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ABSTRACT

A study examined the validity of using questions concerning retirement expectations in large-scale micro surveys. A simple static labor supply model that considered wages, hours worked, and health data was developed for this purpose. Next, the model was implemented using data from the National Longitudinal Survey (NLS) on the Labor Market Experience of Older Men. Data from the NLS concerning a sample of white males who were, among other things, (1) between the ages of 45 and 49 in 1966, (2) not self-employed in any survey year, and (3) not subject to mandatory retirement, were compared with actual labor supply data. The reported expected retirement ages were actually more accurate than expected retirement ages predicted by the labor supply model, although the correlation between them is significant. This was found to be consistent with the idea that expectations data provide valuable information about labor supply behavior, which can be exploited to improve estimates of labor supply models. (MN)

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On the Use of Expectations Data in Micro Surveys: The Case of Retirement

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Abstract

Most large-scale micro-based data sets, cross-sectional and longitudinal, contain questions concerned with expectations about future life events, among them future labor force behavior, fertility, schooling, and occupation. The aim of this paper is to ascertain whether data on retirement expectations is consistent with data on actual labor supply in the sense that both are derived from the same optimizing model. We develop a methodology for this purpose and implement it using data from the National Longitudinal Survey of Labor Market Experience of older men. We find that reported expected retirement ages are actually more accurate than expected retirement ages predicted by the labor supply model, although the correlation between them is significant. This is consistent with the idea that expectations data provide valuable information about labor supply behavior which can be exploited to improve estimates of labor supply models.

Introduction

Most large-scale micro-based data sets, cross-sectional and longitudinal, contain questions concerned with expectations about future life events, among them future labor force behavior, fertility, schooling, and occupation. Economists have made very little use of this kind of data.[1] Sociologists have used expectations data more extensively, mainly to learn whether or not the responses correspond to actual subsequent behavior.[2] The usefulness of such data for predicting behavior has been much debated.[3]

It is our view that the potential value of expectations data as a means of understanding behavior has been overlooked. If survey responses to expectations questions accurately portray optimal future behavior conditional on current information, then these data can provide the same information about the decision process as can data on current or retrospective behavior. Our purpose here is to ascertain whether data on retirement expectations is consistent with data on actual labor supply in the sense that both are derived from the same optimizing model.

If individuals make use of all available information in making forecasts about their future decisions, then the researcher can at best provide equally powerful forecasts. Even though forecasts about the future obtained from individuals may be poor in a predictive sense, they may be the best available. It is important to know whether responses to expectations questions are consistent with optimization. If expectations data are valid in the sense described above, they can be used to augment cross-sectional data and thus provide more precise estimates of parameters of interest.

We use retirement as the case study, although the methodology we develop is general to other decisions. The National Longitudinal Survey of Labor Market Experience of older men's data contain a comprehensive set of questions on retirement expectations, including not only expected age at retirement, but also expected private pension income and age at eligibility, and expected social security income. Expectations about exogenous forcing variables obviate the need for the researcher to do the forecasting and place the burden of consistency more squarely on the respondents. Unfortunately, even with these data many of the forcing variables must still be forecasted by the researcher, e.g., future wages and health.

For methodological and computational reasons, we adopt a very simple static labor supply model.[4] Utility is assumed to be quadratic in non-market time and linear in goods consumption. The wage function is stochastic and depends upon age, health, and schooling. Health is itself random and depends upon prior health. Thus, retirement may occur because wage rates eventually fall with age and/or because health deteriorates. The reservation wage and thus the probability of retirement are positively related to pension income and to the taste for leisure.

The essence of a pension is that it can only be collected if the individual does not work; in the case of private pensions the individual must not work at a given firm. Since most individuals stop working altogether when they leave their regular job, we do not distinguish between private and public pensions in the budget constraint.[5] We ignore most of the complexities of private and public pension systems, which have been extensively discussed elsewhere (see Blinder, Gordon and Wise, 1980; Boskin, 1977; Boskin and Hurd, 1978; and Fields and Mitchell, 1983).

Our strategy is first to estimate the parameters of the model, that is, the utility function and the wage function, using observed hours and wage data for several years. The expected age at retirement will be a complicated function of the same parameters.[6] We assume that the utility function has an individual-specific parameter so that the expected age at retirement will differ even for individuals with identical observable characteristics. We then calculate a new set of individual-specific taste parameters which equate each individual's reported expected age at retirement to its calculated value. If the new α_1's are statistically indistinguishable from the old α_1's, then we conclude that the retirement expectations data conform to the same optimizing model governing current labor supply decisions. If the expectations data are not consistent with the model, we then compare the forecasting precision, in terms of actual age at retirement, of the model to that of the reported retirement expectations. If the model outperforms the reported expectations, then it is clear that the expectations do not optimally make use of all available information. In the opposite case our conclusion must be more tentative, namely, that there is support for the notion that expectations data provide useful information about behavior.

