

An Event History Analysis of the Retirement Process

This study identifies and quantifies the impact of variables that affect the length of the retirement process. Data from the National Longitudinal Survey of Labor Market Experience and event history analysis are used. Results are compared for two different definitions of retirement. The study affirms the findings of studies that acknowledge the existence of a retirement process. However, we find fewer variables associated with length of the retirement process than are related to the decision to retire.

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There is evidence in recent literature to support retirement as a process, often called "bridge employment" (Doeringer, 1990; Reitzes, Mutran & Fernandez, 1996; Ruhm, 1995). However, despite the availability of a very large literature in the area of retirement, little is known about this process because much of the research has characterized the retirement decision as a single event. This paper estimates the length of the retirement process using event history analysis. Utilizing two different definitions of when a person is retired, one psychologically and one behaviorally based, the impact on the retirement process of several variables representing individual and family characteristics and characteristics of pre-retirement job is obtained.

Literature Review

Ekerdt and DeViney (1990) review retirement definitions and neatly classify definitions of retirement into five separate categories, each with positive and negative aspects. These categories are: separation from a career, exit from the labor force, reduced effort, pension receipt and self definition. A huge economics based literature using these definitions or combinations of these definitions exists. The majority of these studies have treated the criteria used to define when retirement takes place and the retirement decision as one. That is, when the criteria are met, the individual is retired. However, while most economic studies of retirement have characterized retirement as a dichotomous variable, some have examined retirement timing decisions in the broader context of a process, such as the phenomenon of becoming re-employed after retirement (Berkovec & Stern, 1991; Blau, 1994; Honig & Reimers, 1987), that of "partial retirement" (Honig & Hanoch, 1985; Quinn, 1981), and the concept of "bridge" employment (Quinn &

Burkhauser, 1994; Quinn, Burkhauser & Myers, 1990; Ruhm, 1995). Current literature provides evidence of a transitional stage in the retirement process and indicates that between 25 and 40 percent of individuals utilize bridge employment as a route to retirement (Quinn, Burkhauser & Myers, 1990; Ruhm, 1995). When bridge employment has been specifically addressed, wealth, personal characteristics including race and number of dependents, and characteristics of job have been found to be important (Quinn, Burkhauser & Myers, 1990).

Social scientists in fields other than economics have acknowledged retirement as a process and suggest that work after "retirement" or shifts in work patterns before a complete labor force separation is due to how individuals define their role in society. There is some evidence that working after retirement or a flexible retirement process leads to better adjustment to the retirement years (Cliff, 1991; Dillard, 1982; Reitzes, Mutran & Fernandez, 1996; Richardson & Kilty, 1991; Soumerai & Avorn, 1983; Viney & Tych, 1985). These results fit with the assertion that "work" was a primary descriptor of "manhood" for men who were born in the first quarter of the century (Astrachan, 1986; Gaylin, 1992; Pasick, 1990).

In order to explore the timing of the retirement process, the identification of the beginning and ending of the retirement process, i.e., from employment to the point after which no work activity occurs is necessary. This study characterizes this process for adult males in the United States who experienced retirement between 1966 and 1990 and estimates the effect of various factors on the length of that process. As Ekerdt and DeViney (1990) point out, the definition chosen to use in any empirical work should be related to the type of empirical question being asked. Because retirement inherently encompasses both social and economic aspects, we use two different criteria to define

retirement, one psychologically based (self reported retirement) and one behaviorally based (receipt of social security or pension).

Methodology

In order to examine the process of retirement, we employ the method of event history analysis. Because our research question is related to the time interval between two events -- beginning and ending of the retirement process -- and the second event does not occur to everyone over the observed period, Cox regression is used to accomplish the objective. This technique reveals how independent variables affect the likelihood of an event continuing into the next time period. In the case the retirement process, Cox regression allows us to examine how characteristics of an individual, their family, and their pre-retirement job affect the length of time from the initiation of the retirement decision to "full" retirement as defined by two different criteria. In Cox regression, the cumulative survival function or the hazard function is the dependent variable.

