Social Security, Liquidity, and Early Retirement

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Working Paper No. 74
March 1987

SOCIAL SECURITY, LIQUIDITY, AND EARLY RETIREMENT

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Working Paper No.: 74

April 1985, revised March 1987

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Abstract

This paper investigates the effect of Social Security on the decision to retire at age 62. I argue that it is important to take realistic account of how recipients evaluate potential benefit flows. If individuals face liquidity constraints, for example, and therefore use a relatively high discount rate in evaluating future benefits, then Social Security actually discourages continued work (on average). Using data on individual retirement decisions, I find support for the argument that this phenomenon is responsible for at least some of the increased incidence of early retirement.

The impact of the Social Security system on retirement decisions has been the subject of much research in recent years. Problems with the system's solvency have generated legislative changes in its benefit structure and have stimulated debate about the system's impact on the behavior and welfare of participants. A number of the changes appear to have as their goal a general increase in the age of retirement. These include a gradual increase in the age of first eligibility for full benefits (from 65 to 67), and an increase in the bonus for postponing retirement beyond that age (from 1 percent to 3 percent per year). An understanding of the determinants of the age of retirement is clearly prerequisite to analysis of such policy changes.

Whether Social Security affects retirement decisions also is an important factor in determining its effect on savings. Feldstein (1974) argues that an unfunded pension system such as Social Security can affect savings through two channels. Social Security wealth may substitute for personal savings, but if the system encourages earlier retirement, individuals may wish to increase their total savings. The net effect on savings is ambiguous, and depends on how much retirement is hastened by the system. On the other hand, Barro (1974) shows that a pay-as-you-go Social Security system would have no effect on aggregate savings (or on retirement behavior) provided different generations are linked via intergenerational transfers of wealth. Even in this view, however, persons who have low wealth, and are as a result either liquidity-constrained or at a corner in their optimal bequest solution, would be affected by changes in Social Security policy.

The goal of this paper is to discover whether the Social Security system provides individuals with an incentive to retire early. In a very influential paper Blinder, Gordon, and Wise (1980) argue that, contrary to popular belief, Social Security provisions provide a net subsidy to continued work for most men between the ages of 62 and 64; they conclude that any negative effect on labor supply must be a consequence either of large income effects or simply of confusion on the part of recipients. I will argue that their calculations presume that individuals ought to evaluate Social Security benefit flows as returns from some marketable asset. If this is not the case (and surely Social Security wealth is not marketable in any meaningful sense), then there is no reason to believe that in fact the system subsidizes work effort at those ages. To put it another way, BGW's arguments implicitly assume that individuals can behave according to standard life-cycle assumptions, i.e. with sufficient access to capital markets so as to necessitate consideration of only their lifetime budget constraint in choosing consumption and labor supply. While this may be true of some people, recent findings by Diamond and Hausman (1984b) of a substantial portion of older people with a very low level of financial wealth suggest that many people are unlikely to be able to behave as true life-cycle maximizers even at the age in which the life-cycle hypothesis predicts they should most easily be able to do so. Furthermore, even households with significant financial wealth might not discount future earnings or pension benefits at prevailing market rates of interest if they perceive the possibility of future liquidity constraints, and are therefore reluctant to draw down their stock of wealth (as argued, for example, by Zeldes (1984)).

That life-cycle assumptions are often made implicitly in analyzing Social Security is somewhat ironic, since it is precisely the alleged failure of many people to behave according to the model, and the inadequacy of capital and insurance markets (which itself could be a major reason for people not being life-cycle maximizers) that are two of the reasons most often cited for having a system of mandatory social insurance (see, for example, Diamond (1977), or Aaron (1982)). The present system could hardly be said to complete the missing markets, so even with Social Security the market failure explanation for non-life-cycle behavior is still pertinent. Furthermore, even granted the relevance of life-cycle considerations to the behavior of retirement vis a vis Social Security, it is an empirical question whether or not individuals do in fact behave according to its predictions. The literature is full of evidence that many people do not do so, but such tests of the hypothesis have not generally been at all related to the questions considered here.

Casual evidence suggests that eligibility has strong effects, and many writers take it for granted that this is the case.[1] Yet the empirical literature reaches ambiguous conclusions on the subject. The results of Hanoch and Honig (1983) suggest that retirement responds to current net income flows without regard to changes in future benefits. On the other hand, Sickles and Taubman (1986) find that the gain from postponing retirement (including the change in the present value of Social Security benefits) has the expected negative effect on retirement, but that there is a strong pre-age-62 effect as well. They speculate that liquidity constraints might be the reason for this, but do not pursue the point any further. On the other hand, Gustman and Steinmeier (1986) conclude that their structural life-cycle model explains retirement behavior quite well without a need to resort to pure age or eligibility effects. They do not subject their conclusion to a statistical test, however.[2]

If in fact eligibility effects are important, then the pure life-cycle model fails, and the question becomes: what is the source of the failure? The obvious candidate in this context is imperfect credit markets. The life-cycle model presumes a complete separation between income flows and consumption decisions, and in particular the ability to borrow against future income. Yet in reality an individual is likely to find it difficult to borrow at anything like the same rate at which he can save, a fact that could make his consumption decisions sensitive to current income flows. Many researchers have found evidence in micro data that liquidity constraints may be important in making consumption exhibit "excess sensitivity" with respect to current income (e.g. Hall-Mishkin (1982), Zeldes (1984), Paquette (1985)). In much the same way, many people might like to retire (that is, consume more leisure) against future income flows (i.e. Social Security benefits), but cannot do so because of the inability to borrow against those flows. There is no reason to think that such individuals should treat future income as returns from a marketable asset and discount them at a real after-tax rate of return as suggested by BGW.[3]

Indeed, there is independent evidence that the distinction between marketable and non-marketable assets is important. In studies involving data on household appliances, Hausman (1979) and Dubin-McFadden (1984) find that individuals behave is if they discount future flows quite heavily (on the order of 18 percent), and, further, that the implicit discount rates are inversely related to income level. On the other hand, in a study of used cars (1986), I find that the response of their prices to gasoline price shocks is consistent with discount rates of roughly 5 percent. One suspects that a used car is much more marketable an asset than most household appliances.