Table 1 shows the relationship of expected age at retirement in 1966 to actual age at retirement as of 1981 for three age cohorts. There is clearly information about actual retirement age contained in retirement expectations. For example, of those men age 45-49 in 1966 who expected to retire between the ages of 55 to 59, 60 percent actually retired in that age range. Similarly, of those age 50-54 in 1966 who expected to retire between the ages of 60 to 62, 43 percent actually retired in that age range. The diagonal elements generally are larger than the off-diagonal elements. There does, however, appear to be some systematic bias in the expected age at retirement. For the first two 1966 age cohorts, on average the expected retirement age exceeds the actual retirement age; for the oldest cohort the relationship is less clear. This apparent tendency to retire earlier than expected does not, however, imply that initial expectations were not rational since common shocks, e.g., changes in laws governing pensions or changes in inflation rates, could affect each individual's actual retirement behavior in the same way. Further, although expected age at retirement is asked on almost all surveys subsequent to 1966 as well, individuals usually retire only once, and thus the longitudinal aspect of the data cannot support a test of rational expectations formation.

The Model

In this section we present a very simple labor supply model in which retirement is the outcome of changing constraints. The individual is assumed to maximize the static utility function

$$(1) \qquad U(\ell_t, X_t) = \alpha_1 \ell_t - \alpha_2 \ell_t^2 + X_t$$

subject to a time constraint in each period

$$(2) \qquad \ell_t = \bar{L} - h_t P_t$$

and a budget constraint in each period

$$(3) \qquad X_t = w_t h_t P_t + y_t(1-P_t) + a_t$$

where ℓ_t is the number of hours of non-market time, X_t the consumption level of a composite good, h_t the number of hours of market work, P_t a dichotomous variable with value one if the individual does market work ($h_t > 0$) and value zero otherwise ($h_t = 0$), $\bar{L}$ the total time available, w_t the market wage, a_t

non-labor income and y_t the pension income received if eligible when $P_t = 0$, e.g., social security or a private pension. Retirement is best viewed as permanent separation from one's regular job, although for the vast majority of people, leaving their regular job is synonymous with leaving the labor market. We also ignore the earnings test for Social Security except when it no longer becomes operative at age 70. Our purpose is to capture only the essential features of the opportunity set in the retirement state under the assumption that these are sufficient to represent the decision process for individuals still some time away from their expected retirement age. In any event, the data concerning expectations about prospective retirement income is not sufficiently detailed to accommodate a more accurate representation of such opportunities and, even for this simple model, it is quite complicated to incorporate expectations data.

The wage function is assumed to be log-linear

$$(4) \quad \ln w_t = M_t\Gamma + \beta H_t + \theta_t$$

where $M_t\Gamma$ represents those factors about which the individual is assumed to have perfect foresight including the wage-age gradient and the wage-schooling relationship; H_t represents the health stock which is assumed to be imperfectably forecastable but known at t; θ_t represents unforeseen random fluctuation in the individual's value marginal product (known at t) and is assumed to be serially uncorrelated and normally distributed, with mean zero and variance σ_θ^2.

Maximizing (1) subject to (2), (3), and (4) yields an hours of work function given by

(5)

$$h_t = \begin{cases} \frac{1}{2\alpha_2}(2\alpha_2\bar{L} - \alpha_1) + \frac{1}{2\alpha_2}w_t & \text{if } h_t > \sqrt{y_t/\alpha_2} \\ 0 & \text{if } w_t \leq (\alpha_1 - 2\alpha_2\bar{L}) + 2\sqrt{\alpha_2 y_t} = w_t^* \end{cases}$$

If y_t is positive the hours of work function has a discontinuity at $w_t = w_t^*$; for $w_t \leq w_t^*$, $h_t = 0$, while for $w_t > w_t^*$, $h_t \geq \sqrt{y_t/\alpha_2}$. Retirement income, which is conditional on not working, acts exactly like a fixed money cost of work. In periods in which $y_t = 0$, the hours of work function is linear in the wage over the entire wage domain. Notice that with the utility function specified in (1), unearned income a_t, i.e., income that would be available independent of the work decision, does not enter the hours of work function. This formulation is consistent with a large number of cross-sectional estimates of hours of work functions for males.[7]

As noted, health is assumed to be random. In particular, it is assumed that for a dichotomous health stock measure, H_t, the probability that the individual is unhealthy at any time t ($H_t = 1$) is related to the previous period health stock and to other exogenous variables;

(6) $$Pr(H_t = 1) = Pr(z_t \leq \gamma H_{t-1} + G_t \eta)$$

where z_t is a random variable with a known distribution. With this Markov structure, the probability that an individual is or is not healthy at a future time t+k given the information available at t, Ω_t, is

(7) $$Pr(H_{t+1} = j \mid \Omega_t) = Pr\left[(z_{t+1} - \gamma H_t - G_{t+1}\eta)(-1)^{j+1} \leq 0\right] \qquad j = 0,1$$

$$Pr(H_{t+2} = j \mid \Omega_t) = Pr(H_{t+2} = j \mid H_{t+1} = 1)\ Pr(H_{t+1} = 1 \mid \Omega_t)$$

$$+ Pr(H_{t+2} = j \mid H_{t+1} = 0)\ Pr(H_{t+1} = 0 \mid \Omega_t)$$

$$\vdots$$

$$Pr(H_{t+k} = j \mid \Omega_t) = Pr(H_{t+k} = j \mid H_{t+k-1} = 1)\ Pr(H_{t+k-1} = 1 \mid \Omega_t)$$
$$+ Pr(H_{t+k} = j \mid H_{t+k-1} = 0)\ Pr(H_{t+k-1} = 0 \mid \Omega_t)$$

Notice that G_{t+k} is known at t for all $k \geq 0$.

