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CENTER *for* RETIREMENT RESEARCH at BOSTON COLLEGE

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Abstract

Using *Health and Retirement Study* (HRS) data, this paper examines how changes in individual workers' past and present pension coverage, retirement incentives in Social Security, and retiree health insurance have contributed to retirement decisions for the 1931-1953 birth cohorts. It then uses these findings to project retirement behavior for the 1955-1987 cohorts in the *Survey of Income and Program Participation* (SIPP). A key assumption is that younger cohorts will have no defined benefit (DB) pensions or retiree health coverage in their future jobs. A key limitation is the assumption of a stable relationship in each successive cohort between each factor and labor market decisions.

The paper found that:

- The decrease in DB pension coverage from previous jobs and the decline in retiree health coverage between the HRS and SIPP cohorts each push the retirement age up by approximately one year, all else equal.
- The one-year increase in Social Security's Full Retirement Age is associated with a 0.3-year increase in the retirement age, all else equal.
- After accounting for other differences between the HRS and SIPP cohorts, the average retirement age is projected to rise by one year over the next three decades, from age 61.8 to 62.8.

The policy implications of the findings are:

- We anticipate that changes in pensions, retiree health benefits, and Social Security that are already in motion will continue to increase, albeit slightly, the average retirement age.
- Nonetheless, policies aimed at extending retirement ages may still be necessary, given that a one-year retirement age increase is likely to be insufficient to permit future cohorts to achieve a sufficient standard of living.

Introduction

As recently as the mid-1990s, the average American man retired by age 62 and the average woman retired by age 59. By 2010, the average retirement ages had increased to 64 and 62 for men and women, respectively.[1] Munnell (2011) cites several factors behind this increase: Social Security reforms, the shift from defined benefit (DB) to defined contribution (DC) plans, declines in retiree health insurance (RHI), less physically demanding work, and a better-educated, healthier, and longer-lived workforce. Although the shift in pension coverage appears to be largely complete – few workers have DB coverage in their current job – its effect on the retirement age may not be. The reason is that a significant number of current older workers started their careers participating in DB plans; they will approach retirement participating in DC plans but will carry some DB wealth from their previous jobs. Furthermore, the declines in RHI and Social Security benefits have not yet been fully felt: the RHI coverage rate is still 18 percent, and even higher for current retirees, while the cohorts facing a Social Security Full Retirement Age (FRA) of 67 has not yet reached retirement. Estimating the influence of legacy DB and RHI coverage and the ongoing reductions in Social Security retirement benefits will yield projections that indicate whether the average retirement age has potential to increase further on its own, or whether policy interventions are required to encourage further delays in the retirement age.

The shift from DB to DC pensions is well-documented, but the fact that many current workers were covered by DB plans earlier in their careers – and that DB benefits will continue to be a source of retirement income until the last of these workers has died – is under-appreciated. Only 16 percent of 50- to 59-year-olds are covered by DB pension plans in their current jobs. But when they were in their 30s, 29 percent had DB plans, so DB pension wealth from previous employers will likely generate appreciable income in retirement (Munnell 2014).[2] By contrast, only 11 percent of current 30- to 39-year-olds have DB coverage, so Generations X and Y will derive little of their retirement income from DB pension wealth. Existing research, which

[1] The average retirement age is defined as the age at which half of the population is not in the labor force (Burtless and Quinn 2002, Munnell 2011).
[2] Gustman, Steinmeier, and Tabatabai (2010) find that 63 percent of pension wealth among the 1948-1953 birth cohorts is derived from DB plans, both at the current employer and any previous employers.

focuses on pension plans in current jobs, neglects this lag in the decline of career DB coverage and may understate the degree to which the retirement age will continue to increase.[3]

RHI coverage fell rapidly at nearly the same time as DB coverage. Although RHI is exceedingly rare for younger workers, recent retirees may have been grandfathered into retiree health coverage, allowing RHI to continue to affect their retirement decisions. Workers who will retire in the next two decades, however, will be left without RHI, changing the retirement calculus.[4]

In addition, the FRA increase for individuals born after 1937 reduces benefits at any given claiming age, translating to a decrease in lifetime Social Security benefits (holding longevity constant). While the effects of the increase in the FRA to 66 for the 1938-1954 birth cohorts has already been felt, the next gradual increase, to age 67 starting with the 1955 cohort, will further reduce individuals' reliance on Social Security benefits, the main source of retirement income for the bottom 60 percent of the income distribution age 65 and over (Reno and Veghte 2010).

This study uses the *Health and Retirement Study* (HRS) to estimate how past and present pension and retiree health coverage and changing Social Security incentives contribute to the decision to retire. These results are then used to project retirement behavior for younger cohorts using both the HRS and the *Survey of Income and Program Participation* (SIPP).

The estimates for current older workers and retirees in the HRS indicate that DB coverage will continue to have some influence: having potential DB income from a previous job decreases a worker's retirement age. RHI coverage is also associated with earlier retirement. Consistent with previous research (Song and Manchester 2007), the increase in the Social Security FRA is associated with later retirement. Because of the lower levels of DB coverage earlier in the careers of workers currently under age 50, the projected decline in their RHI, and the increase in their FRA, the simulations suggest that they will retire no more than one year later than the previous generation of workers. The simulated retirement age increases from 61.8 for the 1931-1953 birth cohorts to 62.8 for the 1955-1987 cohorts. The least-educated workers, whose retirement age would need to increase the most to secure their retirement, will see an even

[3] The projections in Friedberg and Webb (2005) use only current DB and DC coverage. Munnell, Cahill, and Jivan (2003) include a single indicator variable for ever having pension coverage, thereby not differentiating between DB coverage through a current employer and coverage through a previous employer.
[4] The Affordable Care Act reduces the cost of non-employer based coverage. But it will remain more expensive than RHI earned during the working years.

smaller increase than better-educated workers, further widening the education-related disparity in retirement security. Furthermore, the one-year increase is likely an upper bound estimate, because the SIPP lacks information on the level of DB pension wealth and retiree health coverage. This small increase in the retirement age is not likely to be sufficient for future retirees to maintain the standard of living of current older households.

Background

The retirement decision hinges on many considerations, including health, job satisfaction, family needs, and health insurance coverage, but an individual's or couple's prospective retirement income is also a critical factor.

Social Security is the primary income source for most retirees, and its structure affects the incentive to retire at particular ages. The spike in the retirement hazard at age 62, the Early Entitlement Age for Social Security retirement benefits, indicates that being able to draw even reduced benefits is enough to lure many workers into retirement (Hurd 1990). In subsequent months, accruals are approximately actuarially fair for the typical worker, though Coile and Gruber (2000) document substantial heterogeneity (e.g., in their mortality) in whether an additional month of delayed claiming increases or decreases Social Security wealth. Coile and Gruber suggest that the difference between the "peak value" of Social Security wealth – that is, the expected present value of Social Security wealth at its highest point – and the individual's Social Security wealth if he retires immediately better represents the incentives to keep working at older ages. Increases in longevity and the increase in the Delayed Retirement Credit have put upward pressure on the so-called peak difference, while the peak difference may fall if workers have fewer years of zero earnings to replace with earnings at older ages.

In an effort to shore up the finances of the Social Security system, amendments passed in 1983 phased in an increase in the Full Retirement Age, which had been 65. Beginning with the 1938 cohort, the FRA increased by 2 months per year until it reached age 66 for the 1943 cohort. The FRA is scheduled to continue increasing, by 2 months per year, beginning with the 1955 cohort; ultimately, cohorts born in 1960 and later will have an FRA of 67. The FRA increase has been associated with an increase in the average retirement age. Behaghel and Blau (2012) find that the spike in the retirement and claiming hazards previously found at age 65 has moved to the FRA of each respective cohort. Song and Manchester (2007) find that for every 2-month increase in the FRA, the claiming age increased by between 0.68 and 1.0 months. The FRA increase effectively reduces Social Security wealth, though lifetime benefits may increase across cohorts if the effects of real earnings growth and an increase in longevity exceed this reduction.