The plan of the paper is as follows: The first section presents a model of the retirement decision in a life-cycle framework. Although it represents a stylized view of the retirement decision, it clearly indicates the variables that ought to influence the timing of the decision for a life-cycle maximizer. This is followed by a discussion of how liquidity constraints could distort the retirement decision in an otherwise neutral pension system. Section II describes the data, which come from the Social Security Administration's Longitudinal Retirement History Survey, and presents the statistical results on age-Social Security wealth profiles in the sample.

I. Theoretical Issues

This section presents a standard economic analysis of retirement, focusing on the lifetime profiles of wages, potential retirement income, accumulated assets, and the disutility of labor.[4] I begin with a discussion of the retirement decision from the perspective of an individual life-cycle maximizer. I then introduce uncertainty (of one particular kind), liquidity constraints, and household considerations.

A. The Individual Life-Cycle Retirement Decision

The basic assumption of the model is that the disutility of labor tends to increase over time, especially at later ages when the frequency of health problems increases significantly, while the net financial return to continued work fails to rise sufficiently to forestall a reduction in desired hours of work. To the extent that it is difficult to reduce hours of work to what would otherwise be the desired level, either because of the nature of the work, or because of the rules governing pension receipts (e.g. the Social Security earnings test), workers will tend to make the discrete change in their work status that we call retirement. Viewed in this way, retirement need not be complete (i.e. zero hours of work), but it should involve a discrete reduction in hours together with a qualitative change such as beginning to receive Social Security retirement benefits if eligible to do so.

If one takes pensions and Social Security into account, the net return to continued work may decline substantially at some ages. Kotlikoff and Wise (1984) have documented the fact that many private pensions feature provisions that in effect reduce net compensation discretely at certain ages. Lazear (1983) suggests that such features are a means by which employers can encourage older workers, who in many cases may be on average less productive, to retire without actually having to cut their wages directly. Social Security is well known to have this feature at age 65 and may, as we shall see below, have it at age 62 as well. So there is good reason to treat retirement conceptually as a well-defined, discrete event, although in practice it may not be so easily discernible in the data. The model presented below, which draws on Sheshinski's (1978) model, incorporates the above considerations into a simple life-cycle framework. It treats the retirement decision as an optimal stopping problem, first under certainty and then with extensions to allow for uncertainty and liquidity constraints.[5]

Consider an individual with a horizon of T years. He wants to choose a path of consumption, c(t), and a retirement age q, to maximize lifetime utility. He faces a known path of wage rates w(t), tax rates z(t), and potential retirement income p(t,q).[6] Assume that his utility is both time-separable and separable in consumption and leisure, and let the instantaneous utility function have the form

$$U(t) = \begin{cases} [u(c(t) - v(x(t))]e^{-\alpha t} & 0 \leq t \leq q \\ u(c(t))e^{-\alpha t} & q < t \leq T \end{cases}$$

where x(t) is some factor such as poor health that increases v, the instantaneous <u>dis</u>utility of labor, and where utility in consumption u(c) is concave and differentiable. Assume perfect capital markets, and that the individual can borrow and lend as much as he wants to at a constant rate r.

The worker's problem is to maximize lifetime utility subject to a single lifetime budget constraint:

$$(2) \qquad \max_{c,q} \quad J = \int_0^q [u(c(t))-v(x(t))]e^{-\alpha t}dt + \int_q^T u(c(t))e^{-\alpha t}dt$$

subject to

$$(3) \quad \int_0^T c(t)e^{-rt}dt \leq \int_0^q (1-z(t))w(t)e^{-rt}dt + \int_q^T p(t,q)e^{-rt}dt + A(0) \equiv W(0;q)$$

where A(0) is initial tangible (i.e. liquid) wealth, and W represents total human, pension, and tangible wealth.

Differentiation of the appropriate Lagrangian with respect to q and c(t) yields:

$$(4) \qquad \lambda e^{-rt}b(t,q) - v(x(t))e^{-\alpha t} = 0 \quad \text{at } q=t$$

where λ is the Lagrange multiplier associated with the budget constraint, and b(t,q) is marginal compensation in period t conditional on retirement at some time $q \geq t$,

$$(5) \qquad b(t,q) \equiv (1-z(t))w(t) - p(t,q) + \int_q^T \frac{\partial p}{\partial q}(s,q)e^{-rs}ds \ ;$$

and a condition on the path of consumption:

$$u'(c(t)) = \lambda e^{(\alpha-r)t}. \tag{6}$$

The last equation is the standard envelope condition for lifetime utility maximization; it requires that the marginal utility of wealth, $J'(W(0))$, which equals the Lagrange multiplier λ, be equal at any point in time to the marginal utility of consumption $u'(c(t))e^{-\alpha t}$ divided by the price of consumption e^{-rt}. In the simplest case where $r=\alpha$, for example, consumption is constant. Substituting into equation (4) using equation (6) yields

$$b(t,q)u'(c(t)) - v(x(t)) = 0 \quad \text{at } q=t. \tag{4'}$$

The first term in (4') is the gain in utility from consumption resulting from continuing work for an additional instant of time (per unit of time)..

Provided that the functions are all sufficiently well behaved that the left-hand side of (4') crosses zero only once, (4') is sufficient to determine the optimal retirement age under certainty. It says, quite simply, that one should stop working when the rate of compensation expressed in terms of utility falls below the current disutility of work. Compensation has two components: the wage (net of taxes and foregone retirement benefits) and the rate of change in pension wealth associated with delaying retirement.[7]

The assumption of certainty greatly simplifies the analysis; it turns out, though, that behavior is much the same in the case of at least one type of uncertainty. If $x(t)$ is modeled as a Wiener process, then retirement behavior is essentially indistinguishable from that which obtains under certainty. One may show that instead of condition (4') we get (letting σ^2 denote the instantaneous variance of the process)

$$(4'') \qquad b(t,q)u'(c(t)) - v(x(t)) + (\sigma^2/2)(\tilde{J}_{xx} - J_{xx}) = 0$$

where $\tilde{J}$ is the value function as of time t conditional on retiring, while J is conditional on continuing work (by assumption, $J_{xx} < \tilde{J}_{xx} \leq 0$). The last term in parentheses reflects the option value of continuing work: To the extent that x might change for the better, one might not retire even if v exceeds b•u'(c) at the moment. Despite this difference, it is clear that in practice (4') and (4") would be difficult to distinguish.

