.45)	.171 (2.20)	.415 (2.02)	.006 (.71)	79 (1.24)	.998	9,788	1.90
(14.3)	Gross	Adaptive expectations	-.020 (-1.89)	.479 (3.80)	.278 (3.23)	.164 (1.26)	.597 (5.87)	.190 (2.47)	.516 (2.39)	.010 (1.13)	52 (.79)	.999	9,208	1.86
(14.4)	Gross	Perfect foresight	-.032 (-1.18)	.333 (2.24)	.220 (2.63)	.054 (.49)	.710 (7.65)	.199 (2.34)	.393 (1.89)	.010 (.93)	-39 (-.29)	.998	10,100	1.79
(14.5)	Gross	Actuarial projection	.003 (.46)	.441 (3.19)	.216 (2.50)	-.074 (-.70)	.704 (7.28)	.160 (1.98)	.287 (1.38)	.002 (.17)	105 (1.62)	.998	10,660	1.70
(14.6)	Net	Benefits:constant ratio Taxes:constant ratio	-.060 (-1.77)	.282 (1.92)	.190 (2.31)	.074 (.76)	.682 (7.69)	.190 (2.45)	.431 (2.15)	.016 (1.43)	-36 (-.37)	.999	9,365	1.72
(14.7)	Net	Benefits:current ratio Taxes:current ratio	-.012 (-1.13)	.430 (3.34)	.243 (2.80)	.084 (.62)	.640 (6.15)	.161 (2.04)	.384 (1.86)	.003 (.37)	143 (1.97)	.998	10,150	1.91
(14.8)	Net	Benefits:adaptive exp. Taxes:adaptive exp.	-.018 (-1.59)	.472 (3.66)	.270 (3.07)	.145 (1.05)	.589 (5.28)	.171 (2.22)	.477 (2.19)	.007 (.81)	152 (2.20)	.998	9,612	1.87
(14.9)	Net	Benefits:perf. foresight Taxes:perf. foresight	-.036 (-1.01)	.362 (2.54)	.220 (2.61)	.038 (.35)	.692 (7.47)	.192 (2.26)	.392 (1.84)	.008 (.76)	16 (.15)	.998	10,260	1.79
(14.10)	Net	Benefits:actuarial proj. Taxes: legislated	.004 (.51)	.434 (3.24)	.212 (2.44)	-.083 (-.73)	.703 (7.34)	.165 (2.04)	.284 (1.37)	.003 (.33)	91 (1.34)	.998	10,640	1.69
(14.11)	Net	Benefits:constant ratio Taxes:perfect foresight (Feldstein perception)	-.089 (-1.79)	.284 (1.95)	.207 (2.57)	.081 (.81)	.686 (7.75)	.197 (2.52)	.461 (2.24)	.011 (1.18)	12 (.15)	.999	9,344	1.73

Figures in parentheses are t-statistics.

Table 15.--Consumer Expenditure Functions Estimated Using Feldstein Original, Feldstein Replica, and Leimer-Lesnoy Replica SSW Variables: Darby Specification

Equation	Period	SSW Concept	Construction	SSW	YP	YT	M 1	DUR	$\frac{PCD}{PCN}$	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(15.1)	1930-74*	Gross	Feldstein Original	.027 (2.68)	.716 (16.96)	.494 (10.23)	.105 (1.99)	-.049 (-.83)	6.223 (.27)	4.794 (2.19)	9.990 (.41)	.9996	396.7	1.92
(15.2)	1930-74*	Gross	Feldstein Replica	-.014 (-.68)	.810 (13.56)	.568 (10.74)	.153 (2.40)	-.022 (-.34)	-23.874 (-1.05)	6.378 (2.72)	17.147 (.62)	.9996	481.6	1.54
(15.3)	1930-74*	Gross	Leimer-Lesnoy Replica	-.024 (-2.82)	.894 (16.70)	.552 (12.94)	.104 (1.97)	-.056 (-.96)	-5.086 (-.24)	4.638 (2.13)	-14.762 (-.55)	.9996	388.8	1.82
(15.4)	1930-74*	Net	Feldstein Original	.039 (2.93)	.724 (18.46)	.498 (10.77)	.123 (2.39)	-.040 (-.69)	6.818 (.31)	4.919 (2.31)	5.129 (.21)	.9996	382.5	1.95
(15.5)	1930-74*	Net	Feldstein Replica	-.064 (-1.95)	.859 (15.65)	.582 (12.21)	.172 (2.97)	-.018 (-.30)	-19.412 (-.91)	5.944 (2.67)	.439 (.02)	.9996	435.4	1.59
(15.6)	1930-74*	Net	Leimer-Lesnoy Replica	-.039 (-3.43)	.888 (19.30)	.536 (13.07)	.105 (2.11)	-.039 (-.70)	.683 (.03)	3.570 (1.66)	-19.499 (-.76)	.9997	354.5	1.85
(15.7)	1947-74	Gross	Feldstein Original	-.016 (-1.13)	.899 (19.30)	.369 (7.19)	.858 (6.29)	-.049 (-.86)	81.770 (2.42)	2.691 (1.50)	-283.235 (-4.45)	.9997	125.5	2.55
(15.8)	1947-74	Gross	Feldstein Replica	-.030 (-1.06)	.908 (16.13)	.411 (5.44)	.744 (7.85)	-.030 (-.48)	77.598 (2.29)	3.223 (1.61)	-253.962 (-4.59)	.9997	126.4	2.59
(15.9)	1947-74	Gross	Leimer-Lesnoy Replica	.002 (.227)	.850 (20.03)	.345 (6.28)	.767 (5.87)	-.062 (-1.09)	80.179 (2.30)	2.140 (1.20)	-249.993 (-4.29)	.9997	133.1	2.43
(15.10)	1947-74	Net	Feldstein Original	-.022 (-1.25)	.898 (20.76)	.357 (7.37)	.872 (6.38)	-.060 (-1.09)	82.380 (2.45)	2.391 (1.39)	-286.681 (-4.55)	.9997	123.8	2.53
(15.11)	1947-74	Net	Feldstein Replica	-.044 (-1.19)	.901 (19.37)	.400 (6.25)	.707 (7.07)	-.044 (-.78)	75.628 (2.24)	2.719 (1.52)	-241.116 (-4.41)	.9997	124.6	2.55
(15.12)	1947-74	Net	Leimer-Lesnoy Replica	.0003 (.08)	.856 (22.15)	.350 (6.56)	.750 (5.46)	-.063 (-1.10)	79.516 (2.27)	2.158 (1.21)	-247.047 (-4.12)	.9997	133.5	2.44

*The years 1941-46 are excluded. The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 16.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification

1930-76 excluding 1941-46*

Equation	SSW Concept	Perception	SSW	YP	YT	M·1	DUR	$\frac{PCD}{PCN}$	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(16.1)	Gross	Constant benefit ratio (Feldstein perception)	-.016 (-1.90)	.867 (15.54)	.571 (11.62)	.106 (1.89)	-.075 (-1.15)	-10.509 (-.46)	5.445 (2.55)	-1.762 (-.06)	.9996	569.6	1.92
(16.2)	Gross	Current benefit ratio	-.014 (-1.62)	.824 (18.34)	.536 (10.44)	.108 (1.90)	.036 (.50)	-22.350 (-.95)	3.547 (1.48)	17.507 (.64)	.9996	585.7	1.78
(16.3)	Gross	Adaptive expectations	-.013 (-1.43)	.841 (15.88)	.538 (10.34)	.089 (1.52)	.004 (.07)	-17.465 (-.75)	3.528 (1.42)	11.806 (.43)	.9995	595.0	1.80
(16.4)	Gross	Perfect foresight	-.013 (-1.56)	.862 (14.25)	.570 (11.39)	.104 (1.81)	-.067 (-1.00)	-12.371 (-.54)	5.426 (2.50)	994 (.03)	.9995	588.7	1.90
(16.5)	Gross	Actuarial projection	-.000 (-.02)	.793 (17.96)	.559 (10.89)	.106 (1.77)	-.027 (-.40)	-14.028 (-.57)	5.241 (2.32)	16.474 (.58)	.9995	632.0	1.71
(16.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.022 (-2.19)	.876 (16.00)	.568 (11.81)	.096 (1.73)	-.08 (-1.24)	-7.144 (-.32)	5.466 (2.60)	-7.441 (-.26)	.9996	551.7	1.96
(16.7)	Net	Benefits: current ratio Taxes: current ratio	-.019 (-2.41)	.801 (20.61)	.512 (9.99)	.125 (2.26)	.075 (1.04)	-16.581 (-.75)	2.524 (1.07)	13.451 (.52)	.9996	537.4	1.85
(16.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.017 (-2.13)	.828 (19.34)	.514 (9.78)	.099 (1.79)	.026 (.40)	-11.305 (-.51)	2.630 (1.08)	6.418 (.24)	.9996	555.9	1.83
(16.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.024 (-1.98)	.875 (15.20)	.562 (11.58)	.102 (1.82)	-.060 (-.96)	-9.372 (-.41)	4.770 (2.23)	-4.501 (-.16)	.9996	565.0	1.93
(16.10)	Net	Benefits: actuarial projection Taxes: legislated	-.003 (-.35)	.791 (18.72)	.556 (10.66)	.112 (1.82)	-.008 (-.10)	-15.687 (-.65)	4.965 (2.09)	17.724 (.62)	.9995	629.7	1.73
(16.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.030 (-2.53)	.874 (17.40)	.560 (11.91)	.107 (1.98)	-.069 (-1.13)	-5.315 (-.24)	4.625 (2.24)	-8.592 (-.31)	.9996	529.4	1.95