Retirement income is assumed to be a deterministic function of past wages and other prior factors known to the individual. However, since the future determinants of pension provisions are not known, e.g., changes in laws, future retirement income is not perfectly foreseen.[8] We assume that the forecast error, given the current information set, is lognormal, namely

(8) $$\ln Y_{t+k} = E(\ln Y_{t+k} \mid \Omega_t) + v_t$$
or
$$Y_{t+k} = E(Y_{t+k} \mid \Omega_t) e^{-1/2\sigma_v^2} e^{v_t}$$

where $v_t \sim N(0, \sigma_v^2)$ and is serially uncorrelated assuming expectations are rational.[9]

The static nature of the model greatly simplifies the calculation of the likelihood of future labor force participation given current information. The individual knows the decision rule for future period choices and also knows the distribution of the random variables that determine the choice. The probability that an individual will work at t+k given the information set at t can be written as

(9)

$$Pr(P_{t+k} = 1 \mid \Omega_t) = \sum_{j=0}^{1} Pr(e^{M_{t+k}\Gamma + \beta j} e^{\theta_{t+k}}$$

$$- 2\sqrt{(\alpha_2 E(y_{t+k} \mid \Omega_t))} e^{1/2 v_{t+k}} D_{t+k} \geq \alpha_1 - 2\alpha_2 \bar{L})$$

$$\times Pr(H_{t+k} = j \mid \Omega_t)$$

where Ω_t contains M_{t+k}, w_{t-j}, H_{t-j}, all auxiliary information used in the forecast of pension income at t+k, and where D_{t+k} is unity if the individual is eligible for retirement income at t+k and zero otherwise.

A literal interpretation of the model implies that the wage rate available to retirees is the same as that available to non-retirees of the same age, schooling, and health. Under that assumption, defining retirement to be the end of working life, that is, no period of work between the date of retirement and the end of life, the expected age at retirement given the information set at t is

(10a)

$$EAR_t = (t+1)\Pi_{t,t+1}(Pr_t(P_{t+1}=0)(1 - \Pi_{t+1,t+2}) + Pr_t(P_{t+1}=0, P_{t+2}=0)(1-\Pi_{t+1,t+3})$$

$$+ \ldots + Pr_t(P_{t+1} = 0, P_{t+2} = 0, \ldots, P_T = 0)(1-\Pi_{t+1,T}))$$

$$+ (t+2)\Pi_{t,t+2}(Pr_t(P_{t+2}=0)(1-\Pi_{t+2,t+3}) + Pr_t(P_{t+2}=0, P_{t+3}=0)(1-\Pi_{t+2,t+4})$$

$$+ \ldots + Pr_t(P_{t+2}=0, P_{t+3}=0, \ldots, P_T=0)(1-\Pi_{t+2,T}))$$

$$+ \ldots + T\Pi_{t,T} Pr_t(P_T=0) + (T+1)P_{NR}$$

where $\pi_{j,k}$ is the probability of surviving to k given survival to j, $\pi_{j,T+1}=0$ for all j, P_{NR} is the probability of "never" retiring, given by one minus the sum of the probabilities of retiring at all prior ages, and Pr_t signifies that the probability is computed using the information available at t. Note that we assume the survey question "When do you expect to retire?" to correspond to the mathematical expectation over future potential retirement ages. If instead the question was interpreted by respondents as the modal age, the methodology described below would require modification.

Alternatively, at the other extreme, if we assume that the opportunity wage of retirees is zero, the expected age at retirement is[10]

$$(10b)\quad EAR' = (t+1)\pi_{t,t+1}\, Pr(P_{t+1}=0) + (t+2)\pi_{t,t+2}\, Pr_t(P_{t+1}=1,\ P_{t+2}=0)$$

$$+ \ldots + T\pi_{t,T}\, Pr(P_{t+1}=1,\ P_{t+2}=1,\ \ldots,\ P_T=0) + (T+1)P'_{NR}$$

Ideally, the wage equation should be specified as a function of the previous year's participation decision and the opportunity wage when retired should be estimated. However, there are only a few individuals in our sample who returned to work after missing a year of employment, making estimation of that effect infeasible.

Estimation Issues

The unknown parameters include α_1, α_2, Γ, β, σ^2_{ϵ}, σ^2_V, γ, η, σ^2_Z. The parameters associated with health can be separately estimated given a distributional assumption for z. We adopt a logit specification. These parameters are not of direct interest and are required only for the calculation of the expected age of retirement (see equations 7-10). The utility function parameters (α_1, α_2), the wage function parameters (r, β, σ_θ^2) and the pension income forecast variance (σ_V^2) can be estimated from data on hours worked, wages, and expected and actual pension income. However, as seen in (5), hours worked is an exact function of the wage rate. A simple way to introduce an estimation error is to assume that wages are misreported. Thus, observed wages are $w_t^o = w_t^T e^{u_t}$ where w_t^T is the true wage and observed hours are

$$(11) \quad h_t = (\bar{L} - \frac{\alpha_1}{2\alpha_2}) + \frac{1}{2\alpha_2} w_t^o e^{-u_t}$$

It is assumed that $u_t \sim N(0, \sigma_u^2)$ and that u_t is independent of θ_t. In addition, it is assumed that α_1 differs permanently among individuals; it is treated as a fixed effect.

