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A TIME SERIES ANALYSIS ON SOCIAL SECURITY AND ITS EFFECT ON THE MARKET WORK OF MEN AT YOUNGER AGES

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ABSTRACT

The distortion of the labor-leisure choice by social security during the period the earnings test is in effect is well known. This paper, using a life cycle asset maximization approach to social security acceptance, shows that the earnings test is not a sufficient cause for such a distortion in the constrained period or over the life cycle. We use time series analysis to test the net empirical importance of the substitution and wealth effects associated with social security on the market work of younger men, and find that hours worked per week would have fallen from 2 to 3 hours since 1936 without the present social security system. Such findings suggest that large savings effects associated with social security are overestimates.

A Time Series Analysis on Social Security and its Effect on the Market Work of Men at Younger Ages

Both private pensions and social security that make benefits conditional on market work decisions affect the labor supply of older men. Job specific private pensions tie acceptance of a pension to leaving the job and may in some cases restrict work in other market jobs. Social security restricts market work through its test on earnings. Recent papers by Boskin (1977), Burkhauser (1977), and Quinn (1977) indicate that these constraints on market work reduce the labor supply of older men.

The emphasis in the literature on the substitution of nonmarket activities for market work during years when the pension constraints are binding overlooks full life cycle adjustments to such constraints. An exception is Smith (1975), who suggests that programs like social security, which place earnings tests on wages during one period of life, change a worker's lifetime relative wage pattern, inducing substitution of market work from the constrained to the unconstrained years of life. Induced intertemporal substitution of time raises hours of work of prime age males, but social security may also have a wealth effect that reduces labor supply. Feldstein (1974) argues that social security intergenerational transfers are not entirely offset by private intergenerational transfers. If this is the case, increases in the wealth of recipients reduces their labor supply during all ages of life. However, if there is no net change in total transfers as Barro (1974, 1977) argues, then no wealth induced labor supply changes occur.

We test the empirical importance of the intertemporal effects of social security on the market work behavior of prime age males. In doing so we suggest an explanation for the changes in the labor supply of males in this age group over the past four decades. The test of the intertemporal effects of social security provides evidence for the life cycle labor supply hypothesis that wages in one time period affect labor supply in other time periods. The effect of social security on savings is a related and controversial topic. Feldstein (1974) finds a large negative effect of social security on private savings whereas Barro (1977) finds no effect. Since savings and labor supply decisions are interrelated, this paper provides some evidence on the effect of social security on savings.

The paper is organized in three sections. Section 1 reviews time series changes in the labor force participation of men. Section 2 presents a theoretical analysis of the effect of social security on labor supply of men during their younger unconstrained years. An empirical analysis is presented in Section 3.

1. TIME SERIES WORK PATTERN OF MALES

There have been two major changes in the pattern of male labor force participation since World War II. First, in sharp contrast to the secular decline in the work week preceding World War II, hours of work for prime age males in the United States have remained relatively constant over the last 35 years. Second, unlike the fall in market work during the depressed economic conditions of the 1930s, the decrease in labor force activity of older men since 1947 has continued through both slack and tight periods of general demand.

Column 1 of Table 1 shows the hours worked per week by men since 1900. Even after the increases in vacations and holidays over this period are taken into account, the adjusted average hours worked per week remain relatively constant since World War II. Column 2, shows that participation rates for men age 65 and over decline from 47.8% in 1947 to 21.7% in 1975. For men age 62 to 64 (column 3), participation rates have fallen from 82.3% in 1961 (the year this age group was first eligible for social security benefits) to 59.7% in 1975. The final columns show the increase in those men receiving social security benefits at ages 65 and over, and ages 62 to 64.

2. SOCIAL SECURITY AND LIFE CYCLE LABOR SUPPLY

Two characteristics of social security (and many private pension plans) cause the timing of its acceptance and market work decisions to be simultaneously determined. First, the asset value of social security benefits (holding contributions constant) varies with age of the worker at acceptance. Any worker who delays acceptance of benefits past age 65 is actuarially penalized.[1] To a lesser extent this may be true for men who delay acceptance past age 62 (see Burkhauser, 1976). Social security benefits would be treated in the same way as any other asset and accepted at the age that maximized the present value of their flow of benefits, if their acceptance placed no constraint on market earnings.[2] This would clearly be age 65 or earlier for most men. The second characteristic of social security is the earnings test, which in effect reduces the net wage for those who accept benefits.[3] The presence of the earnings test forces workers to consider losses in net market earnings in any decision concerning social security acceptance.