Pensions are the other main source of retirement income, and the structure of pensions has changed profoundly over the recent generation of workers. In 1983, defined benefit plans still dominated, covering 88 percent of pension participants. But DB plans fell out of favor quickly: by 1992, the DB share had fallen to 60 percent, plummeting to 39 percent in 2001 (Munnell 2014). In the most recent *Survey of Consumer Finances*, 71 percent of pension participants had only a defined contribution plan in their current jobs, compared to only 17 percent with only a DB pension.

The theoretical impact on the retirement age of the transition from DB to DC pensions is ambiguous, but empirical evidence indicates that DC pension participants retire later, all else equal (Friedberg and Webb 2005). The structure of pensions affects retirement timing in three ways (Munnell, Cahill, and Jivan 2003). First, DB pensions have explicit age markers at which benefit access or accrual change. For example, a pension may include an early retirement age at which participants can access actuarially reduced benefits. At the pension's normal retirement age, retirees may receive their full benefits; thereafter, the expected present value of pension benefits usually decrease, providing a strong incentive to work no later than this age.[5] DC plan benefits are based entirely on individual contributions, the employer match (which does not often change with age or tenure), and the return on these contributions. DC pensions lacks any specific age threshold at which people can or should retire, other than age 59 ½, when funds can first be withdrawn without penalty.[6] The transition from DB to DC plans, therefore, virtually eliminated the influence of the age thresholds built into the structure of the pensions, suggesting that retirement ages will increase (Bairoliya 2014).

The second way in which the DB-to-DC transition affects retirement incentives is the distribution method. DB pensions are typically annuitized automatically. DC pensions, on the other hand, are almost never annuitized automatically, and few participants buy an annuity with their accrued wealth (Johnson, Burman, and Kobes 2004). DC participants who fear outliving

[5] Though the law requires that pension accruals reflect wage increases even past the normal retirement age, many pensions have negative accruals thereafter because they are not actuarially adjusted to reflect that they are received for fewer years (Munnell, Cahill, and Jivan 2003).

[6] Benefits can also be withdrawn without penalty following a job separation at age 55 or older.

their money or are daunted by the prospect of determining how to spend down their assets may work longer to build up greater wealth as self-insurance.

Third, the transition has coincided with a reduction in pension wealth that may be related to the structure of the plans. DC pensions need not be less generous to their participants than DB plans: in particular, workers whose tenures are too short to vest, or at least to reach the steep portion of the tenure-accrual profile, are better off in DC plans. In practice, however, DC plans yield lower retirement income than DB plans for a variety of reasons: participation is not automatic and default contribution levels are often set too low (Munnell 2012), DC returns often suffer from a lack of diversification and high fees (Munnell et al. 2006; Ayres and Curtis 2014), and DC plans are subject to "leakage," often at job separation (Munnell and Webb 2014). Furthermore, DB benefits are insured (up to a cap) by the Pension Benefit Guaranty Corporation, while DC benefits depend solely on the participant's contributions and on investment returns, so wealth differences are even greater during market downturns. Workers in DC plans who approach their planned retirement age with insufficient wealth to maintain their standard of living may choose to postpone retirement.

Other research has focused on the role of the transition from DB to DC pensions in changing retirement behavior (Friedberg and Webb 2005; Munnell, Cahill, and Jivan 2003), but the role of DB pensions earned earlier in one's career is less well-understood. In previous generations, workers with a single career job would base their retirement decisions on the pension incentives in that job. The increases in recent decades in job-to-job transitions among older workers (Johnson, Kawachi, and Lewis 2009), job loss at older ages (Farber 2011), and "bridge employment" between the careers and retirement (Giandrea, Cahill, and Quinn 2009) suggest that an increasing proportion of pension wealth was earned in jobs that ended long before retirement. Current retirees were in their 40s when DB pensions were still common, so they could have conceivably accrued 20 or more years of tenure before the DB-to-DC transition, reaching the steep part of the pension accrual curve and likely being grandfathered in during the transition. If they have since changed jobs, analyses that focus on pension incentives in the current job likely will omit substantial pension wealth from past employers.

The retirement incentives outlined above differ for workers who remain in a DB plan but are no longer active employees: most importantly, the incentive to retire at a particular age is moot, because the participant stopped accruing benefits when he left the former employer. But pension wealth earned at past jobs should still influence retirement behavior through the wealth accumulated in these plans; greater pension wealth should be associated to earlier retirement. Furthermore, past DB pensions pay benefits in annuitized form, which may be more valuable than a lump sum to retirees seeking to finance post-retirement consumption.

Younger cohorts, however, are unlikely to have accrued substantial – or any – DB pension wealth. The total expected present value of that previously accrued pension wealth will still influence their retirement behavior,[7] but the retirement age may increase if DC has substituted for DB wealth and if the retirement decision is more sensitive to DB than to DC wealth. DB pension wealth among the workforce at any given point – including wealth accrued in previous jobs – will diminish further as the ever-declining number of workers with a DB pension history retire, pushing retirement to older ages on average.

In the same vein as previous pension coverage, retirees may also be able to count on retiree health insurance (RHI) from previous employers. RHI was the primary source of health insurance coverage for 43 percent of retirees age 55-64 in 2006 (Monk and Munnell 2009), and 32 percent of never-retired SIPP respondents age 45-64 in 2010 expected health benefits from an employer when they retire (Fronstin and Adams 2012). But RHI at one's *current* employer is rare: only 18 percent of private-sector employees work for firms that offer health insurance to retirees up to Medicare eligibility (Fronstin and Adams 2012). A rich literature finds that RHI significantly increases the retirement hazard (see Gruber and Madrian 2002 for a review), so future cohorts lacking RHI are likely to see an increase in their average retirement age.

In summary, changing Social Security incentives; reductions in pension wealth from both current and previous employers, particularly in DB plans; and lower rates of RHI coverage are likely to further increase the average retirement age beyond the two-year gains already observed since the mid-1980s. Other factors may also contribute: better-educated, healthier future generations with less physically demanding jobs will likely extend careers, but these factors are mostly accounted for in projections of the retirement age.[8] This paper accounts for the

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[7] One difficulty is that few datasets – including the HRS and, especially, SIPP – will be able to accurately measure wealth from past pensions. This study limits the analysis of past pension wealth to the extensive margin of DB or DC coverage from any previous employer. Our informal analysis of the *Survey of Consumer Finances* indicates that younger generations are accumulating less total pension wealth than current retirees accumulated at the same ages, so controlling only for the extensive margin of pension coverage by type likely understates the differences in retirement incentives by cohort.

[8] Burtless (2013) cautions that the most recent cohort of retirees is no less educated than younger generations, so educational attainment may have already exhausted its potential for increasing the retirement age.

substantial – yet under-appreciated – wealth available from past DB employment, and quantifies how changes in Social Security and pension wealth, RHI, and other factors contribute to our projections of increases in the retirement age.

Data and Methodology

The study uses HRS data to estimate reduced-form models of the impact of pension incentives and job and socioeconomic characteristics on the age of retirement. It then uses coefficient estimates derived from the above models to project retirement ages for SIPP participants, currently ages 25-49, taking account of changes in pension incentives, as well as job and socioeconomic characteristics. In contrast to the alternative of estimating a structural model, this strategy avoids strong assumptions about the functional form of utility, and takes advantage of a clear source of variation: changes in pension incentives.