The Cox regression model with multiple independent variables is written:

$$S(t) = [S_0(t)]^P \quad (1)$$

$$P = e^{(B_1X_1 + B_2X_2 + \dots + B_nX_n)} \quad (2)$$

where $S(t)$ is the cumulative survival function (proportion of cases "surviving" at a particular time), $S_0(t)$ is called the baseline survival function, and, for simplicity, $B_1X_1 + \dots + B_nX_n = g$.

Data

Data from the Older Men's cohort of the National Longitudinal Survey of Labor Market Experience (NLS) are used in this study. This is a panel data set collected from 1966 through 1990 by the Bureau of Labor Statistics, U.S. Department of Labor. Data forming part of the older men's cohort include an original sample of 5,020 men who were age 45-59 in 1966.

To determine when an individual is retired the individual's actual work behavior was tracked from 1966 through 1990. This tracking is done in two passes over the full data set, once for each of the two criteria used to define when retirement occurs. Once an observation is classified as retired using each of the

two criteria (self reported and receipt of pension or social security), the length of time from the beginning to the end of the process is calculated. This length of time becomes the dependent variable in the event history analysis.

As with all longitudinal studies, the data set is limited by attrition of the sample. Of the 5,020 individuals who began the survey in 1966, 83.2 percent remained in 1971. That number fell to 56.4 percent in 1981, which left 42 percent of the original 5,020 in 1990. Our aim was to track individuals until retirement. Therefore, most of the attrition problem due to death is of lesser concern in this study, as the majority of respondents could be tracked through their retirement process before death. The number of individuals who were actually assigned a retirement timing process (or still working) differed according to the criteria used to define when retirement occurred. 92% of the original sample were classified using the receipt of pension or social security criteria and 74% of the original sample using the self report criteria.

Explanatory variables used in the analysis are those found to be important predictors of retirement in previous research studies: characteristics of the respondent's pre-retirement job, personal characteristics, family characteristics, and a set of control variables for factors known to impact work behavior.

The model is estimated on four different age groups: 55-61, 62-64, 65 and over age 65 when the retirement process began. Diagnostics using the log-minus-log (LML) survival plot indicated that the baseline survival rates for each age group are not proportional. Thus, when estimating the length of the retirement process (survival until retirement), the different age groups are treated as separate strata.

Definitions and summary statistics are provided as Table 1. Fifty-six percent of the sample reported an average length of 3.31 years for the retirement process for those defined as retired by self report. Sixty-seven percent of the sample reported an average length of 4.08 years for those defined as retired by receipt of pension or social security. These are at the upper end of what others have reported in the examination of bridge employment before retirement (Quinn, Burkhauser & Myers, 1990; Ruhm, 1995).

Empirical Framework

Recall equation (1) and (2) where (2) equals $P = e^g$. To operationalize the model, we define g :

$$g = \beta_1 \text{COW} + \beta_2 \text{DEP} + \beta_3 \text{EDUC} + \beta_4 \text{HLIMR} + \beta_5 \text{HLIMSP} \\ + \beta_6 \text{INOUT} + \beta_7 \text{JOBSAT} + \beta_8 \text{MARITAL} + \beta_9 \text{NWINC} \\ + \beta_{10} \text{OCC} + \beta_{11} \text{PENS} + \beta_{12} \text{RACE} + \beta_{13} \text{RETPL} + \\ \beta_{14} \text{SALR} + \beta_{15} \text{SALSP} + \beta_{16} \text{TRANS} + \beta_{17} \text{UNEMP} + \\ \beta_{18} \text{UNION} + \text{ERROR}$$

where the listed variables correspond to the measures outlined in the previous section.

The following list of hypothesized directions of effects is gleaned from previous research that examined the factors that are associated with the retirement event or bridge employment taking.

1. Increases in age at the beginning of the retirement process will *decrease* the length of the retirement process;
2. Being classified as a minority will *increase* the length of the retirement process;
3. Having a health condition that limits a respondent's ability to work will *decrease* the length of the retirement process;
4. Being married and having a spouse with a condition that limits her ability to work will *increase* the length of the retirement process;
5. Still having dependents living at home when the retirement timing event occurs will *increase* the length of the retirement process;
6. Higher salary earnings of the respondent when the retirement timing event occurs will *decrease* the length of the retirement process;
7. Higher salary earnings of the spouse when the retirement timing event occurs will *increase* the length of the retirement process;
8. Higher non wage income levels when the retirement timing event occurs will *decrease* the length of the retirement process;
9. Being employed in a non-hazardous occupation before retirement will *increase* the length of the retirement process;
10. Increases in job satisfaction will *increase* the length of the retirement process;
11. Being self-employed before retirement will *increase* the length of the retirement process;
12. Increases in the unemployment rate will *decrease* the length of the retirement process;
13. Planning to continue working after retirement will *increase* the length of the retirement process;
14. Increases in educational attainment will *increase*

the length of the retirement process;

