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The Effects of Subjective Survival on Retirement and Social Security Claiming

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1. Introduction

This research examines the relationship between mortality risk and retirement, and mortality risk and the propensity to take early and reduced Social Security benefits. The main theory for understanding saving behavior is the life-cycle model (LCH). The LCH, however, can be extended to find the optimal retirement age, and can be used to make predictions about the desire to annuitize or equivalently, the desire to delay claiming Social Security benefits. According to the LCH, individuals who expect to be exceptionally long-lived will retire at a later age than individuals who expect to die early because they will need greater wealth to finance more years of retirement. According to almost any model of intertemporal maximization, those who expect to be long lived will see the increase in Social Security benefits that result from retiring at 65 rather than at 62 as being financially advantageous and will, therefore, delay application for benefits until the age of 65. In principle the decision to retire and the decision to take early and reduced benefits are related decisions but not necessarily the same decision. Therefore this study examines both decisions.

The relationship between mortality risk and retirement is important both from the scientific point of view and from the point of view of public policy. Data on mortality risk provide an opportunity to find if expectations of survival have effects that are independent from economic effects as would be predicted by the LCH. If we find that they do, the LCH can be used with greater confidence to integrate studies of asset accumulation and the choice of work effort including retirement. Furthermore, the results would be useful additions to models that forecast labor force participation by older workers: although such models may recognize that greater life expectancy will require that more resources be devoted to the retirement years, they do not incorporate any behavioral retirement response to the increase in life expectancy. Moreover, we can learn about unobserved tastes and perceptions by studying claiming behavior. The claiming of Social Security benefits is a similar decision as that involved in the purchase of annuities. Social Security claiming behavior provides important information about the desire to annuitize because we understand completely the Social Security rules and we know the population the rules apply to. In contrast, with private pensions we have limited information about who is eligible to annuitize, about the private market for annuities where pricing varies from firm to firm, and about the characteristics of the target population.

From the point of view of public policy, understanding the relationship between retirement and survival is important. First, we would like to know how well prepared for extended years of retirement are those with greater life expectancy. Second, the financial liability of the Social Security system depends on the detailed life expectancy of beneficiaries and on their choices in response to variation in life expectancy. For example, the reduction in Social Security benefits for retirement before age 65 is meant to be actuarially fair. However, different individuals when grouped by observable characteristics such as sex and marital status have differing life expectancies, and even holding constant observable characteristics, individuals have differing subjective survival probabilities. Those who expect to survive until extreme old age will not retire at age 62, and as a consequence they will receive higher benefits for many years. If subjective survival does influence retirement behavior and does predict actual mortality, the total Social Security payments to a cohort over its lifetime will be greater than the payments predicted from a single life table.

The LCH makes a number of predictions about the claiming of Social Security benefits before the age of 65. As has been pointed out by Coile, Diamond, Gruber and Jousten (1999), claiming of Social Security benefits after retirement is the same kind of decision as that involved in the purchase of annuities. Someone who retires at age 62 has the option of taking Social Security immediately or delaying claiming. If someone delays claiming for a year, financing consumption out of bequeathable wealth, his or her Social Security benefit will be increased by approximately eight percent by claiming at age 63. Thus, the delay involves the implicit marginal purchase of eight percent more in Social Security annuities by the expenditure of a year's Social Security benefits. The aim of the eight percent increase in benefit was to make the implicit purchase actuarially fair, and as the calculations in Coile, Diamond, Gruber and Jousten (1999) show, that is approximately the case for a single male based on population life tables and a real interest rate of three percent.

The fact that Social Security is approximately fair is not, however, the determinant of whether someone should "purchase" additional Social Security benefits by delaying claiming: rather it is whether expected lifetime utility is increased. A simple life-cycle model makes these predictions about the desire to annuitize or equivalently the desire to delay claiming. An increase in subjective survival should lead to a delay. An increase in bequeathable wealth should also lead to a delay because high wealth individuals are less likely to experience a liquidity constraint in the future. An increase in the rate of return on alternative investments should lead to early claiming in that part of the cost of a delay is the foregone investment income. High levels of baseline annuitization such as high levels of pensions should lead to early claiming because of the substitution between various forms of annuities. Extended discussion of these effects can be found in Hurd (2000).

Based on a life-cycle model Coile, Diamond, Gruber and Jousten (1999) find that for representative single men, there is a gain from delaying claiming, and the gain varies with bequeathable wealth. Based on data from a 1982 survey, Coile, Diamond, Gruber and Jousten (1999) find, however, that very few delay claiming. Among those who retired before the age of 62, 81% claim within the first month of reaching age 62, and 91% within the first year. Only three percent delay claiming Social Security benefits until the age at which the implicit price is no longer actuarially fair; age 65. The authors conclude that "...part of the population simply claims immediately without sufficient consideration of intertemporal choice issues." An alternative point of view, which is plausible due to the importance of tastes and perceptions, is that because of observable characteristics, and unobservable tastes and subjective beliefs it is not optimal for most retirees to delay.