*The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 17.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification

1947-76

Equation	SSW Concept	Perception	SSW	YP	YT	M 1	DUR	PCD/PCN	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(17.1)	Gross	Constant benefit ratio (Feldstein perception)	.002 (.33)	.864 (18.91)	.339 (5.05)	.776 (5.79)	-.037 (-.55)	107.874 (2.56)	.564 (.27)	-292.466 (-4.08)	.9996	228.1	2.43
(17.2)	Gross	Current benefit ratio	-.004 (-.47)	.880 (22.94)	.343 (5.47)	.739 (5.96)	-.033 (-.49)	95.567 (2.22)	.490 (.23)	-272.517 (-3.83)	.9996	226.9	2.44
(17.3)	Gross	Adaptive expectations	.002 (.22)	.867 (19.25)	.349 (5.55)	.769 (5.81)	-.048 (-.77)	106.867 (2.49)	.884 (.41)	-289.635 (-4.05)	.9996	228.7	2.43
(17.4)	Gross	Perfect foresight	.003 (.35)	.861 (17.63)	.339 (5.12)	.775 (5.94)	-.037 (-.55)	107.982 (2.57)	.578 (.28)	-291.691 (-4.15)	.9996	227.9	2.42
(17.5)	Gross	Actuarial projection	.004 (.72)	.867 (23.86)	.346 (5.62)	.763 (6.44)	-.055 (-.89)	110.796 (2.72)	.729 (.36)	-293.418 (-4.34)	.9996	223.9	2.43
(17.6)	Net	Benefits: constant ratio Taxes: constant ratio	.002 (.25)	.866 (18.80)	.341 (5.15)	.773 (5.66)	-.039 (-.58)	106.933 (2.52)	.630 (.30)	-290.740 (-4.03)	.9996	228.5	2.43
(17.7)	Net	Benefits: current ratio Taxes: current ratio	-.004 (-.51)	.872 (24.45)	.342 (5.44)	.730 (5.65)	-.026 (-.37)	96.635 (2.31)	.489 (.23)	-270.088 (-3.74)	.9996	226.5	2.43
(17.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	.002 (.24)	.870 (23.26)	.350 (5.52)	.773 (5.56)	-.050 (-.78)	106.613 (2.53)	.886 (.42)	-291.129 (-3.98)	.9996	228.6	2.44
(17.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	.002 (.20)	.867 (17.98)	.343 (5.30)	.768 (5.73)	-.042 (-.64)	106.101 (2.51)	.704 (.34)	-288.962 (-4.05)	.9996	228.8	2.42
(17.10)	Net	Benefits: actuarial projection Taxes: legislated	.004 (.72)	.878 (24.34)	.349 (5.67)	.764 (6.45)	-.073 (-1.02)	110.241 (2.71)	.977 (.48)	-295.244 (-4.33)	.9996	223.9	2.45
(17.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	.002 (.16)	.869 (20.07)	.343 (5.20)	.768 (5.44)	-.042 (-.65)	105.658 (2.49)	.697 (.34)	-288.893 (-3.91)	.9996	228.9	2.43

Figures in parentheses are t-statistics.

Table 18.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification (Aggregate) 1930-76 excluding 1941-46*

Equation	SSW Concept	Perception	SSW	YP	YT	M2	DUR	PCD/PCN	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(18.1)	Gross	Constant benefit ratio (Feldstein perception)	.009 (.98)	.677 (9.82)	.460 (8.91)	.222 (4.24)	-.028 (-.48)	-9.040 (-.56)	4.767 (3.08)	14.6 (.63)	.9997	411.0	1.96
(18.2)	Gross	Current benefit ratio	-.001 (-.17)	.740 (16.58)	.485 (10.65)	.187 (4.21)	-.043 (-.65)	-4.304 (-.27)	4.393 (2.25)	2.0 (.10)	.9997	422.5	1.94
(18.3)	Gross	Adaptive expectations	.003 (.31)	.723 (13.32)	.487 (10.70)	.198 (4.10)	-.058 (-.97)	2.805 (-.18)	4.956 (2.56)	2.6 (.13)	.9997	421.7	1.94
(18.4)	Gross	Perfect foresight	.011 (1.25)	.659 (9.28)	.455 (8.93)	.229 (4.48)	-.023 (-.40)	-8.551 (-.55)	4.740 (3.10)	17.2 (.75)	.9997	403.9	1.95
(18.5)	Gross	Actuarial projection	.011 (2.18)	.690 (17.52)	.467 (10.78)	.220 (5.36)	-.096 (-1.74)	-1.090 (-.08)	5.783 (3.72)	4.9 (.27)	.9997	369.6	2.01
(18.6)	Net	Benefits: constant ratio Taxes: constant ratio	.009 (.73)	.690 (9.61)	.467 (9.01)	.218 (3.88)	-.034 (-.57)	-8.287 (-.50)	4.668 (3.01)	12.5 (.51)	.9997	416.1	1.94
(18.7)	Net	Benefits: current ratio Taxes: current ratio	-.005 (-.69)	.747 (19.37)	.480 (10.50)	.178 (4.01)	-.020 (-.30)	-2.175 (-.14)	3.618 (1.72)	-.7 (-.03)	.9997	416.9	1.93
(18.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.001 (-.10)	.739 (15.84)	.485 (10.49)	.187 (3.82)	-.047 (-.76)	-3.498 (-.22)	4.449 (2.08)	1.5 (.07)	.9997	422.8	1.94
(18.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	.001 (.82)	.684 (9.48)	.469 (9.48)	.218 (4.09)	-.039 (-.70)	-8.229 (-.51)	5.021 (3.08)	13.2 (.56)	.9997	414.4	1.95
(18.10)	Net	Benefits: actuarial projection Taxes: legislated	.009 (1.44)	.727 (20.79)	.484 (10.98)	.205 (4.95)	-.117 (-1.67)	-4.383 (-.29)	6.143 (3.31)	3.4 (.18)	.9997	397.8	2.02
(18.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	.006 (.39)	.713 (10.50)	.477 (9.53)	.204 (3.70)	-.045 (-.79)	-6.858 (-.40)	4.840 (2.89)	7.7 (.32)	.9997	421.0	1.95

*The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 19.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification (Aggregate)

1947-1976

Equation	SSW Concept	Perception	SSW	YP	YT	M2	DUR	$\frac{PCD}{PCN}$	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(19.1)	Gross	Constant benefit ratio (Feldstein perception)	.003 (2.73)	.556 (6.73)	.323 (4.20)	.380 (5.11)	.076 (.97)	96.300 (2.15)	2.808 (1.29)	-138.3 (-2.18)	.9995	264.4	2.05
(19.2)	Gross	Current benefit ratio	.002 (.14)	.747 (13.03)	.463 (6.85)	.219 (3.86)	-.031 (-.35)	55.884 (1.07)	4.091 (1.53)	-88.7 (-1.21)	.9994	353.9	1.90
(19.3)	Gross	Adaptive expectations	.005 (.47)	.726 (9.99)	.469 (6.88)	.232 (3.78)	-.033 (-.41)	60.832 (1.19)	4.528 (1.63)	-92.7 (-1.30)	.9994	350.8	1.88
(19.4)	Gross	Perfect foresight	.031 (2.79)	.547 (6.53)	.334 (4.54)	.364 (5.30)	.070 (.92)	94.850 (2.14)	3.006 (1.39)	-129.4 (-2.09)	.9995	261.7	2.02
(19.5)	Gross	Actuarial projection	.018 (2.94)	.699 (15.75)	.418 (7.15)	.282 (5.82)	-.092 (-1.29)	87.563 (2.05)	4.231 (2.01)	-129.7 (-2.12)	.9996	254.5	2.16
(19.6)	Net	Benefits: constant ratio Taxes: constant ratio	.041 (2.59)	.551 (6.29)	.337 (4.46)	.385 (4.88)	.081 (1.00)	97.351 (2.13)	3.282 (1.50)	-138.1 (-2.14)	.9995	271.3	2.06
(19.7)	Net	Benefits: current ratio Taxes: current ratio	-.003 (-.26)	.754 (15.30)	.457 (6.63)	.208 (3.55)	-.012 (-.13)	49.472 (.98)	3.676 (1.37)	-80.1 (-1.10)	.9994	353.2	1.90
(19.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	.003 (.29)	.741 (12.41)	.468 (6.65)	.227 (3.50)	-.033 (-.40)	56.586 (1.13)	4.317 (1.54)	-90.2 (-1.26)	.9994	352.9	1.89
(19.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	.045 (2.39)	.563 (6.27)	.368 (5.17)	.360 (4.77)	.042 (.54)	91.319 (1.98)	4.314 (1.95)	-128.2 (-1.98)	.9995	281.5	1.98
(19.10)	Net	Benefits: actuarial projection Taxes: legislated	.017 (2.13)	.756 (17.26)	.452 (7.41)	.257 (5.14)	-.145 (-1.58)	76.273 (1.68)	5.165 (2.22)	-122.6 (-1.86)	.9995	293.8	2.10
(19.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	.049 (2.25)	.579 (6.57)	.357 (4.68)	.382 (4.39)	.046 (.59)	92.685 (1.96)	4.148 (1.85)	-140.7 (-2.08)	.9995	288.2	2.01

Figures in parentheses are t-statistics.

