ORES Working Paper Series

Number 97

Do Early Retirees Die Early?
Evidence from Three Independent Data Sets

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July 2002

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Summary

In Waldron (2001) I use the 1973 cross-sectional Current Population Survey (CPS) matched to longitudinal Social Security administrative data (through mid-1998) and find that men who retire early die sooner than men who retire at age 65 or older. Relative mortality risk estimates control for current age, year of birth, education, marital status in 1973, and race, and the sample is restricted to men who have lived to at least age 65. This paper uses the 1982 New Beneficiary Survey (NBS) and a 1 percent extract of the Social Security Administration's year 2000 Master Beneficiary Records (MBR) to test whether the mortality differentials reported in Waldron (2001) can be replicated in other independent data sets. Regression equations on the 1973 CPS are re-estimated with a complementary log-log model for continuous time as an additional test of robustness. In general, mortality estimates reported in Waldron (2001) are robust across different data sets and models.

Regression results in Waldron (2001) indicate that the categories of the age-of-entitlement variable matter. Entitlement to Social Security retired-worker benefits is established when a fully insured person files an application for them. For this paper, I divide the possible ages of retired-worker entitlement into five categories: exactly age 62 to less than 62 years and 3 months (AGE62A), age 62 and 3 months to 62 and 11 months (AGE62B), age 63 (AGE63), age 64 (AGE64), and age 65 (AGE65). All three data sets show that men taking benefits at AGE62A and AGE62B have higher mortality risk than men taking benefits at AGE64 and AGE65. Both the 1973 CPS and the MBR show that

Acknowledgments: The author would like to thank Susan Grad, Michael Leonesio, Joyce Manchester, and David Pattison for their helpful comments and suggestions.

men taking benefits at AGE63 or AGE64 have a higher mortality risk than do men taking benefits at AGE65. The 1973 CPS and the MBR also show that men taking benefits at AGE62A have a higher mortality risk than men taking benefits at AGE62B. Thus, empirical evidence suggests that early retirement analyses may be sensitive to how one categorizes the age of entitlement. Specifically, combining age 62 retirees with age 64 retirees in the same category or comparing age 62 retirees with all older retirees may be an inappropriate way to analyze early retirement characteristics or behavior. The first age-of-entitlement combination will bias results by making "early" (aged 62-64) retirees appear more educated and healthier than the most vulnerable subgroup of the early retiree population (that is, some fraction of the age 62 retirees) because age 64 retirees will pull up average education and average health characteristics. The second age-of-entitlement combination will bias results by muting differences in education and health between age 62 retirees and age 65 retirees because age 63 and age 64 retirees will pull down the average education and health characteristics of "older" (aged 63 or older) retirees.

Data Description

This study uses data from the 1973 Current Population Survey (CPS) matched to Social Security administrative records (through mid-1998), the 1982 New Beneficiary Survey (NBS) matched to Social Security administrative records (through 2000), and a 1 percent extract of Social Security's year 2000 Master Beneficiary Records (MBR). All three data sets possess MBR variables. Each sub-sample I use for analysis on each data set is selected based on identical criteria using identical MBR variables. Each sub-sample consists of male, retired-worker beneficiaries, excluding Social Security Disability

Insurance recipients, who survived until at least age 65.[1] As indicated in Table 1, the MBR sample is by far the largest of the three, while the NBS sample is approximately half the size of the CPS full sample and slightly larger than the CPS sample when the sub-samples are restricted to common birth cohorts.

The model I use to estimate the variables described below is a discrete-time logistic regression. The dependent variable is a censored binary variable that equals 1 if an individual dies in the observation period (age 65 until death or until 1997 in the CPS or 2000 in the NBS and MBR) and 0 if the individual is alive at the end of the observation period (1997 in the CPS or 2000 in the NBS and MBR). The model measures the logit or log-odds of dying using the maximum likelihood method of estimation. All regressions performed on the NBS use weighted data because of the special sample design of the NBS. Regressions performed on the CPS and MBR use unweighted data. Adjustments made for late entry into the mortality risk set for the NBS sample is described in a later section of this paper.

Explanatory Variables

Current age. Current age from age 65 to death or to year 1997 in the CPS or year 2000 in the NBS and MBR is used to estimate the effect of age on mortality risk. Current age

[1] Deaths in the 1973 CPS are observed on the MBR, Numident, and Master Earnings File. Deaths in the 1982 NBS are observed in the MBR and the Numident. Deaths in the MBR are observed in the MBR. Because death reporting for retired beneficiaries in the MBR is thought to be close to 100 percent (see Aziz and Buckler (1992)), I judge the additional death sources in the CPS and NBS to have an irrelevant effect upon this analysis.

Table 1.
Sample counts (unweighted) of male retired-worker beneficiaries, by selected categories

Category	Data set: 1973 CPS	1982 NBS	1 percent 2000 MBR
Beneficiaries born from—			
1908 to 1932	10,460	n.a.	186,246
1908 to 1919	4,661	5,193	82,300
Beneficiaries entitled at age 62 to age 65 and 11 months (entitled at 66 + eliminated), born from—			
1908 to 1932	10,166	n.a.	178,871
1908 to 1919	4,556	5,013	79,952
Beneficiaries surviving to at least age 65 (those with deaths between 62-64 eliminated), born from—			
1908 to 1932	9,970	n.a.	174,418
1908 to 1919	4,468	4,995	77,969
Beneficiaries surviving to age 65 (beneficiaries with missing values eliminated), born from—			
1908 to 1919	n.a.	4,949	n.a.
Beneficiaries surviving to age 65, born from[a]—			
1908 to 1910	1,073	220	18,778
1911 to 1913	1,106	283	18,974
1914 to 1916	1,128	2,561	19,930
1917 to 1919	1,161	1,885	20,287
1920 to 1923	1,342	n.a.	22,326
1924 to 1926	1,268	n.a.	22,625
1927 to 1929	1,241	n.a.	22,565
1930 to 1932	1,248	n.a.	21,526

SOURCE: 1973 CPS, 1982 NBS, and 1 percent 2000 MBR.

NOTE: n.a. = not applicable.

a. Due to the sample design of the NBS, weighted counts by year of birth are distributed differently from unweighted counts. The weighted counts for the NBS are 14,172.6 (1908–1910); 17,979.2 (1911–1913); 240,586.5 (1914–1916); and 378,893.4 (1917–1919).

is a censored, time-varying variable because the measurement of current age ends in 1997 or 2000. Therefore, censoring increases with birth cohort.

