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AN ASSET MAXIMIZATION APPROACH TO EARLY SOCIAL SECURITY ACCEPTANCE

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ABSTRACT

This paper, using a sample from the 1973 Social Security Exact Match File, tests the importance of economic choice variables on the decision of male workers to take social security retired worker benefits initially upon reaching age 62. In contrast to the approach of previous investigators, the asset nature of social security is emphasized. It is not simply the size of annual benefits received each year, but the present value of the entire potential stream of benefits that emerges as theoretically and empirically crucial. Since acceptance of social security constrains market work, the potential loss in market earnings given social security acceptance is weighted against changes in the asset value of private pension and social security benefits if they are postponed. Although worsening health or prolonged unemployment force some workers to accept early social security benefits, this paper finds economic choice variables have an important role to play for many workers.

An Asset Maximization Approach to Early Social Security Acceptance

Introduction

Since the option to receive actuarially reduced retired-worker benefits at age 62 was extended to men in 1961, the percentage accepting early social security benefits has grown to the point that over one-half of all men now accept benefits prior to age 65. This paper uses recently available data from the 1973 Social Security Exact Match File and additional information from the 1971 Retirement History Survey to test the importance of economic choice variables for male workers deciding whether to take benefits initially upon reaching age 62. In contrast to the approach of previous investigators such as Boskin (1977) or Quinn (1977), the asset nature of social security is emphasized. It is not simply the size of annual benefits received each year but the present value of the entire potential stream of benefits that emerges as theoretically and empirically crucial.

The study is unique in that data from the Exact Match File include actual social security earnings records for all individuals, permitting a present value estimate of social security benefits (retired worker, spouse, and survivor) to be made. Rather than a simulated value of the retired worker benefits as used by Boskin or a variable of eligibility for social security benefits as used by Quinn, the actual retired worker, spouse, and survivor benefits of a worker and his spouse are used in this study. To this is added estimated private pension eligibility data from the Retirement History Survey.

THE ASSET VALUE OF SOCIAL SECURITY

Social Security Acceptance and Market Work

Social security and most private pension plans are a special type of asset. Receipt of private pension benefits is linked to the giving

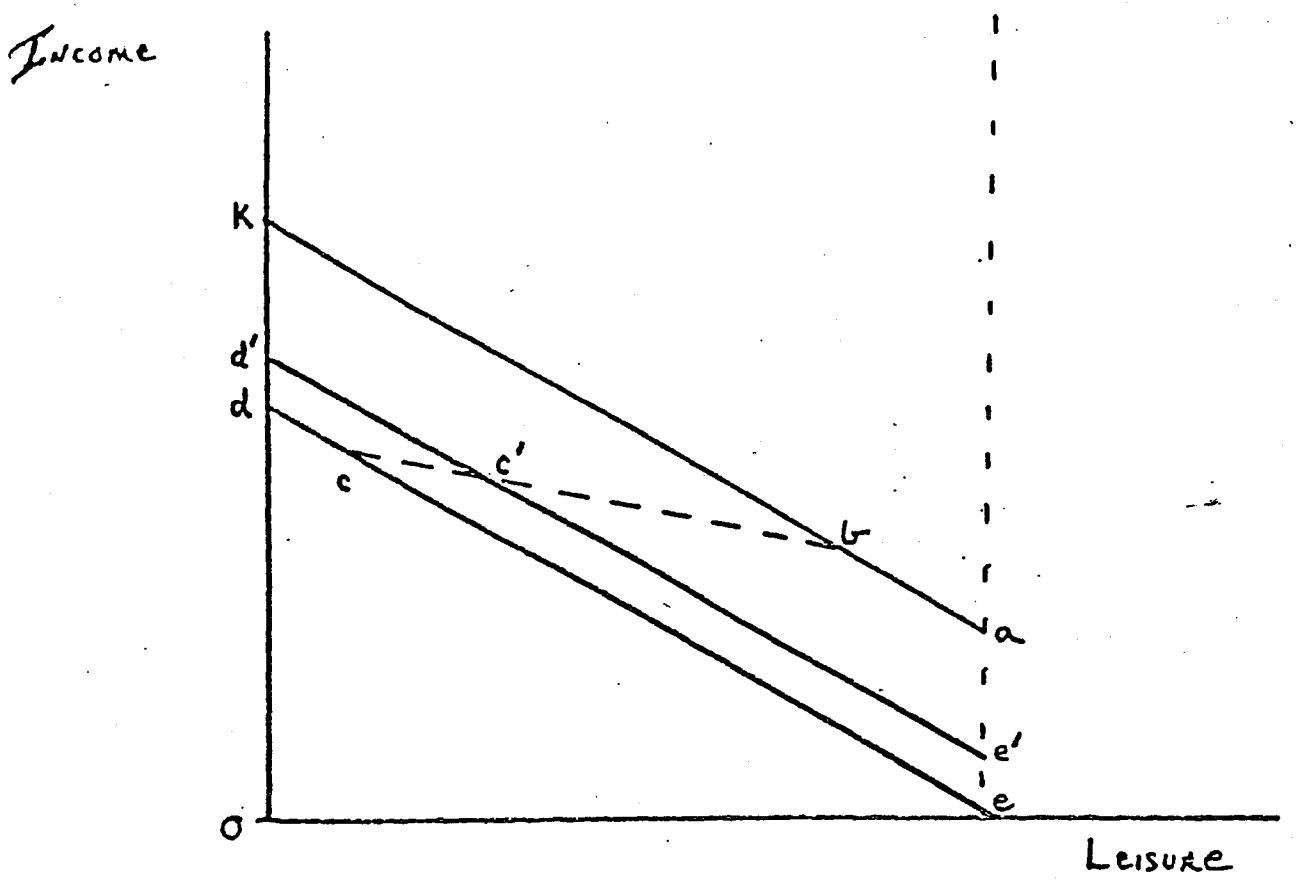
up of a specific job. Social security, while not necessarily requiring loss of a particular job, has an earnings test. Without the earnings test (currently not imposed on those age 72 and over) like any other asset, social security would be accepted at the age that yielded the greatest discounted stream of benefits. But the existence of the earnings test for those age 62 to 71, together with a less than fair actuarial adjustment if benefits are delayed (this important additional requirement is discussed in full detail below), make it necessary for workers to simultaneously consider benefit acceptance and labor market work decisions.