Table 20.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification without Money (Aggregate)

1930-76 excluding 1941-46*

Equation	SSW Concept	Perception	SSW	YF	YT	DUR	$\frac{PCD}{PCN}$	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(20.1)	Gross	Constant benefit ratio (Feldstein perception)	-.015	.910	.603	-.078	17.356	3.160	-28.0	.9995	634.5	1.73
			(-1.77)	(17.84)	(12.54)	(-1.12)	(.95)	(1.72)	(-1.09)			
(20.2)	Gross	Current benefit ratio	-.014	.872	.567	.030	5.559	1.202	-9.3	.9995	649.3	1.61
			(-1.51)	(22.42)	(11.29)	(.38)	(.29)	(.55)	(-.39)			
(20.3)	Gross	Adaptive expectations	-.016	.890	.557	.006	3.669	1.288	-10.4	.9995	636.5	1.68
			(-1.74)	(20.57)	(10.91)	(.09)	(.19)	(.62)	(-.44)			
(20.4)	Gross	Perfect foresight	-.013	.908	.602	-.071	14.839	3.204	-25.1	.9995	649.9	1.72
			(-1.50)	(16.43)	(12.35)	(-1.01)	(.81)	(1.72)	(-.97)			
(20.5)	Gross	Actuarial projection	.002	.836	.589	-.043	14.222	3.139	-9.9	.9995	691.3	1.52
			(.29)	(21.92)	(11.89)	(-.58)	(.75)	(1.58)	(-.40)			
(20.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.022	.920	.599	-.085	18.484	3.420	-32.6	.9995	606.0	1.80
			(-2.21)	(19.17)	(12.85)	(-1.25)	(1.04)	(1.90)	(-1.29)			
(20.7)	Net	Benefits: current ratio Taxes: current ratio	-.016	.855	.552	.057	15.093	.160	-16.4	.9995	620.4	1.62
			(-2.00)	(25.87)	(10.90)	(.72)	(.85)	(.07)	(-.69)			
(20.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.018	.875	.540	.024	14.219	.320	-18.6	.9995	609.5	1.68
			(-2.16)	(24.56)	(10.39)	(.34)	(.80)	(.15)	(-.79)			
(20.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.025	.920	.593	-.064	17.499	2.575	-30.5	.9995	624.2	1.76
			(-1.94)	(17.63)	(12.59)	(-.96)	(.97)	(1.41)	(-1.19)			
(20.10)	Net	Benefits: actuarial projection Taxes: legislated	.001	.841	.590	-.044	13.409	3.170	-10.0	.9995	692.6	1.54
			(.15)	(24.64)	(11.83)	(-.49)	(.71)	(1.39)	(-.40)			
(20.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.029	.919	.593	-.072	22.734	2.338	-35.1	.9996	595.5	1.77
			(-2.36)	(20.11)	(12.88)	(-1.09)	(1.27)	(1.30)	(-1.39)			

*The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table 21.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification without Money (Aggregate)

1947-76

Equation	SSW Concept	Perception	SSW	YP	YT	DUR	$\frac{PCD}{PCN}$	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(21.1)	Gross	Constant benefit ratio (Feldstein perception)	-.017 (-1.65)	.900 (13.00)	.624 (8.74)	-.062 (-.58)	21.540 (.35)	4.205 (1.34)	-32.5 (-.38)	.9990	578.4	1.85
(21.2)	Gross	Current benefit ratio	-.017 (-1.44)	.866 (14.20)	.563 (7.10)	.058 (.54)	8.449 (.13)	1.880 (.57)	-14.4 (-.16)	.9990	593.3	1.68
(21.3)	Gross	Adaptive expectations	-.019 (-1.65)	.902 (12.89)	.544 (6.65)	.022 (.22)	13.436 (.22)	1.433 (.43)	-28.3 (-.33)	.9990	578.7	1.75
(21.4)	Gross	Perfect foresight	-.015 (-1.40)	.901 (12.02)	.623 (8.60)	-.053 (-.49)	23.017 (.37)	4.028 (1.27)	-36.0 (-.41)	.9990	595.8	1.82
(21.5)	Gross	Actuarial projection	.001 (.15)	.829 (13.88)	.611 (8.15)	-.004 (-.04)	39.942 (.61)	3.425 (1.05)	-45.3 (-.49)	.9989	646.1	1.55
(21.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.023 (-1.83)	.907 (13.23)	.615 (8.77)	-.070 (-.67)	19.744 (.33)	4.017 (1.31)	-32.3 (-.38)	.9991	564.6	1.86
(21.7)	Net	Benefits: current ratio Taxes: current ratio	-.021 (-1.95)	.832 (15.37)	.532 (6.60)	.100 (.91)	13.917 (.23)	1.420 (.44)	-12.6 (-.15)	.9991	555.2	1.76
(21.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.021 (-2.02)	.870 (15.21)	.513 (6.06)	.043 (.44)	19.304 (.32)	1.117 (.35)	-26.7 (-.32)	.9991	549.6	1.77
(21.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.027 (-1.73)	.913 (12.62)	.607 (8.60)	-.051 (-.49)	20.801 (.34)	3.406 (1.11)	-34.3 (-.40)	.9991	572.5	1.86
(21.10)	Net	Benefits: actuarial projection Taxes: legislated	.001 (.09)	.832 (13.92)	.612 (8.06)	-.006 (-.05)	38.899 (.60)	3.477 (1.04)	-44.6 (-.48)	.9989	646.6	1.57
(21.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.032 (-2.13)	.905 (14.24)	.604 (8.81)	-.060 (-.60)	19.216 (.33)	3.552 (1.19)	-28.1 (-.34)	.9991	540.5	1.89

Figures in parentheses are t-statistics.

Appendix A

Data

This appendix presents definitions, sources, and data series for variables used in this paper. National income and product accounts (NIPA) data are from the Data Resources, Inc. (DRI) data bank. Data have been revised as of December 22, 1980.

C	Personal consumption expenditures in 1972 dollars.
YD	Disposable personal income in 1972 dollars.
RE	Undistributed corporate profits including inventory valuation adjustment and capital consumption adjustment.
W	Ordinary household wealth (real assets plus financial assets less liabilities) at beginning of year in 1972 dollars. For 1929-52, data are the Ando-Modigliani series published in M.K. Evans, Macroeconomic Activity, Harper & Row, 1969, p. 37. For 1953 ff., data are from the data bank for the Federal Reserve Quarterly Econometric Model, as of January 1980.
SSW	Social security wealth in 1972 dollars. These data are described in Leimer and Lesnoy [1980].
YPRIV	Private sector income in 1972 dollars. Private sector income equals disposable personal income + undistributed corporate profits + inventory valuation adjustment + capital consumption adjustment + wage accruals less disbursements - other personal outlays.
Y	Measured income in 1972 dollars defined as real private sector income adjusted for the imputed yield on the stock of consumers' durable goods, i.e., $Y_t = YPRIV_t + .1DUR_t$, where DUR_t is the real stock of durable goods at the beginning of year t.
YP	Permanent income in billions of 1972 dollars, computed by the exponentially declining weight methods as $YP_t = \beta Y_t + (1-\beta)(1+G)YP_{t-1}$, where β is 0.1, G is .037 per annum, the trend growth rate of aggregate measured income over the period 1929 to 1976, and $YP_{1929} = Y_{1929}$. Real income data for 1941-46 were replaced by a log-linear interpolation for purposes of computing permanent income. This method follows Darby [1978, 1979].

YT Transitory income in billions of 1972 dollars, $YT_t = Y_t - YP_t$.

yp Permanent income per capita in 1972 dollars, computed as

$$yp_t = \beta y_t + (1-\beta)(1+g)yp_{t-1}$$

where β is 0.1, g is .0237 per annum, the trend growth rate of per capita measured income, y = Y/N, over the period, and $yp_{29} = y_{29}$. Real income data for 1941-46 were replaced by a log-linear interpolation for purposes of computing permanent incomes.

yt Transitory income per capita in 1972 dollars, $yt_t = y_t - yp_t$.

M1 Money supply M1 in billions of 1972 dollars. For 1929-46, data are from U.S. Department of Commerce, Bureau of Economic Analysis, Long-Term Economic Growth, 1860-1970 (Washington, D.C.: Government Printing Office, 1973) Series B109, pp. 230-231. For 1946-76, data are average of monthly data in the DRI data bank.

M2 Money supply M2 in billions of 1972 dollars. Sources are same as for M1. For 1929-46, data are Series B111, pp. 230-31.

SUR Surplus of the total government sector, calculated on a national income accounts basis, in 1972 dollars.

DUR Stock of consumers' durable goods at beginning of year in 1972 dollars. Data are from J.C. Musgrave, "Durable Goods Owned by Consumers in the United States, 1925-77," Survey of Current Business, 59:3, March 1979, pp. 17-25, Table 4.

RU Unemployment rate, defined as the percent of number of unemployed to total labor force (civilian labor force plus armed forces). For 1929-46, data are from U.S. Bureau of the Census, Historical Statistics of the United States, Colonial Times to 1970 (Washington, D.C.: Government Printing Office, 1975), Table D1-10, page 126. For 1947 ff., data are from Economic Report of the President, 1980 (Washington, D.C.: Government Printing Office, 1980), Table B-27, page 234.

RU^d Unemployment rate, defined as the percent of number of unemployed to total labor force, including Darby adjustment. Data for 1931-42 were adjusted to reclassify government "emergency workers" as employed. (See Michael R. Darby, "Three-and-a-Half Millions U.S. Employees Have Been Mislaid: Or, an Explanation of Unemployment, 1934-41, Journal of Political Economy, 84, February 1976, pp. 1-16 tables 1-3.)