Another simplifying assumption implicit in this analysis is that retirement is irreversible. This is not the case, of course, but provided there are costs to retiring and then unretiring (beyond simply lost earnings) modeling the decision as irreversible should do a good job of predicting behavior in terms of the initial retirement decision.

In a first-best world, where the tax on wages is used to finance the pension benefits and the pension budget balances for every individual at every point in time, it is an immediate consequence of life-cycle assumptions that the pension system is neutral with respect to all decisions made by the individual. This follows from the one-budget-constraint assumption: Because the pension breaks even for every individual it merely shifts around the flows of income without affecting total lifetime resources. In terms of the above notation, pension budget balance requires that for any $q \in [0,T]$

$$(7) \qquad \int_0^q z(t)w(t)e^{-rt}dt = \int_q^T p(t,q)e^{-rt}dt;$$

hence

$$(8) \qquad z(q)w(q) + p(q,q) = \int_q^T \frac{\partial p}{\partial q}(s,q)e^{-rs}ds \quad \forall q \in [0,T].$$

After substituting (8) into the individual budget, we get

$$(9) \qquad \int_0^T c(t)e^{-rt}dt \quad \leq \quad \int_0^q w(t)e^{-rt}dt + A(0).$$

The pension system thus leaves the net marginal compensation and the budget constraint unaffected, and therefore does not distort labor supply or consumption decisions. Note that this is so regardless of the particular time path given by p(t,q) so long as it satisfies (8). The fact that p(t,q) = 0 for q less than some minimum $\bar{q}$, for example, would be irrelevant in a world of certainty where individuals can borrow at risk-free rates against future benefits.

B. Liquidity Constraints

The neutrality result of the previous section holds more generally provided all the relevant markets exist, but presumably we observe pensions precisely because they are in fact not neutral, and actually mitigate the consequences of some market imperfections (e.g. adverse selection in annuities markets, or moral hazard problems such as in Diamond and Mirrlees (1978)). Regarding liquidity constraints, if one cannot borrow against future income flows, or if the borrowing rate is greater than the lending rate, then rearrangements of income flows may have substantial effects on patterns of consumption and labor supply. The standard story in a 2-period setting is illustrated in Figure 1. That the rate the consumer must pay to borrow is higher than that which he can receive if he saves is reflected by the kink in the budget constraint. If he could borrow at the same rate, he would be at point A. At point B, his marginal rate of substitution between the first and second period is clearly higher than at A. Moreover, additions to current income or assets could have him go to a point such as C, so that in his response to such changes he would be behaving very much like a consumer who simply faced the higher rate on both sides of the market.

In terms of the model in the previous section, consider a consumer who cannot borrow at a rate r against future pension wealth, and who therefore faces the additional constraint that if he wishes to draw down his financial assets to zero, any consumption in excess of current income has to be financed at a rate $r' > r$. Furthermore, let us assume for simplicity that r' is sufficiently large that the individual essentially faces the constraint

$$A(t) \geq 0 \quad \forall t \in [0,T], \tag{10}$$

where, we recall, $A(t)$ represents liquid (i.e. non-pension and non-human) wealth. Finally, suppose that the pension system has $p(t,q) = 0$ for t and q less than some minimum $\bar{q}$, $p(t,q) > 0$ for $t,q \geq \bar{q}$ (e.g. $\bar{q} = 62$ for Social Security).

Let the time path of shadow prices associated with the constraint (10) be denoted by $\mu(t) \geq 0$. Now consider an individual who is liquidity-constrained at time $\tau < \bar{q}$. The question is how should such a person value future pension benefits? Whereas a non-constrained person is indifferent at the margin between \$1 today and \$$e^{rt}$ t time units from today, this will not be true of someone who is constrained. Such a person would in fact demand $\frac{\lambda + \mu(\tau)}{\lambda + \mu(\tau+t)} e^{rt}$ dollars at time $\tau+t$ for giving up one dollar at τ. If $\tau+t > \bar{q}$ we would expect to have $\mu(\tau+t) = 0$, or at least $\mu(\tau+t) < \mu(\tau)$; this is the basis for the argument that a constrained individual would discount future pension claims at a rate greater than r. .

How does the discounting issue relate to retirement? If we take as a reference case the situation of an individual who if unconstrained would have a marginal gain from continued work $b(t,q)u'(c(t)) - v(x(t))$ that is continuous in t--say an individual for whom $w(t)$ and $x(t)$ are continuous and for whom (8) (the pension budget balance requirement) holds. Such an individual, if constrained prior to $\bar{q}$, would generally experience a discrete fall in his marginal compensation at age $\bar{q}$. This would occur because of the jump in $p(t,q)$ at $q=\bar{q}$ and the fact that the change in future benefits resulting from delaying retirement had been valued by the individual at less than $\int_q^T \frac{\partial p}{\partial q}(s,q)e^{-rs}ds$ at time $q < \bar{q}$. These considerations cast doubt on BGW's assertion that Social Security provisions "--if understood by the public--should provide work disincentives for only a small minority of individuals."

C. Household Considerations

In many instances the fundamental economic decision-maker is not the individual but the household. This is especially so in the case of labor supply decisions. If, for example, a household consists of a husband and wife, the relevant first-order conditions will involve the marginal utilities of both household members. Or, to put it another way, the marginal utility of income for a household will clearly depend, ceteris paribus, on the number of household members.