The interdependence of the benefit acceptance and market work decisions is illustrated in Diagram 1. Often these decisions are depicted in a one period model in which changes in future periods are ignored. As will be seen, this can lead to overestimates of the adverse effect of the social security earnings test on market work. In a one period model, workers age 65 who choose to receive social security benefits are seen as facing the budget constraint line abcd. Along this line are the set of possible choices available to them with respect to market work. Their final choice depends on individual preferences.

Over the line segment ab, wages are below the earnings test threshold and acceptance of benefits has no additional effect on market work. Over the line segment bc, the earnings test is in effect and for each dollar of wages earned, fifty cents in benefits are lost.[1] Over this range acceptance of benefits induces less work because the earnings test reduces the net wage. Over the line segment cd, workers' earnings are sufficient for the earnings test to exhaust all social security benefits in the period.

Line segment cd is also part of the line ecd, the budget constraint line of workers who choose not to take social security benefits in this

Diagram 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 the present value of increases in the stream of future social security benefits due to postponing acceptance have a net value of ee' (see note 3).

3. In the special case where the present value of net increases in social security benefits are actuarially fair, that is when they equal ea, line abk is the relevant budget constraint. In this case the present value of social security does not change, even when acceptance is delayed and the earnings test is irrelevant.

period. As shown, ecd assumes social security benefits are completely lost if postponed over the period. Once the asset nature of social security is understood it is clear that modifications in this one period model are necessary.[2] If future benefits are increased when acceptance is postponed for the period, (this has been the case since 1972 for those 65 and over), part of the loss in postponing benefits is made up and ecd underestimates the budget possibility set for these workers. Line e'c'd' reflects the net increase in the present value of future benefits caused by postponing acceptance of benefits in this period. As can be seen from the diagram, the greater the net actuarial increase in benefits in future period (as measured by ee'), the higher e'c'd' rises, and the more attractive is the option to postpone benefits. The value ee' is equal to the expected present value of all additional benefits gained through delayed acceptance in the inital period.[3]

The case where the increase in future benefits is actuarially fair is represented by line abk. It is important to note that in this special case, no point on bc is above line abk, no worker will ever choose to be on line segment bc, and social security has no adverse effect on work.

The closer social security benefits come to being adjusted actuarially fair as their acceptance is postponed, the smaller the range of line segment bc and the smaller the potentially adverse effect on work. The present increase in benefits for workers who postpone benefits past age 65 is not actuarially fair, but for workers age 62 to 64, postponed social security benefits are closer to being actuarially fair. Currently benefits are increased by 6.67% for each year acceptance is postponed during this age period.

Burkhauser (1976) provides a range of interest rates and life expectancies that would make the current actuarial adjustments between age 62 and 64 consistent with a constant asset value of social security over this age period (see appendix A). The results suggest that even with the 6.67% increase in yearly benefits, the asset value of social security falls for men after age 62. Further, if the actuarial increase in benefits for those who postponed acceptance was actuarially fair for women when it was first initiated in 1956, then for men, who have on average a shorter life expectancy, the asset value falls with postponement.

If the benefit adjustment were actuarially fair, the asset value of social security would not change and no independent effect would occur. In such a case those with wage and salary income below the earnings test threshold would accept early benefits. Those who earn over this threshold would continue to work and merely postpone acceptance with no loss in the expected value of benefits. Acceptance of early benefits would still be positively related to the size of the social security asset, however, since non-wage income has a negative effect on hours worked, making it more likely that earnings will be below the initial earnings test point (point b of Diagram 1).

The importance of earnings to the decision to accept social security benefits is illustrated in Table 1. Two workers in three who at age 61 earned less than $2100 in market wages (the amount permitted without reduction in benefits by the earnings test in 1972) took social security benefits upon turning age 62. If their potential earnings at age 62 continued at this level, they would fall along line segment ab in Diagram 1 and the earnings test would not affect them. In contrast, for those whose earnings were great enough that all retired worker benefits would

Table 1. Acceptance of Social Security Retired Worker Benefits Upon Reaching Age 62 by Market Earnings at Age 61

(in percentage)

Accepted Retired Worker Social Security Benefits \ Earnings	$1 - $2100 (a)	$2100 - Maximum (b)	Over the Maximum (c)	All
Yes	67	32	12	25
No	33	68	88	75
All*	15	26	59	100

Note: This table is based on a subsample of the 1973 Social Security Exact Match File. Only those who were eligible for social security retired worker benefits at age 62, who had never previously received social security benefits, and who worked in social security covered employment at age 61 were included in the sample. The sample size is 636.

a. This corresponds to line segment ab in Diagram 1. From 1968 to 1972 the earnings test offset did not begin until after the first $2100.

b. This corresponds to line segment bc in Diagram 1. Maximum is the earnings level at which all retired worker benefits are lost due to the earnings test. This value is a function of a worker's PIA and varies with each worker. For example, a worker age 62 with retired worker social security benefits of $2000 would lose all benefits if he received $6100 in market earnings. His maximum would be $6100.

c. This is equivalent to line segment cd in Diagram 1. Earnings above the maximum level result in all retired worker benefits being lost due to the earnings test.

* horizontal distribution by age 61 earnings

be lost due to the earnings test, if they continued to earn at age 61 levels (line segment cd), only about one in ten took benefits. For those workers whose earnings at age 61 fell between these two extremes (line segment bc) about three in ten took benefits at age 62.

Asset Value Measurement of Social Security Benefits

The asset value of social security is the life time discounted value of all expected benefits paid by the system. In addition to the retired worker benefits of the husband and wife, it also includes spouse and survivor benefits. Annuity payments are dependent on the longevity of the recipients and only at death can their actual realized value be known. However, an expected present value of social security benefits can be estimated.