The HRS is a panel dataset originally comprising 12,652 individuals who were either age 51-61 in 1992 or were married to an individual in that age range. These individuals have been interviewed every two years subsequently, with an additional 13,200 individuals in later birth cohorts added in 1998, 2004, and 2010. We select 9,581 individuals drawn from the 1931-1953 birth cohorts who participated in at least two consecutive interviews between 1992 and 2010, were observed for at least one period of 12 months commencing between their 50th and 69th birthdays, and were working for pay at their initial interview.[9] We convert this data into 74,888 person-year observations. Of these, 57,811 were working, 14,665 had previously experienced a voluntary job exit, and 2,412 had previously experienced an involuntary job exit.

Our approach involves first estimating a multinomial logit explaining annual job transitions for the HRS sample. The emphasis in the literature on the heterogeneity in retirement transitions explains our multichotomous approach (Ruhm 1990, Gustman and Steinmeier 1986). This approach is richer than common specifications that pick a binary definition of retirement (leaving a career job, describing oneself as retired, working zero hours, etc.). This also allows us

[9] Our sample comprises participants in the original HRS cohort, plus those who joined as part of the War Baby and Early Baby Boomer cohorts; these individuals were born in 1931-1953 or married to someone born during those years.

to consider both voluntary and involuntary job exit, a distinction that has been overlooked in much of the retirement literature but is an important determinant of exit from the labor force.[10]

Thus, we seek to explain the probability of observing outcome y_{nt}= 1*, 2,…, K* for each individual *n* in year *t*, with *K = 4* outcomes possible at the end of the year:

- Remain in the beginning-of-year job;
- Leave that job for another job during the year voluntarily or involuntarily;
- Voluntarily cease working during the year;
- Involuntarily cease working during the year.

We include both employees and the self-employed, with no distinction between them. We classify an individual as having made a job-to-job transition if the gap between the cessation of the first job and the commencement of the second job is less than three months.[11] Ignoring possible correlation of the error term across observations for the same individual, we can write $y_{nt} = y_i$. The probability that a particular y_i is observed, conditional on observables x_i and for *k* > 1, can be expressed as:

$$Pr[y_i = k|x_i] = \frac{\exp(x_i'\beta_k)}{1 + \sum_{j=1}^{K} \exp\left(x_i'\beta_j\right)}$$

This specification will yield coefficient estimates for each covariate x_i specific to each outcome *k*, relative to the base case of remaining in the current job. Explanatory variables include dummies for whether the individual is covered by a DB or a DC plan in his current job, whether he anticipates receiving benefits from a DB plan from a past job, and whether he has attained the normal retirement age in his current DB pension plan.[12] Following Coile and Gruber (2000), we also include four measures of Social Security incentives: 1) for those who

[10] Involuntary job separation is defined as leaving one's job because the business closed or the worker was laid off or let go. All other job separations are classified as voluntary: poor health, family care, leaving for a better job, or quitting.
[11] If someone both changes jobs and exits that second job during the year, they are coded as having exited rather than having made a job-to-job transition.
[12] We chose not to include measures of DB pension wealth accrual, such as the difference between current and peak DB pension wealth. The SIPP contains insufficient information to identify pension wealth accrual patterns, and we cannot project estimates of the effect of accrual patterns onto the SIPP data. We include a gender dummy. In future work, we plan to estimate separate models for men and women, which is equivalent to interacting all the explanatory variables with the gender dummy variable.

have not yet attained the age at which Social Security wealth peaks, the difference between current and peak Social Security wealth, normalized by lifetime income; 2) being at or past the age at which Social Security wealth peaks; 3) current Social Security wealth, normalized by lifetime income; and (4) an indicator for whether the individual has reached the FRA.[13] Other explanatory variables include industry and occupation dummies, indicators of health and socioeconomic status, and a full set of age dummies.

We then estimate logistic models of the annual probability of returning to employment for individuals who have experienced voluntary and involuntary separations.[14] The dependent variable takes the value one if the individual is employed at age $t+1$, zero if he is not employed. The sample comprises both those who were not working at time t and those who were working at time t but separated voluntarily or involuntarily between t and $t+1$. We allow the duration of non-employment prior to time t to have a non-linear effect on the probability of re-employment by including dummies for having separated either one to three years, or more than three years, prior to time t, relative to a base case of having separated after time t. We include a dummy variable for having DB pension coverage in any previous job.[15] We also include measures of Social Security retirement incentives and RHI plus controls for socioeconomic status and age and year dummies. The Social Security retirement incentives assume re-employment at the final wage earned in the previous job, increased by 1.1 percent annual real wage growth.

Finally, we estimate a logistic model of the probability of having a pension in the new job. We estimate the probability of receiving any pension, rather than a multinomial logit with separate estimates for receiving a DB or DC pension, because we assume that 1) any job beginning after the initial period will offer only a DC pension and never a DB plan, and 2) the overall offer rate will not increase. Explanatory variables include having any type of pension coverage – DB or DC – in the previous job, having participated in a DB plan in a prior job, and

[13] We use the HRS Social Security Earnings Records to calculate the above measures of Social Security incentives (other than whether the individual has reached his FRA, which is based on his birth year and current age). We assume that workers enjoy 1.1 percent annual real wage growth until retirement and face mortality rates that vary with gender, ethnicity, education, and birth cohort. These mortality rates are based on Brown, Liebman, and Pollet (2002). Social Security wealth excludes spousal and survivor benefits.

[14] We do not include self-reported retirement status. Although it is a strong predictor of re-entry to the labor force, its inclusion would necessitate increasing the number of outcomes in the multinomial logit.

[15] The coefficient identifies individuals who were covered, regardless of whether they vested, because this is the only information available in the SIPP.

earnings in the new job. Explanatory variables also include the characteristics of the new job and the individual's socioeconomic characteristics.

Starting at age 50, we use the above coefficient estimates to simulate the job-status transitions of individuals in the 2004 and 2008 panels of the SIPP. The focus is on the impact of changes in employer pension coverage and Social Security retirement incentives on the average retirement age, defined as the youngest age at which one-half of the sample is not employed (Burtless and Quinn 2002). The SIPP interviews each member of a household every four months for approximately four years about their socioeconomic status and labor market activity, including job transitions and whether they are covered by a pension.[16,17] Our SIPP sample includes the 59,769 individuals who were ages 25 through 49. These individuals, born between 1955 and 1987, are 30 years younger, on average, than the HRS cohort.

The HRS models are estimated only for individuals who have attained age 50 and therefore cannot be used to forecast SIPP labor-force transitions from age 25 to 49. Participants in the SIPP may change their employer, industry, or occupation, and may even enter or exit employment between the age at which they are observed and age 50, when we start our annual job-status simulations. We first predict the probability that each SIPP participant is working at 50, conditional on his labor force status at his current age and socioeconomic status. We do this by estimating a series of logit regressions on the HRS sample for the probability of being employed at the time of the first interview, conditional on gender, race, education, and the number of quarters of Social Security coverage earned during a series of four-year windows.[18] The series starts with a regression including a window covering ages 22 through 25, another

[16] Relative to the *Current Population Survey* (CPS), the HRS seems to understate educational attainment, while the SIPP overstates it. Among individuals born in 1931-1953, the HRS finds that 24.8 percent have at least some college experience; for the same cohort, the CPS reports 48.9 percent, and the SIPP 58.2 percent (and 66.7 percent for the 1955-1987 SIPP cohort). To make the SIPP sample look more like the HRS sample, while still reflecting gains in educational attainment, we randomly assign individuals with some college experience but no degree to the high-school-only category until the group with some college experience or more reaches 35.5 percent (i.e., 24.8 percent from the HRS plus the 10.7-percentage-point gain in this level of attainment between the 1931-1953 and 1955-1987 cohorts in the CPS).