Table 1

Time Series Changes in Male Labor Force Participation

Year	(1) Hours of work per week for men	(2) Labor force participation for men age 65+	(3) Labor force participation for men age 62-64	(4) Percentage of eligible males age 65-71 receiving social security benefits	(5) Percentage of eligible males age 62-64 receiving social security benefits
1900	58.5	63.1			
1910	55.6	--			
1920	50.6	55.6			
1930	47.1	54.0			
1940	42.5	41.8			
1941	43.3	--			
1947	42.4	47.8			
1950	41.1	45.8		59*	
1955	41.6	39.6		62*	
1960	41.0	33.1	81.1	74*	
1961	41.2	31.7	82.3	76	20
1965	42.0	27.9	76.8	80	32
1970	41.1	26.8	72.1	80	34
1975	40.9	21.7	59.7	90	46

* Includes all men age 65 and older.

Sources:

(1) Owen (1971, p. 75); Kniesner (1976, p.5). See Appendix for fuller description.

(2) U.S. Department of Commerce (1975, pp. 131-132); U.S. Department of Labor (1976, p. 30).

(3) Burkhauser (1976, p. 46).

(4) U.S. Department of Health, Education, and Welfare (Social Security Administration, 1977, p. 85).

(5) Same as (4).

The presence of both an earnings test and an actuarial penalty for postponing acceptance of benefits is needed in order for a distortion in labor market activities to occur, as is shown in the modified one-period graph of Figure 1. A worker age 65 who chooses to take social security is normally seen as facing the budget constraint line abcd. Over the line segment ab, the wages are below the limit taxed by the earnings test. Over the line segment bc, the earnings test is in effect and for each dollar of wages earned, 50 cents in benefits are lost. Over the line segment cd, benefits are completely exhausted and the earnings test ends. Line segment cd is also part of line ecd, which is the budget constraint of the worker who chooses not to take social security benefits in this period. As shown, ecd assumes benefits from social security are completely lost if postponed over the period. If future benefits are increased due to postponing acceptance in this period, which has been the case since 1972, part of the loss is made up and ecd underestimates the budget possibility set for this worker. Line e'c'd' reflects the increase in the present value of future benefits caused by postponing acceptance of benefits in this period.[4] As can be seen from the figure, the greater the actuarial increase in benefits in future periods, the higher e'c'd' rises, and the more likely a worker is to postpone benefits. The case where the increase in future benefits is actuarially fair is represented by line abk. In such a case no worker will ever choose to be on line segment bc and the earnings test is irrelevant. But the greater the value of net social security benefits lost when their acceptance is postponed, the greater the range of line segment bc and the more likely a worker to accept the work constraint and take social security benefits. Burkhauser (1977) has shown that the