The algorithm used in this study discounts by an interest rate as well as the probability of living through each year of life. The expected probability of survival at each age for both husband and wife is estimated using Public Health Service (U.S. DHEW 1972) mortality tables and assuming the probability of survival in any one year is independent of survival in any other year. The life time expected value of the social security asset is estimated by weighting the expected yearly returns of retired worker, spouse, and survivor benefits by the probability of eligibility for these benefits over the life of the worker and his spouse. A full description of the algorithms used to estimate the present value of benefits is found in appendix A.

Table 2, using data from the 1973 Exact Match File, estimates the asset value of social security for men age 62 as they first become eligible for retired worker benefits. For the median worker these benefits exceed $35,000 (all values are for 1972). This compares to a median value of

Table 2. Estimated Value of Assets Held by Families of Male Workers Eligible for Retired Worker Benefits at Age 62: Percentage Distribution by Type of Asset

Value of Assets (in dollars)	Social Security Benefits[a]	Dividend Bearing Assets[b]	Interest Bearing Assets[c]
Total Percentage	100	100	100
None	0	82	33
1 - $6,999	0	9	33
7,000 - 9,999	2	2	5
10,000 - 14,999	5	1	9
15,000 - 19,999	6	2	5
20,000 - 14,999	11	1	3
25,000 - 29,999	11	1	3
30,000 - 34,999	15	0	2
35,000 - 39,999	34	*	2
40,000 - 44,999	12	*	1
45,000 - 49,999	3	0	*
50,000 - 54,999	1	*	1
55,000 - 59,999	0	0	*
60,000 - 69,999	0	*	1
70,000 - 79,999	0	*	*
80,000 - 89,999	0	*	*
90,000 and over	0	1	2
Quartile Value of All Reporting Units			
First Quartile	25,717	0	0
Median	35,053	0	2,117
Third Quartile	38,901	0	12,167

Note: This table is based on a subsample from the 1973 Social Security Exact Match File. It contains information on the asset position of men age 62 and their wives, if married, who are eligible for social security retired worker benefits at age 62 and who had never previously received social security benefits. The sample size is 714.

a. This is the lifetime discounted value of expected social security benefits (retired worker, spouse, and survivor) for a man age 62 and, if married, his wife. The complete algorithm, found in Appendix A, is based on AMW information from the 1973 Social Security Exact Match File.

b. This is based on the 1972 Internal Revenue Master File for individual income tax returns, contained in the 1973 Social Security Exact Match File. The stock value of these assets was estimated by dividing the flow of dividends by a 6% interest rate.

c. This is based on the 1972 Internal Revenue Master File for individual income tax returns, contained in the 1973 Social Security Exact Match File. The stock value of these assets was estimated by dividing the flow of interest payments by a 6% interest rate.

* less than 1%.

just under $2,200 for his interest bearing assets. Only 18% of these men hold dividend bearing assets. Whereas 98% have social security assets exceeding $10,000, only three men in ten hold interest bearing assets and less than one man in ten holds dividend bearing assets of this size. Social security assets dominate both interest and dividend bearing assets in the portfolio of men in this age group.

Home equity is usually considered an older worker's major asset and in this group 78% own their home (82% of married men). While the equity value of their homes is not included in the Exact Match File data, the median social security asset for these men is over twice the median value of home equity found for men age 62-63 in the Retirement History Survey (1969), even after adjustments are made for inflation ($35,053 vs. $16,747 in 1972 dollars).[4]

Asset Versus Replacement Rate Concepts

Since it is a life time estimate of social security benefits an asset measure is necessarily complex. But it has several advantages over the more familiar single year replacement ratio concept.

Replacement ratio measures normally take the ratio of a single year of social security benefits over the previous year of market earnings. More sophisticated versions use longer market earnings periods and often are net of taxes. This type of measure, although useful for some purpose, is misleading when used to explain the timing of benefit acceptance.[5]

First, it upwardly biases the relative value of postponed social security benefits. Yearly benefits (holding primary insurance amount (PIA) constant) increase by 6.67% for each year acceptance is delayed from age 62 to age 65, and by 1% thereafter. A replacement ratio measure

appears to show that delayed acceptance results in more lucrative benefits. Using an asset value, it is clear that if the increase is actuarially fair there is no change in benefits up to age 65 (Diagram 1) and that delay past that age results in a fall in the asset value of social security rather than an increase.

Second, a replacement ratio measure is insensitive to expected variations in future benefits. In any single year, spouse or survivor benefits may not actually be received but they are as important to a worker's asset position as private insurance. These currently unrealized social security benefits will vary with the age and work history of the wife and are not sufficiently accounted for in a replacement ratio measure.

PRIVATE PENSIONS

Substantial growth in private pension plans over the last three decades has increased their importance in the retirement plans of workers. The longitudinal Retirement History Survey (RHS) provides a detailed measure of the incidence of private pension eligibility for those currently on the verge of retirement. Results from the merged 1969-1971 RHS show that although not universal, eligibility for men is substantial. Forty percent of male workers and 50% of non-agricultural wage and salary workers are eligible for a private pension. Table 3 shows the pattern of pension eligibility across the United States by two digit industry.

Of importance to this study is the degree that private pensions, especially those with early acceptance options, affect early social security acceptance. As can be seen in Table 3, the majority of workers eligible for private pension plans have the option to receive benefits at or before

Table 3. Percentage of Workers Eligible for Private Pension Benefits by Two Digit Industry a/