15. Being eligible to receive a pension will *decrease* the length of the retirement process;

16. Membership in a union will *decrease* the length of the retirement process; and

17. Following periods in and out the labor force as opposed to retiring gradually will *increase* the length of the retirement process.

Results and Discussion

In the third and fourth numerical columns of Table one, information is provided about the estimated coefficients on each of the covariates included in the model. The age stratification variable shows a different process length for each defined age group. Of the independent variables, only three produce significant results under both the behavioral and psychological criteria that define when the retirement process begins: health limits of the respondent, the way in which the process occurs and levels of non wage income (hypotheses 3, 8, and 17). Presence of health limits and increases in non-wage income levels decrease the survival rate (the time it takes to fully retire). Following periods in and out of the labor market (in comparison with gradually reducing hours) increases survival rates.

For the self reported criteria, being satisfied with pre-retirement job, reporting plans to work after retirement, higher salary of spouse, if married, and increases in the unemployment rate all increase the time to retirement (hypotheses 7, 10, 12, and 13). Participation in a pension plan and increases in respondent salary decrease time to retirement (hypotheses 6, 15).

For the receipt of pension or social security criterion, fewer, and different covariates are significant. Being self-employed or in a non-hazardous occupation before retirement and being non-white increase the survival time of the retirement process (hypotheses 2, 9).

Therefore, when examining the length of the process of retirement, only three of seventeen null hypotheses based on previous research can be rejected using both of the criteria to define when retirement occurs. Seven others can not be unequivocally rejected and depend on whether one is interested in policy implications resulting from a behaviorally or psychologically based definition of retirement. If one is interested in the psychological definition of retirement, then a total of nine of the seventeen null hypotheses are rejected. Using this definition, it appears that both economically based co-variates, and

Table 1. Descriptive Statistics and Parameter Estimates--Length of Retirement Process

Variable	Definition	Descriptive Statistics		Estimated Coefficients	
		Self-report	SS/Pension	Self-report	SS/Pension
LENGTH	length of retirement process (dependent variable)	3.31 (3.51)	4.08 (3.93)	-----	-----
AGECAT	stratifying variable 1= 55-61 2= 62-64 3=65 4=>65	.22 .16 .04 .14	.37 .17 .04 .09	-----	-----
COW	= 1 if self employed	.15 (.35)	.13 (.35)	.0061 (.04)	.08*** (.03)
DEP	= 1 if dependents are living in home of respondent	.25 (.43)	.22 (.41)	.04 (.03)	.008 (.02)
EDUC	education in years	9.12 (3.91)	9.35 (3.92)	.01 (.007)	-.01 (.02)
HLIMR	= 1 if health limits work of respondent	.42 (.49)	.43 (.49)	-.05*** (.02)	-.03** (.01)
HLIMSP	= 1 if health limits work of spouse	.26 (.44)	.27 (.44)	.03 (.03)	-.02 (.02)
INOUT	= 1 if retirement process is periods in and out of labor force	.07 (.25)	.35 (.45)	.44*** (.04)	.84*** (.02)
JOBSAT	= 1 if satisfied with pre-retirement job	.69 (.46)	.53 (.49)	.12*** (.03)	.03 (.02)
MARITAL	= 1 if married	.79 (.41)	.71 (.45)	.02 (.03)	.04 (.03)
NWINC	non-wage income in year before retirement	7032 (14,067)	7475 (14,005)	-3.1E-06** (1.72E-06)	-2.49E-06** (1.19E-06)
OCC	= 1 if employed in non-hazardous occupation	.71 (.46)	.69 (.46)	.00 (.00)	.53*** (.02)
PENS2	= 1 if participates in pension plan	.60 (.49)	.45 (.49)	-.18*** (.03)	.01 (.02)
RACE	= 1 if non-white	.29 (.46)	.30 (.46)	.02 (.03)	.04* (.02)
RETPL	= 1 if respondent plans to work after retirement	.23 (.42)	.25 (.44)	.08*** (.03)	.04 (.03)
SALR	salary of respondent in year before retirement	17,673 (17,140)	15,681 (17,090)	-3.41E-06** (1.59E-06)	1.43E-06 (1.14E-06)
SALSPL	salary of spouse in year before retirement	2,938 (7,196)	2,238 (6,098)	5.39E-06* (3.28E-06)	-2.11E-06 (2.32E-06)
TRANS	transfer income in year before retirement	173 (1161)	127.8 (805.5)	-4.8E-05*** (1.56E-05)	-1.79E-05 (2.51E-05)
UNEMP	unemployment rate in region of residence	7.04 (2.95)	6.61 (4.19)	.04*** (.00)	.002 (.007)
UNION	= 1 if belonged to a union before retirement	.36 (.49)	.27 (.44)	-.02 (.03)	-.003 (.02)
N	Number of observations			3684	4639
Chi-sq.				212.98***	1447.81***