Marital status. Marital status in 1973 in the CPS and in 1982 in the NBS is used to approximate a measure of the effect of marriage on mortality risk. This variable does not have the explanatory power of a marriage variable, like current marital status, that changes over time. Because men in the NBS sample are aged 63 to 74 at time of interview, this variable is inconsistent over that sample because men interviewed at age 74 have had more of a chance to become widowed than men interviewed at age 63. The MBR does not have a marriage variable.

Race. Estimates are made for the effect of being African American on mortality risk in the CPS and NBS. Sample sizes are too small in the CPS and NBS for other race effects to be estimated. A race effect is not estimated on the MBR.

Education. Education, recorded in the CPS and NBS in single years, is grouped into three categories for estimation: less than 12 years of school (less than high school (EDU1)), 12–15 years of school (high school graduate (EDU2)), and 16 or more years of school (college graduate (EDU3)). Because of the age of the birth cohorts in the NBS, some sensitivity analysis is conducted by splitting the lowest category into less than 8 years of school and 8–11 years of school. The MBR does not have an education variable.

Retirement age. The retirement age (the Social Security age of entitlement) of each beneficiary, measured in months, is grouped into five categories for estimation: exactly 62.0 years to less than 62 years and 3 months (AGE62A), 62 and 3 months to 62 and 11 months (AGE62B), 63 to 63 and 11 months (AGE63), 64 to 64 and 11 months (AGE64), and 65 years to 65 years and 11 months (AGE65). Beneficiaries are first eligible to retire at age 62. This variable is observed on all three data sets as an MBR variable.

Special Sample Design of the NBS

The NBS is a nationally representative survey of noninstitutionalized persons *newly* entitled to benefits. Individuals *receiving* retired-worker benefits at age 62 or older (including the dually entitled and excluding disability conversions at age 65) were eligible for survey selection as retired workers (Maxfield 1983). New beneficiaries were selected from Social Security's MBR if they first received benefits from June 1980 through May 1981.[2] The interviews were conducted from October 1982 through December 1982. This paper further restricts the definition of retired workers in the NBS to workers who have *never* received disabled-worker benefits. Retirement age is defined as the age of *entitlement* to (not receipt of) retired-worker benefits and is observed in the 2000 MBR. Thus, the definition of retired workers used here matches my definition of retired workers in the CPS and MBR data sets, but not the definition used in the NBS public-use sample.[3]

[2] Note that because of a national recession at the time of sample selection, retirement behavior observed in the NBS sample might not necessarily be reflective of retirement behavior in times of economic growth.

[3] In contrast, the 1982 NBS public-use file includes retired-worker beneficiaries who may have claimed retired-worker benefits at age 62 and then qualified for disability benefits from age 62 to 64. In addition, retirement age in the NBS (the "newsampt" variable) is defined as the age at which retired-worker benefits are first *received*, not the age of *entitlement*. For those reasons, sample counts in this paper do not match sample counts in the 1982 NBS public-use file.

Late Entry of Sample Respondents into the Risk Set in the NBS

The structure of the NBS creates a problem for comparisons between the NBS and the CPS and MBR that is only partially overcome in this analysis. In all three data sets, I restrict the sample to men who have survived until at least age 65 and who were entitled to retired-worker benefits from age 62 to age 65. I then set up my regressions to begin observing deaths at age 65. On the MBR, those restrictions are sufficient for unbiased mortality estimates, because the historical 1 percent extract contains both deceased and living beneficiaries.[4] However, the CPS and NBS data sets require further restrictions because individuals must be alive at the time of the CPS or NBS interview to be included as survey respondents. Thus, individuals in those surveys who are interviewed at age 66 would have a 0 percent risk of death from age 65 to age 66. So before I begin observing all deaths at the same starting point (age 65), I restrict the oldest cohort in the CPS sample to birth year 1908 to roughly ensure that all members of the data set were no older than age 65 at the time of interview. However, in the NBS, eliminating anyone interviewing after age 65 is not feasible because all men in the AGE65 retirement category were interviewed after age 65. Because men interviewing after age 65, by necessity, must have survived past age 65, the AGE65 group in the NBS could be selectively healthier than men in the AGE65 category in the 1973 CPS and the MBR. Note that about 28 percent of the AGE65 group in the NBS was interviewed at age 69 or older; those men are first observed to be at risk for death at least 4 years later than AGE62 men (see Table 2).

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[4] In practice, I restrict the MBR to the same birth cohorts as the CPS to allow for easier comparisons.

Table 2.
Age at interview as a percentage (weighted) of AGE65 group, NBS

Reference group	Less than or equal to 65	66	67	68	69	70	71	72	73	74	75+
AGE65	0	16.8	38.7	16.7	7.1	5.1	3.2	2.8	6.2	3.5	0

SOURCE: 1982 NBS.

To correct for late entry of male respondents into the risk set, I remove those men from observation if their age at interview is greater than their current age (starting at age 65) and allow them to enter into the regression only when their current age equals their age at interview—that is, when they are first observed to have more than a 0 percent risk of death.[5] The age-at-interview distribution of the AGE65 retirees adds complexity to the interpretation of the regression coefficients because AGE65 retirees serve as the reference group. Essentially, only AGE62 retirees who live long enough to equal the age-at-interview of the AGE65 retirees contribute to the estimates. Thus, AGE62 men who die before AGE65 retirees are interviewed are essentially dropped out of the comparison, and we should expect retirement-age coefficients in the NBS to be lower than comparable coefficients in the 1973 CPS and the MBR. For those reasons, parameter estimates in the NBS are not directly comparable to parameter estimates in the other two data sets.[6]

Demographic Limitations of the 1982 NBS vis a vis the 1973 CPS

Besides the late entry of AGE65 retirees into the risk set, the sampling structure of the NBS creates some additional difficulties for this mortality analysis. Because the retired-

[5] To clarify, current age is a time-varying variable that I increase each year from age 65 until death or censoring, while age of interview is a time-invariant variable. Thus, men in the regression can have a current age of 65 and an age of interview of 66 in the NBS. In this example, I would not allow individuals to enter the regression until the next year, when their current age is 66 and their age of interview is 66.