LF65 — Labor force participation rate of men aged 65 or older. For 1929-40, data are from Long Term Economic Growth, 1860-1970, Series B21, pp. 214-15. Data are interpolated. For 1947 ff., data are from U.S. Department of Labor, Employment and Training Report of the President, 1979, Table A-4.

PD/PND — Ratio of implicit price deflator for consumer durables to weighted average of implicit price deflators for consumer nondurables and consumer services.

R — Yield on U.S. government bonds. For 1929-46, data are from Long Term Economic Growth, 1860-1970, Series B72, pp. 224-225. For 1947 ff., data are from the DRI data bank.

N — U.S. population including Armed Forces abroad, in millions of persons, NIPA concept. Data are from the DRI data bank.

PC — NIPA implicit price deflator for personal consumption expenditures.

Table A.1

Data for Variables Excluding Leimer-Lesnoy SSW Variables

	C	YD	RE	U	SSW: Feldstein Original		SSW: Feldstein Replica	
					Gross	Net	Gross	Net
1929	215.2	229.5	5.2	1,300.3	0.0	0.0	0.0	0.0
1930	199.8	210.9	-1.5	1,269.4	0.0	0.0	0.0	0.0
1931	192.0	202.1	-10.6	1,218.1	0.0	0.0	0.0	0.0
1932	174.2	174.6	-17.0	1,144.8	0.0	0.0	0.0	0.0
1933	170.3	169.4	-16.0	1,133.8	0.0	0.0	0.0	0.0
1934	177.0	179.9	-8.4	1,118.3	0.0	0.0	0.0	0.0
1935	187.8	196.9	-4.3	1,134.3	0.0	0.0	0.0	0.0
1936	206.0	220.2	-3.9	1,205.6	0.0	0.0	0.0	0.0
1937	213.5	227.4	-1.7	1,208.0	156.1	74.1	151.5	68.6
1938	208.6	212.4	-1.5	1,163.5	139.6	65.6	135.8	61.0
1939	219.6	229.6	0.4	1,206.6	230.8	143.8	152.0	64.4
1940	229.7	243.8	5.8	1,284.8	256.9	157.9	255.8	156.0
1941	243.3	277.6	6.3	1,283.1	335.9	199.9	334.4	197.6
1942	241.4	317.8	9.9	NA	427.1	254.1	426.1	251.0
1943	247.9	331.7	12.5	NA	447.3	270.3	446.8	267.8
1944	255.1	343.4	14.3	NA	444.2	270.2	444.1	269.3
1945	271.0	338.1	8.5	NA	438.5	261.5	438.0	260.0
1946	300.9	332.5	4.0	1,456.9	453.6	252.6	452.5	251.4
1947	305.8	318.9	8.9	1,450.9	432.4	234.4	431.0	233.3
1948	312.1	335.7	17.8	1,508.9	452.5	239.5	450.7	239.0
1949	319.2	336.7	17.4	1,585.3	431.1	227.1	429.1	226.6
1950	337.4	363.1	12.7	1,640.1	477.4	246.4	474.6	245.4
1951	341.7	373.0	12.5	1,692.4	585.3	312.3	583.1	312.3
1952	350.2	383.4	13.2	1,756.8	612.9	324.9	608.2	324.1
1953	363.4	399.1	11.4	1,677.7	645.2	339.2	642.4	340.3
1954	370.2	403.6	13.2	1,727.3	639.1	337.1	635.5	338.0
1955	393.9	427.0	20.4	1,857.6	738.3	391.3	733.8	393.2
1956	405.5	446.5	16.3	1,981.9	793.5	419.5	788.8	422.6
1957	413.6	455.2	15.2	2,023.6	860.1	451.1	849.3	448.7
1958	418.3	461.0	11.9	2,055.5	876.7	467.7	847.0	448.5
1959	440.4	479.6	19.5	2,246.3	943.6	503.6	893.3	465.1
1960	452.0	489.7	16.8	2,360.7	979.0	527.0	908.0	469.1
1961	461.4	503.8	17.2	2,412.5	1,025.3	562.3	933.8	485.6
1962	482.0	524.8	24.7	2,569.7	1,134.9	643.9	1,004.0	529.8
1963	500.5	542.3	27.3	2,553.3	1,201.8	685.8	1,043.8	548.0
1964	528.0	580.9	31.5	2,738.2	1,334.2	771.2	1,129.6	590.6
1965	557.5	616.3	38.8	2,895.0	1,465.7	844.7	1,229.6	636.6
1966	585.7	646.9	40.3	3,000.0	1,611.5	927.5	1,331.3	680.9
1967	602.7	673.6	36.6	2,898.4	1,728.7	1,000.7	1,406.1	716.8
1968	634.4	701.2	33.0	3,077.1	1,847.4	1,073.4	1,479.5	749.8
1969	657.9	722.5	26.1	3,282.4	1,951.5	1,132.5	1,539.5	770.0
1970	672.1	751.6	16.0	3,216.2	2,065.8	1,205.8	1,606.4	807.1
1971	696.8	779.2	23.6	3,252.5	2,163.8	1,276.8	1,659.4	833.2
1972	737.1	810.4	30.5	3,385.5	2,331.3	1,377.3	1,762.3	878.8
1973	768.5	865.5	30.6	3,643.8	2,590.2	1,533.2	1,929.4	953.8
1974	763.6	858.4	11.5	3,547.2	2,615.6	1,556.6	1,912.5	945.9
1975	780.2	875.8	23.2	3,423.1	NA	NA	1,927.1	965.5
1976	823.7	907.3	28.0	3,745.8	NA	NA	2,031.5	1,012.3

Table A.1 (continued)

Data for Variables Excluding Leimer-Lesnoy SSW Variables

	YPRIV	Y	YP	YT	yp	yt	M1	M2	SUR	DUR
1929	229.5	238.2	238.2	0.0	1,954.7	0.0	74.2	129.8	2.7	87.0
1930	206.0	215.2	243.9	-28.6	1,976.2	-228.9	73.6	130.7	-0.9	91.9
1931	188.5	197.7	247.4	-49.6	1,980.5	-387.7	76.6	135.5	-9.2	92.6
1932	155.0	164.0	247.3	-83.2	1,956.5	-643.7	75.7	129.2	-6.3	90.7
1933	150.9	159.6	246.7	-87.2	1,930.1	-660.6	74.0	119.8	-5.1	86.2
1934	169.3	177.5	248.0	-70.5	1,919.1	-515.6	75.4	118.5	-8.3	82.2
1935	190.4	198.3	251.3	-53.0	1,924.4	-367.5	87.1	131.5	-6.8	78.9
1936	213.7	221.5	256.7	-35.2	1,946.3	-218.5	98.2	144.5	-10.4	77.8
1937	222.9	230.8	262.7	-31.8	1,972.7	-182.7	99.1	146.4	1.1	79.4
1938	208.2	216.4	266.8	-50.4	1,984.5	-319.4	99.4	148.2	-5.7	81.9
1939	227.2	235.3	272.5	-37.2	2,008.5	-212.6	112.0	161.5	-7.1	81.2
1940	246.4	254.8	279.8	-25.1	2,043.9	-115.6	128.3	178.6	-2.2	83.6
1941	280.6	289.4	287.6	1.8	2,082.1	87.5	140.1	188.3	-11.4	88.2
1942	325.5	334.4	296.0	38.4	2,122.8	356.6	150.8	193.9	-85.5	88.6
1943	342.9	351.5	304.8	46.7	2,165.3	405.5	180.1	224.2	-110.0	86.2
1944	355.4	363.6	314.1	49.5	2,210.1	417.4	201.3	251.9	-122.2	82.7
1945	344.5	352.5	324.0	28.4	2,257.2	261.6	225.0	287.1	-89.6	79.2
1946	333.5	341.3	334.5	6.8	2,307.0	106.8	222.7	290.2	11.3	77.4
1947	324.6	333.0	345.5	-12.5	2,357.1	-46.8	211.3	276.0	27.2	84.0
1948	349.8	359.2	358.3	0.9	2,417.3	32.7	200.6	264.5	15.1	94.1
1949	350.0	360.5	370.5	-10.0	2,469.4	-53.1	199.2	264.3	-6.0	104.9
1950	371.0	382.8	384.1	-1.3	2,528.2	-4.8	200.6	265.0	14.1	117.1
1951	380.8	394.2	397.9	-3.6	2,585.5	-30.3	196.7	258.2	10.0	134.0
1952	391.4	406.0	411.9	-5.9	2,641.4	-54.9	202.0	266.0	-6.1	146.1
1953	404.0	419.5	426.4	-6.9	2,697.3	-68.1	203.1	270.9	-11.0	155.0
1954	410.1	426.6	440.6	-14.0	2,748.5	-121.3	204.5	278.1	-11.2	165.9
1955	439.8	457.3	457.0	0.3	2,809.7	-43.0	208.8	285.2	4.9	174.5
1956	454.3	473.0	473.8	-0.8	2,870.6	-58.7	207.3	284.9	7.9	187.5
1957	461.7	481.3	490.3	-9.0	2,926.6	-116.4	201.7	282.9	1.4	196.4
1958	464.2	484.6	506.1	-21.5	2,975.4	-192.9	199.9	290.6	-18.2	203.3
1959	489.9	510.5	523.4	-12.9	3,029.1	-159.4	203.6	298.3	-2.2	205.8
1960	496.1	517.3	540.2	-22.9	3,077.8	-216.0	199.6	295.7	4.3	211.5
1961	510.2	531.9	557.3	-25.4	3,126.0	-230.9	201.8	308.1	-5.9	217.0
1962	538.3	560.3	576.2	-15.9	3,181.2	-178.5	203.2	321.1	-5.1	219.7
1963	557.0	579.7	595.7	-16.1	3,238.0	-175.8	205.9	336.7	1.0	226.5
1964	598.4	622.1	618.2	3.9	3,308.3	-67.0	211.3	353.1	-3.0	236.5
1965	639.9	664.9	643.5	21.4	3,391.0	30.1	216.5	374.7	0.7	249.6
1966	671.3	698.1	670.4	27.8	3,480.2	70.7	220.2	392.7	-1.6	268.3
1967	693.7	722.7	697.9	24.8	3,571.0	65.3	223.5	412.9	-17.5	289.9
1968	717.0	747.9	726.2	21.8	3,663.6	62.1	230.2	432.5	-7.0	309.4
1969	729.9	763.3	754.0	9.2	3,752.9	12.0	233.6	440.8	11.2	334.0
1970	748.4	784.1	782.2	1.9	3,841.3	-15.1	231.9	438.9	-11.4	356.9
1971	783.9	821.2	812.1	9.1	3,936.7	28.8	237.2	469.6	-20.2	372.9
1972	820.3	859.6	843.9	15.8	4,039.6	75.9	245.0	500.9	-3.3	393.4
1973	873.8	915.8	879.2	36.8	4,158.1	193.9	249.2	519.7	7.4	420.8
1974	847.9	893.2	909.9	-16.4	4,253.5	-39.3	238.8	511.9	-4.1	453.0
1975	878.8	926.0	941.9	-15.4	4,353.6	-17.8	231.6	512.4	-51.0	472.0
1976	914.4	963.2	975.4	-11.7	4,459.8	15.7	231.8	535.3	-27.7	487.6