Industry	Male workers		Wage and salary workers		Self-employed workers	
	b/ early	c/ ever	early	ever	early	ever
Agriculture, Forestry, and Fish.	1	1	3	3	0	1
Mining	42	50	43	51	-	-
Construction	19	31	23	38	0	1
Manufacturing--durable goods						
Lumber and wood, except furn.	12	20	13	22	0*	0*
Furniture and fixtures	15	28	15	29	-	-
Stone, clay, and glass	52	62	53	64	-	-
Primary metals	63	78	63	76	-	-
Non-primary metals	41	61	42	63	-	-
Machinery, except electrical	44	63	45	63	-	-
Electrical machinery	52	71	52	72	-	-
Motor vehicles	75	84	76	85	-	-
Transp. equip., except mot. veh.	47	61	48	62	-	-
Prof. and photo. equip., watches	52	58	52	58	-	-
Misc. manufacturing	23	44	26	49	-	-
Manufacturing--non-durable goods						
Food	43	58	44	60	-	-
Tobacco	20	40	20	40	-	-
Textile mills	21	41	21	41	-	-
Apparel	21	43	22	44	-	-
Paper	58	78	58	78	-	-
Printing and publishing	31	60	32	61	-	-
Chemicals	51	69	52	70	-	-
Petroleum and coal	71	78	71	78	-	-
Rubber and plastics	47	63	47	63	-	-
Leather	21	43	21	43	-	-
Transp., Commun., Public Utilities						
Railroads	10	16	10	16	-	-
Trolleys, buses, and taxis	34	48	38	52	-	-
Trucking and warehousing	38	47	45	54	0*	11*
Water and air transp., pipe lines	47	67	48	68	-	-
Communications	74	86	74	86	-	-
Utilities and sanitation	58	84	59	86	-	-
Wholesale and retail trade						
Wholesale trade	18	30	21	35	6	6
Retail trade	8	15	12	20	2	5
Finance, Insurance, and Real Estate						
Finance	31	58	32	61	-	-
Insurance and real estate	19	29	24	36	2	2
Business and Repair Services						
Business services	17	24	21	30	0*	0*
Repair services	4	9	8	18	2	3
Personal Services	2	9	3	9	0	11
Entertain. and Recreation Services	9	18	10	20	-	-
Professional Services						
Medical services, except hospital	13	32	24	44	7	26
Hospital services	24	47	24	47	-	-
Educational services	37	68	38	69	-	-
Welfare and religious services	14	44	15	44	-	-
Other professional services	11	26	15	36	5	13
Public Administration						
Federal and postal services	70	84	70	84	-	-
State services	44	66	44	66	-	-
Local services	41	66	41	66	-	-
Total	27	40	33	49	2	4
Total non-Agricultural	30	44	34	50	2	7
Number of observations	7,201		5,804		1,397	

Source: Estimated from the Retirement History Survey (1969-1971), DHEW-SSA

a/ All workers were between the ages of 58 and 63 in 1969.
b/ The term early signifies eligibility to receive private pension benefits by age 62.
c/ The term ever signifies eligibility to receive private pension benefits at any age.
- less than 10 observations
* less than 25 observations

age 62. Acceptance of a private pension for most of these workers is conditional on giving up their jobs. For those workers who take early private pension benefits at or before age 62 despite this constraint on their market work, the early acceptance of social security becomes more attractive since the earnings test is less likely to further constrain their market work.[6] Barfield and Morgan (1969) found that nearly 90% of auto workers who took early private pensions also took social security benefits prior to age 65. Using resurvey data from this study on auto workers, Burkhauser (1977) found that those workers younger than age 62 who postponed early private pension acceptance when the plan was first introduced were more likely to accept benefits at age 62 together with early social security benefits.[7]

MARKET EARNINGS

In deciding to accept social security benefits, losses in their asset value due to postponing acceptance of benefits must be balanced against the loss in wages due to the earnings test. As can be seen from Diagram 1, the higher the market earnings of workers the less attractive is early pension acceptance. Even if all postponed benefits were lost (this was the case for men 65 and over prior to 1971) there is no advantage to accepting social security benefits for those with earnings along line segment cd.

For many workers in the auto industry, Burkhauser (1977) found that the potential loss in wages overwhelmed any losses in the asset value of their pension plan incurred by delayed acceptance. Since labor market earnings are also affected by social security, the same tradeoff must be considered in the early social security acceptance decision.

OTHER FACTORS

The emphasis thus far has been on the economic choice variables that affect the acceptance decision. In addition, health and unemployment affect the acceptance decision. Health has traditionally been the reason given by the majority of workers asked why they took social security benefits. Burkhauser (1977) has found health to be an important factor in early private pension acceptance. This same result is likely with respect to early social security acceptance. Poor health or unemployment increase the probability that a worker's market earnings will fall below the minimum earnings test level (point b in Diagram 1). In addition, deteriorating health is likely to increase the relative disutility of market work.

AN EMPIRICAL TEST

Because of the dichotomous nature of the dependent variable, probit analysis was used to estimate the effect of economic choice variables on the decision of men to take retired worker benefits upon reaching age 62.[8] The results are presented in Table 4. Data is from the 1973 Social Security Exact Match File.

The regression in column (1) of Table 4 consists of 636 males eligible for social security retired workers' benefits at age 62 who were employed in social security covered work at age 61 and had not previously received social security disability payments. Because of the restriction on the sample, these workers are healthier than the full population of men age 62 and none have experienced more than one year of unemployment.

The regression in column (2) of Table 4 consists of 713 males. This larger sample also includes men eligible for social security retired worker

Table 4. Results of Probit Analysis on Workers' Decisions to Accept Social Security Benefits at Age 62

Variable	(1) Value	(2) Value
Constant	.300 (1.09)	.412 (1.70)
Asset Value of Social Security Benefits	.303 E-1 (3.06)	.336 E-1 (3.68)
Market Earnings	-.230 (10.05)	-.199 (10.15)
Early Private Pension (EARLY)	.311 E-1 (2.72)	.205 E-1 (1.93)
Private Pension (EVER)	-.221 E-1 (2.40)	-.171 E-1 (1.98)
Education	-.313 E-1 (1.66)	-.449 E-1 (2.64)
Marital Status	-.269 (1.14)	-.487 (2.35)
Observations	636	713
Adjusted Log Likelihood Ratio	135.74	142.01

Note: t-statistics are in parentheses.

benefits at age 62 who had not previously received social security disability payments. It differs from the other sample by including men regardless of previous work history. For this reason the group is more likely to be unemployed and in poorer health. Descriptions of all variables in the analysis are found in Table 5. The results are quite comparable with the results found by Burkhauser (1977) for early private pension acceptance and support the economic choice aspects of the decision to take early social security benefits.

Asset Value of Social Security

This variable measures the expected present value of all future social security benefits. In addition to the retired worker benefits received by both the worker and his wife, spouse and survivor benefits are included. The algorithm used to estimate this value is available in appendix A. As expected, the asset value of social security is significant and positively related to social security acceptance at age 62 in both equations.