Social Security takes account of household size by providing additional labor force participation rates for two age groups of workers from 1955 to 1981. For workers aged 55-64 there is no obvious trend in participation until after 1961, the very year in which the early retirement option became available to male Social Security recipients. The rate of decline becomes considerably steeper in the 1970s, which coincides with a period of substantial real increases in Social Security benefits. Table 2, excerpted from Rones (1985), gives the percentage-point decline in labor force participation for each age 61 through 65, by cohort, based on data from the Current Population Survey. There are noticeable peaks at ages 62 and 65, with the age 62 peak becoming increasingly prominent. In addition to the fact that benefits were increased in the seventies, two other possible explanations for the increased prominence of the peak at age 62 some 8 to 10 years after the policy change are, first, that many workers undoubtedly plan their retirement several years ahead of time, so that at the time of the policy change the initial response would have been small; and, second, that it may take time for the earlier age to become socially acceptable as a retirement age.

None of this, of course, contradicts BGW's claims. They do not deny that people are retiring at age 62; rather they deny that Social Security subsidizes them to do so. Social Security retirement benefits are based on a concave function of what is called Average Monthly Earnings (AME). Roughly speaking, AME is based on one's reported earnings since 1951, dropping the lowest five years from the average. BGW's main point is that because earnings for most workers are at their highest when they are older, or at the very least they are significantly higher than the lowest of the years used in their AME, by working additional years one can permanently raise one's benefit. They conclude that for most people the system provides a subsidy to continued work, at least until age 65.

benefits if the primary recipient has other dependents. A beneficiary gets an additional 50 percent benefit for a spouse over the age of 62 (unless the spouse has a direct benefit already that exceeds that increment), and other additions for dependent children. Also, in the event of the death of the husband or wife, the survivor continues to receive a reduced benefit.

I will assume that Social Security gets this insurance aspect of its benefit provisions approximately right, so that the marginal utilities of the husband and/or wife are equalized over the possible outcomes in which at least one of them is still alive. This is a strong assumption, but it is better than simply ignoring household considerations, or using per capita income for the household, as is frequently done. The discount factors (e.g. $e^{-\alpha t}$, e^{-rt}) should be multiplied by the probability that either the husband or wife survives to that period. In the case of a husband with a non-working wife, Social Security wealth is the present discounted value of the benefit flow (including the spouse benefit). Consistency then requires that the wage of an unmarried man be deflated by one-third, in order to take account of the lower marginal utility of a given level of income for a single wage-earner. The discount factor for an unmarried man would be the time preference factor multiplied just by his own survival probability. Most previous studies have not made this adjustment, which is important if the true incentive to continued work is to be calculated.

II. Data and Results

As stated earlier, casual evidence would seem to support the view that Social Security has contributed to the trend toward earlier retirement, both through changes in the level of benefits, and, more to the point of this paper, as a consequence of the early retirement option. Table 1 gives the

Their calculations are, however, suspect for several reasons. First, they are highly sensitive to the choice of discount rates. As was argued in the previous section, the appropriate discount rate for many individuals may be much larger than prevailing real after-tax rates. Second, their calculations are subject to sample selection bias: We observe the earnings of those who remain working, whereas it is likely that those who chose not to do so have poorer potential earnings profiles than those whose earnings we observe. Hence Social Security might not have been a net subsidy for those persons who made the decision to retire, and may indeed have contributed to that decision.

This section presents results that show that on average the alleged subsidy may not be present at all. After describing the data, I provide age-Social Security wealth profiles for workers in the sample. To do this, I construct implicit earnings potential for workers who retired, based on fitted earnings equations, and then calculate the change in Social Security wealth at each age that would accrue to the worker if he remained working for one more year. I control for the real increases that occurred in the early seventies by calculating the change in Social Security wealth that would accrue to each worker at each potential retirement age if the worker were to delay retirement by one year, holding the benefit formula constant. For a 63-year-old in 1973, for example, I calculate Social Security wealth if he were to retire immediately, and compare it to the present value of his benefits if he were to retire a year later, using the 1973 benefit formula in both cases.

The data come from the Social Security Administration's Longitudinal Retirement History Survey, a panel of some 11,000 workers (males and unmarried females who were between the ages of 58 and 63 in 1969) observed every two years from 1969 through 1979. The criteria for selection that I used for the calculations in this section are that the workers be male, not self-employed, and not a recipient of other pensions. The reasons for limiting the sample in this way is to have a set of people for whom retirement is likely to be a fairly well-defined event, and whose compensation for continued work is observable. (The information on other pensions is not sufficiently complete or reliable.) People who died or left the sample for other reasons are included for as long as they are there, or until their retirement. After the elimination of observations with important missing data, the sample consists of 1581 people.[8]

The definition of retirement that I use is the declared status on the survey, modified if earnings or Social Security benefits information contradict it. For instance, if a worker claims to be not yet retired, or partially retired, but is receiving Social Security retirement benefits, then for the purposes of this paper he is considered to have retired. As stated earlier, the nonconvexities in individual budget sets induced by the implicit tax rates on income imposed by the Social Security system suggest treating retirement as a discrete event, with one key determinant of whether someone is considered to have retired being whether they are receiving retirement benefits. Hence the fact that I do not address the issue of subsequent returns to the labor force can be justified in two ways. First, one can think of the analysis as applying to an individual's first decision to retire, under the assumption that this decision is made essentially as if it is intended to be permanent. Second, according to the above view of what constitutes retirement, a person can be said to have "unretired" only if he works so much as to lose eligibility for Social Security retirement benefits. Examination of the data revealed that this was rare.

Figure 2 displays retirement probabilities by age for the sample of 1125 persons with good asset data. Because the survey is only every two years, the actual point of retirement is not observed, so the plot is of the frequency distribution of the age at which retirement is first observed. Despite the smearing of the profile that this should cause (because many people who retire at a given age are not observed until a year later), the picture is very much like that found by Rones: a noticeably bimodal distribution of retirement age. It seems unlikely that anything other than Social Security could be responsible for this pattern, since these individuals were not part of any other pension plan.[9]

If liquidity constraints are an important part of the explanation of the early retirement phenomenon, then we would expect the bimodal pattern, or at least the age 62-63 blip, to be more apparent for recipients with low wealth than for those with high wealth. I therefore took subsamples of 526 low-wealth (non-Social Security wealth less than $6,000) and 310 high wealth (greater than $15,000) workers and plotted the age-retirement distributions in Figure 3. As predicted, the bimodal pattern, with a peak at age 63, is present only for the low-wealth group. For the high-wealth group, the retirement probability is steadily increasing up to age 65, the age at which it is generally agreed that Social Security discourages further work. The entire profile is later for the high-wealth group, undoubtedly because of some combination of higher earnings, better health, and greater enjoyment of work in that group.