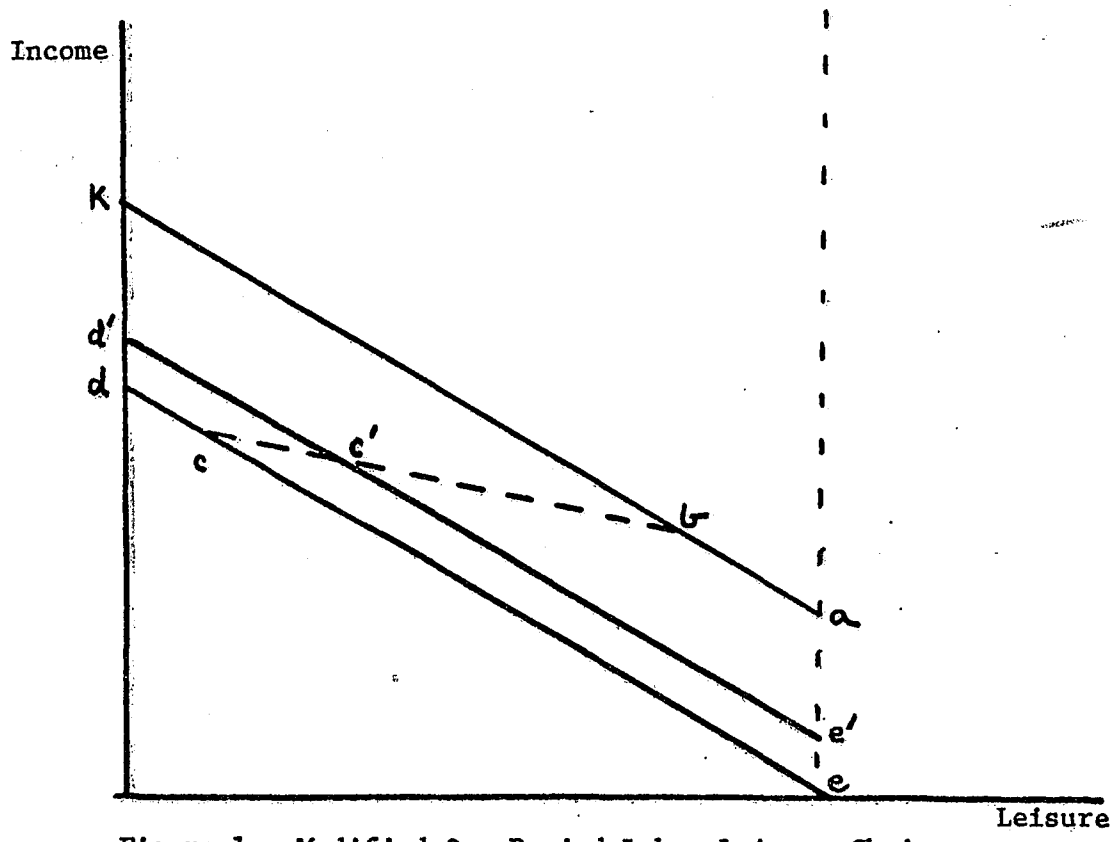

Figure 1. Modified One-Period Labor-Leisure Choice

Note:

1. Line abcd is the relevant budget constraint when postponed social security benefits are totally lost.

2. Line abc'd' is the relevant budget constraint when increases in the stream of future social security benefits due to postponing acceptance have a net value of ee' (see note 4).

3. Line abk is the relevant budget constraint when the increase in future social security benefits is actuarially fair. In this case the present value of social security does not change even when acceptance is delayed and the earnings test is irrelevant.

difference in the asset value of private pension benefits based on a worker's age at acceptance is an important factor both in the timing of private pension acceptance and in the market work decisions of older men.

The point of departure for this paper is that social security also affects work during the nonconstrained periods of the life cycle. Since wages are subject to the earnings test only during the constrained period, the relative value of time is changed across a worker's lifetime. This implicit tax on wages during one period of life induces a worker to substitute time in the market at younger ages for time during the constrained period. The net loss in the asset value of social security directly affects the decision to accept social security benefits and its accompanying earnings test. It is this difference in asset value of social security, which is positively related to total social security wealth, that causes a positive substitution effect on the labor supply of prime age males.[5]

The intertemporal substitution effect of social security is distinct from the wealth effect of social security discussed by Feldstein (1974) and Barro (1974). If there is a positive wealth effect associated with social security as Feldstein argues (that is, if social security transfers result in a net increase in the wealth of a generation), then this effect of social security will offset to some extent the positive effect of the induced substitution of market working time toward the nonconstrained periods. The sign and magnitude of the social security wealth coefficients in the estimated regressions in the next section provide evidence relating to the relative magnitude of the two effects.[6]

There is a functional relationship between changes in savings and market work consistent with changes in net wealth due to social security

transfers. Writing the income-consumption identity

$$Y = C + S \tag{1}$$

in logarithmic differential form gives

$$E\,Y = (C/Y)\,E\,C + (S/Y)\,E\,S, \tag{2}$$

where E is the operator dln, Y is personal disposable income, C is consumption, and S is savings. Assuming the relative price of time (wage) and goods is unchanged by social security transfers in the non-constrained years, the proportion of time and goods in household production will be unchanged.[7] Since no relative prices have changed in this period, the change in consumption expenditures due to the wealth effect will equal the percentage change in nonmarket time H

$$E\,C = E\,H. \tag{3}$$

Writing the allocation of time identity

$$H + L = T, \tag{4}$$

where L is labor market time and T is total time per period, in logarithmic differential form and substituting into (2) yields

$$E\,Y = -(LC/YH)\,E\,L + (S/Y)\,E\,S. \tag{5}$$

Assuming a rate of return of r on assets A and making the wage the numeraire yields

$$Y = L + rA \text{ and } E\,Y = (L/Y)\,E\,L. \tag{6}$$

Substituting (6) into (5) and solving for E L gives

$$E\,L = (Y/L)\,(H/(H + C))\,(S/Y)\,E\,S.^{8} \tag{7}$$

With an estimate of the wealth effect of social security on savings, knowledge about the earned share of income (L/Y), the average propensity to save (S/Y), and the share of nonmarket time in household production (H/(H + C), the implied labor supply effect for prime age males is determined.