A positive coefficient is consistent with a less than actuarially fair postponed benefits system. In such a system the greater the absolute dollar value of assets lost by postponement, the more likely is acceptance at age 62. The net effect of the asset maximization effect cannot be determined, however, since higher total asset values are also consistent with early acceptance.[9] The results are particularly encouraging since social security benefits are related to workers' earnings, which have a strong negative relation to benefit acceptance. For this reason the simple correlation between asset value and acceptance is negative.

Market Earnings

Losses in the asset value of social security must be balanced against the effects of the earnings test on the wages of those who take early social

Table 5. Definition of Variables Used in Table 4

Dependent Variable	= 1 if a worker takes social security retired worker benefits up to three months after he becomes age 62. = 0 if a worker does not take social security retired worker benefits up to three months after he becomes age 62.
Asset Value of Social Security	= the present discounted value of all social security retired worker, spouse, and survivor benefits (the full algorithm is provided in appendix A).
Market Earnings	= the social security taxed earnings of a worker at age 61. For those age 62 in 1972 this was 1971 earnings. For those 61 in 1972 this was 1972 earnings. (See appendix A.)
Early Private Pension (EARLY)	= This is the probability of a worker being eligible for a private pension at or before age 62 based on the industry he last worked.
Private Pension (EVER)	= This is the probability of a worker being eligible for a private pension at any age based on the industry he last worked.
Marital Status	= 1 if married, living with wife = 0 if not married, or not living with wife.
Education	= completed years of education.

security benefits. It was expected that potential market earnings would be negatively related to social security acceptance. In both regressions in Table 4 the market earnings variable was significant and negative. Potential market earnings are estimated from a worker's social security taxed earnings at age 61. The method of estimation is found in appendix A.

Private Pensions

Since the Exact Match File did not contain information on individual private pension options available to workers, a proxy was used. The effect of private pension eligibility is captured by the variable EARLY, which is the probability that the worker has a pension option allowing acceptance at or before age 62, and the variable EVER, which measures the probability that a worker has a pension option at any age. These industry wide pension probabilities shown in Table 3 are computed using data from the Retirement History Survey (RHS). Each worker is assigned the probability of eligibility for a pension based on the industry last worked.

As expected, in both regressions an increased probability of pension eligibility at age 62 increases the likelihood of social security acceptance at age 62.

Interestingly, the probit equation shows that those whose private pension plans do not offer early benefits are less likely to take early social security benefits than those with no coverage at all. One reason for this may be that the last years of work may count more heavily in pension benefit calculations. This would increase the incentives to remain in market work full time and postpone social security acceptance. The private pension proxies have the expected sign in both regression equations but are only on the borderline of significance at the 5% level in equation (2).

Other Variables

Studies of labor force participation of older workers have found that married men spend more time in market work. Schooling has also been found to increase market work of older men. Such findings would suggest that both marriage and schooling would decrease the probability of early social security acceptance. Although the signs of both these variables are negative in both equations, they are significant only in the second regression,[10] Race was used in regressions not shown and was not significant in either sample of workers.

Mean Value Equation

When all other variables are held at their mean value,[11] the elasticity of each independent variable at its mean can be found. This was done using the regression results from column (1) of Table 4. A 10% increase in (1) the asset value of social security increases the probability of accepting retired worker benefits upon reaching age 62 by 14%; (2) market earnings decreases the probability by 19%; (3) EARLY increases the probability by 11%; (4) EVER decreases the probability by 12%.[12]

Coefficients of independent variables in probit functions do not relate directly to changes in the dependent variable, so it is useful to illustrate some of the predicted probabilities of early social security acceptance based on a range of values for the independent variables. This is done in Table 6.

Increases in the asset value of social security, holding other variables constant, increase the probability of acceptance of retired worker benefits at age 62. Increases in market earnings decrease this probability. For those with market earnings at $2100 per year (the

Table 6. Probabilities of Acceptance of Social Security Retired Worker Benefits at Age 62 by Workers with Differing Market Earnings and Social Security Asset Values (in percentage)

Asset Value of Social Security (thousands) \ Market Earnings (thousands)	0	2.1	4.2	6.3[a]	8.4	9.7
0	36.5	20.3	9.5	3.6	1.1	0.5
10	48.2	29.8	15.6	6.7	2.4	1.1
20	60.0	40.9	23.9	11.6	4.7	2.4
30	71.0	52.8	34.0	18.5	8.4	4.7
33.1[a]	74.1	56.5	37.5	21.2	10.0	5.7
40	80.4	64.5	45.6	27.5	14.1	8.5
50	87.5	74.9	57.5	34.6	21.8	14.1

Note: The probabilities of acceptance of social security retired worker benefits in this table are derived from the probit equation (1) of Table 4. All variables not shown are held at their mean value.

[a]mean value

earnings test threshold--point b of Diagram 1), the probability of acceptance increases from 20% to 75% across the range of asset values. At the mean market earnings value of $6300 per year, the probabilities range from 3.6% to 34.6%. The fall in probabilities across the range of market earnings, holding the social security asset value at its mean, is from 74.1% to 5.7%. This table shows the importance that both these variables play in the social security acceptance decision.

SUMMARY

The asset nature of social security is emphasized in this study. The life time present discounted value of social security benefits are examined rather than yearly payments. Because acceptance of benefits subjects the worker to an earnings test this is not a simple asset model. Two workers with the same potential social security benefit will not act the same if the earnings test affects them differently. The empirical results support the belief that economic incentives play an important part in the decision to accept social security benefits.

In the decision to take benefits at age 62 the worker looks at his option of continued market work, and compares it to his options if he accepts social security benefits. The potential loss in market earnings given social security acceptance must be weighted against changes in the value of his private pension options and the value of his social security benefits if they are postponed. Clearly, worsening health or prolonged unemployment force some workers to accept early social security benefits, but the results of this paper show that economic choice variables have a role to play for many workers.