[6] Readers may wonder why some men are interviewed at such late ages in the NBS, even though I have eliminated men entitled at age 66 or older from the sample. Because the NBS sample was created using age of benefit *receipt* as a selection criteria, and I use age of *entitlement* to create my NBS sample, it is possible to have people entitled at age 65, but first receiving benefits at 66 or older. Prior to the 1977 Social Security Amendments, beneficiaries were required to file for OASDI and HI benefits simultaneously to be able to begin receiving HI benefits at age 65, even if they had no intention of also starting receipt of OASDI benefits at age 65 (Myers 1993). In addition, before February 1981, retired workers could backdate their age of entitlement up to 12 months, and after February 1981, they could backdate entitlement up to 6 months (Maxfield 1983).

worker sample in the NBS was selected off the MBR using age of benefit receipt as a sampling criteria and only *new* retired-worker beneficiaries in 1980–1981 were chosen, all age 65 retirees are, necessarily, born earlier than all age 62 retirees. Therefore, year of birth and age of retirement are highly correlated in the NBS. (The correlation between year of birth and a continuous retirement-age variable—measured in months—is –0.83 in the 1982 NBS and –0.14 in the 1973 CPS.) In other words, year of birth essentially acts as a proxy for retirement age in the NBS. That takes away the ability to control for the separate effect of year of birth in multivariate regressions performed on the NBS. However, in the NBS, 92 percent of the sample is born from 1915 to 1918, so controlling for mortality improvement over time may not be a serious concern. (In contrast, in the 1973 CPS sample, the birth cohorts span 24 years, making year of birth a necessary variable for estimation.) However, it does mean that, unlike in the 1973 CPS, I am unable to test for interactions between year of birth and education or year of birth and age of retirement (see Waldron 2001). The difference in sample between the MBR, CPS, and the NBS is illustrated in Table 3.

Analysis of the 1973 CPS in Waldron (2001) shows that a greater proportion of age 65 retirees are college educated than age 62 retirees. That pattern also occurs in the NBS (see Table 4). The sampling structure of the NBS—which causes year of birth and age of retirement to be highly correlated—alters the distribution of the education variable by year of birth, so that trends in educational attainment move in the *opposite* direction in the NBS and the CPS. In Table 4, note that the percentage of men with less than 12 years of education drops from 59.7 percent to 38.9 percent from the 1908 birth cohort to the

Table 3.
Percentage of birth cohort with age of retired-worker entitlement, by sample

Birth cohort	Retage62A			Retage62B			Retage63			Retage64			Retage65		
	MBR	CPS	NBS	MBR	CPS	NBS	MBR	CPS	NBS	MBR	CPS	NBS	MBR	CPS	NBS
1908	24.7	21.7	0	9.5	7.5	0	12.1	12.8	0	22.5	26.3	2.7	31.1	31.1	**97.3**
1909	25.3	22.4	0	10.1	8.0	0	15.7	14.6	2.3	20.4	22.9	2.2	28.6	30.5	**95.5**
1910	27.7	26.0	0	10.7	11.8	0	15.0	15.2	0	20.1	22.3	4.8	26.5	23.8	**95.2**
1911	28.8	31.4	0	10.7	9.8	0	15.8	15.1	0	19.7	16.8	11.0	25.0	26.2	**89.0**
1912	32.5	30.2	0	11.0	14.0	0	16.4	9.1	1.09	18.3	23.4	3.5	21.8	22.6	**95.4**
1913	35.0	38.5	0	10.2	7.6	0.6	11.2	11.6	0.6	22.6	22.4	12.0	21.0	19.1	**86.8**
1914	36.7	35.4	0	9.0	8.7	0	9.5	8.9	0.8	25.6	25.4	21.0	19.1	21.1	**78.2**
1915	35.6	36.9	0.3	9.5	8.5	0.2	10.5	10.4	0.8	26.3	24.7	**60.4**	18.1	18.1	**38.3**
1916	34.5	37.6	0.4	10.9	9.4	0.2	11.9	9.6	**17.8**	25.9	24.1	**69.6**	16.8	17.3	11.9
1917	35.3	31.5	1.6	11.8	11.5	**21.0**	11.3	13.8	**69.6**	23.9	26.1	7.8	17.8	15.4	0
1918	36.3	32.8	**65.7**	13.3	10.2	**30.0**	10.4	13.3	4.4	22.3	22.8	0	17.7	18.8	0
1919	40.6	39.8	**97.1**	11.9	16.0	2.7	9.1	7.5	0	19.2	20.1	0.2	19.2	14.9	0

SOURCE: 1973 CPS, 1982 NBS (weighted percentages), and 1 percent 2000 MBR.

Table 4.
Percentage distribution of male retired-worker beneficiaries, by trends in educational attainment and sample

Birth cohort	Less than 12 years of school	12 to 15 years of school	16 or more years of school
		1973 CPS	
1908	59.7	28.6	11.7
1909	57.8	33.2	9.1
1910	58.0	33.6	8.4
1911	50.4	35.3	14.3
1912	53.6	35.3	11.1
1913	51.3	38.6	10.2
1914	48.0	39.5	12.6
1915	46.0	41.0	13.4
1916	42.7	46.4	10.9
1917	35.0	51.4	13.7
1918	35.6	49.1	15.2
1919	38.9	48.4	12.7
		1982 NBS (weighted)	
1908	18.2	31.0	50.8
1909	20.9	45.4	33.7
1910	20.8	36.3	42.9
1911	20.5	41.9	37.5
1912	31.7	41.8	26.5
1913	32.3	43.8	23.9
1914	38.4	43.8	17.8
1915	41.5	44.5	14.0
1916	48.4	40.3	11.4
1917	48.7	38.6	12.7
1918	48.8	42.1	9.2
1919	51.1	40.4	8.5

SOURCE: 1973 CPS and 1982 NBS.

1919 birth cohort in the CPS, while the percentage of men with less than 12 years of education rises from 18.2 percent to 51.1 percent from the 1908 to 1919 birth cohort in the NBS. The education statistics move from more educated to less educated over time (the opposite of the historical trend) in the NBS because the birth cohorts observed in the sample move from age 65 retirees (whom are more educated) to age 62 retirees (whom are less educated). In addition, because age 65 retirees in the NBS may be selectively healthier than the general age 65 retired-worker beneficiary population (due to the age-of-interview issue), they are also likely to be more educated than the general retired-worker population because education and health are correlated.

Descriptive Statistics of the Data Sets

In this section, I examine the distribution of the NBS and CPS samples by some of the explanatory variables (see Table 5A and Table 5B). The last column in both tables gives the estimated probability that an individual will survive until age 80 or older for each subgroup, given survival to age 65. The survival estimates are obtained using the life-table (actuarial) method.[7] For the full NBS sample, given survival to age 65, there is a 72 percent probability that an individual will survive until age 80 or older.