Table 2 provides a range of changes in hours worked per week for prime age males consistent with Feldstein's estimated changes in savings due to the social security wealth effect. He claims social security has reduced personal savings by 30% to 50%. The calculations in Table 2 assume earned income (L/Y) makes up 75% of personal income and that the average propensity to save (S/Y) is 0.1 over this period.[9] The share of nonmarket time in household production (H/(H + C)) used by Ghez and Becker (1975) was 0.6. Because that figure was arbitrarily chosen, calculations for a value of 0.5 are also made. As can be seen from Table 2, wealth effects consistent with Feldstein's findings would cause decreases in market work of from 2 to 4% or 0.8 to 1.7 hours per week.

Smith (1975) provides a method of estimating the intertemporal substitution effect of social security constraints on work during nonconstrained ages. Equation (8) estimates the percentage change in labor supply during the nonconstrained period caused by the earnings test:

$$E\,L = -\sigma\,(H/(H + C))\;\Omega\,(H/L)\;E\,w. \qquad (8)$$

It is derived from his demand equation for household time during periods in which the earnings test is not applicable. In equation (8) the symbols L, H, C, have the same meaning as previously defined, σ is the intertemporal elasticity of substitution in consumption, E w is the percentage change in wages due to the implicit tax on wages caused by the earnings test, and Ω is a measure of the fraction of the life cycle covered by the earnings test. Smith's original equation (equation 4, p. 31) was transformed into a labor supply equation by multiplying by (H/L).

Table 2

Estimated Changes in Hours Worked per Week for Prime Age Males Due to the Wealth Effect

E S	(Y/L)	(H/(H + C))	(S/Y)	E L	Hours*
-30	1.3	.6	.1	-2.4	-1.0
-50	1.3	.6	.1	-4.0	-1.7
-30	1.3	.5	.1	-2.0	-0.8
-50	1.3	.5	.1	-3.3	-1.4

* Hours = (E L) (42) (.01)

Table 3 provides a range of changes in hours worked per week for prime age males consistent with social security constraints on earnings during older ages. The values for σ are in the range estimated by Ghez and Becker (1975), who found upper bounds for σ of 0.28 and 0.17. The values for Ω are based on the assumption of a working life of 40 years and a 10 year period over which the earnings test is in force. This assumption holds only in the long run when all members of the labor force are able to adjust their entire working life to the introduction of the social security system. Initially the average Ω for all workers is higher. A worker age 55 in 1937 who took social security benefits at age 65, lived to age 75, and who had not foreseen the enactment of the social security system would have an Ω of 0.5. As new workers replace older workers, the average falls since new workers have a longer period to adjust to the established system.

The value for (H/L) depends on the definition of total time T. If T is defined as 24 hours a day, and there is a 42 hour work week, (H/L) is 3. However, if it is defined to exclude sleep and "personal care" time, by making the strong assumption that there is no substitution possible for these activities, T is reduced. Ghez and Becker (1975) use both a 24 and a 14 hour value of T: When T equals 14, (H/L) is 1.3.

The values for E_w are based on implicit earnings test taxes of 50% and 100%, the two tax rates used by social security during the history of the program. As can be seen from Table 3, substitution effects are predicted to increase hours worked per week by from 1.5 to 9.0% or from 0.6 to 3.8 hours. It is important to note that Smith's equation is relevant because an adjustment to the earnings test is necessary. If

Table 3

Estimated Changes in Hours Worked per Week for Prime Age Males Due to the Substitution Effect

σ	(H/(H + C))		(H/L)	E w	E L	Hours*
.25	.6	.20	3.0	-100	9.0	3.8
.25	.5	.20	1.3	-100	3.3	1.4
.25	.6	.20	1.3	- 50	2.0	0.8
.25	.6	.15	3.0	-100	6.8	2.8
.15	.5	.20	3.0	- 50	2.3	1.0
.15	.6	.15	3.0	- 50	2.0	0.8
.15	.5	.15	1.3	-100	1.5	0.6

* Hours = (E L) (42) (.01)

the asset value of social security were independent of age at acceptance, the earnings test is irrelevant and causes no substitution in life cycle labor supply.

3. EMPIRICAL ANALYSIS

Owen (1971) provides a detailed examination of the labor market activity of prime age males over the last 50 years. His original regression equations, which include the real wage, unemployment, and the relative price of recreation, are used as a base for this study. Our regression equations differ by the inclusion of social security wealth, family size, and revised unemployment data. In addition, the sample has been extended from 1961 to 1971.