This paper uses data from survey waves one through four of the Health and Retirement Study (HRS). The appropriate survival expectation in an individual's retirement choice or of the choice of applying for Social Security benefits is that person's subjective evaluation of his or her life expectancy (more precisely the subjective survival curve). In the HRS, respondents were asked to give their chances of surviving to target ages of 75 and 85. The data on subjective survival probabilities in the HRS have been the objects of considerable study. These variables have been shown to be good approximations to population probabilities, to be internally consistent and to co-vary with other variables in the same way as in other data (Hurd and McGarry, 1995; Hurd and McGarry, forthcoming). The subjective survival probabilities predict actual mortality, thus we use them rather than observations on life expectancy itself. We first relate the propensity to retire to the subjective survival probabilities. Do those who expect to be exceptionally long-lived retire later? Next, we relate the tendency to take early Social Security benefits to the subjective survival probabilities. Do those with reduced subjective life expectancy see the increase in benefits from delaying retirement past age 62 as too small, inducing them to take benefits early?

Estimating the effect of life expectancy on retirement or Social Security claiming behavior is complicated by the correlation between economic status and mortality. It is well known those with more wealth or income tend to live longer, but because income and wealth should have independent effects on retirement, it has been very difficult to separate their direct economic effects from their correlations with mortality risk. Using a reduced form probit equation, we model the probability of retirement as a function of subjective survival probabilities, eligibility for pensions, age, wealth and wage rates as well as a number of other individual characteristics that are known to predict retirement such as health status. We examine whether the subjective survival probabilities have explanatory power for retirement after we have controlled for indicators of socio-economic status. To model the decision to take early and reduced Social Security benefits, we specify a statistical model that accommodates a sequential decision. That is, we first study retirement and then, conditional on retirement, the application for Social Security benefits. Thus, among those retired we estimate the probability of taking early and reduced Social Security benefits as a function of wealth, income, personal characteristics, health and subjective survival probabilities.

2. Data

The Health and Retirement Study (HRS) is a biennial panel with emphasis on retirement behavior and how it is affected by health status, economic status and work incentives. At baseline in 1992 the HRS had 12,652 respondents and was nationally representative of individuals born in 1931-1941 and their spouses except for over-samples of blacks, Hispanics and Floridians (Juster and Suzman, 1995). This paper uses data from survey waves one through four fielded respectively in 1992, 1994, 1996 and 1998.

The HRS contains several innovative questions about the chance of future events such as working to age 62 and living to age 75. The data on subjective survival probabilities in the HRS have been the objects of considerable work, which has aimed to establish that in cross-section the responses are reasonable and in panel that they predict actual mortality. Both aims have been established: In the HRS the subjective survival probabilities aggregate to be very close to life table survival probabilities, and they vary appropriately with known risk factors (Hurd and McGarry, 1995). For example, smokers have lower subjective survival probabilities than nonsmokers; the more educated and more wealthy have higher subjective survival probabilities; and those whose parents have survived to advanced old age give higher probabilities. Between waves 1 and 2 of HRS, those who reported lower chances of survival did, indeed, die at a greater rate than those who reported higher chances (Hurd and McGarry, forthcoming). Thus the subjective survival probabilities predict actual mortality.

The stacked data are restricted to those who are age eligible (cohorts of 1931-1941 inclusive) for a total of 35,225 observations. The first part of the analysis examines individuals who leave the labor force between waves. To be included in the sample, individuals must have non-missing data on their labor force status in sequential waves. We define individuals in the labor force as those respondents who report working full-time or part-time or are unemployed. Respondents who are not in the labor force in the following wave are those who are retired, partially retired, disabled or not in the labor force.[1] This selection reduces the sample to 14969. Although the response rate to the primary variables of interest, the probability of living to age 75 (P75) and the probability of living to age 85 (P85), is high, individuals 66 years old and older were not queried thus the sample reduces to 12504 observations for the analysis using P75 and 12426 observations for P85. Our analyses are of retirement hazards: conditional on labor force participation at wave t, what is the probability of not being the labor force in wave t+1, where t and t+1 are waves 1 and 2, 2 and 3 or 3 and 4.