[17] The information on DB pension coverage in SIPP is much less detailed than in the HRS; the SIPP only includes whether the individual has DB coverage from the current job, or whether he has coverage through any previous job. Information on DB and DC pension coverage is available once during the 2004 panel (the topical module for the 7th wave in early 2006) and twice during the 2008 panel (the topical modules for the 3rd and 11th waves, from mid-2009 and early 2012, respectively).

[18] Work history is derived from the HRS data linked to administrative earnings records. An HRS respondent is classified as having worked in a year if he earned four quarters of coverage from Social Security (the equivalent of $4,800 in 2014 dollars). The average age of HRS participants at their first interview is somewhat over 50. As participation rates decline with age, use of this model will therefore somewhat under-predict the probability that a SIPP participant is working at age 50 and correspondingly under-predict their average retirement age.

regression controlling for a window covering ages 23 through 26, and so on, ending with ages 46 through 49. We then predict the probability of employment at age 50 of SIPP participants, conditional on the number of quarters of coverage that we observe them earning during their years in the SIPP (2004-2007 for the 2004 panel or 2009-2012 for the 2008 panel), as well as their current age, gender, race, and education. We assign employment status by drawing from the random uniform [0,1] distribution and comparing the draw with the predicted probability.

We tabulated SIPP participants at ages 25 and 50 by industry and occupation. The only major difference between these two age groups was that 50-year-old employees were more likely to work in manufacturing and less likely to work in professional services. We hypothesize that these trends reflect secular shifts in the composition of employment, rather than shifts over the lifecycle; that is, today's age-25 employees are unlikely to move to manufacturing by the time they reach age 50. We therefore assume that SIPP participants retain their current industries and occupations until age 50.[19] We use the HRS data to hot-deck impute age-50 job tenure, based on industry and occupation.

Another key input into the simulation of SIPP career patterns through age 70 is Social Security wealth. Unlike the HRS, we do not have SIPP data matched to administrative earnings files, and most of the SIPP sample is too young to accurately predict their future Social Security benefits using only their accumulated earnings data. Instead, we project earnings for the SIPP sample based on estimates from a regression of earnings on gender, race, Hispanic origin, education, and a spline in age using the HRS sample. We use these projected earnings to calculate Social Security benefits at each birthday.

A third key input is 401(k) and IRA wealth. The literature indicates that high pension wealth is associated with significantly earlier retirement, which our HRS estimates confirm. We assign 401(k) and IRA wealth by imputing age-related changes in participation status and assuming that participants contribute 6 percent of their salary and receive a 50 percent employer match.[20] Our model predicts that successive birth cohorts will accumulate similar amounts of

[19] We find evidence of a shift with age from blue-collar jobs to white-collar jobs, which we plan to incorporate into our model in future work.

[20] The Plan Sponsor Council of America (2013) reports that the average contribution rate for non-highly compensated workers is 5.2 percent and 6.6 percent for highly-compensated individuals, while employers contribute an average of 2.7 percent. But the model of 401(k) wealth accumulation is likely optimistic, as leakage from 401(k) plans reduces wealth at retirement by at least 20 percent (Munnell and Webb 2015). By overstating 401(k) wealth, we will likely overstate the increase in the retirement age, assuming that 401(k) wealth is positively correlated with the retirement age as our estimates suggest.

wealth as current 50 year olds have accumulated. This is consistent with the finding by Munnell, Webb, and Golub-Sass (2012) using *Survey of Consumer Finances* data that wealth-to-income ratios have remained stable over the past 27 years, notwithstanding the increase in DC coverage.

Finally, we impute net worth,[21] employer-sponsored health insurance, health status, work limitations, the presence of Activities of Daily Living (ADLs) and Instrumental Activities of Daily Living (IADLs), marital status, and the number of children for the SIPP sample at age 50, based on the status of HRS individuals in their first interview wave. The hot-deck imputation for each variable's age-50 value is determined by the individual's race, Hispanic origin, education, gender, industry, and occupation. DC coverage at age 50 is determined by imputing DC coverage in five-year age increments starting at age 23 and ending at age 50. We assume that no individual changing jobs in the SIPP sample will gain a DB plan in their new job; individuals who have DBs at age 50 are those in a DB-covered job when last observed in the SIPP, and we predict they will remain in that job until age 50.[22] Finally, because the SIPP lacks information on retiree health insurance, we assume that no one in the SIPP sample has RHI coverage at age 50 or later; this assumption is almost certainly too strong, but RHI coverage is currently at 18 percent and continues to decline (Fronstin and Adams 2012).

We then simulate labor force transitions – retain existing job, change job, voluntary and involuntary job exits, and re-entry to employment – for SIPP individuals until they reach age 70. We use the HRS coefficient estimates to predict the annual probability of experiencing each type of transition, given each individual's time-invariant characteristics, projected prior work history, and Social Security wealth; for example, a 55-year-old might have a 50 percent chance of staying in his current job, a 30 percent chance of switching jobs, a 10 percent chance of exiting employment voluntarily, and a 10 percent chance of exiting involuntarily. We then draw from the random uniform [0,1] distribution and assign an outcome based on the draw. We predict a

[21] Net worth is the difference between total assets and total liabilities. It excludes DB, DC, and IRA wealth. IRA wealth is grouped with wealth from DC plans.

[22] For the 33.7 percent of DB pensions in the HRS with no reported NRA, we assume an NRA of 60. We have also estimated the job transition models using a separate indicator for missing NRA, but this specification estimates a very high rate of job-to-job, voluntary, and involuntary transitions for workers who do not report their NRA. The high transition rates are more consistent with a low NRA such as 60 (because when workers reach their NRA at younger ages, their transition rates increase at younger ages), rather than age 65, the more common NRA among HRS respondents who report one. SIPP lacks information on the DB pension plan's normal retirement age; we again assume the NRA is 60. Alternative estimates that use a missing NRA indicator in the HRS and assume a constant NRA of 65 in the SIPP have estimates for the retirement age and the marginal effect of current DB coverage that are only slightly larger.

probability of re-employment for those to whom we assign an exit from employment and assign employment status based on a draw from the random uniform distribution. If re-employed, we predict and assign pension coverage.

After simulating the career paths of each individual in the SIPP sample, we then calculate employment rates by age and birth cohort. Again, the average retirement age is defined as the youngest age at which half of the sample is not working for pay (Burtless and Quinn 2002).

Results

Table 1 reports the results of the multinomial logit model for job separations by type: job-to-job transitions, and voluntary and involuntary separation without re-employment for at least three months. It shows the estimated effects of each covariate in the form of relative risk ratios (RRR). The RRR is a transformation of the estimated logit coefficient and captures the marginal effect of the covariate on the likelihood of a particular job transition occurring relative to the likelihood of the base outcome (staying in the job). If the RRR takes a value equal to one, then the right-hand side variable does not alter the likelihood of that particular job transition occurring relative to staying in the job. If the RRR takes a value that is smaller than one, then the variable reduces the likelihood of the job transition occurring relative to staying in the job by the percentage of RRR minus 1, and if the RRR takes a value greater than one, it raises the likelihood relative to staying in the job. The standard errors are also transformed to correspond to the RRRs and can be compared to RRR minus 1, using the critical values for z-statistics; so, if, upon computing RRR minus 1 and dividing by the transformed standard error reported in Table 1, one obtains a value that is roughly two, then that RRR is statistically significant at roughly the 95 percent confidence level.