When examining survival probabilities for various NBS sub-samples, several patterns emerge. Survival probability increases with education. There is a 12 percentage

[7] Estimates of survival functions are constructed from the 1982 NBS sample data, using single-year age intervals, and represent the probability that the individual deaths observed in the sample occur at age 80 or older. Right censoring is taken into account, but not late entry into the NBS data set. See Allison (1995) for details.

Table 5A.
Male retired-worker beneficiaries surviving to at least age 65, 1982 NBS

	Unweighted		Weighted [a]		
Sample	Number	Percentage of sample	Number	Percentage of sample	Survival probability to age 80
Full sample	4,949	100.0	651,631.60	100.0	0.72
Education (years)					
Less than 8	635	12.8	92,355.80	14.2	0.63
8–11	1,521	30.7	209,262.60	32.1	0.70
Less than 12	2,156	43.6	301,618.40	46.3	0.68
12–15	2,084	42.1	270,970.60	41.6	0.74
16 or more	709	14.3	79,042.60	12.1	0.80
Marital status in 1982					
Married	4,242	85.7	552,504.10	84.8	0.74
Divorced or separated	278	5.6	40,669.12	6.2	0.65
Widowed	244	4.9	30,984.80	4.8	0.57
Never married	185	3.7	27,473.55	4.2	0.67
Retirement age					
Less than 65	3,498	70.7	547,993.80	84.1	0.71
AGE62A	1,046	21.1	238,706.80	36.6	0.69
AGE62B	379	7.7	80,095.67	12.3	0.67
AGE63	594	12	75,922.31	11.7	0.73
AGE64	1,479	30.0	153,269	23.5	0.74
AGE65	1,451	29.3	103,637.90	15.9	0.78
Race					
African American	358	7.2	51,632.54	7.9	0.68
White	4,515	91.2	589,058.20	90.4	0.72

SOURCE: Author's calculations on the 1982 NBS sample born from 1908 to 1919.

a. Sample counts, percentages, and survival probabilities are weighted using "finlwgt."

Table 5B.
Male retired-worker beneficiaries surviving to at least age 65, 1973 CPS

Sample	Number	Percentage of sample	Survival probability to age 80
Full sample	9,970	100.0	0.69
Education (years)			
Less than 12	3,818	38.3	0.66
12–15	4,531	45.5	0.71
16 or more	1,621	16.2	0.73
Marital status in 1973			
Married	8,939	89.7	0.70
Divorced or separated	410	4.1	0.59
Widowed	195	2.0	0.62
Never married	426	4.3	0.66
Retirement age			
Less than 65	8,047	81.0	0.67
AGE62A	3,942	39.5	0.63
AGE62B	1,076	10.8	0.68
AGE63	1,034	10.4	0.70
AGE64	2,022	20.3	0.71
AGE65	1,896	19.0	0.75
Race			
African American	578	5.8	0.63
White	9,309	93.4	0.69

SOURCE: Author's calculations on 1973 Exact Match sample born from 1908 to 1932.

NOTE: Sample counts, percentages, and survival probabilities are unweighted. Weighted statistics might differ.

point difference between those with less than 12 years of education and those with at least 16 years of education and a 17 percentage point difference between those with less than 8 years of education and those with at least 16 years of education. Beneficiaries who are married in 1982 have a 7 percentage point greater chance of surviving to age 80 than the never married in 1982, while men who are widowed in 1982 have a 17 percentage point lower chance of surviving to age 80 than men who are married in 1982. Whites in the sample have a 4 percentage point greater probability of surviving to age 80 than do African Americans. Results by retirement-age category show a general pattern of increase in survival probability with retirement age, although men retiring at AGE62A have a 2 percentage point *greater* probability of surviving to age 80 than men retiring at AGE62B. Those retiring at AGE65 have a 9 percentage point greater probability of surviving to age 80 than those retiring at AGE62A.

Comparisons between the 1982 NBS and the 1973 CPS indicate similar survival patterns in both samples. Weights must be used for the NBS sample because of disproportionate sampling by age at first retirement benefit receipt, as indicated by the unweighted versus weighted sample counts in Table 5A. The CPS sample contains birth cohorts 1908-1932 and the NBS heavily samples birth cohorts 1914-1919, so survival probability by education levels should differ, due to changes in educational attainment over time. The CPS marriage variable is observed over ages 41 to 65 in 1973 while the NBS marriage variable is observed over ages 63 to 74 in 1982, so survival probability by marriage levels should also differ. (In particular, note the stronger effect of widowhood in the NBS, due to the older age of the sample at interview.) While both samples show survival probability increasing with retirement age, the 1973 CPS shows those retiring at

AGE62A have a *lower* survival probability than those retiring at AGE62B, while the NBS does not.

Next, I compare survival patterns by retirement age for the NBS and the CPS to the 1 percent MBR (see Table 5C). To enable a closer comparison, I restrict the CPS and MBR to the range of birth cohorts in the NBS—1908 to 1919. Like the CPS, the MBR exhibits lower survival probabilities for AGE62A retirees versus AGE62B retirees, but the difference in the MBR is very small (0.70 versus 0.69). Note that the survival probability of AGE65 retirees is highest in the NBS, perhaps reflecting selectively healthier male AGE65 retirees in that data set because of older ages at interview. AGE62A survival probability is 4 percentage points lower in the 1973 CPS than in the MBR and NBS.

Comparative Regression Analyses of the Data Sets

In general, the pattern of mortality differentials by age, education, marital status, and retirement age found in the 1973 CPS is replicated in the 1982 NBS.[8] Regression estimates on the NBS seem to provide confirmation of the negative correlation between age of retirement and mortality risk found in the 1973 CPS, once differences in sample are taken into account.

First I estimate, in the NBS, the effect of current age, education, marital status in 1982, race, and retirement age on the log-odds of dying (see equation 2, Table 6), and then I estimate the same regression (adding year of birth) in the CPS (equation 1,

[8] For comparisons in this section, the regression in Waldron (2001) is re-estimated after men retiring at ages 66 or older and birth cohorts 1906 to 1907 are eliminated from the sample. Estimates do not change substantially from Waldron (2001) with this change in the sample.