The second part of the analysis examines individuals who claim Social Security benefits shortly after turning age 62. We select individuals who are 62.3 to 63.5 years old at the end of the interview in wave 2, 3, or 4, who are not in the labor force and who are not recipients of Social Security benefits prior to age 62. We define those that take-up Social Security benefits at age 62 as those who claim between the ages of 62 and 62.2 and excluding new claiming of DI. We define individuals as not having taken up Social Security benefits at age 62 to be individuals age 62.3 to 63.5 who claim at the age of 62.3 or older. We do not include individuals in the sample who, over the four waves of data, have not yet claimed Social Security benefits because in that group we are unable to distinguish those who are eligible for benefits but have not yet claimed from those who are not eligible.[2] Again, the samples for the analysis of P75 and P85 differ slightly due to item non-response. The sample for the analysis of the effect of P75 on Social Security take-up is based on 902 observations, and for the effect of P85, is based on 898 observations.

3. Results

Subjective survival probabilities have been elicited from respondents in all waves of the HRS. Those less than 66 years old were asked about their chances of surviving to the target ages of 75 and then of 85. In cross-section the subjective survival probabilities aggregate well to life table levels as shown in Table 1. For example, a weighted average of all age-eligible responses to the target of 75 was 0.645 and a life table survival was 0.677. Thus if individuals survive with the probabilities that they state the average survival in the population will be very close to what the life table predicts. The cross-section variation accords with known risk factors: for example smokers give lower probabilities and those with higher SES give higher probabilities.

In panel the subjective probabilities predict actual mortality. Table 2 shows that between waves 1 and 2, 183 HRS respondents died and they had given an average subjective survival

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[1] The labor force status variables are based on several questions in the HRS including job status, whether the respondent is working for pay, considers himself retired, is looking for work, the number of hours working per week and per year, and information on any second jobs.

[2] In future work we will request the use of restricted Social Security data that will allow us to make this distinction.

probability to age 75 in wave 1 of 0.45. Among the survivors the average survival probability was 0.65. The predictive power of the subjective survival probability remains after controlling for a number of other risk factors (Hurd and McGarry, forthcoming).

3.1 Subjective survival and retirement

We first show that subjective survival, as measured by either the subjective survival probability to age 75, which we will call P75, or the subjective survival probability to age 85, which we will call P85 (both scaled by 100), predict retirement. Note that we will call the departure from the labor force "retirement" even though we know that some retirees may re-enter the labor force. The sample is selected to be those working at wave t, where t may be one of HRS waves 1, 2 or 3, and our outcome is whether that person has left the labor force when we observe him or her at wave t+1, where t+1 is one of waves 2, 3 or 4.

Table 3 shows the retirement rate as a function of age. We classify age of the respondent as age at t+1 because we want to relate the age at which we observe the labor force outcome to the availability of pension income or Social Security benefits. The retirement rates follow well-know patterns: men have slightly lower retirement rates than women. There is a large increase in the rate at age 62. Note that with our age classification that increase is also found at 63 because a 63 year-old individual would have last been observed at age 61 and will have passed through the age of 62 between the waves. Thus any effect of Social Security is spread over the ages of 62 and 63. There is also a high level at age 65 most likely due to the delayed retirement credit and the availability of Medicare.

Table 4 shows the relationship between P75 and retirement. We have aggregated P75 into five categories: zero, 1-49, 50, 51-99 and 100 so that we can study nonlinear effects.
The table shows that among those age 53-56 the retirement rate varied in a statistically significant way with the subjective survival probability, but that the important variation was between those with a zero probability and those with a positive probability. We also note that relatively few report a subjective survival probability of zero, just 4.7% of the sample. Among those 57-61 the results are similar, although the retirement probability is somewhat elevated for those with a subjective survival probability of 1-49. At age 62 or over the relationship between subjective survival probability and retirement is monotonic, but elevated retirement is mostly confined to those with survival probabilities less than 50. In terms of relative risk, which we define to be the retirement rate of a group exposed to some risk such as having an elevated level of P75 divided by the average retirement rate, the effects of P75 are greatest in the youngest age group and smallest in the oldest.

Because of the different effects of P75 on relative risk and because of the likely differing effects of pension eligibility, we estimate probit retirement models separately over those aged 53-61 at wave t+1 and over those aged 62 or older. We allow for non-linearities and interactions between non-labor income at wave t+1 and wealth at wave t+1 by defining three income and three wealth categories and their interactions. The categories are low (lowest quartile), medium (second and third quartiles) and high (highest quartile). In prior work we have found that pensions, particularly DB pensions, act to reduce retirement when a worker is not yet eligible for benefits and act to accelerate retirement when workers become eligible. Thus we define variables to indicate that a worker has a DB plan, that a worker is already eligible for benefits at wave t, that a worker becomes eligible between waves t and t+1, or that worker is not yet eligible at wave t+1. These variables are further defined over full or reduced benefits. In a similar way we define indicator variables for DC plans. We measure health at wave t+1 in two ways: whether a worker has a health condition that limits the type or amount of work that he or she can do; and a self-reported five-point scale from excellent to poor. Based on prior research we redefine the five-point scale to be a three point scale by combining excellent and very good, and fair and poor.