To test the model, time series data are used from 1929 to 1971 (excluding 1943-1945). The dependent variable, taken directly from Owen, is the log of hours worked per week by nonstudent male wage earners in private, nonagricultural employment in the United States.[10] He has corrected this variable downward in the years since 1941 to adjust for changes in the number of holiday and vacation days. All data and their sources are found in the Appendix.

Social Security Wealth

Social security wealth is of principal interest in the analysis. This variable was originally constructed by Feldstein (1974). It is used here as a proxy for both social security wealth transferred across generations and net differences in the asset value of social security lost by delaying acceptance of benefits. It captures both a substitution and wealth effect. In Feldstein's model, increases in wealth of one generation

due to social security transfers are not entirely transferred back to the next generation. He contends that this leads to decreases in savings, and as we have shown, to decreases in hours worked in the labor market. But the increase in the value of the net difference in social security benefits induces a substitution effect through the earnings test, which increases hours worked in the nonconstrained years of a worker's life. The fact that the coefficient for social security wealth is consistently positive suggests that the substitution effect dominates the wealth effect in our regression equations.

The interaction of a time trend with social security was entered to capture the change in Ω, the average noncovered work period of men. The interaction is significantly negative. This is consistent with the expected effect of an increase in the average noncovered work period over time as younger workers replace older workers who had spent only part of their work life under the social security system. For the time period 1929-1961 the interaction is not significant. When the net effect of these two variables is measured, the increase in hours worked due to social security varies from about 2 to 3 hours per week.[11] This result is within the range predicted using the Smith equation. The potential range of values consistent with the assumptions made in Tables 2 and 3 is such that some wealth effect cannot be ruled out. Although at least the upper limits of the Feldstein values seem inconsistent with our results, neither the Feldstein nor the Barro position can be rejected. The regressions do provide evidence that social security has had a positive effect on the labor supply of prime age men. In both equations 1 and 2 of Table 4 the social security wealth variable is significantly positive. Regression equations

for these years in which all variables were in their nonlogarithmic form did not change the results. It was not possible to estimate a regression in which all variables were in logarithmic form since social security wealth was zero from 1929 to 1936. But equation 3 of Table 4 examines the period 1937-1971 and in this regression all variables are in natural logarithms. The social security wealth variable continues to be significantly positive.

The results for the post-war period 1946-1971 are less encouraging. While the sign continues to be positive it is not significant at the 5% level. The generally insignificant results of the regression equation for the post-war period may be due to the relatively small variation in the work week for men during that period. The standard deviation of the work week during the post-war period is 0.59 hours compared to 1.69 hours for the whole sample period. The standard errors of the regression equations are given in hours in Table 4 as a measure of the absolute deviation of the estimates. They are approximately 1 hour for all regressions.

Real Wage

Since changes in real wages have both a substitution and income effect, the sign of this variable may be positive or negative. In each equation of Table 4, the income effect outweighs the substitution effect for real wage (wage deflated by CPI). These results are consistent with those found by Owen (1971).

Unemployment Rate

The recent work of Darby (1976) shows that the unemployment rate was consistently overestimated for the period 1934-1939. Using both the corrected and uncorrected rates, this variable was significant (except in equation 4) and negatively related to hours worked per week, which is consistent with Owen's findings (1971). When the unemployment rate was omitted, the sign and significance of the social security variable was not affected. The insensitivity of social security wealth to different unemployment rate specifications shows that it is not merely capturing the effect of the depression as has been argued with respect to its effect on consumption (see Barro 1977). Only the corrected values are used in Table 4.

Relative Price of Recreation

This variable was central to Owen's analysis. If consumption time and market purchased recreation are complements, a fall in the relative price of market recreation would induce an increase in hours of consumption time. Owen found this variable to have a negative effect on the demand for leisure, implying a positive effect in these regressions. While this variable is significant and positive in equation 1 it is not significant in any other time period.