Table A.1 (continued)

Data for Variables Excluding Leimer-Lesnoy SSW Variables

	RD	RU^d	LF65	PD/PND	R	N	PC
1929	3.228	3.228	NA	1.262	3.600	121.900	0.359
1930	8.897	8.900	0.540	1.260	3.290	123.200	0.350
1931	16.174	16.174	0.530	1.235	3.340	124.100	0.315
1932	23.953	23.953	0.520	1.214	3.680	124.900	0.279
1933	25.092	24.171	0.511	1.228	3.310	125.700	0.269
1934	21.846	17.078	0.501	1.216	3.120	126.500	0.290
1935	20.189	15.289	0.491	1.166	2.790	127.400	0.297
1936	16.936	10.085	0.481	1.151	2.650	128.200	0.301
1937	14.236	9.231	0.471	1.158	2.680	129.000	0.312
1938	18.935	12.425	0.462	1.197	2.560	130.000	0.307
1939	17.054	11.269	0.452	1.199	2.360	131.000	0.305
1940	14.454	9.484	0.442	1.211	2.210	132.100	0.309
1941	9.665	5.854	0.460	1.233	1.950	133.400	0.332
1942	4.405	2.900	0.478	1.205	2.460	134.900	0.367
1943	1.657	1.526	0.495	1.178	2.470	136.700	0.401
1944	1.015	1.015	0.509	1.224	2.480	138.400	0.424
1945	1.593	1.593	0.508	1.277	2.370	139.900	0.441
1946	3.723	3.723	0.474	1.336	2.190	141.389	0.478
1947	3.815	3.815	0.478	1.323	2.250	144.126	0.529
1948	3.666	3.666	0.468	1.294	2.440	146.631	0.560
1949	5.782	5.782	0.469	1.307	2.310	149.188	0.558
1950	5.149	5.149	0.458	1.320	2.320	151.684	0.569
1951	3.156	3.156	0.449	1.302	2.570	154.287	0.606
1952	2.865	2.865	0.426	1.274	2.680	156.954	0.620
1953	2.755	2.755	0.416	1.258	2.950	159.565	0.632
1954	5.272	5.272	0.405	1.204	2.550	162.391	0.637
1955	4.190	4.190	0.396	1.206	2.840	165.275	0.644
1956	3.962	3.962	0.400	1.215	3.080	168.221	0.656
1957	4.100	4.100	0.375	1.225	3.470	171.274	0.678
1958	6.549	6.549	0.356	1.200	3.430	174.141	0.692
1959	5.273	5.273	0.342	1.217	4.070	177.073	0.706
1960	5.339	5.339	0.331	1.192	4.020	180.671	0.719
1961	6.455	6.455	0.317	1.184	3.900	183.691	0.726
1962	5.325	5.325	0.303	1.183	3.950	186.538	0.737
1963	5.458	5.458	0.284	1.176	4.000	189.242	0.748
1964	4.993	4.993	0.280	1.172	4.150	191.889	0.759
1965	4.361	4.361	0.279	1.146	4.210	194.303	0.772
1966	3.644	3.644	0.270	1.108	4.650	196.560	0.794
1967	3.682	3.682	0.277	1.098	4.850	198.712	0.813
1968	3.424	3.424	0.273	1.090	5.260	200.706	0.846
1969	3.362	3.362	0.272	1.065	6.120	202.677	0.884
1970	4.759	4.759	0.268	1.040	6.580	204.878	0.925
1971	5.744	5.744	0.255	1.031	5.740	207.053	0.965
1972	5.439	5.439	0.244	1.000	5.640	208.846	1.000
1973	4.728	4.728	0.228	0.955	6.310	210.400	1.057
1974	5.444	5.444	0.224	0.919	6.980	211.900	1.163
1975	8.260	8.260	0.217	0.928	7.000	213.600	1.252
1976	7.520	7.520	0.203	0.932	6.790	215.200	1.316

Table A.2

Social Security Wealth for Alternative Perceptions: Leimer-Lesnoy Algorithm

	Gross SSW					Net SSW					
	Constant Ratio	Current Ratio	Adaptive Expectations	Perfect Foresight	Actuarial Projection	Constant Ratio	Current Ratio	Adaptive Expectations	Perfect Foresight	Actuarial/ Legislated	Constant R./ Perfect F.
1929	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1930	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1931	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1932	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1933	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1934	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1935	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1936	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1937	134.9	136.6	136.6	148.0	180.8	49.3	103.4	103.4	88.5	103.9	75.4
1938	130.9	132.6	132.6	141.5	176.9	51.9	103.4	102.6	84.0	106.6	73.4
1939	146.2	148.1	148.1	160.4	199.1	58.4	115.3	115.1	93.9	117.5	79.7
1940	245.5	248.1	248.1	263.8	301.2	149.1	212.2	212.0	187.6	211.2	169.3
1941	263.9	243.1	255.0	287.0	293.8	151.8	200.1	212.5	194.7	182.3	171.5
1942	284.6	241.7	258.4	309.1	262.2	156.5	192.0	209.2	197.3	127.9	172.8
1943	319.2	241.6	265.7	343.2	260.8	179.7	182.1	209.2	213.4	97.3	189.3
1944	343.3	240.5	263.1	372.8	258.2	202.9	176.9	203.0	235.3	80.5	205.8
1945	336.4	245.3	251.6	368.5	262.4	204.5	189.0	195.2	235.5	102.6	203.4
1946	340.8	238.8	246.9	377.3	284.0	208.5	184.3	191.4	241.9	128.7	205.4
1947	369.6	230.9	249.4	409.9	272.3	229.9	170.2	189.7	261.4	97.9	221.0
1948	395.3	231.8	249.3	439.7	271.2	249.1	167.4	185.9	278.1	151.6	233.7
1949	416.6	249.5	256.2	461.5	289.4	271.2	185.8	192.8	294.4	168.2	249.5
1950	445.3	294.0	284.0	505.8	337.5	290.4	191.9	199.2	321.0	204.6	260.6
1951	643.5	441.6	425.8	722.1	498.1	450.4	316.0	310.2	477.9	285.3	399.3
1952	684.1	607.9	530.5	768.5	679.4	482.1	473.4	402.7	505.1	445.9	420.7
1953	734.9	684.2	627.4	823.5	790.7	521.2	540.2	487.8	536.4	534.1	447.9
1954	769.3	760.9	708.7	866.8	861.9	556.3	572.3	544.8	571.8	603.3	474.3
1955	871.4	946.3	874.5	981.7	1,216.9	629.4	738.7	677.6	638.7	901.0	528.4
1956	948.2	967.2	959.2	1,078.5	1,190.5	686.1	741.4	739.7	698.1	839.3	567.8
1957	998.3	991.9	1,001.0	1,135.0	1,171.0	726.0	762.9	772.4	731.6	808.4	594.9
1958	1,035.1	1,097.4	1,067.5	1,183.0	1,244.3	760.6	871.8	839.5	766.0	878.2	618.0
1959	1,099.6	1,219.8	1,176.7	1,254.7	1,369.1	809.7	947.0	920.0	803.2	911.3	648.0
1960	1,149.6	1,248.4	1,239.1	1,316.3	1,388.1	851.8	906.7	936.4	842.2	908.3	675.5
1961	1,187.5	1,222.4	1,250.8	1,379.9	1,345.5	885.9	875.6	924.1	892.4	850.8	700.0
1962	1,280.0	1,306.9	1,327.5	1,488.7	1,366.9	959.3	921.0	960.8	961.9	812.1	753.2
1963	1,329.0	1,359.5	1,368.9	1,543.9	1,436.8	996.5	888.8	943.5	990.0	851.0	775.1
1964	1,405.0	1,401.4	1,424.3	1,633.6	1,496.0	1,052.3	900.7	948.3	1,040.9	866.8	812.3
1965	1,468.3	1,499.3	1,493.9	1,711.5	1,617.0	1,095.0	969.0	976.8	1,079.1	943.6	835.9
1966	1,547.7	1,594.8	1,584.6	1,819.7	1,868.5	1,148.1	1,003.0	1,012.1	1,137.0	1,141.8	864.9
1967	1,623.7	1,566.6	1,614.5	1,912.9	1,819.6	1,202.7	935.6	997.4	1,188.5	1,048.4	899.3
1968	1,693.7	1,787.9	1,736.0	1,998.3	2,059.2	1,255.3	1,168.6	1,105.1	1,239.0	1,245.9	934.4
1969	1,755.9	1,785.4	1,792.6	2,082.9	2,134.3	1,299.8	1,058.8	1,101.1	1,285.7	1,272.4	958.7
1970	1,799.4	2,040.5	1,939.0	2,153.8	2,424.9	1,334.4	1,315.3	1,224.0	1,337.8	1,554.8	983.3
1971	1,849.2	2,258.1	2,125.3	2,224.0	2,671.5	1,377.8	1,442.9	1,355.2	1,392.3	1,783.0	1,017.5
1972	1,957.8	2,410.2	2,330.0	2,394.2	2,835.0	1,458.9	1,554.5	1,494.6	1,513.3	1,872.5	1,076.8
1973	2,057.9	2,719.5	2,584.3	2,485.7	2,705.6	1,538.3	1,770.9	1,675.0	1,566.9	1,761.4	1,139.0
1974	2,030.1	2,891.2	2,720.4	2,485.8	2,916.7	1,521.1	1,945.0	1,801.9	1,586.8	1,978.6	1,131.1
1975	2,018.9	2,982.2	2,843.1	2,482.4	3,050.6	1,518.7	2,069.3	1,935.4	1,601.1	2,144.9	1,137.7
1976	2,126.0	3,094.5	3,044.1	2,606.8	3,210.0	1,597.6	2,134.5	2,084.7	1,677.3	2,257.0	1,196.6