For a sample of individuals observed at several periods, the likelihood function based upon hours, wage and pension data is given by

(12)

$$L = \prod_t \prod_i \left[n(h_{it}, w_{it}^o \mid w_{it} \geq w_{it}^*) \times \Pr(w_{it} \geq w_{it}^*) \right]^{d_{it}} \left[\Pr(w_{it} < w_{it}^*) \right]^{1-d_{it}}$$

$$= \prod_t \prod_i \left[\mid J \mid f\,(u_{it}, \theta_{it}) \right]^{d_{it}} \left[\Pr(\theta_{it} < \theta_{it}^*) \right]^{1-d_{it}}$$

where $d_{it} = 1$ if the individual i works at t and zero otherwise, $u_{it} = \ln w_{it} - \ln(\alpha_1 - 2\alpha_2 (\bar{L} - h_{it}))$, $\theta_{it} = \ln w_{it} - M_{it}r - \beta H_{it} - u_{it}$, $\theta_{it}^* = \ln w_{it}^* - M_{it}r - \beta H_{it}$, and $|J|$, the Jacobian of the transformation, is $\dfrac{2\alpha_2}{w_{it}(\alpha_1 - 2\alpha_2 (\bar{L} - h_{it}))}$.

Identification in static labor supply models such as this usually requires exclusionary restrictions, namely, that there be a variable in the wage equation that does not appear in the reservation wage equation (Heckman, 1974). Identification obtains in the above model due to the log-linear wage function and the restriction that θ and u are uncorrelated. More importantly, however, the model is identified in the absence of these restrictions because information on pension income for those already retired directly permits the identification of α_2 and thus of the other parameters.

The expected age at retirement (equations 10a and 10b) is a function of the same parameters estimated from hours and wage data with the addition of the pension income forecast variance. For any set of parameter values, the probabilities of working (not working) can be calculated numerically from equation (9) and thus an expected age at retirement can be computed. Because the probability of working at any age declines with α_1, the expected age at retirement (10a and 10b) also declines monotonically with α_1.

To test whether the reported expected age at retirement is consistent with the reported hours and wage data (assuming the validity of the labor supply model) the expected age of retirement equation, which must hold for each individual given their individual-specific α_1's, can be treated as a restriction on the parameter set. Calculating a new set of α_1's, setting the other parameter values at their maximum likelihood estimates, allows a likelihood ratio test to be performed. If the new α_1's are statistically different from the old α_1's, the expected age at retirement data can be inferred to come from a different model than does the hours-wage data.

If instead of estimating α_1 as a fixed effect we had assumed α_1 to be drawn from a known distribution, the same set of parameters as estimated from (13), suitably modified to account for the randomness in α_1, could have been estimated from the expected age at retirement data. Because the α_1's are known to each individual though not to the researcher, they could serve as the estimation error, and the likelihood function would consist of the product of densities for α_1 evaluated at the α_{1i}'s which solved (10). Equality of the estimated parameters from the different sources of information, hours-wage data and expected age at retirement data, could then be tested.[11] We did not pursue this strategy because it is more complicated to implement.

2. The Data

The data are from the National Longitudinal Surveys older men's cohort. The original sample consisted of over 5,000 men who were ages 45-59 in 1966; they have been surveyed twelve times through 1983. In 1971 detailed questions about expected retirement income were asked. Respondents were asked whether they would be eligible for Social Security and how much they would expect to receive, whether their employer or union had a pension plan, at what age they would be eligible for full and/or reduced benefits, and how much income per month they expected to receive. In addition, in almost every survey since 1966 they were asked at what age they expected to retire from their regular job. Hours worked and wage rates are available for each survey, as is a dichotomous measure of health based upon the response to questions about work limitations.

We restricted the original sample to white males age 45-49 in 1966 who were not self-employed in any survey year; who either were not subject to mandatory retirement or, if so, who expected in 1971 to retire prior to that age; who either were not eligible for Social Security or if eligible reported in 1971 their expected social security income; who either were not eligible for a private pension or if eligible reported in 1971 their expected pension income; who either were already retired or reported an expected age at retirement in 1971; and who had at least one year of data on wages, hours and health. Wage, hours and health data from the 1967, 1969, 1971, and 1976 surveys are used in the estimation. With these restrictions, we have 159 individuals in the sample. Besides the age and race restrictions which reduce the sample size by about three-quarters, the other major sources of sample size reduction come from the expected age at retirement and the Social Security and pension information, particularly the amounts expected.[12] The age restriction was adopted because it provides a stronger test of the expectations data since retirement is further removed for the younger men of this cohort. The health relationship is estimated from health data reported in the consecutive years 1966, 1967, and 1980, 1981.