Participants in DB pension plans in their current jobs who have not yet reached their plan's normal retirement age are 45 percent less likely to change jobs, 37 percent less likely to separate voluntarily, and 78 percent less likely to separate involuntarily, relative to a base case of having no DB or DC pension coverage. Once a worker reaches his DB plan's normal retirement age (NRA), he is statistically significantly *more* likely to exit voluntarily or change jobs, while the probability of separating involuntarily is not statistically different from the transition probabilities of the "unpensioned." In contrast, participants in DC pension plans are 24 percent more likely to have a voluntary separation than workers without a DB or DC pension, but they are about half as likely as the unpensioned to involuntarily leave their jobs. These results seem to confirm that DB pension participants are loathe to leave their jobs while benefits are accruing but are even more likely than DC participants to leave their jobs voluntarily after they reach their NRA, at which point pension wealth typically declines.[23]

Coverage in a DB pension plan in a previous job is associated with statistically significantly higher probabilities of changing jobs (29 percent), voluntary separation (59 percent), and involuntary separation (51 percent), again relative to a base case of having no pension. The increased rate of voluntary separation is consistent with a wealth effect, with workers who either receive or anticipate receiving DB pension income from a past employer choosing more leisure. Indeed, net worth (excluding DB, 401(k) and IRA wealth) is positively correlated with voluntary separations, though 401(k) and IRA wealth has a precisely estimated zero correlation. Economic theory suggests that one dollar of DB pension wealth from a past job should have a similar effect on the separation rate as a dollar of DC or non-pension financial wealth. We find wealth from a previous DB appears to have a substantially larger effect. We attribute this either to mental accounting on the part of households or to households regarding annuitized income from DB coverage in a previous job as a more secure means of financing post-retirement consumption than unannuitized wealth. It follows that succeeding birth cohorts, who will be less likely to have any DB pension coverage, will exhibit lower separation and job transition rates, holding all else constant; i.e., they will work until older ages.[24]

As economic theory predicts, our measures of Social Security retirement incentives have only a small effect on job-to-job transitions. They have a slightly larger and statistically significant effect on voluntary retirement. A difference between current and peak Social Security wealth of one times salary is associated with a 14 percent lower probability of voluntary separation for workers with at least one DB pension, but there is no statistically significant relationship between the peak difference and voluntary separation among DC pension holders.

[23] The RRR for DB pension participation before the NRA in the involuntary separation equation is smaller than one, albeit not statistically significantly. One possibility is that the few remaining DB pension participants are protected from job loss by union contracts or comparatively-stable public sector employment. Alternatively, DB pension holders may be more reliable, forward-looking individuals, making them too valuable for employers to lose during layoffs. The DC pension RRR is also far below one, suggesting that a job with any kind of pension is a higher quality job where layoffs are less likely.

[24] We are less certain as to why past DB coverage is associated with higher rates of job switching and involuntary job loss. We hypothesize that some self-reported, involuntary separations may have a voluntary component to them and that workers who have an income safety net of past DB coverage may be more willing to risk a job change or step down to a less demanding job.

An increase in Social Security wealth of an amount equal to one year's income is associated with a 3-4 percent decrease in rates of job-to-job transitions and voluntary separation, but it is not associated with any apparent change in involuntary separations, as expected.

Many of the other RRRs in the voluntary separation column follow expected patterns. Access to retiree health insurance appears to be a key factor in retirement decisions: this coverage is associated with a 12 percent higher probability of voluntary separation, and respondents who have health insurance through their spouse's employer are 16 percent more likely to quit in any year. A one-unit increase in log earnings (a 170 percent dollar increase) is associated with just over a 20 percent decrease in the likelihood of separating voluntarily. Fair or poor self-reported health and work limitations are associated with higher rates of voluntary separation. Voluntary separation is more likely among homeowners, women, parents, and workers in small firms, and it is less likely among blacks, married people, and workers in retail trade or with short tenures in their current job. Rates of voluntary separation increase strongly with age (suppressed for space); job-to-job transitions fall off after age 64, while involuntary separations are roughly constant with age.

Table 2 reports odds ratios from a logistic model in which the dependent variable takes the value one if the individual returns to work following a voluntary (first column) or involuntary (second column) job loss. The odds of returning to work is the probability of returning to work divided by one minus that probability. The odds ratio is the impact of a one-unit change in the explanatory variable on the ratio of the odds of returning to work.[25] An odds ratio greater than one signifies that the explanatory variable increases the odds of re-employment and a ratio of less than one that it decreases the odds.

DB pension coverage in the previous job is associated with increased odds of re-employment after an involuntary displacement but with lower odds of re-employment after a voluntary displacement, though the coefficients fall short of conventional levels of significance. Those who have not been employed for extended periods are much less likely to re-enter employment. A high net worth (excluding DB, 401(k), and IRA wealth) is associated with greater odds of returning to work following either type of displacement, but a higher 401(k)/IRA balance is associated with reduced odds of returning. A large difference between current and

[25] In contrast to probit marginal effects, the odds ratio does not vary with the assumed values of the other explanatory variables.

peak Social Security wealth is associated with greater odds of returning to work following both voluntary and involuntary severances. Following both voluntary and involuntary displacements, individuals in worse health are less likely to return to employment. These results indicate that return to employment is unlikely among individuals with resources – DB pensions and high 401(k) and IRA wealth – but that returning to employment is more likely among individuals seeking to maximize their lifetime Social Security benefits.

Table 3 reports odds ratios from a logistic model in which the dependent variable takes the value one if a worker participated in a pension plan in his new job, and zero if he did not. Individuals covered by any type of pension plan in their previous job – and especially DC pensions – are much more likely to be covered by a pension plan in their new job, as are higher earners, and individuals covered by employer-sponsored health insurance in their new job. Workers in small firms are much less likely to have pension coverage. Interestingly, individuals with access to health insurance either through a spouse or as a retiree are more likely to be covered by a pension in their new job, which may indicate higher unobserved skill.

These regression results are then used to simulate employment histories, starting at age 50, for the older cohorts in the HRS and for the younger cohorts in the SIPP. Figure 1 displays the simulated employment rate by age for both samples.[26] While employment rates for current cohorts of older workers fall rapidly starting at age 62, the decline in simulated employment rates for future cohorts is much more gradual; for example, the employment rate at age 66 is 18 percent in the HRS simulation but 37 percent in the SIPP simulation. As a result, the retirement age – the first age at which the employment rate falls below 50 percent – is 61.8 for the HRS sample and 62.8 for the SIPP cohorts.[27] The model projects approximately a one-year increase in the retirement age between the 1931-1953 birth cohorts and the 1955-1987 birth cohorts.

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[26] The simulated employment rate for the HRS sample is within 5 percentage points of their actual employment rate until age 62. Starting at age 62, however, the simulated employment rate decreases fairly rapidly, while the actual employment rate decreases more gradually; by age 66 the simulated employment rate is 17 percentage points lower than the actual employment rate observed for 66-year-olds in the HRS. The actual HRS retirement age, using the same definition as our simulation, is 62.7 years, just less than a year older than the simulation result for the HRS; compared to the actual HRS age, the SIPP simulated retirement age for coming cohorts is actually 0.3 years *earlier*, rather than 0.6 years later. This result implies that the simulation model is biased toward low employment rates at older ages.

[27] The fractional retirement ages result from a linear projection between the last age at which more than 50 percent of the sample is employed and the first age at which less than 50 percent is employed. For example in the simulation, 58.3 percent of the HRS sample works at 61, and 48.5 percent of 62-year-olds are employed. The difference between these two employment rates is 9.9 percentage points, and the difference between the employment rate at 61 and 50 percent is 8.3 percentage points, so the average retirement age is 61+8.3/9.9 = 61.84 years.