In order to construct profiles of actual and potential Social Security wealth, I constructed imputed earnings for those who retired, by estimating an earnings equation. To account for possible sample selection biases, I jointly estimated participation and earnings in the standard two-step way suggested by Heckman (1979), treating the panel as a cross-section. The results are in Tables 3 and 4. Variables included in the estimation are RACE (1 if nonwhite), SMSA (1 if resides in an SMSA), EDUC (# years of education), MARR (1 if married), HEALTH (1-3, 1=worse than average), EXP (labor market experience), PROF (1 if in a "professional" occupation), UEXP (1 if observed to have been unemployed), LNPE (log of real price of energy, intended to proxy for real effects of energy price shocks during this period), T (a time trend), and LAMBDA (the inverse Mills ratio). Although the hypothesis of no sample selection problem cannot be rejected, this does not mean that it is no problem for BGW. The large coefficients on health in both equations suggest that earnings potential is likely to be much lower for those who choose to retire. The other results contain no surprises, except that the real price of energy enters with a large negative coefficient. This variable is probably just proxying for the recession that occurred after the first energy price shock.

The fitted values from the earnings equation were then used to calculate age-Social Security wealth profiles. It was assumed that a person who retired could have earned the amount obtained from the fitted value of the wage equation estimated in Table 3 (the first column). The present value of the benefits that each person would receive if he retired in a given year was calculated based on the legislation in effect at the time.[10] The discount rates used for this calculation include survival probabilities as described in the previous section.[11] The implicit assumption here is that people expect their benefits to be maintained at a constant level in real terms after they retire. Although benefits actually increased on average during this time period, the most plausible assumption is that the increases were surprises, and that they were not expected to continue (as indeed they did not).

The results of these calculations are shown in Table 5 for two extreme choices of discount rates, 0.03 and 0.12. This table shows averages of Social Security wealth by retirement age, i.e. the present value of benefits conditional on retirement at that age. The last two columns show the average subsidy to continued work (in percentage changes and level differences), found by calculating the average change in Social Security wealth that results from working one more year and then retiring, as compared to retiring immediately. Although there may be biases resulting from the fact that workers who have retired do not continue to be in the sample, there appears to be no clear tendency for Social Security to encourage or discourage work between the ages of 62 and 65 provided a low discount rate is assumed. At the 0.12 rate, however, there is a clear change in the incentive for continued work upon reaching the age of 62. While 12 percent is considerably higher than real after-tax market rates during this time period, it is not inappropriately large for liquidity-constrained consumers, many of whom might find it difficult to borrow significant amounts of money even at much higher rates.

The picture that emerges from these results is that at low discount rates, Social Security on average provides not much of a subsidy or penalty to work for ages 62 to 64. At higher rates there is a clear disincentive to continued work. Thus we would expect that liquidity-constrained individuals would be more likely to retire early in response to becoming eligible at age 62.

III. Conclusions

The results from the previous section suggest the following broad conclusions. First, the claim by BGW that Social Security does not discourage work between the ages of 62 and 64 does rely heavily on the assumption of the appropriateness of using market rates to discount future income flows. One of the points of this paper has been to cast doubt on this, and to show that BGW's findings are not robust. Second, the blip in age 62 retirement appears to be concentrated among people with low wealth, a finding that supports the view that liquidity constraints play a significant role in retirement decisions, and that Social Security may therefore be contributing to the trend toward early retirement.

The implications for policy, and for welfare, are a little trickier. If credit market imperfections are preventing people from retiring prior to the age of 62, it might be appropriate to allow even earlier retirement, together with actuarial reductions in benefits, provided adverse selection is not too severe a problem. On the other hand, if observed retirement behavior is simply evidence that people do not do what is best for themselves, i.e. that they do not appropriately take into account the changes in future income flows that result from their present actions, then one would draw the opposite conclusion. This paper suggests that in fact people may be behaving appropriately under the circumstances, that is, given that they may be rationed in credit markets.

Notes

1. For example, Ginzberg (1984) writes that "the mere fact of being eligible for benefits at age 62 has probably had a strong disincentive effect upon further work."

2. Numerous authors have studied the effects of government policies on retirement behavior. For example, Diamond and Hausman (1984b) estimate a hazard model of retirement, and Fields and Mitchell (1984) analyze the effect of recent reforms on retirement ages and incomes. Boskin and Hurd (1984) also look at the issue of early retirement.

It is not clear where the differences between the findings of Taubman and Sickles and those of Gustman and Steinmeier come from. In particular, it is surprising that Gustman and Steinmeier's explanatory variables lead to simulated retirement behavior with spikes at ages 62 and 65. They do have a different sample, and they make use of information on pensions other than Social Security. Information on the latter is very incomplete in the RHS, though, and in any case could not be the whole story since the same retirement patterns are observed in my sample of individuals who have no other pensions.

3. BGW (1981) go so far as to say that Social Security wealth is just like a government bond, so that the after-tax rate on government bonds would be an appropriate discount rate. Again, government bonds are marketable, Social Security wealth is not.

4. See Nalebuff and Zeckhauser (1984) for a more detailed discussion of these issues.

5. I do not address issues of dynamic efficiency that arise in analyses of pay-as-you-go systems with population growth exceeding the rate of interest

(as in Diamond (1965)). In such models the budget need not balance in the sense to be assumed below, but the basic conclusions are not likely to be affected by taking account of this possibility.

6. It is easiest to think of p(t,q) having the characteristic that p(t,q) = 0 for t < q, although that is not the case with Social Security, since one may begin receiving benefits at age 72 regardless of whether one has retired yet.