Descriptive statistics are presented in Table 2. Because so few of the original sample answered the questions about expected pension and Social Security income, a relatively large proportion of our sample (.145) is retired as of 1971; all individuals who reported themselves already retired are included. Of those not already retired, 77 percent are eligible for Social Security and 54 percent are eligible for some form of private pension. On average, the expected monthly Social Security payment is 144 dollars, expected monthly early retirement pension income is 175 dollars and expected monthly full retirement pension income is 269 dollars; all figures include zeroes for ineligibles.[13] The average age of eligibility for reduced benefits is 56 and for full benefits 62.

Average annual hours worked decline slightly between 1967 and 1976 for all individuals, including non-workers, but they actually increase over the period for those with positive hours. The hourly wage rate for workers rises from 1967 to 1971 and then falls in 1976. Health, on average, deteriorates over the period and by 1981 almost one-half of the sample report that their health limits the amount or kind of work they can do.

In the calculation of the expected age at retirement, we need to know expected retirement income conditional on the information set at t for all periods (ages) subsequent to t. The entire profile of expected benefits conditioned on each potential age of retirement was not, however, collected so we need to make an assumption about that profile. We assume that expected retirement benefits from Social Security and reduced and full pension benefits are constant over time in real terms at the level reported in the data at the given ages of eligibility and that these benefits are invariant to the age of retirement. For Social Security, we assume that the expected Social Security income response corresponds to what is expected to prevail at age 65 and 7 percent is deducted per year for the ages between 62 and 65. Note that our assumption about expectations corresponds to what we believe individuals would assume about the future status of public and private pension provisions.

Results

Maximum likelihood estimates of the parameters are presented in Table 3.[14] In terms of the wage parameters, the wage rate increases by 2.3 percent for each additional year of schooling; it increases with age until 49 and then declines, and falls with a deterioration in health by 3.1 percent. The rather early age at which the wage peaks is roughly consistent with the raw data shown in Table 2, but may be peculiar to the sample. The measurement error component of the unexplained (ln) wage variance is estimated to be 69 percent. In terms of the utility function parameters, the marginal utility of leisure is positive until 4472 annual hours for the average sample observation and then becomes negative. Thus, the reservation wage, given pension ineligibility, which is simply the marginal utility of leisure evaluated at $\bar{L}$, is also negative for the average individual and is only positive for those individuals whose α_1 exceeds 2473, fourteen individuals in the sample. The estimates imply that the overwhelming majority of individuals in this sample would never retire without some (public or private) pension income, and this is true regardless of health or schooling. The estimate of α_2 implies that for each one cent increase in the hourly wage rate, annual hours worked increases by 2.1, an implied wage elasticity of about .6 at the mean.

A sample test of the validity of the labor supply model is provided by the restriction that hours worked exceed the amount $\sqrt{Y_t/\alpha_2}$ if the individual works when Y_t is positive, that is, when the individual is eligible for a pension. This restriction is not explicitly accounted for in the estimation.[15] In 65 cases an individual was eligible for pension income but chose to work. In only two of these cases, however, did actual annual hours worked fall below the minimum hours implied by the model, and in one case the difference was only fifteen hours. Our working hypothesis for now is that the model accurately depicts the labor supply decision.

The implications of these parameter estimates for retirement behavior are best illustrated by simulating the effects of changes in exogenous variables on the predicted expected age at retirement. Table 4 presents several such simulations for the two expected retirement age measures. The first row of Table 4 shows the average predicted expected age at retirement obtained by using the actual data and computing each individual's predicted expected age at retirement.[16] As shown, the average is 78.07 for the first measure of expected age at retirement (equation 10a) and 69.95 for the second measure (equation 10b).[17]

Increasing the age of eligibility for Social Security to 70, the age at which there is no longer an earnings test, increases the predicted average expected age at retirement for this sample by .46 years and 2.48 years for the two expected retirement age measures respectively. Increasing the benefit level of private pensions by 50 percent at each age of eligibility for the sample of eligibles (about 50 percent of the sample) reduces the retirement age by about one year for either measure. Finally, the effect of health on the expected retirement age is very small even in the most extreme cases where individuals are either healthy or unhealthy at each age with certainty. The estimates of the model clearly imply that for this sample the major motivating force for retirement is public and private pension income. It is important to recall that these statements may be relevant only for this subsample; the individual-specific taste parameter distribution may not represent that of the general population of (white) males 45-49 years old as of 1966, not because the NLS is unrepresentative, but because the subsample drawn may be very selective. For example, although they are outliers, there are a few individuals for whom the difference in expected age at retirement between the healthy and not healthy states was .66 years for the second expected retirement age measure.

To assess the conformity of the reported expected ages at retirement to the labor supply model, we computed a new set of α_1's that satisfied the restrictions given by equations 10a and 10b using the maximum likelihood estimates of the other parameters as shown in Table 2.[18] Under the null hypothesis that the reported expected ages at retirement are derived from the same labor supply model as has already been estimated, the likelihood value for the labor supply model substituting these new values for the α_1's should not be statistically different from the value reported in Table 3. The log likelihood value for this restricted model was -9919 using the first measure of expected age at retirement (10a) and -9487 using the second measure (10b).[19] In each case, the likelihood ratio test rejects the equivalence of the two sets of α_1's at almost any significance level.