Table 5 has the estimated effects on retirement as derived from probit estimation.3 For example, in the younger age group a subjective survival probability of zero results in retirement probabilities that are about 0.039 higher than when the subjective survival probability is 50. Reference to Table 4 shows that in simple cross-tabulations the difference is about 0.105, so that the covariates in the probit have reduced the raw difference substantially. In terms of relative risk, having a subjective survival probability of zero increases relative risk of retirement of about 29%. Even though the estimated coefficient on P75=0 is significant and as a group the P75 categorical variables are significant (p-value = 0.014, not shown), the overall effects of P75 are not large and the pattern is not monotonic. Over the older group the effects of P75 are more consistent: The effect of P75=0 is larger both in absolute value and in relative risk (33%) and, although not significant, the coefficient on P75 = (1-49) indicates elevated retirement probabilities.

For clarity the wealth and income interactions are in Table 6. Greater wealth is associated with higher retirement rates, especially at low income levels. The difference in retirement rates between low wealth and high wealth is 0.09, which is an increase in relative risk of 69%. Among the older group wealth is associated with retirement only among those in the lowest income category, and income is a very strong predictor of retirement.

In Table 5, the wage rate is marginally statistically significant but not economically important, at least compared with other predictors. For example, a doubling of the average wage rate (from $16 to $32) would reduce the retirement rate by 0.02. DB pension availability has the expected effects on retirement. When a worker has a DB plan but is not yet eligible the retirement hazard is reduced by 0.053 relative to a worker who does not have a DB plan. However, if the worker was already eligible for full benefits the retirement hazard is increased by 0.144, so that the retirement rate of such a worker would be 0.091 (0.144-0.053) higher than a worker lacking a DB plan.4 These are large effects relative to an average retirement rate of 0.134. Should a worker become eligible between the waves the retirement is increased by 0.166. Eligibility for reduced benefits has similar but smaller effects. In the older age group the pattern of effects of pension eligibility is about the same as that for the younger age group. Although the absolute magnitudes are large, in terms of relative risk, the magnitudes are similar. Eligibility for DC pensions increases the retirement rate but by much less than DB pensions.

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[3]The average values of the right-hand variables are shown in Appendix Table 1.

[4]The categorical variables on full and reduced DB benefits are mutually exclusive, so that the effect on a worker who is eligible for both full and reduced benefits is found from the coefficient on full benefits only.

This is to be expected because DC plans typically lack the strong incentives of many DB plans.

The health indicators, particularly among the younger age group, have large effects. For example the relative risk of retirement is increased by 138% when a worker has a health condition that limits work. Self-assessed health as fair or poor increases retirement among the younger age group by 0.056 but has relatively little effect in the older age group. It may be that the financial incentives are such that workers of all health status leave the labor force at these older ages leaving just a small role for health.

Our overall conclusion about the effects of the subjective survival probability on retirement is that workers with a very low survival probability do leave the labor force earlier than those with moderate or high survival probabilities. Although the effects in the older age group are more consistent, the effects among the younger group accumulate over a number of years to produce substantial effects.

To illustrate the cumulative effects, Table 7 shows some simulated labor force participation rates based on the probit estimates. The simulations are for a group of workers aged 52. Those with P75 = 50 are simulated out based on the average population retirement hazards. Those with other values of P75 are simulated out based on altered retirement hazards according to the estimated probit effects. The results for those aged 53-61 are used to age 62 and the results for those aged 62 or over are used for older ages.

About 54.6% of workers who have an unchanging subjective survival probability of 50 would remain in the labor force to age 62 whereas just 44.4% of workers reporting P75 = 0 would remain at age 62. Stated differently the relative risk of retirement by age 62 is 22% higher among those with P75 = 0 compared with those with P75 = 50. About 18.6% of workers who have an unchanging subjective survival probability of 50 would remain in the labor force to age 67. This survival rate is about the same for other levels of P75 with the exception of those with P75=0. Among that group the rate would be 0.099. Of course the correlation between retirement and actual survival would be greater than what we have discussed because of the correlations between our health indicators and survival. Thus workers with a health condition that limits work have reduced survival chances and leave the labor force at elevated rates.