Appendix B

Table B.1.--Consumer Expenditure Functions Estimated Using Feldstein Replica SSW Variables with Alternative Perceptions: Feldstein Specification 1930-1976 excluding 1941-1946*

Equation	SSW Concept	Perception	SSW	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(B.1.1)	Gross	Constant benefit ratio (Feldstein perception)	.005 (.39)	.713 (11.41)	.093 (1.79)	.062 (.67)	.009 (1.36)	168 (2.67)	.9987	23,330	1.38
(B.1.2)	Gross	Current benefit ratio	.000 (.02)	.724 (11.77)	.098 (1.94)	.080 (.90)	.009 (1.33)	147 (2.59)	.9987	23,430	1.38
(B.1.3)	Gross	Adaptive expectations	.001 (.26)	.719 (11.96)	.098 (1.94)	.086 (1.00)	.008 (1.23)	159 (2.68)	.9987	23,390	1.37
(B.1.4)	Gross	Perfect foresight	.006 (.67)	.703 (11.03)	.090 (1.73)	.059 (.67)	.009 (1.36)	188 (2.72)	.9987	23,130	1.37
(B.1.5)	Gross	Actuarial projection	.001 (.20)	.720 (11.92)	.098 (1.94)	.083 (.98)	.009 (1.32)	154 (3.09)	.9987	23,400	1.36
(B.1.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.005 (-.32)	.731 (12.24)	.102 (1.97)	.091 (1.01)	.009 (1.38)	126 (1.84)	.9987	23,360	1.39
(B.1.7)	Net	Benefits: current ratio Taxes: current ratio	-.002 (-.33)	.730 (12.48)	.100 (1.97)	.074 (.88)	.008 (1.28)	137 (3.57)	.9987	23,360	1.40
(B.1.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.000 (-.08)	.726 (12.64)	.099 (1.94)	.079 (.96)	.009 (1.34)	144 (3.55)	.9987	23,430	1.38
(B.1.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	.007 (.49)	.711 (11.43)	.092 (1.76)	.062 (.70)	.009 (1.36)	174 (2.70)	.9987	23,270	1.37
(B.1.10)	Net	Benefits: actuarial projection Taxes: legislated	.000 (.07)	.723 (11.87)	.098 (1.95)	.081 (.94)	.009 (1.33)	148 (3.66)	.9987	23,430	1.37
(B.1.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.001 (-.07)	.726 (12.21)	.099 (1.89)	.083 (.83)	.009 (1.33)	143 (2.79)	.9987	23,430	1.38

*The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table B.2.--Consumer Expenditure Functions Estimated Using Feldstein Replica SSW Variables with Alternative Perceptions; Feldstein Specification 1947-1976

Equation	SSW Concept	Perception	SSW	YD	YD_{-1}	RE	W	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(B.2.1)	Gross	Constant benefit ratio (Feldstein perception)	-.068 (-2.81)	.788 (8.18)	.215 (2.49)	.190 (1.13)	.022 (2.20)	-188 (-1.60)	.9981	13,610	1.71
(B.2.2)	Gross	Current benefit ratio	-.006 (-.98)	.682 (6.92)	.174 (1.81)	.166 (.84)	.010 (.98)	69 (.95)	.9975	17,390	1.50
(B.2.3)	Gross	Adaptive expectations	-.005 (-.86)	.673 (6.88)	.178 (1.83)	.190 (.98)	.010 (1.00)	71 (.92)	.9975	17,550	1.46
(B.2.4)	Gross	Perfect foresight	-.041 (-2.13)	.763 (7.49)	.215 (2.33)	.176 (.98)	.019 (1.78)	-148 (-1.10)	.9978	15,210	1.70
(B.2.5)	Gross	Actuarial projection	-.004 (-.74)	.678 (6.81)	.169 (1.75)	.194 (.99)	.009 (.88)	92 (1.47)	.9975	17,690	1.55
(B.2.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.072 (-2.95)	.738 (8.37)	.201 (2.38)	.215 (1.30)	.024 (2.37)	-140 (-1.45)	.9981	13,280	1.66
(B.2.7)	Net	Benefits: current ratio Taxes: current ratio	-.006 (-.92)	.676 (6.90)	.170 (1.77)	.168 (.84)	.008 (.86)	102 (2.16)	.9975	17,480	1.50
(B.2.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.005 (-.76)	.667 (6.84)	.172 (1.78)	.188 (.96)	.009 (.92)	103 (2.05)	.9975	17,670	1.46
(B.2.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.050 (-1.86)	.730 (7.38)	.208 (2.22)	.196 (1.08)	.016 (1.53)	-71 (-.63)	.9977	15,810	1.66
(B.2.10)	Net	Benefits: actuarial projection Taxes: legislated	-.003 (-.48)	.676 (6.63)	.165 (1.69)	.197 (.99)	.007 (.74)	115 (2.38)	.9974	17,920	1.49
(B.2.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.103 (-2.78)	.744 (8.22)	.207 (2.40)	.233 (1.38)	.019 (1.98)	-80 (-.98)	.9981	13,690	1.65

Figures in parentheses are t-statistics.

Appendix C

Table C.1.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification (per capita)

1930-76 excluding 1941-46*

Equation	SSW Concept	Perception	SSW	YP	YT	Δ M1	DUR	$\frac{PCD}{PCN}$	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(C.1.1)	Gross	Constant benefit ratio (Feldstein perception)	-.025	.840	.579	.156	-.036	-.166	.034	124	.999	19,960	1.78
			(-3.01)	(11.38)	(12.95)	(3.13)	(-.53)	(-1.37)	(2.59)	(.71)			
(C.1.2)	Gross	Current benefit ratio	-.016	.729	.559	.188	.092	-.311	.033	401	.999	23,190	1.60
			(-1.79)	(12.11)	(10.97)	(3.58)	(1.25)	(-2.20)	(2.08)	(2.62)			
(C.1.3)	Gross	Adaptive expectations	-.013	.730	.565	.175	.057	-.281	.036	388	.999	24,070	1.59
			(-1.37)	(10.26)	(10.89)	(3.23)	(.82)	(-1.98)	(2.20)	(2.46)			
(C.1.4)	Gross	Perfect foresight	-.023	.840	.581	.156	-.031	-.189	.036	143	.999	20,920	1.77
			(-2.67)	(10.36)	(12.70)	(3.06)	(-.44)	(-1.53)	(2.65)	(.80)			
(C.1.5)	Gross	Actuarial projection	-.008	.694	.579	.187	.060	-.252	.042	400	.999	24,330	1.70
			(-1.23)	(12.55)	(11.60)	(3.46)	(.84)	(-1.83)	(2.82)	(2.53)			
(C.1.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.039	.882	.568	.132	-.046	-.126	.031	20	.999	18,120	1.86
			(-3.65)	(12.04)	(13.23)	(2.70)	(-.71)	(-1.08)	(2.43)	(.12)			
(C.1.7)	Net	Benefits: current ratio Taxes: current ratio	-.019	.698	.541	.204	.131	-.280	.028	396	.999	21,830	1.60
			(-2.34)	(15.36)	(10.61)	(3.96)	(1.72)	(-2.16)	(1.78)	(2.66)			
(C.1.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.017	.716	.546	.184	.083	-.257	.030	373	.999	22,910	1.57
			(-1.91)	(13.32)	(10.36)	(3.52)	(1.17)	(-1.96)	(1.85)	(2.42)			
(C.1.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.039	.856	.569	.157	-.013	-.181	.029	108	.999	19,920	1.77
			(-3.02)	(10.98)	(12.61)	(3.16)	(-.20)	(-1.50)	(2.07)	(.62)			
(C.1.10)	Net	Benefits: actuarial projection Taxes: legislated	-.012	.671	.569	.199	.110	-.260	.037	423	.999	23,920	1.69
			(-1.45)	(14.97)	(11.24)	(3.68)	(1.30)	(-1.91)	(2.36)	(2.73)			
(C.1.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.047	.849	.563	.158	-.015	-.139	.025	80	.999	18,220	1.79
			(-3.62)	(12.85)	(13.02)	(3.33)	(-.24)	(-1.19)	(1.90)	(.49)			