7. The term involving the partial derivative of p is intended to capture all of the factors affecting the benefit level that change as a result of changing q including, for example, average earnings, if that is the basis of determining benefit levels.

8. I do not claim that the sample is representative, only that it is the best subsample of the Retirement History survey for studying the effect of Social Security on retirement. The large number of retirees at age 62 and 63 that I find might not be indicative of the behavior of the population as a whole, for whom other pension wealth is relevant.

9. There is an alternative explanation for the bimodal pattern that is consistent with BGW's hypothesis. Perhaps retirement would (absent Social Security) naturally peak at age 62, but Social Security induces a second peak at age 65. The problem with this explanation is that it fails to explain the emergence of the age 62 peak in the last 25 years.

10. The main difference between my calculation of the gain from postponing retirement and that of Sickles and Taubman (1986) is that they assume that individuals' earnings would remain at their 1969 level in real terms; I use actual earnings when observed, fitted earnings otherwise. This takes account of such important factors as the effect of poor health on potential earnings. Someone who ostensibly retired because of poor health

presumably would not have been able to earn as much from continued employment, and this should be reflected in the calculation of compensation.

11. The survival probabilities were calculated from standard life tables, with an extrapolation out to age 110 using an exponentially declining function. The probability of surviving beyond age 110 was set to zero.