3.2 Subjective Survival and Claiming of Social Security benefits

The second part of the analysis examines individuals who claim Social Security benefits shortly after turning age 62. Recall that for this part of the analysis, we select individuals who are 62.3 to 63.5 years old at the end of the interview in wave 2, 3, or 4 (time t+1), who are not in the labor force and who are not recipients of Social Security benefits prior to age 62. We define those that take-up Social Security benefits at age 62 as those who claim between the ages of 62 and 62.2 and excluding new claiming of DI. We first show that subjective survival predicts the claiming of early and reduced Social Security benefits.

Table 8 shows the relationship between P85 and Social Security early claiming rates. We classify individuals by wealth quartile to hold constant the level of resources.5 High wealth individuals should have a lower probability of early claiming because high wealth individuals are less likely to experience a liquidity constraint in the future. In contrast to the retirement results, the important variation here is between those with absolute certainty (P85=100) and those with P85=99 or less overall and at each wealth quartile. Lower claiming rates are primarily confined to those with a subjective survival of 100. For example, among all individuals with P85=100, the claiming rates is 0.595 compared with 0.731 for individuals with P85=0. We note that respondents in the highest wealth quartile overall have a lower claiming rate than respondents in any of the other three wealth quartiles.

Table 9 has the estimated effects on early and reduced Social Security claiming as derived from a probit estimation. We allow for non-linearities and interactions between total household income and wealth by again defining three income and three wealth categories and their interactions. Similar to the retirement regressions, we include health status at t+1. We also include an indicator for whether the individual owns stock, and whether the individual was in the labor force in the previous wave. The results from the probit estimation reinforce what we saw in the cross tabulations. Considering P75 first, a subjective survival of 100 (P75=100) results in claiming probabilities that are 0.12 lower than when the subjective survival probability is 0.50. The results for P85=100 are similar and result in claiming probabilities that are 0.16 percentage points lower. Reference to the cross tabulations where the difference is 0.179, shows that the covariates have reduced the raw difference only slightly. In terms of relative risk, P85=100 reduces the relative of risk of claiming early and reduced Social Security benefits by 22%. Although the effects of P75=100 and P85=100 on claiming are significantly different from zero, as a group, however, the overall effects of P75 and P85 are not significant.

The effects of income and wealth on the probability of claiming early and reduced Social Security benefits are generally small and not significantly different from zero. The income and wealth interactions for the regressions with P75 are also shown in Table 10 for clarity. At low wealth levels, the difference between low and high income levels is 0.043 which is a decrease in relative risk of 6%. At high wealth levels, the difference between low and high income levels is 0.055 which is a decrease in relative risk of 8%. The largest effect is the difference between low and high income at medium wealth levels. The difference is 0.11 percentage points which is a decrease in relative risk of 15%.

The indicator for whether an individual was in the labor force at time t has a large and statistically different from zero effect on claiming in both the P75 and P85 regressions. In the P75 regression, shown in the first column of Table 9, individuals who were not in the labor force at time t were 0.175 percentage points or 24% more likely to claim early Social Security benefits than those who were in the labor force at time t. The results for the regression with P85, shown in the third column are similar to those reported for the P75 regression.

Our overall conclusion about the effects of subjective survival on the probability a retired

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[5]Here and in most of the results we will base our discussion on the results that use P85 because of a lack of data dispersion in P75: there are just two observations with P75 = 0 and in the highest wealth quartile.

individual takes early and reduced Social Security benefits is that retired workers with a high survival probability are less likely to claim benefits early than those with moderate or low survival probabilities. Interestingly, it was workers with a very low survival probability that left the labor force earlier than those with moderate or high survival probabilities.

We can combine the effects of the subjective survival probabilities on retirement with their effects on claiming by conducting a simulation exercise. To do this we consider a population of workers at age 52 as in the simulation reported in Table 7. Here we will just consider the case where some have subjective survival probability of zero, some of 50 and some of 100. We simulate out their retirement rates to age 62, and then simulate their claiming rates based on the claiming probits as reported in Table 9. The results of these simulations are in Table 11. Just as in Table 7 the participation rates at age 62 are 0.444, 0.546 and 0.510, with the implied retirement rates of 0.556, 0.454 and 0.490. Conditional on these retirement rates the early claiming rates are 0.731 for those with a subjective survival rate of 50 (the population claiming rate), 0.720 for those with a subjective survival probability of and 0.569 for those with a subjective survival probability of 100. The overall effects are shown in the last column of the table. Thus we predict that in a population of 52 year-old workers who have a subjective survival probability of zero, about 40% will be in receipt of Social Security benefits within a few month of turning 62; among those with a subjective survival probability of 50, about 33% will be in receipt of Social Security benefits shortly after turning 62 and among those with subjective survival probability of 100 about 28% will be in receipt.