This increase reflects changes between the HRS and SIPP cohorts in many of the factors associated with the retirement decision. Table 4 reports the differences in the sample means for the explanatory variables at age 53.[28] The SIPP cohort is about half as likely to have DB coverage through a previous job and even less likely to have DB coverage in their current job.[29] Instead, 52 percent of SIPP respondents are projected to have DC pensions in their age-50 jobs, compared with 33 percent of HRS respondents; 401(k) and IRA wealth, as expected, is also projected to be higher at age 53 for the SIPP cohort. Earnings are modestly higher for the SIPP cohorts, reflecting projected real wage growth. The cut in lifetime Social Security benefits due to the FRA increase is offset by longevity increases, so SIPP respondents will have almost exactly the same lifetime Social Security wealth (relative to lifetime earnings) as the HRS cohort, and at age 53, the SIPP cohort is are almost exactly as far from its peak Social Security wealth as the HRS cohort.[30] Other characteristics are fairly similar, though SIPP respondents are less likely to work at small firms, have health insurance through their own or their spouse's employer, be married or have three or more children, or own their home, and more likely to have some college education. In addition, the model assumes that no SIPP respondent has retiree health insurance, in part because SIPP does not ask about RHI and in part because already-low RHI coverage rates are projected to decline further.

Table 5 presents the marginal effect of each variable (or category of variables) on the change in the retirement age between the HRS sample and the SIPP cohort. The first column reports the average retirement age, assuming that the particular variable is at the SIPP cohort's mean while all other variables are at the HRS cohort's mean. The second column calculates the marginal effect for each variable – that is, the difference between the baseline retirement age of 61.8 in the HRS cohort and the predicted average retirement age (the first column). The largest marginal effect is a 1.0-year increase when switching from the HRS' 40 percent average rate of DB coverage from a previous employer to the 21.5 percent coverage rate prevailing in the SIPP.

[28] Age 53 is the average entry age for the HRS sample.
[29] The SIPP cohort is projected to have a DB coverage rate of only 3.2 percent. This is almost certainly too low, given that DB plans are likely to remain the dominant pension type in the public sector. Our model over-predicts public sector job turnover. We plan to amend our model so that public sector turnover is reduced, and workers joining the public sector are assigned DB coverage, in future work.
[30] The SIPP cohort reaches their peak Social Security wealth at slightly older ages due to their increased longevity. The difference between current and peak Social Security wealth is expressed as a multiple of earnings, not as a number of years remaining before the peak.

The DB coverage rate at one's current job is lower in the SIPP as well; as a result, the retirement age is projected to rise by about 0.2 years.

Retiree health insurance also suggests a large retirement age increase of 0.9 years, but we assume that no one in the SIPP sample has RHI coverage, which somewhat overstates this marginal effect. The retirement age is expected to increase by 0.3 years as a result of the already-scheduled FRA increase.[31] Lifetime Social Security wealth and the difference with the peak Social Security wealth are almost the same in the HRS and SIPP samples, so the contributions by these variables are small – only about 0.1 years.

Because the job transition probabilities are estimated in non-linear models, the combined effect of the changes in DB and RHI coverage and Social Security incentives are not simply the sum of their respective marginal effects from column 2 of Table 5. Instead, the model predicts that if the only differences between the HRS and SIPP cohorts were the lower DB and RHI coverage rates and the increased FRA, the average retirement age would increase by 1.9 years. But the SIPP sample differs from the HRS cohort in other ways. Most prominently, the SIPP cohort is projected to have increased probabilities of fair or poor health at older ages, which *lowers* the average retirement age by about six months, offsetting some of the increase from lower DB and RHI coverage and the increase in the FRA. After accounting for the differences between the two cohorts, the average retirement age is expected to rise by only one year.

Figure 2 reports employment rates for the HRS sample and each of the three birth cohorts from the SIPP sample. The SIPP cohorts exhibit very similar employment rate patterns, with each employment rate projected to be far above the HRS cohort after age 61. The average retirement age trends upward for the next three decades: age 62.4 for the 1955-1969 cohorts, increasing slightly in the 1970-1979 cohorts to 62.7, and then increasing further in the 1980-1987 cohorts to 63.1.

Figure 3 reports employment rates by gender. The patterns for men and women in the HRS simulation are similar, and the retirement age is nearly identical: 62.0 for men and 61.6 for

[31] Song and Manchester (2007) report that each 2-month increase in the FRA is associated with between a 0.68- and 1.0-month increase in the Social Security retirement benefit claiming age. Most of the SIPP cohort has a FRA one year greater than most of the HRS cohort, so Song and Manchester's result suggests a lower bound of a 0.34-year increase due solely to the FRA increase. Our estimate is just below this lower bound, but some of the change in the FRA is captured by changes in the peak difference and lifetime Social Security wealth variables. Furthermore, Song and Manchester study claiming age, whereas our outcome of interest is the first age that a majority of the sample is non-employed, irrespective of whether they are collecting Social Security benefits; Coe, Khan, and Rutledge (2013) show that the age of labor force withdrawal is not as responsive to the change in the FRA as the claiming age.

women. For the SIPP simulation, however, the employment rate for men remains elevated at older ages; as a result, the male retirement age is projected to rise to 63.3, while the female retirement age will increase only to 62.3.[32]

Figure 4 shows employment rates by educational attainment. As expected, the retirement age for the HRS cohort is lower among those with less than a high school education (61.4 years) and those who completed high school (61.6 years), and it is higher among workers with some college-level education (62.1 years).[33] The model projects a widening in the disparities in retirement behavior based on education levels. The retirement age of those with less than a high school education is expected to increase by 0.9 years to 62.3, while it will increase by 1.0 years to 62.6 for those with a high school education, and by 1.3 years to 63.3 for workers with some college experience.

Conclusions

The retirement landscape will become more inhospitable for succeeding birth cohorts. Life expectancy is increasing, reducing both annuity rates and the rate at which unannuitized wealth can be decumulated. The increase in the Social Security Full Retirement Age from 65 to 67 is equivalent to a 13 percent cut in benefits. Health care costs are projected to increase, squeezing the amount available for general consumption.

One solution is to delay retirement. This increases monthly Social Security benefits – by at least 76 percent if, for example, retirement is delayed from 62 to 70. It also enables households to contribute to their 401(k) plans for more years. Those who delay face a shorter remaining life expectancy and can therefore obtain more favorable annuity rates and can decumulate their financial assets more rapidly. Previous studies have demonstrated the power of extending careers: Munnell et al. (2012) find that the probability of hitting target replacement rates increases from about 30 percent when retiring at 62 to 86 percent at age 70, and Shackleton (2004) finds that the required retirement savings falls by 90 percent if a married couple can

[32] The model is not estimated separately for men and women, so the coefficients on each factor are constrained to be the same for workers of each sex. A fully interacted model is left for future research.

[33] *Current Population Survey* and other data show that individuals with less than a high school education exit the job market at younger ages than those with a high school education. Many such quits are via Social Security Disability Insurance (SSDI) and Supplemental Security Income (SSI). Our model excludes SSDI and SSI recipients. This sample selection criterion overstates retirement ages for those with less than a high school education relative to those with a high school education or greater, because SSDI and SSI beneficiaries have lower educational attainment (Autor and Duggan 2003).

extend their retirement age from 62 to 70. The average retirement age has already increased by two years from its low point in the early 1990s, in part due to the decline in DB pension plans and RHI coverage and increases in the Social Security FRA. DB and RHI coverage rates among private sector workers in their current jobs are now at very low levels, and the FRA increases have been common knowledge since 1983. The possibility that the factors that helped to increase the retirement age in the past two decades are largely exhausted, and even the two-year increase in the retirement age over this time still leaves Americans short of the late-60s retirement age they probably need, suggests that further increases in retirement ages might require policy interventions.

This paper concludes, however, that the retirement age may continue to rise, even without policy interventions, albeit only by one year. DB pension and RHI coverage early in the careers of workers who are now approaching retirement continue to influence their retirement decisions, and scheduled FRA increases will further delay retirement. But we project that workers under 50, who are much less likely to have ever been covered by DB benefits or RHI, will retire no more than one year later, on average, than the HRS cohort. The increase will be smaller for the least-educated workers, widening the gap in their retirement security relative with better-educated workers.