Table 5C.
Male retired-worker beneficiaries surviving to at least age 65, by retirement age and sample

Sample	1 percent MBR, born 1908-1919 (unweighted data)			1982 NBS, born 1908-1919			1973 CPS, born 1908-1919 (unweighted data)		
	Number	Percentage of sample	Survival probability to age 80	Number (unweighted)	Percentage of sample (weighted)	Survival probability to age 80 (weighted)	Number	Percentage of sample	Survival probability to age 80
Full sample	77,969	100.0	0.72	4,949	100.0	0.72	4,468	100.0	0.71
Retirement									
Less than 65	60,995	78.2	0.71	3,498	84.0	0.71	3,487	78.0	0.69
AGE62A	25,652	32.9	0.69	1,046	36.6	0.69	1,437	32.2	0.65
AGE62B	8,373	10.7	0.70	379	12.3	0.67	458	10.3	0.71
AGE63	9,608	12.3	0.72	594	11.7	0.73	536	12.0	0.71
AGE64	17,362	22.3	0.74	1,479	23.5	0.74	1,056	23.6	0.72
AGE65	16,974	21.8	0.76	1,451	15.9	0.78	981	22.0	0.76

SOURCE: Author's calls on the 1 percent 2000 MBR, 1982 NBS, and 1973 CPS.

Table 6.
Parameter estimates (standard errors) for equations 1, 2, 3, 4, and 5

Variable	1. 1973 CPS full sample birth cohorts 1908–1932	2. 1982 NBS full sample birth cohorts 1908–1919	3. 1973 CPS birth cohorts 1908–1919	4. 1973 CPS birth cohorts 1914–1919	5. 1982 NBS full sample (checks sensitivity of retirement age to marriage and education variables)
N (unweighted)	9,970	4,949	4,556	2,289	4,949
Intercept	12.268	-10.4317	7.441	12.7477	-10.8193
	(6.9) **	(0.2957) *	(11.7947)	(34.3885)	(0.2952) *
Age	0.0919	0.0984	0.0914	0.0888	0.0983
	(0.00334) *	(0.00363) *	(0.00348) *	(0.00640) *	(0.00363) *
Year of birth	-0.0117	n.a.	-0.0091	-0.0117	n.a.
	(0.00354) *		(0.00613)	(0.0170)	
Edu1	0.3429	0.3847	0.2914	0.3867	n.a.
	(0.0579) *	(0.0635) *	(0.0683) *	(0.1054) *	
Edu2	0.1597	0.1794	0.1343	0.187	0.1806
	(0.058) *	(0.064) *	(0.0694) *	(0.1039) **	(0.064) *
Married	-0.2724	-0.3718	-0.2517	-0.3073	a
	(0.0503) *	(0.05) *	(0.0581) *	(0.0926) *	
African	0.1665	0.0172	0.1566	0.205	-0.0222
	(0.0689) *	(0.0696)	(0.0804) *	(0.1246) **	(0.0714)
AGE62A	0.3195	0.1793	0.3171	0.3742	0.1823
	(0.0488) *	(0.0577) *	(0.0556) *	(0.0908) *	(0.0579) *
AGE62B	0.1922	0.2107	0.138	0.1722	0.2099
	(0.065) *	(0.0716) *	(0.0755) **	(0.1192)	(0.066) *
AGE63	0.1334	0.0638	0.1176	-0.063	0.066
	(0.0637) *	(0.0725)	(0.0711) **	(0.1245)	(0.0726)
AGE64	0.0938	0.0575	0.1106	0.0649	0.0555
	(0.0487) **	(0.0592)	(0.0595) **	(0.0989)	(0.0593)

Continued

Table 6.
Continued

Variable	1. 1973 CPS full sample birth cohorts 1908–1932	2. 1982 NBS full sample birth cohorts 1908–1919	3. 1973 CPS birth cohorts 1908–1919	4. 1973 CPS birth cohorts 1914–1919	5. 1982 NBS full sample (checks sensitivity of retirement age to marriage and education variables)
Divorced/separated	n.a.	n.a.	n.a.	n.a.	0.3072 (0.0741) *
Widowed	n.a.	n.a.	n.a.	n.a.	0.4773 (0.0811) *
Never	n.a.	n.a.	n.a.	n.a.	0.3219 (0.0904) *
Edu1a	n.a.	n.a.	n.a.	n.a.	0.4977 (0.0762) *
Edu1b	n.a.	n.a.	n.a.	n.a.	0.3439 (0.0656) *
-2Log	30431.736	24021.556	22081.278	9546.572	24011.904

SOURCE: Author's calculations on the 1973 CPS and the 1982 NBS.

NOTES: n.a. = not applicable.
* = standard error significant at the 5 percent level;
** = standard error significant at the 10 percent level.

Where:
age = age from age 65 until death or year 2000 (NBS) or 1997 (CPS)
edu1 = 1 if < 12 years of school
edu2 = 1 if 12-15 years of school
edu1a = 1 if < 8 years of school
edu1b = 1 if 8-11 years of school
Reference variable (edu3) = 1 if 16+ years of school
married = 1 if married in 1973/1982
divorced/separated = 1 if divorced/separated in 1973/1982
widowed = 1 if widowed in 1973/1982
never married = 1 if never married in 1973/1982
African American = 1 if African American
Reference variable = not African American
AGE62A = 1 if retirement age <62.25
AGE62B = 1 if retirement age >=62.25 and <=62.9
AGE63 = 1 if retirement age >=63 and <=63.9
AGE64 = 1 if retirement age >=64 and <=64.9
Reference variable (AGE65) = 1 if retirement age >=65 and <=65.9

a. Married in 1982 is the reference variable for equation 5.

Table 6). The parameter estimates in Table 6 can be interpreted as the change in the log-odds of dying—given survival to age 65—associated with a one unit increase in the explanatory variable (age, year of birth) or the change in the log-odds of dying associated with an individual being in a dummy (1 or 0) variable category relative to the reference category for that dummy variable.[9] In equation 2, retiring at AGE62A increases the log-odds of dying by 0.1793 and retiring at AGE62B increases the log-odds of dying by 0.2107 relative to those retiring at AGE65. Retiring at AGE63 or AGE64 is not significantly different from retiring at AGE65.