NOTES

[1]This underestimates the true marginal tax rate. Social security benefits are tax free, whereas the earnings test is on gross earnings, so the true marginal tax rate on market earnings is greater than 50%. It was estimated to be over 70% for the median worker in 1974 (Tolley and Burkhauser 1977).

[2]A life cycle pension acceptance model is provided in appendix B.

[3]For a man age 65 who delays acceptance of benefits until age 66 it would be

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

where

ee' = net present discounted value of addition social security benefits gained by delayed acceptance

P_i = probability of surviving the (i) period

B_{65} = benefits at age 65 (ea in Diagram 1)

d = rate of increase in yearly benefits in future periods due to delayed acceptance in inital period (1% since 1972)

r = rate of interest.

[4]See Sherman (1976) for information on asset holdings of workers in the Retirement History Survey.

[5]See Tolley and Burkhauser (1976) for a critique of the replacement ratio as an equity measure.

[6]For clarity of discussion, labor force decisions as well as decisions over the timing of social security and private pension acceptance are discussed as if they were sequential. In fact they are made simultaneously, as can be seen from the life cycle model in appendix B.

[7]The auto workers pension plan was heavily tilted actuarially toward early acceptance. The mean loss in the asset value of benefits if delayed to age 65 for worker was $9705 (in 1965 dollars). Those accepting pension benefits were under the same earnings restrictions as those enforced by social security in 1965. Anyone accepting these benefits would be under no further constraints if they took social security benefits. Across the economy little systematic information is available on the actuarial fairness or work restrictions of private pensions.

[8]For a full discussion of probit analysis see Amemiya (1974).

[9]Within a life cycle framework the age at which social security benefits are received, given perfect expectations and perfect capital markets, would have no independent wealth effect on labor supply decisions at that age. Additionally, if benefits were actuarially fair with respect to individual contributions into the system and no loss in benefits occurred through delayed acceptance, the social security system would be merely a deferred wage scheme, neutral with regard to life cycle labor/leisure choices (Burkhauser and Turner 1977). But the asset maximization effect will influence acceptance decision, even with perfect expectations and perfect capital market, when postponed benefits are lost. To the degree that changes in wealth due to social security are unexpected the effect would have a greater impact at acceptance.

[10]It is possible that education and marital status are reflecting the effects of health on the early social security acceptance decision. Particularily in the larger sample health difference could be important. Education is positively related to health and likely to be negatively

related to physical requirements of current job. Both these factors would make education negatively related to early social security acceptance.

[11]See Table 1A in appendix A for mean values.

[12]Both the education and marital status variables were insignificant in this regression. Their elasticities were - 0.5 and - 0.3 respectively. The elasticities for variables in column (2) of Table 4 are close to those found in column (1). The mean elasticity for the asset value of social security is 1.5, for market wage is -1.5, for EARLY is 0.7, for EVER is -0.9, for education is -0.7, and for marital status is -0.6.

Appendix A

The data are from the 1973 CPS-SSA Exact Match File compiled under the direction of Fritz Scheuren of the Social Security Administration. The sample tested in this paper consists of men age 61 years and 2 months to 63 years and 2 months in 1972 and their spouses if married, who had worked in social security covered employment at some time during age 61. In addition, they had received no benefits prior to age 62 but were eligible for retired worker benefits at age 62.

The asset value of social security was estimated by using the four equations below.

Asset Value of Social Security

For a single worker,

$$(1)\quad \sum_{t=1}^{39} [MALE(61+t) * BENS(61+t)]/(1.05)^t.$$

For a married worker and spouse,

$$(2)\quad \sum_{t=1}^{39} \Big[FEMALE\big(AGE + (t-1)\big) * MALE(61+t) * [BENS(61+t) + BENB(AGE+t)]\Big]/(1.05)^t,$$

$$(3)\quad \sum_{t=1}^{LIFE} \Big[BENW(AGE+t) * \prod_{j=1}^{t} FEMALE\big(AGE+(j-1)\big) * \sum_{k=1}^{t} \Big(\prod_{L=62}^{62+K-1} MALE(L)\Big)_K \big(1 - MALE(61+k)\big)\Big]/(1.05)^t,$$

$$(4)\quad \sum_{t=1}^{39} \Big[BENH(61+t) * \prod_{j=1}^{t} MALE\big(AGE(j-1)\big) * \sum_{N=1}^{t} \Big(\prod_{M=AGE}^{AGE+N-1} FEMALE(M)\Big)_N \big(1 - FEMALE(AGE+N)\big)\Big]/(1.05)^t,$$ where

AGE = the age of the wife when husband is age 62

FEMALE ( ) = the probability of the wife surviving the ( ) year of her life

MALE ( ) = the probability of a husband surviving the ( ) year of his life

BENS (61 + t) = male retired worker benefits at age (61 + t)

BENB (AGE + t) = the wife's retired worker or spouse benefit at age (AGE + t)

BENW (AGE + t) = the wife's survivor or retired worker benefit at age (age + t)

BENH (61 + t) = the husband's survivor or retired worker benefit at age (61 + t).

When (AGE + t) < 62 BENB = 0, BENW = 0.

When K = 1 $\left(\prod_{L=62}^{62+K-1} \text{Male (L)} \right) = 1.$

When N = 1 $\left(\prod_{M=AGE}^{AGE+N-1} \text{Female (M)} \right) = 1.$

Equation (1) is the present discounted value of the retired worker benefit for a single worker age 61 who accepts benefits at age 62. BENS is 80% of his PIA, which is estimated from the AMW provided in the Exact Match File.

Equation (2) is the present discounted value of retired worker benefits for the husband and wife when they both survive the period. BENB is zero prior to the wife reaching age 62 and it is assumed that the wife first receives benefits at age 62. If a wife's benefit as a spouse is greater than her retired worker benefit the former is used.

Equation (3) is the present discounted value of all possible returns to the wife given the death of the husband in any period. BENW is zero prior to a wife reaching age 62 and it is assumed that the wife first receives benefits at age 62. If a wife's survivors benefit is greater than her retired worker benefit the former is used.

Equation (4) is the present discounted value of all possible returns to the husband given the death of the wife in any period. BENH is the retired worker benefit unless his survivor benefit is greater, then it is his survivor benefit.