We view this variation in the receipt of Social Security benefits to be relatively large, especially in view of the fact that the estimations control for a large number of socio-economic variables that are themselves correlated with mortality, and which are also predictive of retirement. For example, health limitations on work and self-assessed health both predict retirement and such health variables are predicative of mortality. On claiming, however, the results are less consistent: For example, although not statistically significant, the more highly educated who tend to have greater-than-average life expectancy are less likely to claim. However, those in fair or poor health are also less likely to claim and they have lower-than-average life expectancy.

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Table 1
Average probabilities of surviving to 75 or 85

	All		Women		Men	
	Age 75	Age 85	Age 75	Age 85	Age 75	Age 85
HRS subjective probability*	0.645 (0.003)	0.427 (0.003)	0.663 (0.004)	0.460 (0.004)	0.622 (0.005)	0.388 (0.005)
1990 life table, wave 1 weights	0.677	0.349	0.746	0.438	0.594	0.242

* Weighted average of responses of individuals from birth years of 1931 through 1941; estimated standard errors in parentheses. 9149 observations in wave 1.
Source: Hurd and McGarry, forthcoming

Table 2
Means of subjective survival probabilities by survivorship to wave 2

	Died between waves	Lived to wave 2
Subjective survival to age 75	0.45	0.65
Subjective survival to age 85	0.28	0.43
Number of observations	*183*	*10642*

Sample is individuals 46 to 65 in wave 1.
Source: Hurd and McGarry, forthcoming

Table 3. Retirement rates

	Males			Females		
age at t+1	observations	retirement rate	standard error	observations	retirement rate	standard error
52	127	0.07	0.02	144	0.10	0.03
53	363	0.07	0.01	297	0.09	0.02
54	459	0.09	0.01	446	0.12	0.02
55	671	0.11	0.01	592	0.15	0.01
56	709	0.11	0.01	716	0.16	0.01
57	867	0.12	0.01	788	0.12	0.01
58	780	0.10	0.01	694	0.15	0.01
59	806	0.14	0.01	734	0.18	0.01
60	739	0.17	0.01	623	0.20	0.02
61	687	0.19	0.02	632	0.23	0.02
62	646	0.36	0.02	516	0.38	0.02
63	472	0.39	0.02	412	0.44	0.02
64	274	0.36	0.03	219	0.42	0.03
65	174	0.45	0.04	168	0.57	0.04
66	94	0.38	0.05	66	0.56	0.06
67	31	0.35	0.09	23	0.35	0.10

Table 4
Average retirement rates and subjective survival

Survival to 75	Number of observations	Rate	Standard error
	Age 53-56 at wave t+1		
0	190	0.211	0.030
1-49	415	0.101	0.015
50	1042	0.104	0.009
51-99	1629	0.117	0.008
100	806	0.110	0.011
All	4082	0.115	0.005
	Age 57-61 at wave t+1		
0	266	0.256	0.027
1-49	624	0.181	0.015
50	1715	0.155	0.009
51-99	2432	0.156	0.007
100	1412	0.149	0.009
All	6449	0.161	0.005
	Age 62 or over at wave t+1		
0	79	0.519	0.057
1-49	223	0.489	0.034
50	628	0.404	0.020
51-99	909	0.381	0.016
100	602	0.387	0.020
All	2441	0.403	0.010

Note: Based on panel observations from waves 1 to 2, 2 to 3 and 3 to 4. Wave t+1 refers to one of waves 2, 3 or 4. Averages by survival category significantly different at p-values of less than 0.01

Table 5. Determinants of the probability of leaving the labor force: effects from probit estimation