When one compares equation 1 (1973 CPS) to equation 2 (1982 NBS), the age, education, and marriage variables have the same sign and pattern and are significant at the 5 percent level. The difference in the magnitude of the education coefficients between the two samples most likely reflects the difference in the range of birth cohorts (from 1908 through 1932 in the CPS and from 1908 through 1919 in the NBS). The difference in magnitude on the married in 1973/1982 coefficients (between the CPS and the NBS) reflects differences in the composition of the reference group (not married at the time of the interview). The coefficient on married in 1982 is probably larger than the coefficient on married in 1973 because the reference variable for the NBS (not married in 1982) contains more high-risk widowed and divorced men because of older ages at interview in the NBS. The effect of being African American on mortality risk is significant in the CPS and not significant in the NBS. The greatest difference in the parameter estimates between the two samples appears in a comparison of the retirement-age coefficients. Unlike the 1973 CPS, the NBS does not show a mortality risk

[9] If q is the probability of dying, the odds of dying is the ratio of the probability of dying over the probability of not dying (q/1-q). The log odds of dying = ln (q/1-q).

difference between AGE63 and AGE65 or AGE64 and AGE65 retirees. However, this is less surprising when one considers that late entry into the risk set for AGE65 retirees causes mortality risk differentials to be evaluated at later ages in the NBS than in the CPS. Since risk differentials tend to decrease with age and since AGE63 and AGE64 differentials started off less pronounced than age 62 differentials, it may not be surprising that they are not significant in the NBS. The NBS coefficients on retiring at AGE62A to AGE64 are virtually unchanged under an alternative specification that includes more detailed educational and marital status dummy variables (see equation 5, Table 6). As in the CPS, interactions between age and retirement age, age and marital status, and age and education indicate that mortality differentials by retirement age, marital status, and education tend to shrink as individuals live longer and move further past entrance into the risk set (see Appendix Table 1).[10]

However, a surprising difference in estimates does emerge between the two samples. The 1973 CPS shows a statistically *significant* decrease in mortality risk between men retiring at AGE62A and men retiring at AGE62B at the 5 percent level, while the NBS shows no statistical difference between men retiring at AGE62A and those retiring at AGE62B.[11] The difference between men taking benefits at AGE62A and those taking benefits at AGE62B in the 1973 CPS lends some support to the argument that the age-62 retirement option provides a safety net for slippage in the Disability Insurance program. The lack of a difference in the NBS somewhat weakens this

[10] Specifically, a log likelihood test comparing equation 1, Appendix Table 1, and equation 2, Table 6, is significant at the 5 percent level, showing that the group of age interactions in the 1982 NBS is significant.
[11] Statistical significance is determined by performing contrast tests—that is, comparing AGE62A retirees to a reference variable of AGE62B retirees.

argument—although the structure of the NBS sample may differ so substantially from the CPS sample that a valid test of the argument is not possible.

Which Sample Is Closer to the Truth?

I conduct several experiments to attempt to explain the AGE62A puzzle. In Table 6, column 3, I restrict the CPS sample to birth cohorts 1908-1919 (all of the cohorts included in the NBS sample) and in table 6, column 4, I restrict the CPS sample to cohorts 1914–1919 (the majority of cohorts in the NBS sample). Under both restrictions, AGE62A is still significantly different from AGE62B. Despite the smaller sample size of the CPS (N=2,289) versus the sample size of the NBS (N=4,949), the CPS still exhibits a statistical difference between the two age-62 retirement levels that the NBS does not (see Table 7). Thus, an explanation for the difference is probably not the smaller sample size (N=4,949) of the NBS relative to the 1973 CPS full sample (N=9,970).

Next, I compare the 1 percent MBR to the 1973 CPS and the 1982 NBS (see Table 8). The advantage of the 1 percent MBR is that the sample size is large; the disadvantage is that the file does not have an education variable. That may be a serious shortcoming because there appears to be some correlation between retirement age and education. To conduct the most direct comparison, I limit my regressions on the CPS and NBS to the variables available in the MBR—current age, year of birth (CPS only), and retirement age. Those comparisons are most useful to assess the *pattern* of mortality risk by retirement age; the point estimates are inaccurate because a socioeconomic proxy is not being controlled for. (Comparing equation 1, Table 6 to equation 2, Table 8, one can see that the retirement-age coefficients are higher when education is not controlled for.)

Table 7.
AGE62A retirees versus AGE62B retirees

Sample	Number	Contrast	Odds ratio (standard error)	Confidence intervals
1973 CPS (equation 4, Table 6)	2,289	AGE62A vs. AGE62B	1.2239 (0.1250) *	1.002-1.4951
1982 NBS (equation 2, Table 6)	4,949	AGE62A vs. AGE62B	0.9691 (0.06)	0.85-1.1

SOURCE: Author's calculations on the 1973 CPS and 1982 NBS.

NOTE: * = standard error significant at the 5 percent level.

Table 8.
Parameter estimates (standard errors) for equations 1, 2, 3, 4, 5, 6, and 7

Variable	1. 2000 1 percent MBR birth cohorts 1908–1932	2.1973 CPS birth cohorts 1908–1932	3. 1982 NBS birth cohorts 1908–1919	4. 1973 CPS birth cohorts 1908–1919	5. 2000 1 percent MBR birth cohorts 1908–1919	6. 1973 CPS birth cohorts 1914–1919	7. 2000 1 percent MBR birth cohorts 1914–1919
N	174,418	9,970	4,949	4,468	77,969	2,289	40,217
Intercept	30.0564	23.7268	-10.338	21.3588	33.9617	22.4707	10.7653
	(1.3163) *	(6.7634) *	(0.2874) *	(11.5769) **	(2.5248) *	(34.2847)	(7.4171)
Age	0.0882	0.0906	0.0958	0.0903	0.0881	0.0864	0.0885
	(0.000645) *	(0.00333) *	(0.00362) *	(0.00347) *	(0.000688) *	(0.00639) *	(0.00119) *
Year of	-0.0208	-0.0176	n.a.	-0.0164	-0.0228	-0.0168	-0.0108
	(0.000676) *	(0.00347) *		(0.00602) *	(0.00131) *	(0.0178)	(0.00386) *
AGE62A	0.2981	0.399	0.2325	0.3902	0.2772	0.4568	0.3048
	(0.0102) *	(0.0479) *	(0.0571) *	(0.0545) *	(0.0121) *	(0.0889) *	(0.0192) *
AGE62B	0.2447	0.2569	0.2582	0.1951	0.2332	0.2558	0.2571
	(0.0137) *	(0.0643) *	(0.0709) *	(0.0746) *	(0.0162) *	(0.1177) *	(0.0252) *
AGE63	0.2111	0.1955	0.0952	0.176	0.1911	0.00671	0.02523
	(0.0134) *	(0.0632) *	(0.0719)	(0.0704) *	(0.0153) *	(0.1229)	(0.0255) *
AGE64	0.125	0.1426	0.0994	0.157	0.1224	0.1181	0.1358
	(0.0115) *	(0.0531) *	(0.0588) **	(0.0589) *	(0.0132) *	(0.098)	(0.0209) *
-2Log	653677.38	30520.878	24134.71	22133.624	439028.41	9582.448	200399

SOURCE: Author's calculations on the 1 percent 2000 MBR, 1973 CPS, and 1982 NBS.