*The years 1941-46 are excluded. The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table C.2.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification (per capita) 1947-1976

Equation	SSW Concept	Perception	SSW	YP	YT	M1	DUR	$\frac{PCD}{PCN}$	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(C.2.1)	Gross	Constant benefit ratio (Feldstein perception)	.003 (.40)	1.089 (17.54)	.348 (5.91)	.738 (7.00)	-.106 (-1.95)	.572 (2.79)	.006 (.57)	-2,216 (-5.00)	.999	5,608	2.44
(C.2.2)	Gross	Current benefit ratio	-.006 (-.79)	1.104 (17.76)	.342 (6.03)	.693 (8.98)	-.084 (-1.37)	.489 (2.31)	.003 (.33)	-2,072 (-4.96)	.999	5,492	2.48
(C.2.3)	Gross	Adaptive expectations	-.002 (-.28)	1.101 (16.21)	.351 (5.96)	.702 (8.81)	-.103 (-1.82)	.533 (2.53)	.005 (.47)	-2,131 (-5.12)	.999	5,628	2.45
(C.2.4)	Gross	Perfect foresight	.003 (.43)	1.084 (16.91)	.348 (6.00)	.737 (7.29)	-.105 (-1.93)	.573 (2.80)	.006 (.58)	-2,209 (-5.10)	.999	5,601	2.43
(C.2.5)	Gross	Actuarial projection	.003 (.64)	1.091 (17.93)	.357 (6.61)	.725 (9.14)	-.121 (-2.10)	.583 (2.87)	.007 (.68)	-2,208 (-5.28)	.999	5,544	2.45
(C.2.6)	Net	Benefits: constant ratio Taxes: constant ratio	.003 (.31)	1.089 (17.47)	.351 (6.06)	.732 (6.76)	-.106 (-1.95)	.569 (2.76)	.006 (.60)	-2,203 (-4.94)	.999	5,624	2.44
(C.2.7)	Net	Benefits: current ratio Taxes: current ratio	-.007 (-.99)	1.085 (17.92)	.334 (5.77)	.692 (9.12)	-.065 (-.97)	.499 (2.47)	.003 (.27)	-2,052 (-4.95)	.999	5,405	2.49
(C.2.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.003 (-.35)	1.095 (17.77)	.346 (5.63)	.701 (8.89)	-.097 (-1.59)	.535 (2.62)	.005 (.43)	-2,122 (-5.08)	.999	5,616	2.45
(C.2.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	.003 (.20)	1.089 (16.90)	.354 (6.29)	.722 (7.04)	-.108 (-1.99)	.562 (2.74)	.006 (.63)	-2,177 (-5.00)	.999	5,638	2.44
(C.2.10)	Net	Benefits: actuarial projection Taxes: legislated	.003 (.58)	1.101 (17.62)	.360 (6.62)	.719 (9.29)	-.133 (-1.91)	.580 (2.85)	.008 (.74)	-2,211 (-5.24)	.999	5,562	2.46
(C.2.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	.002 (.11)	1.092 (17.75)	.355 (6.20)	.718 (6.50)	-.108 (-1.98)	.558 (2.71)	.006 (.62)	-2,172 (-4.76)	.999	5,645	2.44

Figures in parentheses are t-statistics.

Table C.3.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification (Per Capita)

1930-76 excluding 1941-46*

Equation	SSW Concept	Perception	SSW	YP	YT	M2	DUR	$\frac{PCD}{PCN}$	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(C.3.1)	Gross	Constant benefit ratio (Feldstein perception)	-.003 (-.33)	.639 (8.40)	.484 (11.24)	.239 (5.63)	.022 (.39)	-.106 (-1.20)	.026 (2.73)	236.4 (1.67)	.9992	13,200	1.90
(C.3.2)	Gross	Current benefit ratio	-.001 (-.07)	.620 (12.31)	.480 (11.54)	.246 (6.87)	.031 (.56)	-.114 (-1.20)	.027 (2.36)	265.8 (2.46)	.9992	13,240	1.90
(C.3.3)	Gross	Adaptive expectations	.003 (.43)	.595 (10.17)	.482 (11.62)	.254 (6.81)	.025 (.48)	-.093 (-.97)	.030 (2.72)	273.9 (2.53)	.9992	13,170	1.91
(C.3.4)	Gross	Perfect foresight	-.001 (-.09)	.623 (7.73)	.481 (11.18)	.245 (5.82)	.027 (.49)	-.110 (-1.27)	.027 (2.84)	258.6 (1.82)	.9992	13,240	1.90
(C.3.5)	Gross	Actuarial projection	.005 (1.01)	.584 (12.98)	.476 (11.63)	.260 (7.23)	.016 (.31)	-.091 (-1.04)	.032 (3.24)	284.8 (2.65)	.9992	12,850	1.89
(C.3.6)	Net	Benefits: constant ratio Taxes: constant ratio	-.010 (-.84)	.681 (8.28)	.489 (11.56)	.221 (4.83)	.009 (.16)	-.093 (-1.05)	.024 (2.58)	175.6 (1.16)	.9992	12,970	1.91
(C.3.7)	Net	Benefits: current ratio Taxes: current ratio	-.004 (-.56)	.629 (16.49)	.476 (11.42)	.242 (6.92)	.047 (.79)	-.117 (-1.35)	.023 (1.95)	256.9 (2.37)	.9992	13,120	1.88
(C.3.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	-.000 (-.01)	.617 (13.55)	.480 (11.39)	.247 (6.74)	.030 (.55)	-.111 (-1.26)	.027 (2.31)	266.4 (2.42)	.9992	13,240	1.90
(C.3.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	-.005 (-.42)	.647 (8.12)	.483 (11.49)	.237 (5.66)	.023 (.43)	-.106 (-1.22)	.025 (2.42)	226.6 (1.57)	.9992	13,180	1.90
(C.3.10)	Net	Benefits: actuarial projection Taxes: legislated	.004 (.58)	.607 (17.20)	.480 (11.67)	.252 (7.20)	.008 (.13)	-.103 (-1.18)	.031 (2.80)	272.0 (2.53)	.9992	13,110	1.91
(X.3.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	-.011 (-.83)	.670 (9.37)	.487 (11.64)	.226 (5.38)	.017 (.33)	-.091 (-1.03)	.023 (2.15)	189.1 (1.33)	.9992	12,980	1.89

*The years 1941-46 are excluded. The Durbin-Watson statistic is adjusted for this gap.
Figures in parentheses are t-statistics.

Table C.4.--Consumer Expenditure Functions Estimated Using Leimer-Lesnoy SSW Variables with Alternative Perceptions: Darby Specification (Per Capita)

1947-76

Equation	SSW Concept	Perception	SSW	YP	YT	M2	DUR	PCD/PCN	R	Constant	$\bar{R}^2$	Sum of Squared Residuals	Durbin-Watson Statistic
(C.4.1)	Gross	Constant benefit ratio (Feldstein perception)	.015 (1.37)	.617 (7.51)	.338 (4.88)	.399 (5.91)	.103 (1.62)	.553 (2.41)	.015 (1.37)	-944.7 (-2.44)	.9989	6,992	2.11
(C.4.2)	Gross	Current benefit ratio	-.003 (-.30)	.708 (14.09)	.380 (5.75)	.321 (7.29)	.077 (1.03)	.440 (1.85)	.015 (1.22)	-810.5 (-2.00)	.9988	7,559	2.07
(C.4.3)	Gross	Adaptive expectations	.004 (.43)	.686 (9.60)	.397 (6.06)	.333 (7.25)	.058 (.96)	.497 (2.05)	.018 (1.47)	-857.5 (-2.17)	.9988	7,525	2.04
(C.4.4)	Gross	Perfect foresight	.015 (1.44)	.604 (6.93)	.341 (5.05)	.396 (6.22)	.104 (1.65)	.553 (2.43)	.015 (1.41)	-911.7 (-2.39)	.9989	6,938	2.10
(C.4.5)	Gross	Actuarial projection	.011 (2.15)	.670 (13.69)	.372 (6.57)	.371 (8.45)	.025 (.44)	.597 (2.75)	.018 (1.74)	-1,014.9 (-2.76)	.9990	6,267	2.19
(C.4.6)	Net	Benefits: constant ratio Taxes: constant ratio	.019 (1.28)	.616 (7.09)	.346 (5.08)	.398 (5.65)	.104 (1.59)	.554 (2.38)	.016 (1.46)	-936.2 (-2.41)	.9989	7,067	2.12
(C.4.7)	Net	Benefits: current ratio Taxes: current ratio	-.003 (-.30)	.708 (14.09)	.380 (5.75)	.321 (7.29)	.077 (1.03)	.440 (1.85)	.015 (1.22)	-810.5 (-2.00)	.9988	7,559	2.07
(C.4.8)	Net	Benefits: adaptive expectations Taxes: adaptive expectations	.001 (.14)	.705 (12.82)	.392 (5.65)	.327 (7.27)	.059 (.91)	.468 (1.99)	.017 (1.34)	-846.9 (-2.12)	.9988	7,583	2.05
(C.4.9)	Net	Benefits: perfect foresight Taxes: perfect foresight	.020 (1.16)	.621 (6.90)	.359 (5.52)	.384 (5.86)	.086 (1.42)	.538 (2.32)	.018 (1.61)	-899.9 (-2.33)	.9989	7,154	2.08
(C.4.10)	Net	Benefits: actuarial projection Taxes: legislated	.012 (1.79)	.716 (15.15)	.388 (6.72)	.354 (8.30)	-.019 (-.26)	.573 (2.57)	.021 (1.90)	-1,029.8 (-2.68)	.9990	6,626	2.18
(C.4.11)	Net	Benefits: constant ratio Taxes: perfect foresight (Feldstein perception)	.020 (1.00)	.644 (7.94)	.358 (5.32)	.385 (5.29)	.082 (1.35)	.533 (2.27)	.018 (1.57)	-939.8 (-2.36)	.9989	7,259	2.09

Figures in parentheses are t-statistics.