psychologically based co-variates are important in describing length of the retirement process. Not only are income related factors important, such as earnings of self, earnings of spouse, non wage and transfer income, so are perceived health limits, satisfaction with job, and retirement plans. When a behaviorally based definition of retirement is used, type of worker and type

of occupation are important, as is race and non wage income. The psychologically based indicators associated with employment are not significant.

Although each of the retirement timing criteria lead to differences in the significance of many of the covariates, the direction of effects in both survival models coincide. And, the overall significance of both

Table 2. Percent Surviving (still retiring) After Two, Four, Six, Eight, and Ten Years

Age Group When Retirement Process Begins								
55-61			62-64		65		>65	
Years of Process	Self Report	Pension/Social Security	Self Report	Pension/Social Security	Self Report	Pension/Social Security	Self Report	Pension/Social Security
2	90	78	82	62	83	62	55	60
4	64	55	52	25	35	17	22	25
6	29	20	23	7	14	8	14	9
8	14	12	14	4	13	7	13	5
10	13	5	12	1	12	6	11	1
65-71			72-74		75		>75	
Age Group After 10 Years of the Retirement Process								

equations is high. Table 2 identifies the cumulative survival rate after two, four, six, eight, and ten years of the retirement process by age group when the process began and definition of retirement. Overall, two general statements can be made about the results. First, for all but the oldest age group (>65), more individuals survive (remain in the retirement process) when retirement is self reported than when the objective measure is used. Second, the largest drops in the survival rate occurs after four and six years, regardless of age group or definition of retirement. However, there are wide variations in the actual predicted cumulative survival rate. After two years of the retirement process, the two definitions of retirement timing yield between at 9 and 33 percent difference in the cumulative proportion of the sample surviving, with the largest difference predicted for the age 65 at the beginning of retirement group and the smallest for the over 65 age group. After four years, the range of predictions are between 13 and 100 percent, with the largest difference predicted for the age 62-64 age group and the smallest difference for the over 65 age group. The gap narrows as the number of years for the retirement process increases to six, eight, and ten years. By eight and ten years, the largest difference is in the 62-64 age group.

This paper addresses an issue as yet relatively untouched in the economic literature regarding retirement: given that retirement is a process, how long does it actually take and what are the factors that influence that length? Other research has pointed out the existence of "bridges to retirement" (Doeringer, 1990; Ruhm, 1995). This study reinforces those

findings and goes further and concludes that many of the factors found to be associated with the existence of bridge employment are not significant when examining the length of the retirement process. And, only three of those factors, health limits, type of process, and level of non wage income, affect the length of process across definitions of retirement. When definitions of retirement are examined individually, other significant factors do not coincide. These results contradict findings of others, who conclude that criteria used to define when retirement occurs matter little in the estimation of retirement (Ekerdt & DeViney, 1990; Palmore, Burchett, Fillenbaum, George & Wallman, 1985). However, these studies examined the retirement process as a single step, from work to retirement. It appears that when retirement is treated as a process, definition matters a great deal. More attention should be paid to the phase in an individual's life if we are to gain a fuller understanding of the well-being of individuals as they age.

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Endnote

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