NOTES: n.a. = not applicable.
* = standard error significant at the 5 percent level;
** = standard error significant at the 10 percent level.

Results indicate that the *pattern* of mortality risk by retirement age in the 1973 CPS is replicated in the MBR. In both files, mortality risk increases as retirement age decreases. However, results also indicate that the point estimate on AGE62A retirees in the CPS may be somewhat exaggerating mortality risk differences between AGE62A and AGE62B retirees. The CPS estimates show that for men retiring at AGE62A the log odds of dying increase by 0.399 relative to men retiring at AGE65; the comparable coefficient is 0.2981 in the MBR (see Table 8, columns 1 and 2).

Composition of the Retirement-Age Variable

In Waldron (2001), I argue that the composition of the “early” retirement-age variable matters. In a heterogeneous population of early retirees, combining age 62 retirees with age 63 and age 64 retirees mutes the higher mortality risk of age 62 retirees. Using contrast tests, I compare retiring at AGE62A to a reference variable of retiring at AGE62B, to a reference variable of retiring at AGE63, and to a reference variable of retiring at AGE64.[12] I also compare retiring at AGE62B to retiring at AGE63 and to retiring at AGE64. Finally, I compare retiring at AGE63 to retiring at AGE64 (see Table 9). In the MBR, all retirement-age dummy variables are significantly different from each other at the 5 percent level. Retiring at AGE62A increases the odds of dying by 5 percent relative to men retiring at AGE62B, by 9 percent relative to men retiring at AGE63, and by 19 percent relative to those retiring at AGE64. In addition, retiring at AGE62B increases the log-odds of dying by 4 percent relative to men retiring at AGE63

[12] Note that the contrast tests are conducted on the equations in Table 8, so that socioeconomic status is not controlled for. Odds ratios may be somewhat inflated because of the correlation between socioeconomic status and age of retirement.

Table 9.
Contrast test of retirement-age dummy variables

Contrast	Sample (birth cohort)	Odds ratio (standard error)	Confidence intervals
AGE62A vs. AGE62B	1973 CPS (1908-1932)	1.1527 (0.0671) *	1.03-1.29
	1% 2000 MBR (1908-1932)	1.0549 (0.013) *	1.03-1.08
	1982 NBS (1908-1919)	0.9745 (0.0602)	0.86-1.10
	1% 2000 MBR (1908-1919)	1.051 (0.0124) *	1.03-1.08
AGE62A vs. AGE63	1973 CPS (1908-1932)	1.2257 (0.0705) *	1.10-1.37
	1% 2000 MBR (1908-1932)	1.0909 (0.0133) *	1.07-1.12
	1982 NBS (1908-1919)	1.1472 (0.0732) *	1.01-1.30
	1% 2000 MBR (1908-1919)	1.0899 (0.0155) *	1.06-1.12
AGE62A vs. AGE64	1973 CPS (1908-1932)	1.2923 (0.0595) *	1.18-1.41
	1% 2000 MBR (1908-1932)	1.189 (0.0119) *	1.17-1.21
	1982 NBS (1908-1919)	1.1423 (0.0569) *	1.04-1.26
	1% 2000 MBR (1908-1919)	1.1674 (0.0139) *	1.14-1.19
AGE62B vs. AGE63	1973 CPS (1908-1932)	1.0633 (0.0763)	0.92-1.22
	1% 2000 MBR (1908-1932)	1.0341 (0.0157) *	1.004-1.07
	1982 NBS (1908-1919)	1.1771 (0.0901) *	1.01-1.37
	1% 2000 MBR (1908-1919)	1.0431 (0.0186) *	1.0072-1.08

Continued

Table 9.
Continued

Contrast	Sample (birth cohort)	Odds ratio (standard error)	Confidence intervals
AGE62B vs. AGE64	1973 CPS (1908-1932)	1.1211 (0.0707) **	0.99-1.27
	1% 2000 MBR (1908-1932)	1.1272 (0.0152) *	1.10-1.16
	1982 NBS (1908-1919)	1.1721 (0.0765) *	1.03-1.33
	1% 2000 MBR (1908-1919)	1.1172 (0.0179) *	1.08-1.15
AGE63 vs. AGE64	1973 CPS (1908-1932)	1.0543 (0.0655)	0.90-1.19
	1% 2000 MBR (1908-1932)	1.09 (0.0144) *	1.06-1.12
	1982 NBS (1908-1919)	0.9957 (0.0664)	0.87-1.13
	1% 2000 MBR (1908-1919)	1.071 (0.0163) *	1.04-1.10

SOURCE: Author's calculations on the 1973 CPS, the 1 percent 2000 MBR, and the 1982 NBS.

NOTES:
* = standard error significant at the 5 percent level;
** = standard error significant at the 10 percent level.
Contrast tests conducted on discrete-time logistic equations 1, 2, 3, and 5, Table 8.

and by 13 percent relative to men retiring at AGE64. Retiring at AGE63 increases the log-odds of dying by 9 percent relative to men retiring at AGE64. Although the NBS is not directly comparable to the other two data sets because of respondents' late entry into its risk set, note that retiring at AGE62A in the NBS increases the odds of dying by 15 percent relative to AGE63 and by 14 percent relative to AGE64.

Thus, all three data sets appear to confirm the sensitivity of early retirement analysis to different categories of retirement-age classification. Most egregious may be to include age 64 retirees and age 62 retirees in the same "early retirement" category for analysis, since there appears to be substantial differences between these two categories of retirees across data sets.