The reported expected ages at retirement are considerably lower than are those predicted by the model. The mean reported expected age at retirement is 61 while for the first expected retirement age measure it is 69 and for the second 78.[19] It is thus not terribly surprising that the equality of the α_1's is rejected. The mean estimated α_1 from the model is 1988.[20] The restricted α_1's have a mean of 2851 and 2668 for the respective expected retirement age measures.

Although the hypothesis that the reported expected retirement ages are consistent with the estimated labor supply model is rejected, it is useful to see whether the reported expected ages at retirement are at all related to the predicted expected ages at retirement obtained from the labor supply model. For the first measure of expected retirement age the correlation between the two sets is .27 while for the second measure the correlation is .39. The reported expected age at retirement and the labor supply model seem to have some elements in common.

Discussion and Conclusions

Given the assumption that the labor supply model is an accurate representation of the hours worked and wage rate data, our conclusion must be that the expected retirement age data is not consistent with the same optimizing model. A corollary would be that the predicted expected age at retirement should conform more closely to actual retirement ages than do the reported expected ages at retirement. Table 5 compares actual retirement ages of our sample through 1981 with both the reported expected ages at retirement and the predicted expected ages at retirement (equation 10b). Evidently, the labor supply model predicts later retirement ages than actually happened, at least for individuals who retired by 1981. Recall, however, that in itself such a finding does not imply that the model is inaccurate, because our forecasts of pension income or the wage structure may be systematically in error if there were common disturbances between 1971 and the year of retirement. But what is quite startling is the much more accurate predictions of retirement ages for those retired by 1981 using the reported expectations in 1971.[21]

One interpretation of this result is that although the reported expectations are not consistent with the postulated labor supply model, they are in fact consistent with an optimizing model which more closely parallels labor supply behavior. Indeed, if individuals made use of all information available to them in forming their expectations, the researcher could at best hope to duplicate them. That our model performs less well lends credence to the argument that reported expectations data are valuable pieces of information about future behavioral outcomes.[22] Expectations data, in this view, can be used to validate the behavioral model, rather than vice versa. Or, alternatively, use of both pieces of information, that is, current labor supply data and reported future expectations, may lead to improved estimates of labor supply models.

Footnotes

[1]See Griliches (1980) for an exception.

[2]See, for example, O'Connell and Moore (1977) or Westoff and Ryder (1977).

[3]See the papers in Hendershott and Placek, eds., Predicting Fertility.

[4]Dynamic labor supply models have not been applied to the retirement decision. Our methodology would permit the use of a dynamic model, although incorporating expectations data would be significantly more complicated.

[5]Parnes and Nestel (1981) report that for those men who were retired between 1966 and 1975, approximately 20 percent did some market work in 1976. Among those not in the labor force in the 1976 survey week, 92 percent had no intention of seeking employment in the year ahead.

[6]We develop two alternative methods for calculating the expected age at retirement based upon alternative assumptions about the opportunity wage after labor force separation.

[7]See the survey by Heckman, Killingsworth, and MaCurdy (1979).

[8]We ignore the possibility that the level of pension income per period depends upon future labor supply and future wages, which would introduce rather complicated dynamics. For private pensions this possibility does not seem to present a serious problem (Gordon and Blinder, 1980) while for Social Security it is clearly a gross simplification (Blinder, Gordon and Wise, 1980).

[9]The forecast variance is assumed to be stationary as there is not enough data to estimate it as a time varying parameter.

[10]We assume that retirement is equivalent to missing one year of employment, which is actually not inconsistent with the data given the ages of the men in our sample.

[11]In terms of estimating parameters from (10), the expected age at retirement as calculated by the researcher would differ from the reported age if the respondents knew something about their future wages, future health, future tastes, or conditional survival rates that was unavailable to the researcher. If these factors changed each period, estimation would require a good deal more data, e.g., the probability that the individual would retire at each future age.

[12]There were a few individuals with no missing information who both worked positive hours and received pension income. Without modelling this option explicitly, we could not incorporate these individuals into the estimation.

[13]A substantial number of individuals reported that they expected to receive the maximum allowable Social Security payment rather than reporting a dollar figure. We used the 1971 maximum in these cases.

[14] T was set equal to 5400 in the estimation. Changing T scales α_1 and has no effect on any of the other parameters including the reservation wage.

[15] For working periods the component of the likelihood function is $f(u_{it}, \theta_{it} \mid \theta_{it} \geq \theta^*_{it}) \Pr(\theta_u \geq \theta^*_{it}) = f(u_{it}, \theta_{it})$. Since $\theta_{it} \geq \theta^*_{it}$ implies that $h_{it} \geq \sqrt{Y_{it}/\alpha_2}$, , the hours restriction is implicit.

[16] In computing the expected age of retirement from equation (10), the maximum retirement age (T) is taken to be 80.

[17] If the earnings test does not apply, then Social Security income is like asset income and it has no effect on the retirement propensity in this model because there are no income effects.