The value of social security benefits expected by single men are estimated by equation (1). For married men, the value of social security benefits expected by both the husband and wife are estimated by the sum of equation (2), equation (3), and equation (4). The algorithms discount by an interest rate of 5%. Since all social security benefits are indexed against inflation (since 1974 this is automatically provided for in the law but it had been done periodically by congressional action prior to 1974) a real interest rate of 5% results in a conservative estimate of social security benefits.

Retired worker, spouse, and survivor benefits are the major sources of social security benefits for the age group in this study. But even among this group, other social security benefits are possible. Disability payment could be paid to a wife who is younger than age 65. Mother or student benefits could be paid to widows with children. This allows them to receive benefits prior to age 60. The expected value of these benefits are not contained in the algorithm.

Market Earnings

Workers age 61 and 2 month through age 63 and 2 month in 1972 were used in order to increase sample size. For workers age 61 in 1972, social security covered earnings for 1972 were used. For workers over age 62 in 1972, social security earnings in 1971 were used. One complication in this process was that the maximum taxable earnings increased from $7800 to $9000 in 1972. The following rule was used to estimate total earnings at age 61 for all workers:

1. If social security taxed earnings were greater than $7800 for those age 61 in 1971 they were given a market earnings value of $9750, if all contributions were made in the first three quarters. If they contributed in all four quarters, they were given a value of $7800.

2. If social security taxed earnings were greater than $7800 for those age 61 in 1972 they were given a market earnings value of $9750, if all contributions were made in the first three quarters. If they contributed in all four quarters, they were given a value of $7800.

Early and Ever Pension

This data, taken from Table 3, is based on data from the Retirement History Survey. The percentages are based on individual data on worker pension option from this survey.

Mean Value Equations

The mean values of all variables used in both probit equations from Table 4 are provided in Table 1A.

Table 1A. Mean Values of Variable in Table 4

Variable	Mean Value (1)	Mean Value (2)
Asset Value of Social Security Benefits	33,132[a]	32,125[a]
Market Earnings	6,300[a]	5,769[a]
Early	26.85[b]	27.28[b]
Ever	40.25[b]	40.65[b]
Education	11.26[c]	11.25[c]
Married	89.15[b]	87.66[b]
Accepted Benefits (dependent variable)	25.26[b]	26.93[b]
Observations	636	713

Note: [a]dollars

[b]percent

[c]years

A Simple Social Security Benefit Algorithm

Prior to 1956 only workers 65 and older were eligible for social security payments. In 1956 women age 62-64 were permitted to receive benefits but the payments were reduced by 5/9% for each month taken before age 65. At age 62 a minimum benefit of 80% of the full benefit could be taken. It may be that the formula used to reduce the benefits was actuarially neutral with respect to the timing of acceptance for women, but by using the same rate of reduction for men it clearly biased the system toward early acceptance. Men have shorter expected life horizons than women at age 62. For this reason alone, the system tilts toward early acceptance for men.

Equation (5) is an approximation[1] of the algorithm used to calculate alternative present values of social security benefits taken between age 62-64. By delaying acceptance, initial payments increase, but depending on the interest rate and life expectance, present value may not:

$$PV(g) = \int_{g}^{n} (k + .067gM)e^{-(r+\alpha)t}\, dt. \tag{5}$$

Equation (5) represents the present value of social security payments for those age 62 taken at any time (g) where

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[1]This is a simplified algorithm for estimating social security benefits. It is assumed that the year of death is known. This differs from the mortality probability method used throughout. But more technically, (M) is not independent of changes in (g), since additional time in the market can increase (M). This is not as large a problem as it might seem because (M) is based on average lifetime earnings. The best five years since 1950 were counted in 1961 and this has increased one additional year for each year since then. In 1974 the best 18 years of earnings were considered. Social security taxes are also collected during added years, which offsets any change in (M). The system is not symmetrical and until 1972 no actuarial increases were permitted for those postponing social security benefits past age 65. In 1972 an increase of 1% per year was permitted, but this is little more than a token of an actuarially fair rate.

g = the number of years elapsed after age 62 and entitlement where

$0 \leq g \leq 3$

M = full payment at age 65 (Primary Insurance Amount, PIA)

k = .8 M, which is the minimum benefit at age 62

r = real interest rate

α = expected rate of inflation

n = expected years of life.

Workers will choose the (g) between age 62-64 that provides the greatest return. For a worker who takes social security at age 62, (g) equals zero and yearly benefits are at the minimum (k).

As can be seen from Table 2A, interest rates above 8.4% always tilt the equation toward the earliest acceptance point regardless

Table 2A. Minimum (r+a) Consistent with (g^*=0) Given Various Values for n

g^*	$r+\alpha$	n
0	8.4	∞
0	8.0	39
0	6.0	21
0	4.0	16
0	1.0	13

Source: Burkhauser (1976).

of life expectancy. With death expected at age 75 or earlier an interest rate as low as 1% is still consistent with earliest acceptance.

The maximizing condition[2] is independent of the size of the basic social security payment (called the primary insurance amount, PIA). But (M) is important in a general model since social security constrains the earnings of workers who receive benefits. As social security benefits increase, the incentives to take early benefits and decrease work in the market will increase both b-cause of the wealth effect and the effective tax on market work for that age period.

$$^{2}PV_{g_o} = \int_{g_o}^{n} (S + .067gM)\, e^{-(r+\alpha)t}\, dt$$

$$PV_{g_o} = (M/(r+\alpha))(.8 + .067g)(e^{-(r+\alpha)g} - e^{-(r+\alpha)n})$$

$$\frac{\partial PV_g}{\partial g} = -(.8 + .067g)\, e^{-(r+\alpha)g} + ((1/r+\alpha)(.067)(e^{-(r+\alpha)g} - e^{-(r+\alpha)n}))$$

$$\frac{\partial^2 PV_g}{\partial^2 g} = (r+\alpha)(.8 + .067g) - .134.$$

Appendix B

A Life-Cycle Model

A standard Becker (1974) household production model framework is used. Equation (1) is the worker's utility function, where (Z_i) is a composite non-marketable commodity and (p_i) is the probability of surviving the (i) year:

(1) $\quad U = U(p_i Z_i).$

With risk-neutrality, this criterion simplifies to the maximization of expected full wealth. Full wealth is defined as the present value of the stream of commodities produced over the life-cycle.