	Age at wave t+1			
	Age 53-61 average = 0.134, n=10163		Age 62+ average = 0.393, n=2341	
	effect	p-value	effect	p-value
Subjective survival				
0	0.039	0.009	0.130	0.044
1-49	-0.012	0.315	0.048	0.234
50	–	–	–	–
51-99	0.014	0.089	-0.023	0.385
100	0.013	0.158	-0.003	0.910
Wealth and income				
Low and low	-0.090	0.000	-0.281	0.000
Low and medium	0.016	0.125	0.026	0.474
Low and high	-0.004	0.855	0.071	0.363
Medium and low	-0.052	0.000	-0.287	0.000
Medium and medium	–	–	–	–
Medium and high	0.033	0.003	0.021	0.542
High and low	-0.003	0.911	-0.164	0.075
High and medium	0.040	0.000	-0.038	0.294
High and high	0.050	0.000	0.071	0.030
wage rate	-0.000	0.807	-0.001	0.064
wage rate missing	0.030	0.002	0.010	0.769
No pension	–	–	–	–
DB pension	-0.053	0.000	-0.126	0.048
Full benefits: not eligible	–	–	–	–
already eligible	0.144	0.000	0.285	0.000
Newly eligible	0.166	0.000	0.338	0.000
Reduced benefits: not eligible	–	–	–	–
Already eligible	0.076	0.000	0.195	0.012
Newly eligible	0.085	0.000	0.267	0.001
Eligibility missing	0.038	0.023	0.227	0.003
DC pension	-0.054	0.000	0.024	0.569
not eligible	–	–	–	–
already eligible	0.026	0.262	0.028	0.623
Newly eligible	0.046	0.086	-0.102	0.170
Eligibility missing	0.050	0.005	0.012	0.831
Plan type missing	0.007	0.831	0.154	0.227
single	–	–	–	–
married	-0.005	0.508	0.058	0.028
female	–	–	–	–
male	-0.038	0.000	-0.056	0.012
Health limits work	0.178	0.000	0.260	0.000
health poor or fair	0.056	0.000	0.038	0.261
health good	–	–	–	–
health very good or excellent	0.005	0.529	-0.009	0.717
age 53-56 at wave t+1	–	–		
age 57-61 at wave t+1	0.027	0.000		
constant	-0.257	0.000	-0.168	0.000

Note: t refers to one of waves 1, 2 or 3; t+1 refers to one of waves 2, 3 or 4. low is the lowest quartile; medium is the second or third quartile; high is the top quartile

Table 6
Wealth and income effects on retirement

	Wealth					
	Age 53-61 at wave t+1			Age 62+ at wave t+1		
Income	low	medium	high	low	medium	high
low	-0.090	-0.052	-0.003	-0.281	-0.287	-0.164
medium	0.016	--	0.040	0.026	--	-0.038
high	-0.004	0.033	0.050	0.071	0.021	0.071

Note: low is the lowest quartile; medium is the second or third quartile; high is the top quartile

Table 7
Simulated labor force participation rates

	Subjective survival				
Age	0	1-49	50	51-99	100
52	1.000	1.000	1.000	1.000	1.000
53	0.946	0.971	0.965	0.958	0.959
54	0.894	0.943	0.931	0.918	0.919
55	0.837	0.906	0.889	0.871	0.871
56	0.775	0.862	0.840	0.817	0.818
57	0.717	0.820	0.794	0.766	0.768
58	0.660	0.775	0.747	0.715	0.716
59	0.614	0.741	0.709	0.675	0.676
60	0.559	0.694	0.660	0.623	0.624
61	0.501	0.639	0.603	0.566	0.567
62	0.444	0.582	0.546	0.508	0.510
63	0.335	0.463	0.448	0.423	0.419
64	0.248	0.362	0.361	0.345	0.338
65	0.187	0.288	0.296	0.287	0.278
66	0.133	0.216	0.229	0.226	0.216
67	0.099	0.170	0.186	0.186	0.175

Table 8
Average Social Security claiming rates and subjective survival

Survival to 85	Number of observations	Rate	Standard error
	Lowest wealth quartile		
0	42	0.619	0.076
1-49	59	0.847	0.047
50	46	0.783	0.061
51-99	37	0.811	0.065
100	23	0.565	0.106
All	207	0.749	0.030
	Second wealth quartile		
0	32	0.844	0.065
1-49	90	0.778	0.044
50	46	0.804	0.059
51-99	38	0.711	0.075
100	23	0.652	0.102
All	229	0.769	0.028
	Third wealth quartile		
0	28	0.750	0.083
1-49	88	0.773	0.045
50	56	0.768	0.057
51-99	44	0.682	0.071
100	14	0.714	0.125
All	230	0.748	0.029
	Highest wealth quartile		
0	17	0.765	0.106
1-49	77	0.649	0.055
50	42	0.738	0.069
51-99	72	0.653	0.057
100	24	0.500	0.104
All	232	0.659	0.031
	All		
0	119	0.731	0.041
1-49	314	0.758	0.024
50	190	0.774	0.030
51-99	191	0.702	0.033
100	84	0.595	0.054
All	898	0.731	0.015

Table 9. Determinants of the probability of Social Security claiming: effects from probit estimation