Family Size

Since cross-sectional studies by both Ghez and Becker (1975) and Smith (1972) found a generally negative, though not always significant, effect of family size on hours of nonmarket time, this variable was

Table 4

Time Series Regressions
(Dependent Variable = Natural Log of Hours Worked per Week)

Independent Variables	(1)	(2)	(3)	(4)
S.S. Wealth	0.041[a]	0.038[a]	0.047	0.072[a]
	(2.97)	(2.19)	(2.43)	(1.30)
(S.S. Wealth)(Time)	-0.97 E-3[a]	-0.97 E-3[a]	-1.08 E-3	-1.60 E-3[a]
	(3.10)	(0.08)	(1.99)	(1.42)
Real Wage	-0.243	-0.325	-0.145	-0.233
	(7.06)	(2.75)	(3.62)	(3.12)
Unemployment Rate	-0.038	-0.038	-0.030	-0.008
	(5.15)	(4.36)	(3.49)	(0.45)
Price of Recreation	0.118	0.101	-0.081	-0.067
	(2.37)	(1.69)	(1.48)	(0.84)
Family Size	0.310	0.219	0.198	0.223
	(6.27)	(1.30)	(3.18)	(1.64)
Constant	4.69	4.70	4.689	4.92
R^2	0.87	0.88	0.789	0.60
F	37.15	28.16	15.59	4.82
D.W.	1.65	1.77	1.46	1.52
S.E.R.[b]	1.02	1.02	1.01	1.01
N	40	30	32	22
Years[c]	1929-1971	1929-1961	1937-1971	1946-1971

Note: t-statistics in parentheses.

[a]All variables are in natural logarithms except these, since they have some zero values. The time trend has a value of zero until 1937 when it begins with a value of one.

[b]The unit of measure for the standard error of regression (S.E.R.) in all equations is hours.

[c]The years 1943-1945 are omitted from all regressions.

included in our equations. Family size (average number of children ever born to women age 35-39), has the expected positive effect on market work but is not significant in all time periods.

4. CONCLUSION

Evidence has been presented suggesting that social security has raised the work week over 2 hours above what it otherwise would be for prime age males. Some would argue that this effect of social security is desirable since it offsets the reduction in the labor supply at older ages when the earnings test is in operation. In fact, in addition to causing a misallocation of resources due to exit from the market during the age that the constraint is in effect, it also causes higher than optimal labor supply during noncovered periods.

The link between the increased coverage and benefits of social security and the rapid decline in the labor force participation rates of older men is well known. Our results despite their weakness in the post-war period show that social security also affects the market work of younger men. It is likely that the fall in hours worked per week experienced in the first three decades of the century would have continued at least to some degree if no earnings test were attached to social security.

The range of estimated changes in hours worked per week due to the wealth and substitution effects in Tables 2 and 3 is too large for our findings to rule out a savings effect the magnitude of that suggested by Feldstein. It is clear, however, that the net effect of social security is to increase hours worked and that over most of the possible range of values simulated the size of the wealth effect compatible with this change is closer to Barro's findings than to Feldstein's.

APPENDIX

Sources of Variables

The wage, relative price of recreation, and hours of work data up to 1961 are from Owen (1971, p. 75). Missing values between 1962 and 1971 of hours of work were obtained by splicing with the hours of work series of Kniesner (1976, p. 5). Overlapping years of the Owen series were regressed on the Kniesner series to obtain a conversion formula. Missing values of the wage series were obtained by splicing in a similar manner with the average hourly earnings of production workers in manufacturing (published by the U.S. Department of Labor, 1976, p. 40). The missing values for the price of recreation were obtained by using Owen's method (1971) of estimation.

The family size data is from U.S. Department of Health, Education, and Welfare; (Public Health Service, 1976, p. 122). The series used is average number of cumulative births for women age 35 to 39.

Social security wealth and the unemployment rate series are from Barro (1977, pp. 39, 40).

The yearly values of all these variables are found in Table 5.

Table 5

Values of the Variables

	(1)	(2)	(3)	(4)	(5)	(6)
Year	Hours of Work	Real Hourly Wage Rate (cents)	Unemployment Rate (%)	Social Security Wealth (thousands of 1958 dollars per capita)	Number of Children	Relative Price of Recreation
1929	48.7	83.2	3.2	0	2.70	96.9
1930	47.1	85.7	8.8	0	2.66	90.8
1931	45.6	90.5	16.2	0	2.62	88.0
1932	43.7	91.6	24.0	0	2.58	89.4
1933	43.3	91.3	24.2	0	2.54	88.8
1934	40.6	98.6	17.1	0	2.50	81.3
1935	41.7	98.3	15.3	0	2.45	80.1
1936	43.4	98.3	10.0	0	2.41	78.9
1937	43.1	102.6	9.2	.806	2.37	78.7
1938	41.6	106.6	12.4	.723	2.32	81.4
1939	42.1	109.1	11.2	1.191	2.28	81.6
1940	42.5	110.7	9.5	1.325	2.23	83.6
1941	43.3	114.9	5.8	1.724	2.18	81.2
1942	44.3	118.9	2.9	2.128	2.14	77.5
1946	43.3	138.1	3.7	2.193	2.05	85.1
1947	42.4	134.8	3.8	2.054	2.06	87.3
1948	41.7	136.4	3.7	2.114	2.07	96.6
1949	41.0	142.8	5.7	1.984	2.09	100.0
1950	41.1	155.8	5.2	2.161	2.12	98.4
1951	41.7	151.3	3.1	2.602	2.15	95.9
1952	42.0	156.2	2.8	2.685	2.19	92.9
1953	41.5	163.6	2.7	2.791	2.23	93.4
1954	40.4	169.4	5.2	2.711	2.28	92.2
1955	41.6	176.6	4.2	3.098	2.33	92.0
1956	41.9	184.3	3.9	3.268	2.39	92.0
1957	41.2	188.1	4.1	3.477	2.45	92.4
1958	40.9	189.0	6.5	3.482	2.52	93.5
1959	40.8	195.2	5.3	3.700	2.60	94.2