[18] In computing the new set of α_1's, it is possible that the cumulative probability of retirement becomes significantly greater than one at a certain age although less than one for the prior age. When this occurred, we interpolated the expected age at retirement in the following manner and used this interpolated value in the algorithm for finding the new α_1's. Defining EAR_A and EAR_B to be the expected ages at retirement at the ages just after and just before the cumulative retirement probability exceeds ones, and P_A and P_B to be the respective cumulative retirement probabilities, the interpolated value of the expected retirement age is

$$\left(\frac{1-P_B}{P_A-P_B}\right) (EAR_A - EAR_B) + EAR_B.$$

[19] A small group, 16 individuals, reported that they never expected to retire. As noted, it is unlikely that this means their expected retirement age, defined as we do, is at death; for them a more plausible interpretation of the response is the mode. In computing the likelihood value with the restricted α_1's, we assume the unrestricted α_1's for these people. The degrees of freedom in the likelihood ratio test is 120. Of the 149 individuals used in estimating the labor supply model, 13 had retired by 1971 and had no reported expected age at retirement, and 16 said they would never retire.

[20] This differs from the estimate in Table 3 because it excludes individuals already retired in 1971 who could have worked in 1967 or 1969 and those who said they would never retire.

[21] In comparison with Table 1, reported expectations in Table 5 seem to be closer to actual retirement ages. The individuals in Table 5, however, are very select in that they must have reported their anticipated public and private pension amounts. One might expect that individuals who reported this information would have more accurate retirement expectations.

[22] This conclusion should be tempered by the selective nature of the sample.

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Table 1
Number of Individuals by Expected and Actual Ages of Retirement

Expected Age of Retirement	Actual Age at Retirement		
1. Individuals Age 45-49 in 1966			
	50-54	55-59	60+
50-54	7	4	5
55-59	16	52	18
60+	71	129	766
2. Individuals Age 50-54 in 1966			
	55-59	60-62	63+
55-59	11	4	16
60-62	29	80	76
63+	65	151	466
3. Individuals Age 55-59 in 1966			
	60-62	63-65	66+
60-62	56	38	33
63-65	59	150	112
66+	25	67	120

Table 2
Descriptive Statistics

	Mean	Standard Deviation
Age in 1971	51.8	1.15
Expected age at retirement	61.4	3.85
Retired as of 1971 (1=yes; 0=no)[c]	.145	.028
Eligible for Social Security[c] as of 1971 (1=yes; 2=no)	.772	.036
Expected monthly Social Security payment[a,b]	144	103
Eligible for private pension as of 1971[c] (1=yes; 2=no)	.544	.043
Age eligible for reduced payments (1971)	55.9	4.61
Age eligible for full benefits (1971)	62.2	3.65
Expected monthly reduced benefits (1971)[a,b]	175	212
Expected monthly full benefits (1971)[a,b]	269	330
Annual hours worked, 1967	2052	712
Annual hours worked, 1969	1960	861
Annual hours worked, 1971	2026	1043
Annual hours worked, 1976	1846	888
Hourly wage rate, 1967[a,d]	4.82	2.09
Hourly wage rate, 1969[a,d]	5.20	2.07
Hourly wage rate, 1971[a,d]	5.45	2.68
Hourly wage rate, 1976	5.19	2.25

Table 2 (continued)

	Mean	Standard Deviation
Health, 1966[e]	.189	.393
Health, 1967[e]	.244	.431
Health, 1969[e]	.273	.447
Health, 1971[e]	.289	.455
Health, 1976[e]	.303	.461
Health, 1980[e]	.409	.494
Health, 1981[e]	.451	.500
Highest grade completed	10.7	3.38

Number of individuals = 159

[a]1971 dollars

[b]Includes zeros for non-eligible.

[c]Excludes those retired in 1971.

[d]For individuals with positive hours.

[e]1=not health; 0=healthy.

[f]The years that follow the hours, wage and health variables pertain to the year of the interview. For annual hours, it is the product of weeks worked in the previous twelve months and the usual hours worked per week. Hourly rate of pay is for the current or last job at the time of the interview.

Table 3
Maximum Likelihood Estimates[1]

Wage Function Parameters	
Schooling	.023
Age	.157
Age Squared	-.0016
Health	-.031
σ_u	.516
σ_θ	.343
Intercept	2.18
Utility Function Parameters	
$\bar{\alpha}_1$ (2)	2048
α_2	.229
Log Likelihood	-7158

[1] Estimates are based on a sample of only 149 individuals since 10 individuals had zero hours worked in all four years. Wage rates are measured in cents.

[2] The standard deviation of α_1 in the population is 321.

Table 4
The Effect of Changes in Social Security, Private Pensions and Health on Average Predicted Expected Age at Retirement

	EAR (no skill depreciation)	EAR' (total skill depreciation)
Base data	78.13	70.49
Social Security Eligibility Age Raised to 70	78.59	72.98
Private Pension Income Raised by 50% at Each Age for All Eligibles	77.27	69.53
Difference in EAR: Not Healthy at All Ages with Certainty-Healthy at All Ages with Certainty	.082	.131

Table 5
A Comparison of Actual Retirement Ages to Reported Expected Retirement Ages and to Predicted Expected Retirement Ages

	Actual Age at Retirement 55-58		59-62		Above 1981 Age	
	Reported EAR	Predicted EAR	Reported EAR	Predicted EAR	Reported EAR	Predicted EAR
55-58	16	1	6	1	7	0
59-62	9	8	17	6	13	2
63-65	5	7	18	5	27	4
66+	0	14	0	29	2	43

[1]Predicted Expected Retirement Age uses the formulation given in equation 10b.