Some caveats apply to the one-year estimate. The model does not fully account for the continuing prevalence of DB coverage, and possibly RHI, among public-sector workers in their current jobs; the assumption that any subsequent job they take will lack DB and RHI coverage may be too strong if their next job is also within the public sector, especially if they switch agencies within the same government and retain tenure. On the other hand, public-sector workers make up only about 10 percent of our sample. The assumption that RHI coverage is zero for all individuals in the SIPP – while almost certainly correct to a first approximation – is also somewhat unrealistic, but we are unaware of a dataset that includes RHI coverage status for younger workers that would allow us to impute RHI coverage for SIPP respondents. Finally, as with RHI status, previous DB wealth is not available in the SIPP, so our model ignores the level of DB wealth, rather than just whether or not the individual ever participated in a DB plan; more recent cohorts almost certainly have less DB wealth than our HRS sample, so the previous DB coverage rate likely overstates the importance of previous DB plans. The data limitations of SIPP – the lack of RHI status and DB wealth – that constrain the model suggests that the projection of a one-year increase in the average retirement age is an upper bound estimate of the true increase without further policy intervention.

The projected increase in the retirement age found in this study suggests that some of the factors associated with the increase that has already occurred – the decline in DB pension and RHI coverage and the FRA increase – will continue to have some influence on the coming generation of retirees, consisting of the late Boomers and Generations X and Y. It remains an open question whether these factors will extend the retirement age for Millennials and their successors, few of whom have ever seen DB plans or RHI coverage or can recall a Social Security FRA below 67. The one-year increase in the retirement age projected in this study is probably insufficient to allow future generations with lower DB wealth and fewer RHI plans to maintain their lifestyle after retirement. The likelihood that this increase is an upper bound only strengthens the argument that further policy intervention will be required to push future cohorts toward the retirement ages that will better secure their old age.

References

Autor, David H. and Mark G. Duggan, 2003. "The Rise in the Disability Rolls and the Decline in Unemployment." *Quarterly Journal of Economics* 118(1): 157-206.

Ayres, Ian and Quinn Curtis. 2014. "Beyond Diversification: The Pervasive Problem of Excessive Fees and 'Dominated Funds' in 401(k) Plans." Yale Law and Economics Research Paper 493. New Haven, CT: Yale Law School.

Bairoliya, Neha. 2014. "The Effect of Pension Plan Type on Retirement Behavior." Working Paper. Minneapolis, MN: University of Minnesota.

Behaghel, Luc and David M. Blau. 20112. "Framing Social Security Reform: Behavioral Responses to Changes in the Full Retirement Age." *American Economics Journal*: *Economic Policy* 4(4): 41-67.

Brown, Jeffrey R., Jeffrey B. Liebman, and Joshua Pollet. 2002. "Estimating Life Tables that Reflect Socioeconomic Differences in Mortality." In *The Distributional Aspects of Social Security Reform*. Eds. Feldstein, Martin, and Jeffrey B. Liebman. University of Chicago Press. Pages 447-57.

Burtless, Gary. 2013. "Can Educational Attainment Explain the Rise in Labor Force Participation at Older Ages?" *Issues in Brief* 13-13. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Burtless, Gary and Joseph F. Quinn. 2002. "Is Working Longer the Answer for An Aging Workforce?" *Issue in Brief* 11. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Coe, Norma B., Mashfiqur R. Khan, and Matthew S. Rutledge. 2013. "Sticky Ages: Why is Age 65 Still a Retirement Peak?" Working Paper 2013-2. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Coile, Courtney and Jonathan Gruber. 2000. "Social Security Incentives for Retirement." In *Themes in the Economics of Aging*," ed. David Wise, 311–41. Chicago: University of Chicago Press.

Farber, Henry S. 2011. "Job Loss in the Great Recession: Historical Perspective from the Displaced Workers Survey, 1984-2010." Working Paper 17040. Cambridge, MA: National Bureau of Economic Research.

Friedberg, Leora and Anthony Webb. 2005. "Retirement and the Evolution of Pension Structure." *Journal of Human Resources* 50(2): 281-308.

Fronstin, Paul and Nevin Adams. 2012. "Employment-Based Retiree Health Benefits: Trends in Access and Coverage, 1997–2010." Issue Brief 377. Washington, DC: Employee Benefit Research Institute.

Giandrea, Michael D., Kevin E. Cahill, and Joseph F. Quinn. 2009. "Bridge Jobs: A Comparison Across Cohorts," *Research on Aging* 31(5): 549–76

Gruber, Jonathan and Brigitte Madrian. 2002. "Health Insurance, Labor Supply, and Job Mobility: A Critical Review of the Literature." Working Paper 8817. Cambridge, MA: National Bureau of Economic Research.

Gustman, Alan L. and Thomas L. Steinmeier. 1986. "A Disaggregated, Structural Analysis of Retirement by Race, Difficulty of Work and Health," *The Review of Economics and Statistics*, 68(3): 509-13.

Gustman, Alan L., Thomas L. Steinmeier, and Nahid Tabatabai. 2010. *Pensions in the Health and Retirement Study*. Cambridge, MA: Harvard University Press.

Hurd, Michael D. 1990. "Research on the Elderly: Economic Status, Retirement, and Consumption and Saving." *Journal of Economic Literature* 28(2): 565-637.

Johnson, Richard W., Leonard E. Burman, and Deborah I. Kobes. 2004. "Annuitized Wealth at Older Ages: Evidence from the Health and Retirement Study." Final Report to the Employee Benefit Security Administration. Washington, DC: U.S. Department of Labor.

Johnson, Richard W., Janette Kawachi, and Eric K. Lewis. 2009. "Older Workers on the Move: Recareering in Later Life." Working Paper 2009-08. Washington, DC: AARP Public Policy Institute.

Monk, Courtney and Alicia H. Munnell. 2009. "The Implications of Declining Retiree Health Insurance." Working Paper 2009-15. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H. 2011. "What is the Average Retirement Age?" *Issue in Brief* 11-11. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H. 2014. "401(k)/IRA Holdings in 2013: An Update from the SCF." *Issue in Brief* 14-15. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H., Kevin E. Cahill, and Natalia A. Jivan. 2003. "How has the Shift to 401(k)s Affected the Retirement Age?" *Issue in Brief* 2003-13. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H. and Anthony Webb. 2015. "The Impact of Leakages from 401(k)s and IRAs." Working Paper (forthcoming). Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H. and Steven A. Sass. 2008. *Working Longer: The Solution to the Retirement Income Challenge*. Washington, DC: Brookings Institution Press.

Munnell, Alicia H., Mauricio Soto, Jerilyn Libby, and John Prinzivalli. 2006. "Investment Returns: Defined Benefits vs. 401(k) Plans." *Issue in Brief* 52. Chestnut Hill, MA: Center for Retirement Research at Boston College.

Munnell, Alicia H., Anthony Webb, Luke Delorme, and Francesca Golub-Sass. 2012. "National Retirement Risk Index: How Much Longer Do We Need to Work?" *Issue in Brief* 12-12. Chestnut Hill, MA: Center for Retirement Research.

Munnell, Alicia H., Anthony Webb, and Francesca Golub-Sass. 2012. "The National Retirement Risk Index: An Update." *Issue in Brief* 12-20. Chestnut Hill, MA: Center for Retirement Research

Plan Sponsor Council of America. 2013. "56th Annual Survey of Profit Sharing and 401(k) Plans." Chicago, IL: Plan Sponsor Council of America.

Reno, Virginia P. and Benjamin Veghte. 2010. "Economic Status of the Elderly in the United States." Working Paper. Washington, DC: National Academy of Social Insurance.