Table 5--Continued.

	(1)	(2)	(3)	(4)	(5)	(6)
Year	Hours of Work	Real Hourly Wage Rate (cents)	Unemployment Rate (%)	Social Security Wealth (thousands of 1958 dollars per capita)	Number of Children	Relative Price of Recreation
1960	41.0	200.0	5.3	3.780	2.64	95.0
1961	41.2	202.0	6.5	3.909	2.70	96.0
1962	41.5	208.4	5.3	4.283	2.76	97.7
1963	41.6	212.4	5.5	4.492	2.81	98.2
1964	42.0	216.2	5.0	4.914	2.87	99.2
1965	42.0	219.8	4.3	5.358	2.92	98.5
1966	42.1	223.0	3.7	5.846	2.97	98.2
1967	41.6	226.1	3.6	6.200	3.02	96.9
1968	41.7	231.4	3.4	6.607	3.06	97.4
1969	42.0	232.9	3.4	6.942	3.09	95.0
1970	41.1	231.5	4.7	7.273	3.10	94.6
1971	41.2	236.4	5.7	7.549	3.09	95.4

NOTES

[1]Prior to 1972 for those age 65 and over, all postponed benefits were lost. A 1% per year increase in yearly benefits for each year benefits are postponed is now paid to these workers.

[2]Even with an earnings test constraint, hours worked by older men would be no more affected by social security benefits than by any other type of asset, if the flow of social security benefits could be delayed with no net loss in their asset value. In this case, no asset wealth is lost by delay and since the constraint is binding only when benefits are accepted, benefits would merely be delayed until the point the constraint was no longer binding on market work.

[3]The earnings test is currently applicable between the ages of 62 and 71. During this age period, the test will reduce the net wages of most workers, since above a minimum level social security benefit reductions of 50 cents occur for each additional dollar of work related income received. During the years prior to 1972, the marginal tax was 100% over some earnings ranges.

[4]In such a case the value ee' is equal to the expected present value of all additional benefits gained through delayed acceptance in the initial period. For a man age 65 who delayed accepting benefits until age 66 it would be

$$ee' = \sum_{i=1}^{n} P_i B_{65} * d/(1+r)^i$$

where ee' = present discounted value

P_i = probability of living through period (i)

B_{65} = benefit at age 65 (in the case of Figure 1, the value ea)

d = rate of increase in social security benefit in all future periods due to postponement of benefits in initial period (1% since 1972)

r = interest rate.

[5]The net loss in asset value if acceptance of social security benefits is delayed increases as the value of benefits in each period is increased. Over the entire history of the social security system, it is also a function of changes in the interest rate, expected probability of life of recipients, and the way the system adjusts benefits if delayed. With no loss in asset value if postponed, the earnings test is irrelevant and no substitution occurs across periods. With benefits tied directly to wages in an actuarially fair manner, social security is a totally neutral system with respect to all labor/leisure decisions.

[6]In addition to the substitution effect caused by the constraints on market earnings at older ages, another effect may be important. Since transfers are to some degree related to earnings, this affects the relative wage of workers at younger ages. Workers whose marginal wages are affected by social security "tax" paid on earnings have an additional substitution effect. For the generations of workers in this sample in which the net wealth effect of social security is positive, rather than a "tax" on wages at younger ages, contributions into the system yield a wage "benefit." To the degree that this is a factor, it would increase the relative wage at younger ages and increase work during this period. Its empirical importance in changing the relative wage may be small since workers earning

above the maximum tax ceiling have a zero marginal tax. For those below the taxable maximum the marginal tax was only 2% from 1937 to 1950 and by 1971 was 8.1%. This compares with a marginal tax of 100% on earnings from 1937 to 1971 for those accepting social security benefits.