Potential Heterogeneity in the Reference Variable

It should be noted that Social Security's administrative rules may introduce a degree of heterogeneity into the AGE65 reference group. Prior to the 1977 Social Security Amendments, beneficiaries were required to file for OASDI (Old-Age, Survivors, and Disability Insurance) and HI (Hospital Insurance) benefits simultaneously to be able to begin receiving HI benefits at age 65, even if they had no intention of also claiming OASDI benefits at age 65 (Myers 1993). For this analysis, retired-worker beneficiaries in birth cohorts 1908 to 1912 would be subject to that rule. After the 1977 amendments, beneficiaries were not required to file simultaneously, but such filing behavior was still allowed. The result could be a mixing of two distinct behavior groups into one reference group, with the relative sizes possibly changing over time. My concern is that beneficiaries who in actuality are receiving only HI benefits are disproportionately healthier than AGE65 retired-worker beneficiaries and thus would exaggerate differences between early retirees and normal retirees. Future work with longitudinal earnings histories offers the best chance to identify the two groups, which will allow me to check the mortality estimates for sensitivity to heterogeneity in the reference group. Of course, it may be that the HI-only group is too small to have a statistical impact. However, in the meantime, I conduct a rough experiment on the MBR by comparing parameter estimates on age 62, age 63, and age 64 retirement-age variables when an aged 65 or older reference group is used and by comparing estimates on age 62, age 63, age 64, and age 65 retirement-age variables when an aged 66 or older reference group is used. Parameter estimates are hardly affected by a change in the reference variable (results not shown here).

Tests of Model Robustness

All estimates produced thus far have used a discrete-time logistic regression model. That type of model employs the simplifying assumption that events (deaths) occur at discrete times. I measure survival time in years, which results in a large number of ties in the data. Since this assumption is obviously not accurate, I re-estimate the 1973 CPS parameters using a complementary log-log model for continuous time. That type of model assumes an underlying Cox proportional hazards model and its coefficients have a relative risk interpretation (Allison 1995, pp. 216–217). To further test the data, I also re-estimate the model using person-months rather than person-years, so that survival time is measured in months, somewhat reducing the number of the ties in the data.

Results indicate that estimates reported in Waldron (2001) are robust to the discrete-time assumption (see Appendix Table 2). The continuous time assumption affects the parameter estimates and standard errors only slightly. The mortality risk patterns reported in Waldron (2001) are unchanged. Re-estimating the models using person-months also does not greatly alter results.

Conclusion

Estimates on the 1982 NBS indicate a generally negative correlation between age of retirement and mortality risk, controlling for current age, education, marital status in 1982, and race. Such results support the negative correlation between age of retirement and mortality risk found in the 1973 CPS. Estimates on a 1 percent extract of the 2000 MBR also support a negative correlation between age of retirement and mortality risk, controlling for current age and year of birth. The increase in mortality risk associated with retiring between exactly age 62 and age 62 and 2 months versus retiring at age 62 and 3 months to age 62 and 11 months found in the 1973 CPS is *not* replicated in the 1982 NBS. However, a difference in mortality risk between those two groups of retirees *is* found in a 1 percent extract of the 2000 MBR, although the magnitude of the difference is less than that found for the 1973 CPS. All three data sets show a significant and substantial difference in mortality risk between age 62 retirees and age 64 retirees, suggesting potential problems for early retirement statistics based on combined retirement-age categories.

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Appendix Table 1.
Parameter estimates (standard errors) using a discrete-time logit model, by age interactions (1982 NBS, birth cohorts 1908-1919)

Variable	1. 1982 NBS Full Sample birth cohorts 1908-1919	
N (unweighted)	**4,949**	
Intercept	-10.4212	
	(1.0882)	*
Age	0.0976	
	(0.0141)	*
Edu1	1.9473	
	(0.8992)	*
Edu2	2.112	
	(0.9079)	*
Married	0.0198	
	(0.696)	
African American	0.02	
	(0.068)	
AGE62A	1.4768	
	(0.811)	**
AGE62B	-0.6563	
	(1.0355)	
AGE63	-0.4247	
	(1.0427)	
AGE64	-1.2166	
	(0.8578)	
age*edu1	-0.0202	
	(0.0116)	**
age*edu2	-0.0251	
	(0.0117)	*
age*mar	0.0242	
	(0.00907)	*
age*AGE62A	-0.0175	
	(0.0106)	**
age*AGE62B	0.0116	
	(0.0136)	
age*AGE63	0.0065	
	(0.0136)	
age*AGE64	0.00504	
	(0.00993)	
-2Log likelihood	23994.061	

SOURCE: Author's calculations on the 1982 NBS.
NOTE:
* = standard error significant at the 5 percent level;
** = standard error significant at the 10 percent level.

Appendix Table 2.
Parameter estimates (standard errors) for alternative models using 1973 CPS, birth cohorts 1908-1932

	Person years		Person months	
Variable	Discrete-time logit model	Complimentary log-log model	Discrete-time logit model	Complimentary log-log model
N (unweighted)	**98,191**	**98,191**	**1,102,857**	**1,102,857**
Intercept	12.268	12.0018	17.632	17.5906
	(6.9) **	(6.7705) **	(6.7882) *	(6.7771) *
Age	0.0919	0.0892	0.0072	0.0072
	(0.00334) *	(0.0032) *	(0.000276) *	(0.0003) *
Year of Birth	-0.0117	-0.0114	-0.0129	-0.0128
	(0.00354) *	(0.0035) *	(0.00353) *	(0.0035) *
Edu1	0.3429	0.3345	0.3321	0.3313
	(0.0579) *	(0.0567) *	(0.0573) *	(0.0572) *
Edu2	0.1597	0.1567	0.1635	0.1632
	(0.058) *	(0.0568) *	(0.0574) *	(0.0573) *
Married	-0.2724	-0.2619	-0.2522	-0.2513
	(0.0503) *	(0.0487) *	(0.0493) *	(0.0492) *
African American	0.1665	0.1599	0.168	0.1674
	(0.0689) *	(0.667) *	(0.0674) *	(0.0672) *
AGE62A	0.3195	0.3096	0.2856	0.2848
	(0.0488) *	(0.0475) *	(0.0479) *	(0.0478) *
AGE62B	0.1922	0.1865	0.1709	0.1705
	-0.065 *	(0.0633) *	(0.0638) *	(0.0637) *
AGE63	0.1334	0.1302	0.1196	0.1194
	(0.0637) *	(0.0621) *	(0.0624) **	(0.0622) **
AGE64	0.0938	0.0915	0.0828	0.0826
	(0.0536) **	(0.0523) **	(0.0525) **	(0.0524) **
-2Log Likelihood	30431.736	30432.964	48026.672	48026.672

SOURCE: Author's calculations on the 1973 CPS.

NOTE:
* = standard error significant at the 5 percent level;
** = standard error significant at the 10 percent level.