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Figure 1

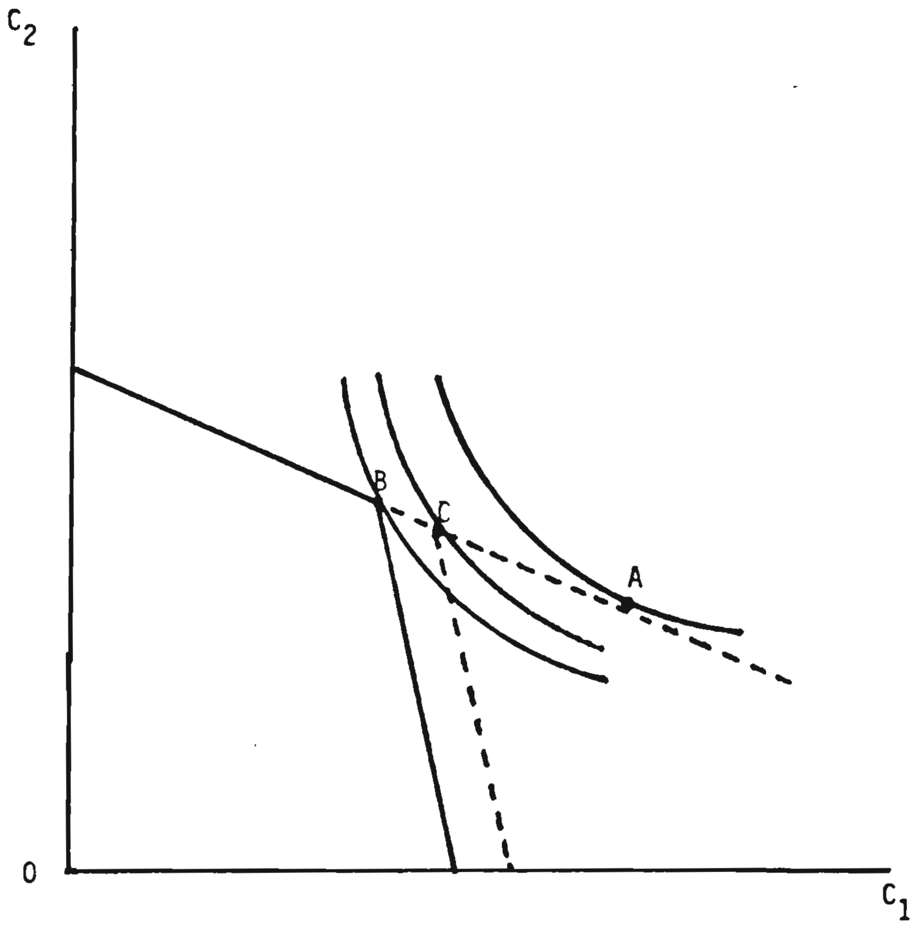

Figure 2: Retirement Ages

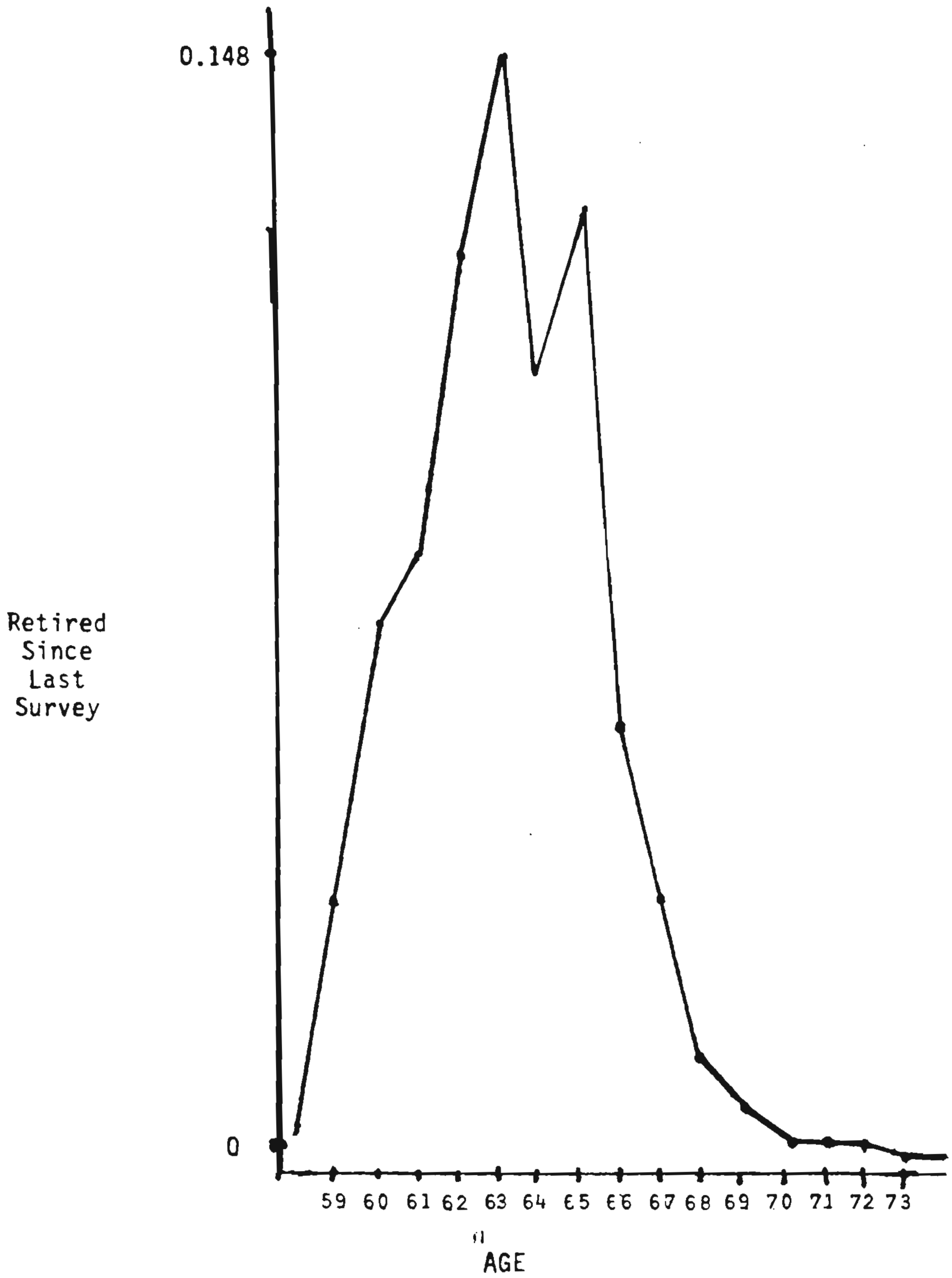

Figure 3: Retirement Ages for Subsamples

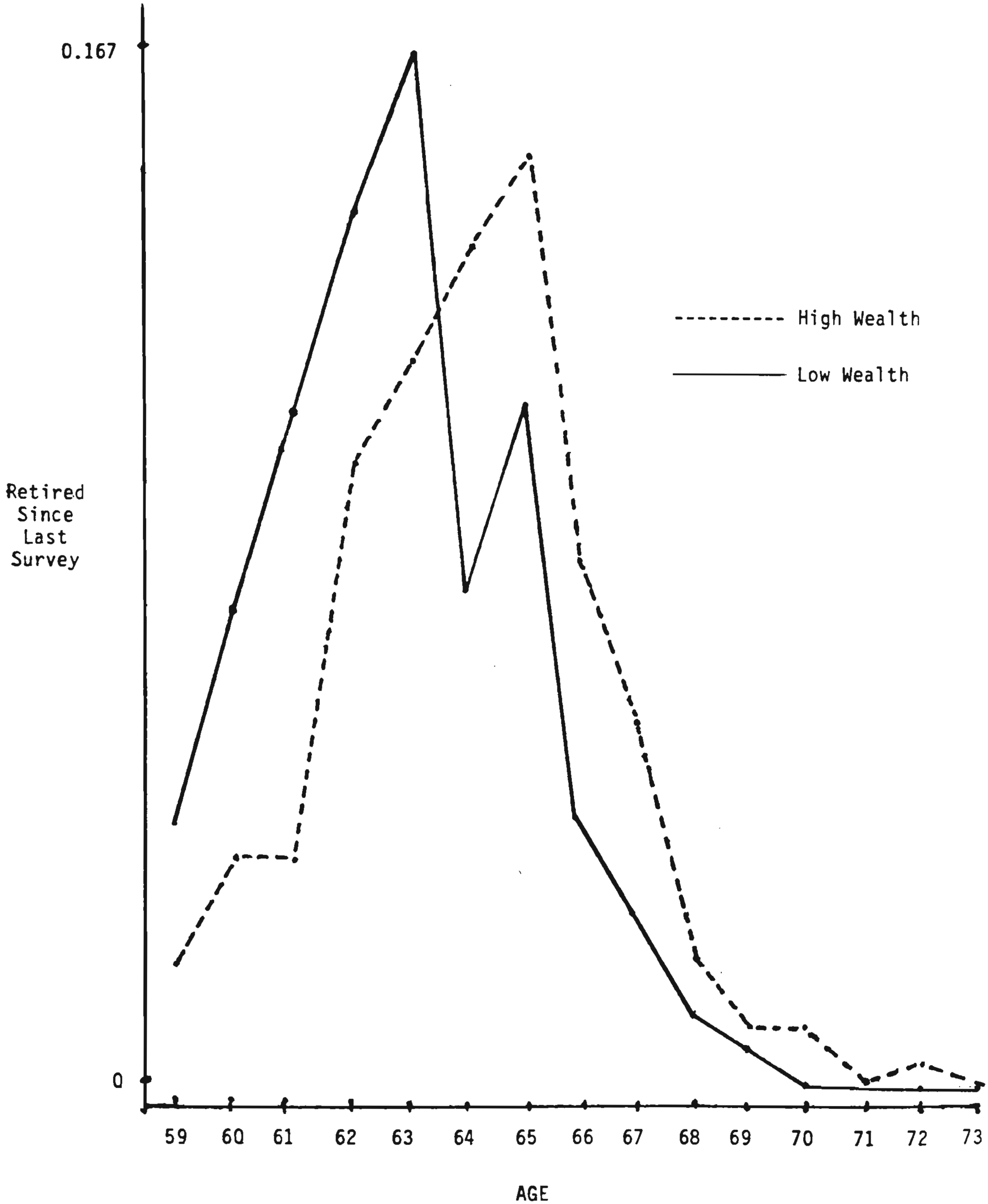

Table 1: Male Labor Force Participation Rates

Year	Age 55-64	Age 65+
1955	87.9	39.6
1956	88.5	40.0
1957	87.5	37.5
1958	87.8	35.6
1959	87.4	34.2
1960	86.8	33.1
1961	87.3	31.7
1962	86.2	30.3
1963	86.2	28.4
1964	85.6	28.0
1965	84.6	27.9
1966	84.5	27.5
1967	84.4	27.1
1968	84.3	27.3
1969	83.4	27.2
1970	83.0	26.8
1971	82.1	25.5
1972	80.4	24.3
1973	78.2	22.7
1974	77.3	22.4
1975	75.6	21.6
1976	74.3	20.2
1977	73.8	20.0
1978	73.3	20.4
1979	72.8	19.9
1980	72.1	19.0
1981	70.6	18.4