	Target age for subjective survival			
	75		85	
	effect	p-value	effect	p-value
Subjective survival				
0	-0.058	0.486	-0.011	0.840
1-49	-0.022	0.704	0.005	0.905
50	--	--	--	--
51-99	-0.018	0.654	-0.053	0.258
100	-0.119	0.005	-0.162	0.004
Wealth and income				
Low and low	-0.019	0.749	-0.027	0.642
Low and medium	0.029	0.599	0.025	0.641
Low and high	-0.062	0.679	-0.038	0.798
Medium and low	0.024	0.683	0.027	0.644
Medium and medium	--	--	--	--
Medium and high	-0.083	0.095	-0.075	0.131
High and low	0.029	0.791	0.018	0.875
High and medium	0.050	0.391	0.041	0.482
High and high	-0.026	0.615	-0.005	0.921
Stock owner wave t	0.022	0.519	0.014	0.697
Not in labor force wave t	0.175	0.000	0.184	0.000
Education				
Less than high school	0.039	0.326	0.037	0.357
High school	--	--	--	--
Some college	-0.006	0.892	-0.006	0.885
College	-0.054	0.234	-0.051	0.258
Female	--	--	--	--
Male	0.027	0.393	0.032	0.319
Single	--	--	--	--
Married	-0.029	0.491	-0.042	0.329
Fair or poor health	-0.073	0.114	-0.068	0.140
Good health	--	--	--	--
Very good or excellent health	0.025	0.477	0.030	0.399
Wave 2 at t+1	-0.065	0.069	-0.057	0.106
Wave 3 at t+1	--	--	--	--
Wave 4 at t+1	0.041	0.298	0.049	0.215
Constant	0.168	0.010	0.153	0.021
Number of observations	902		898	
Average probability	0.731		0.731	

Note: Sample between the ages of 62.3 and 63.5. Social Security claimed if benefits received between ages the ages of 62 and 62.3

Table 10
Wealth and income effects on Social Security claiming behavior

Income	Wealth: Low	Wealth: Medium	Wealth: High
Low	-0.019	0.024	0.029
Med	0.029	0.000	0.050
High	-0.062	-0.083	-0.026

Table 11
Estimated effects of subjective survival on Social Security receipt at age 62.3

Subjective survival	labor force participation at age 52	labor force participation at age 62	rate of Social Security receipt
0	1.000	0.444	0.400
50	1.000	0.546	0.332
100	1.000	0.510	0.279

Appendix Table 1
Average values of right-hand variables: probit estimation of retirement

	Age at wave t+1	
	Age 53-61 (N=10163)	Age 62+ (N=2341)
Subjective survival		
0	0.043	0.031
1-49	0.097	0.092
51-99	0.388	0.373
100	0.210	0.247
Wealth and income		
Low and low	0.114	0.068
Low and medium	0.109	0.120
Low and high	0.018	0.018
Medium and low	0.133	0.069
Medium and high	0.093	0.122
High and low	0.020	0.015
High and medium	0.104	0.116
High and high	0.127	0.168
wage rate	16.345	18.818
wage rate missing	0.101	0.119
DB pension	0.379	0.341
Full benefits: not eligible		
already eligible	0.050	0.094
Newly eligible	0.029	0.078
Reduced benefits: not eligible		
Already eligible	0.058	0.047
Newly eligible	0.024	0.033
Eligibility missing	0.048	0.054
DC pension	0.209	0.219
not eligible		
already eligible	0.025	0.061
Newly eligible	0.015	0.030
Eligibility missing	0.044	0.054
Plan type missing	0.009	0.008
married	0.734	0.731
male	0.499	0.528
Health limits work	0.127	0.145
health poor or fair	0.145	0.164
health very good or excellent	0.559	0.508
age 57-61 at wave t+1	0.612	
constant	1.000	1.000

Note: t refers to one of waves 1, 2 or 3; t+1 refers to one of waves 2, 3 or 4. Low is the lowest quartile; medium is the second or third quartile; high is the top quartile.

Appendix Table 2
Average values of right-hand variables: probit estimation of the probability of claiming Social Security.

	Target age for subjective survival	
	75	85
Subjective survival		
0	0.038	0.133
1-49	0.095	0.350
50	--	--
51-99	0.370	0.213
100	0.227	0.094
Wealth and income		
Low and low	0.112	0.111
Low and medium	0.109	0.109
Low and high	0.010	0.010
Medium and low	0.096	0.097
Medium and medium	--	--
Medium and high	0.119	0.119
High and low	0.023	0.022
High and medium	0.106	0.107
High and high	0.131	0.129
Stock owner wave t	0.421	0.422
Not in labor force wave t	0.585	0.585
Education		
Less than high school	0.271	0.272
High school	--	--
Some college	0.178	0.178
College	0.173	0.173
Female		
Male	0.427	0.427
Single	--	--
Married	0.822	0.823
Fair or poor health	0.183	0.182
Good health	--	--
Very good or excellent health	0.518	0.518
Wave 2 at t+1	0.373	0.373
Wave 3 at t+1	--	--
Wave 4 at t+1	0.286	0.285
Constant	1.000	1.000