APPENDIX D

The Use of Micro-Data to Infer Macro Effects of Social Security

In the final footnote to his monograph challenging Feldstein's time series analysis, Robert Barro [1978] argues that aggregate effects of social security wealth cannot be inferred from cross-section studies of households.

> "The problem of drawing inferences about aggregate saving effects of social security from a household cross section from a single country at a single point in time may be a fundamental one. Suppose that within a given group, individuals differ cross-sectionally in the anticipated value of the direct social security benefits less taxes, SSW_i, they expected to receive (this assumption is necessary if social security effects are to be isolated from cross-section data); but suppose that these same individuals are otherwise identical--including the anticipated manner in which their children (and, to keep things simple, also their parents) are treated by social security. Where all individuals are connected to subsequent and previous generations by operative intergenerational transfers (either child-to-parent transfers or bequests), the consumption of the i^{th} individual in the group, C_i, would depend on $SSW_i - \overline{SSW}$, where $\overline{SSW}$ represents the average individual value of social security wealth. Essentially, $\overline{SSW}$ reflects the i^{th} individual's (equal) indirect share--which works through the connection to children and parents--of the liability for financing the social security system. If all individuals had the same value of social security wealth, then $SSW_i = \overline{SSW}$ and all consumption choices would be invariant with social security. (I am neglecting any induced retirement effects here.) If individuals are treated differently with respect to social security benefits, the program has aspects of an income redistribution scheme--notably, individuals with higher values of SSW_i would, other things equal, choose higher values of C_i. Correspondingly, they would accumulate less savings over their working years (before any social security benefits were received). However, a positive cross-sectional relation between C_i and SSW_i or a negative cross-sectional relation between accumulated pre-retirement savings and SSW_i provides no evidence on the aggregate consumption or saving effects of social security. This cross-sectional relation was claimed to have been found in empirical studies by Alicia H. Munnell, "Private Pensions and Saving: New Evidence," Journal of Political Economy, vol. 84 (October 1976), pp. 1013-32, and Martin Feldstein and Anthony Pellechio, "Social Security and Household Wealth Accumulation: New Microeconomic Evidence," National Bureau of Economic Research Working Paper No. 206, 1977. This aggregate effect involves simultaneous increases in $\overline{SSW}$ and each of the SSW_i, which would leave all the C_i unchanged in the context where $SSW_i - \overline{SSW}$ is the relevant spending determinant. A test for aggregate consumption effects of social security requires sample variation in $\overline{SSW}$, but this variation is absent in a cross section of households in a single country at a single point in time..."

This appendix examines some of the arguments surrounding the question of whether the aggregate effects of social security wealth can be inferred from cross section studies. We draw on an earlier theoretical article by Barro [1974] and on an article by Martin Feldstein and Anthony Pellechio [1977].

Assume for simplicity that each individual's consumption may be represented by the same Ando-Modigliani function.

$$C_{it} = \alpha_0 + \alpha_1 Y_{it} + \alpha_2 W_{it} \quad , \qquad \text{(D1)}$$

where, for the i^{th} individual in period t, C_{it} is consumption, Y_{it} is expected lifetime labor income, and W_{it} reflects the individual's current wealth.[1] Suppose further that wealth can be defined as

$$W_{it} = A_{it} - B_{it} + \lambda SSW_{it} \quad , \qquad \text{(D2)}$$

where A_{it} is fungible net assets, B_{it} is the present value of planned (net) bequests,[2] and SSW_{it} is net social security wealth. The coefficient λ measures the substitutability of social security wealth for fungible wealth. If they are perfect substitutes, then $\lambda=1$; if social security wealth is a poor substitute for fungible wealth, then $\lambda<1$; and if social security wealth has advantages, $\lambda<1$. Assume for simplicity that λ is constant across individuals and time.

We can further generalize the specification to allow for Barro's argument that the existence of net social security wealth implies a future liability which individuals may adjust for in planning their bequests. Specifically, assume that there is an operative bequest motive--that is, individuals plan to leave positive bequests to their heirs--and that

$$B_{it} = B^*_{it} + \sigma SSL_{it} \quad , \qquad \text{(D3)}$$

where B^*_{it} is the present value of the (net) bequests planned by the individual in the absence of social security, SSL_{it} is the share of social security liability which the individual perceives will be borne by his heirs, and σ is the fraction ($0 \leq \sigma \leq 1$) of that liability which the individual plans to offset in his bequest. Again, we assume σ is constant across individuals and time. Under the strict Barro argument, $\sigma=1$.

Using the assumptions embedded in equations (D2) and (D3), we can rewrite the generalized micro consumption function as

$$C_{it} = \alpha_0 + \alpha_1 Y_{it} + \alpha_2 (A_{it} - B^*_{it}) + \alpha_2 \lambda SSW_{it} - \alpha_2 \sigma SSL_{it} \quad . \qquad (D4)$$

Since all the parameters are assumed to be constant across individuals and time, the macro relationship corresponding to (D4) is easily obtained by aggregating across all individuals:

$$\sum_i C_{it} = \alpha_0 \sum_i 1 + \alpha_1 \sum_i Y_{it} + \alpha_2 \sum_i (A_{it} - B^*_{it}) + \alpha_2 \lambda \sum_i SSW_{it} - \alpha_2 \sigma \sum_i SSL_{it} \ , \qquad (D5)$$

or

$$C_t = A_0 + \alpha_1 Y_t + \alpha_2 (A_t - B^*_t) + \alpha_2 \lambda SSW_t - \alpha_2 \sigma SSL_t \ , \qquad (D6)$$

where the time-subscripted variables in equation (D6) represent aggregates. This equation can be further simplified since $SSL_t = SSW_t$ in the aggregate, i.e.,

$$C_t = A_0 + \alpha_1 Y_t + \alpha_2 (A_t - B^*_t) + \alpha_2 (\lambda - \sigma) SSW_t \quad . \qquad (D7)$$

If we abstract from the specification bias introduced by the absence of data on planned bequests (B^*),[3/] the estimated coefficient of SSW in an aggregate equation such as (D7) is therefore an estimate of $\alpha_2(\lambda-\sigma)$. This reflects the net effect of social security wealth, including both the "asset substitution" effect and the offsetting "liability" effect. Whether or not the corresponding parameters can be estimated from cross-section data using a micro relationship such as (D4) depends on the assumptions made concerning individual perceptions of the social security liability faced by their heirs.

Barro assumes that although individuals have varying amounts of social security wealth, they are identical in the way they anticipate that their children (and parents) will be treated by social security. That is, each individual assumes that his heirs' share of the aggregate social security liability is independent of his own social security wealth. Specifically,

$$SSL_{it} = \overline{SSL}_t = \overline{SSW}_t \quad ; \tag{D8}$$

each individual assumes that his heirs' social security liability is equal to the average social security liability and, therefore, equal to average social security wealth. Under this assumption, the micro consumption function can be written as

$$C_{it} = [\alpha_0 - \alpha_2\sigma\overline{SSW}_t] + \alpha_1 Y_{it} + \alpha_2(A_{it} - B^*_{it}) + \alpha_2\lambda SSW_{it}. \tag{D9}$$

Thus, the estimated coefficient of SSW in a cross-section regression would reflect only the "asset substitution" effect of social security wealth, and the "liability" effect would be reflected in the estimated constant. Without further information, then, the net (or aggregate) effect of social security wealth cannot be determined from cross-section estimates.

If Barro's assumption were the only valid one, then his conclusion— that the aggregate effect of social security on saving cannot be inferred from cross-section data—would be correct. There is, however, an alternative assumption which both appears reasonable and also leads to a different conclusion.

Feldstein-Pellechio hypothesize that each individual assumes that the social security liability borne by his heirs is equal to his own social security wealth; i.e.,

$$SSL_{it} = SSW_{it} \quad . \tag{D10}$$

The micro consumption function can therefore be rewritten as

$$C_{it} = \alpha_0 + \alpha_1 Y_{it} + \alpha_2 (A_{it} - B^*_{it}) + \alpha_2 (\lambda - \sigma) SSW_{it}. \qquad \text{(D11)}$$

Under this assumption, then, the coefficient of SSW in a cross-section regression is also an estimate of the aggregate coefficient and reflects the net effect of social security on saving.

Our conclusion is that whether or not aggregate effects of social security wealth can be inferred from cross-section data depends upon which assumption is a better approximation to real behavior: Barro's, which assumes social security liability is independent of the individual's social security wealth, or Feldstein-Pellechio's, which assumes social security liability is related to the social security wealth of the individual.

Footnotes

1/ Ando-Modigliani assume that the coefficients vary with such factors as age and family size. We abstract from such differences (and the associated aggregation problems).

2/ For expository purposes, we assume that bequests are exogenous. In a more rigorous model, bequests would be endogenous.

3/ Throughout this paper, we ignore the effect of excluding the planned bequest variable.