The Center has also been active in manpower planning both in the U.S. and in the developing countries. A project for the Ohio Advisory Council for Vocational Education identified the highly fragmented institutions and agencies which supply vocational and technical training in Ohio. Subsequent projects for the Ohio Occupational Information Coordinating Committee have followed graduates of these programs. These data and information on occupational distributions of employers collected for the Occupational Employment Statistics Program are being integrated into a comprehensive planning model which will be accessible to trainees and employers and linked to a national network.

Another focus of the Center's research is industrial relations and collective bargaining. In a project for the U.S. Department of Labor, staff members are working with unions and management in a variety of industries to evaluate several current experiments for expedited grievance procedures. The procedural adequacies, safeguards for due process, and cost and timing of the new procedure are being weighed against traditional arbitration techniques.

Senior staff also serve as consultants to many boards and commissions at the national and state level. Recently the Center's staff have produced papers and prepared testimony for the Department of Labor, the Vice President's Task Force on Youth Unemployment, the Joint Economic Committee of Congress, the National Commission for Employment and Unemployment Statistics, the National Commission for Employment Policy, the White House Conference on the Family, the Ohio Department of Corrections, the Ohio Board of Regents, the Ohio Governor's Task Force on Health, and the Ohio Governor's Task Force on Welfare.

The Center maintains a working library of approximately 10,000 titles, including a wide range of reference works and current periodicals, as well as an extensive microfilm and microfiche collection. Through their facilities linked to the University computer, the Center's data processing staff provide statistical, technical, and programming support both for in-house researchers and the over 250 users of the National Longitudinal Surveys data tapes. They maintain the NLS tapes, data base, documentation, and associated software.

For information on specific Center activities, write: Director, Center for Human Resource Research, 5701 North High Street, Worthington, Ohio 43085.

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Center for Human Resource Research

The Center for Human Resource Research is a policy-oriented multidisciplinary research organization affiliated with The Ohio State University. Established in 1965, the Center is concerned with a wide range of contemporary problems related to developing and conserving human resources. Its more than thirty senior staff members come from disciplines including economics, education, English, health sciences, industrial relations, management science, psychology, public administration, social work, and sociology. This multidisciplinary team is supported by approximately 70 graduate research associates, full-time research assistants, computer programmers, and other personnel.

The Center has become preeminent in the fields of labor market research and manpower planning. With continuing support from the United States Department of Labor, the Center has been responsible since 1965 for the National Longitudinal Surveys of Labor Market Experience. Staff have assisted in population and human resource planning throughout the world, having conducted major studies in Bolivia, Ecuador, Kenya, Sierra Leone, Venezuela, and Zaire. At the request of the National Science Foundation, a review of the state of the art in human resource planning was conducted. Other studies have assessed the impact of labor and education policy on labor supply and evaluated employment statistics collection methods. Senior personnel are also engaged in several other areas of research—collective bargaining and labor relations, evaluation and monitoring of the operation of government employment and training programs, and the projection of health education and facility needs.

The Center for Human Resource Research has received over two million dollars annually from government agencies and private foundations to support its research in recent years. Providing support have been the U.S. Departments of Labor, State, Defense, Education, Health and Human Services; Ohio's Health and Education Departments and Bureau of Employment Services; the Ohio cities of Columbus and Springfield; the Ohio AFL-CIO; the George Gund Foundation; the Rockefeller Foundation; and the Ford Foundation. The breadth of the Center's research interests is best illustrated by a brief review of a few of its current projects.

The Center's largest project is the National Longitudinal Surveys of Labor Market Experience. This project has involved repeated interviews over a fifteen-year period with four groups of the United States population: older men, middle-aged women, and young men and women. The data are collected for 20,000 individuals by the U.S. Bureau of the Census, and the center is responsible for data analysis. Since 1979, the NLS has followed an additional cohort of 13,000 young men and women between the ages of 14 and 21. This cohort includes for the first time those serving in the armed forces at the time of the initial interview. In addition to being the definitive U.S. national data set on the labor market activities of young adults, this continuing survey includes unique batteries of questions on such socially important issues as delinquency, alcohol and drug use, fertility, and prenatal care. For this cohort, field work is handled by the National Opinion Research Center. To date the Center's staff have prepared dozens of research monographs, special reports, and books on the NLS, and they also prepare and distribute data tapes for public use.

The Quality of Work Life Project, another ongoing study, began in 1975 as an attempt to improve the productivity and the meaningfulness of work for public employees in the cities of Springfield and Columbus. Center staff also served as third party advisers and researchers exploring new techniques for attainment of management-worker cooperation and worker health in a number of central Ohio private sector industries.

(Continued on inside back cover)