Source: Employment and Training Report of the President, 1982

Table 2: Declines in Labor Force Participation, by Age and Cohort

Year Turns 62	Age 60	61	62	63	64	65
1966	3.1	2.2	3.9	6.2	4.2	17.7
1967	3.0	2.6	7.4	4.1	5.9	16.1
1968	2.5	3.7	5.8	8.0	4.6	17.2
1969	1.7	2.7	6.8	6.6	7.2	17.0
1970	3.1	3.2	7.7	5.4	7.0	20.0
1971	1.6	3.8	6.8	7.9	8.4	18.3
1972	2.3	4.3	8.7	8.8	5.8	17.6
1973	3.9	4.1	12.3	7.9	8.4	18.3
1974	4.3	5.5	9.8	8.5	8.0	15.2
1975	5.2	3.1	11.7	8.7	5.5	11.9
1976	4.5	5.5	11.7	8.7	3.9	11.7
1977	6.0	1.6	14.1	7.1	5.5	14.7
1978	4.9	2.5	11.6	8.6	7.1	12.7
1979	2.5	4.4	13.8	9.0	7.4	10.5
1980	5.3	6.8	13.6	9.8	6.3	13.9

Source: Rones (1985)

Table 3: Estimated Earnings Equations

Dependent Variable: Log Real Earnings   #Observations: 1936

Var	Estimated Coefficients (Standard Errors in Parentheses)	
CONST	9.4168 (1.7661)	9.5162 (1.7792)
RACE	-0.3905 (0.0437)	-0.3896 (0.0437)
SMSA	0.1837 (0.0300)	0.1823 (0.0302)
EDUC	0.0601 (0.0076)	0.0624 (0.0089)
MARR	0.4696 (0.0406)	0.4594 (0.0459)
HEALTH	0.1330 (0.0217)	0.1154 (0.0432)
EXP	-0.1003 (0.0764)	-0.1057 (0.0773)
EXP^2	0.0010 (0.0008)	0.0011 (0.0009)
PROF	0.2286 (0.0735)	0.2280 (0.0735
UEXP	-0.2560 (0.1257)	-0.2384 (0.1312)
LNPE	-0.4136 (0.1758)	-0.4000 (0.1782)
T	-0.0562 (0.0115)	0.0575 (0.0118)
LAMBDA	---	-0.0551 (0.1167)
R^2	0.324	0.324

Table 4
Initial Probit Results

Dep. Var.: 1 if not yet retired, 0 otherwise
LR: 962.70 (Dist. Chi-Squared, 19 d.f.)
#Obs.: 3475

Var	Coeff.
Const.	8.838 (2.921)
SMSA	0.068 (0.050)
MARR	0.393 (0.064)
Spouse Works	0.024 (0.050)
AGE	-0.691 (0.210)
AGE^2	0.011 (0.004)
HEALTH	0.713 (0.035)
UEXP	-0.607 (0.134)
AGE>61	-0.282 (0.105)
AGE>64	-0.692 (0.107)
Ln(PE)	-0.839 (0.550)
Ln(P)	2.207 (2.705)
Trend	-0.059 (0.101)

Note: Other variables included but not reported are those used in the earnings equation that did not enter significantly in the probit. Asymptotic standard errors are in parentheses.

TABLE 5A: AGE-SSW PROFILES, δ=.03

AGE	#OBS	MEAN	MEAN%CH	MEAN CHNG
57	261	$ 13930.16	-0.46 %	$ -29.77
58	534	14697.14	-0.88	-83.76
59	713	15849.85	-0.89	-125.14
60	903	16842.81	-0.72	-142.54
61	1011	18532.26	-0.31	-112.97
62	1114	20147.66	1.09	199.81
63	894	22611.18	-0.03	-47.08
64	629	26328.13	-1.32	-369.89
65	448	29281.55	-6.62	-2007.68
66	242	30552.23	-7.82	-2293.18
67	137	30717.07	-9.25	-2844.56
68	67	30783.63	-10.37	-3314.51
69	35	30055.94	-11.82	-3793.01
70	18	33091.76	-14.29	-4735.00
71	10	32010.61	-14.97	-4791.88
72	4	29211.58	-17.52	-4955.99
73	2	26097.18	-16.33	-4239.55

TABLE 5B: AGE-SSW PROFILES, δ=.12

AGE	#OBS	MEAN	MEAN%CHNG	MEAN CHANGE
57	261	$ 4477.62	1.89 %	$ 100.15
58	534	5131.93	1.45	91.85
59	713	6005.14	1.45	97.10
60	903	6944.34	1.64	110.16
61	1011	8323.66	2.06	153.58
62	1114	9849.56	-2.59	-257.52
63	894	11314.67	-3.75	-439.79
64	629	13464.00	-5.10	-698.60
65	448	15291.42	-10.19	-1596.15
66	242	16386.08	-11.43	-1834.52
67	137	16821.18	-12.92	-2178.26
68	67	17187.71	-14.19	-2517.55
69	35	17255.38	-15.87	-2869.45
70	18	19373.43	-18.16	-3527.89
71	10	19229.00	-19.20	-3690.86
72	4	17801.22	-21.24	-3704.59
73	2	16296.18	-20.60	-3339.87

Note: All dollar amounts in constant 1967 dollars.

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