A production function, equation (2), relates the inputs--non-market time (h_i), and purchased goods and services (x_i)--to the composite commodity (Z_i) produced:

(2) $\quad Z = f(x_i, h_i).$

Equation (3) is the budget constraint for purchased goods and services. The present value of all purchased goods and services (x_i) must equal the present value of earned market income ($w_i t_i$), where (w_i) is the market wage rate, (t_i) is time spent in the labor market, and non-wage income is (v_i):

(3) $$\sum_{i=0}^{n} \frac{x_i}{(1+r)^i} = \sum_{i=0}^{n} \frac{w_i t_i + v_i}{(1+r)^i}.$$

The time constraint is represented by equation (4), where (T) is healthy time:

(4) $\quad h_i + t_i = T.$

By substituting equation (4) into (3), the constraint for commodities produced by the household in money terms is obtained, as seen in equation (5);

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[1]The definitions of all variables used in this model are provided in Table 1B.

Table 1B. Definition of Variables

Symbol	Value
Z_i	Commodities produced in the (i)th period
F	Money wealth
w_i	Total value of time in the (i)th period (pre-pension)
w_i'	Total value of time in the (i)th period (post-pension)
v_i	Non-wage assets used in the (i)th period
h_i	Fraction of time spent out of the market in the (i)th period
t_i	Fraction of time spent in the market (i)th period
x_i	Purchased goods and services in the (i)th period
a	The number of years before normal pension age
T_i	Healthy time in the (i)th period
π_i	Price of (Z) in the (i)th period (pre-pension)
π_i'	Price of (Z) in the (i)th period (post-pension)
$\bar{\pi}$	Price index of path of normal retirement
$\bar{\pi}'$	Price index for path of early retirement
Z^*	Maximum wealth
g_i	Weight given to (Z) produced in the (i)th period
k_i	Social security payments in the (i) period
γ_i	Adjustment in social security payment due to postponing acceptance from the (i) period
p_i	Probability of surviving the (i) period

$$(5) \qquad \sum_{i=0}^{n} \frac{x_i + w_i h_i}{(1+r)^i} = \sum_{i=0}^{n} \frac{w_i T + v_i}{(1+r)^i} = F,$$

where the first summation is total expenditures on commodities produced and the second summation is nominal money wealth (F). The value of inputs in one period equal the total value of commodities produced in one period, as seen in equation (6):

$$(6) \qquad x_i + w_i h_i = \pi_i Z_i,$$

where (π_i) is the price of (Z_i). Since any change in the value of time changes the price of commodities across time, an overall price index $\bar{\pi}$ is needed for weighting the (π_i)'s to express wealth in real rather than nominal terms:

$$(7) \qquad \bar{\pi} = \sum_{i=0}^{n} g_i \pi_i,$$

where the (g_i)'s reflect discounting and the relative share of commodities produced in each period. The commodities constraint in real terms is developed in equation (8) by substituting equation (6) into equation (5) and dividing by the price index of equation (7):

$$(8) \qquad \sum_{i=0}^{n} p_i \frac{\pi_i Z_i}{\bar{\pi}(1+r)^i} = \sum_{i=0}^{n} p_i \left[\frac{w_i T + v_i}{\bar{\pi}(1+r)^i}\right] = \frac{F}{\bar{\pi}} = Z^*,$$

where (Z*) is wealth in real terms and is equal to the expected present value of the stream of commodities produced.

The maximum real wealth path for a worker who is eligible for a pension at period (0) is found by comparing the real wealth associated with accepting the pension at each age (a) from 0 to n. A necessary condition for accepting the pension at (a) is that

$$Z^*_a - Z^*_{a+1} \geq 0, \qquad \text{where}$$

$$(9) \qquad Z^*_a = \sum_{i=0}^{n} p_i \frac{(\pi_i' Z_i)}{\bar{\pi}'(1+r)^i} = \frac{F'}{\bar{\pi}'} = \sum_{i=0}^{a} p_i \left[\frac{w_i'T + v_i + k_i}{\bar{\pi}'(1+r)^i} \right] +$$

$$\sum_{i=a+1}^{n} p_i \left[\frac{w_i'T + v_i + k_i}{\bar{\pi}'(1+r)^i} \right],$$

$$(10) \qquad Z^*_{a+1} = \sum_{i=0}^{n} p_i \frac{\pi_i Z_i}{\bar{\pi}(1+r)^i} = \sum_{i=0}^{a} p_i \left[\frac{w_i T + v_i}{\bar{\pi}(1+r)^i} \right] +$$

$$\sum_{1=a+1}^{n} p_i \left[\frac{w_i'T + v_i + k\gamma_i}{\bar{\pi}(1+r)^i} \right],$$

and

$$(11) \qquad Z^*_{\bar{a}} - Z^*_{a+1} > \sum_{i=0}^{\bar{a}} \frac{(Sw_i' - w_i)T + \gamma_i(S-1) + Sk_i}{\bar{\pi}(1+r)^i} +$$

$$+ \sum_{i=a+1}^{n} \frac{(w_i'T + v_i)(S-1) + k_i(S-\gamma)}{\bar{\pi}(1+r)^i},$$

where ($S = \bar{\pi} / \bar{\pi}'$) is the ratio of the overall price index without and with the early pension option. Note that $S > 1$ because, as seen in equation (6), the price of commodities must fall when w_i falls due to the work constraint.

Equation (11) can be expressed in terms of a general function, as seen in equation (12). The direction of the partial derivatives of the expression are in parentheses:

$$(12) \qquad Z^* - Z^*_i = D(w, w', k_i, \gamma, r, S, T, v) \geq 0,$$
$$(-)(+) \quad (?) \quad (-)(+)(+)(?)(+)$$

where the optimal Z^* must be such that $Z^* - Z^*_i > 0$ for all (i). An expanded version of this model is found in Burkhauser (1977).

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