Estimations of the relationship between marginal earnings and social security benefits are further clouded since benefits are a function of marital status, age, and life expectancy, as well as earnings. In addition, the benefits are tilted in favor of workers with low yearly wages and fewer years of lifetime work (above some minimum).

[7]In addition to assuming benefits are not directly related to wages, it assumes a homothetic production function, within a single commodity consumption model. When the single commodity assumption is relaxed, one must assume each commodity's wealth elasticity is unity and that substitution of commodities across periods due to relative wage changes occurs at the same rate.

[8]This ignores changes in the stock of assets. To the degree that assets fall, the implied savings and hours worked relation of equation (7) is lessened.

[9]Labor's share of national income was estimated to be between 73 and 82% in 1970 (U.S. Department of Commerce, 1971). Goldsmith (1955) found that households saved an average of 12% on their income between 1897 and 1949.

[10]The Owen work week data included older men and could be affected by social security induced changes in the hours worked by these men. Unpublished data from the Bureau of Labor Statistics for men aged 25 to 44

and 45 to 64, however, show the same pattern of constancy of the work week for both age groups since 1959 when the data is first available.

[11]Changes in hours = (40) exp ((A + B t) SSW) - 40, where (A) is the coefficient of the social security wealth variable (SSW), (B) is the coefficient of the social security time trend variable, (t) is time elasped, and 40 hours of work are assumed in the absence of a social security system.

REFERENCES

Barro, Robert J. 1974 Are government bonds net wealth? Journal of Political Economy, 82, 1095-1118.

_____. 1977. Social security and private saving--evidence from the U.S. Time Series. Unpublished manuscript, January.

Boskin, Michael. 1977. Social security and retirement decisions. Economic Inquiry, 15, 1-25.

Burkhauser, Richard V. 1977. The early pension decision and exit from the labor market. (Working Paper DHEW/ASPE/ISP-R).

_____. 1976. The early pension decision and its effect on exit from the labor market. Ph.D. dissertation, University of Chicago.

Darby, Michael. 1976. Three-and-a-half million U.S. employees have been mislaid: Or an explanation of unemployment, 1934-1941. Journal of Political Economy, 84, 1-16.

Feldstein, Martin S. 1974. Social security, induced retirement, and aggregate capital formation. Journal of Political Economy, 82, 905-926.

Goldsmith, Raymond. 1955. A study of savings in the United States, (Vol. 1). Princeton, N.J.: Princeton University Press.

Ghez, Gilbert, and Becker, Gary S. 1975. The allocation of time and goods over the life cycle. New York: National Bureau of Economic Research.

Kniesner, Thomas J. 1976. The full-time workweek in the United States, 1900-1970. Industrial and Labor Relations Review, 30 (6), 3-15.

Long, Clarence D. 1958. The labor force under changing income and employment. Princeton, N.J.: Princeton University Press, National Bureau of Economic Research.

Munnell, Alicia H. 1974. The effect of social security on personal savings. Cambridge, Mass.: Ballinger.

Owen, John D. 1971. The demand for leisure. Journal of Political Economy, 79, 57-76.

_____. 1976. Workweeks and leisure: An analysis of trends--1948-1975. Monthly Labor Review, 99 (8), 3-8.

Quinn, Joseph. Forthcoming. The micro-economic determinants of early retirement: A cross-section view of white married men. Journal of Human Resources.

Smith, James P. 1972. The life cycle allocation of time in a family context. Ph.D. dissertation, University of Chicago.

_____. 1975. On the labor-supply effects of age-related income maintenance programs. Journal of Human Resources, 10, 25-43.

U.S. Department of Commerce, Office of Business Economics. 1971. Survey of current business. Washington, D.C.: Government Printing Office. July.

U.S. Department of Health, Education, and Welfare; Public Health Service. 1976. Fertility tables for birth cohorts by color: United States, 1917-73. Washington; D.C.: Government Printing Office.

U.S. Department of Health, Education, and Welfare; Social Security Administration. 1977. Social security bulletin, annual statistical supplement, 1975. Washington, D.C.: Government Printing Office.

U.S. Department of Labor, Bureau of Labor Statistics. 1976. Employment and earnings, U.S., 1909-75. Washington, D.C.: Government Printing Office.

_____. 1976. Handbook of labor statistics, 1975. Washington, D.C.: Government Printing Office.