Ruhm, Christopher. 1990. "Bridge Jobs and Partial Retirement" *Journal of Labor Economics* 8(4) pages 482-501.

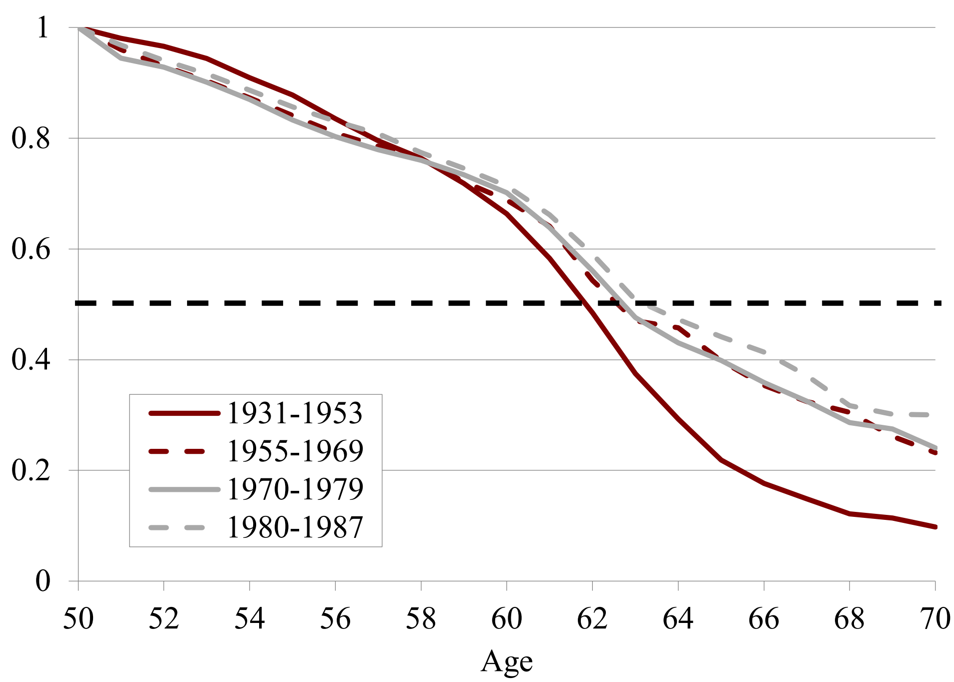
Shackleton, Robert. 2004. *Retirement Age and the Need for Saving*. Economic and Budget Issue Brief. Washington, DC: Congressional Budget Office.

Song, Jae and Joyce Manchester. 2007. "Have People Delayed Claiming Retirement Benefits? Responses to Changes in Social Security Rules." *Social Security Bulletin* 67(2): 1-23.

Figure 1. *Simulated HRS and SIPP Employment Rates by Age*

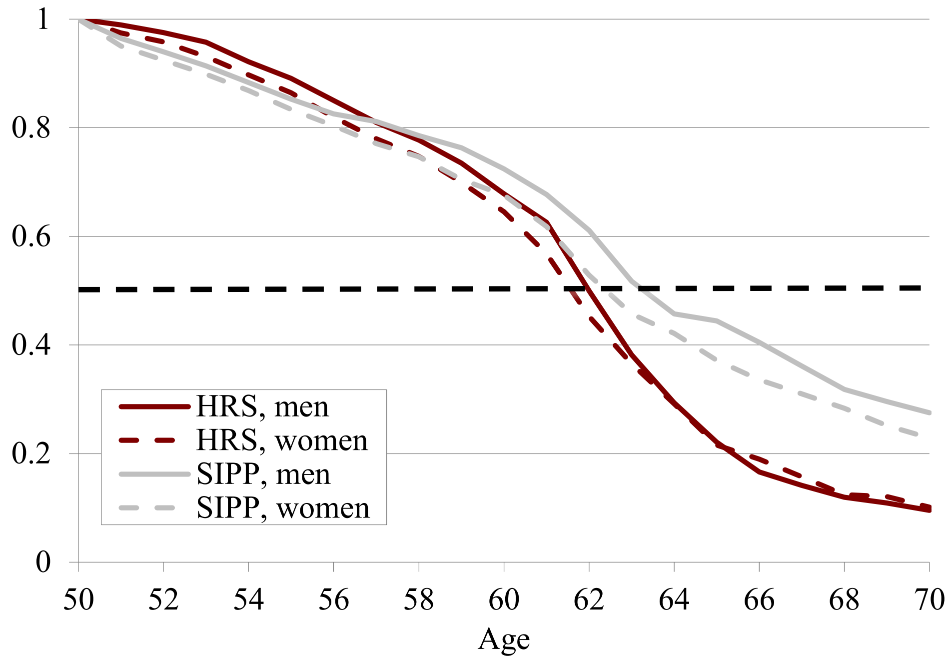
Source: Authors' calculations.

Figure 2. *Simulated HRS and SIPP Employment Rates by Birth Cohort*



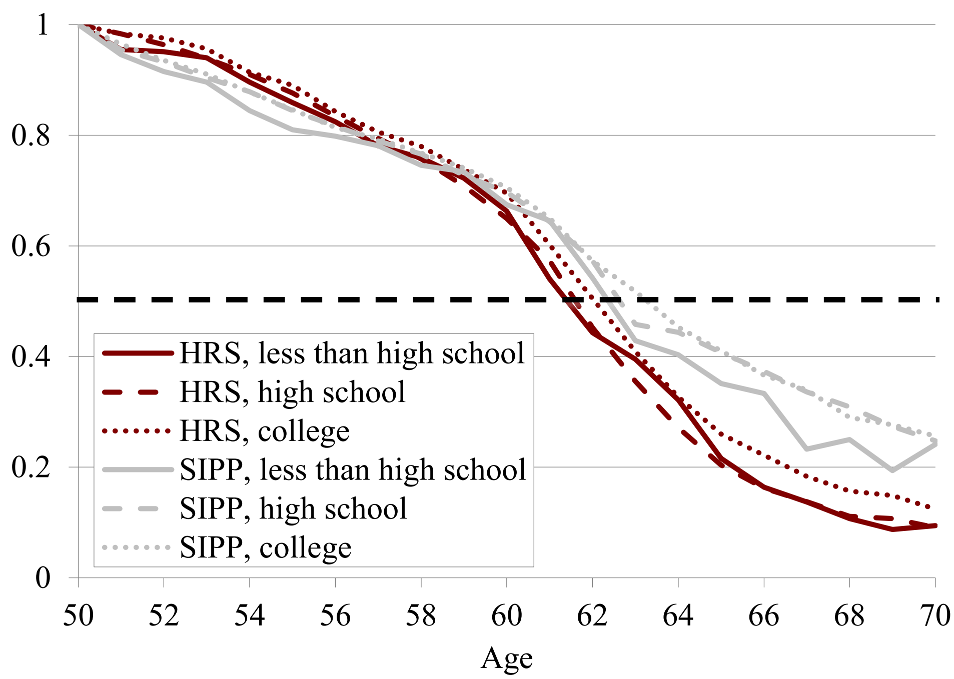
Source: Authors' calculations

Figure 3. *Simulated HRS and SIPP Employment Rates by Age and Gender*



Source: Authors' calculations.

Figure 4. *Simulated HRS and SIPP Employment Rates by Age and Educational Attainment*



Source: Authors' calculations.

Table 1. *Multinomial Logit Regression Results for Job Transitions*

Dependent variable	Job-to-job transition	Voluntary separation	Involuntary separation
DB in current job, under NRA	0.550***	0.631***	0.220***
	(0.052)	(0.041)	(0.088)
DB in current job, at or over NRA	1.323**	2.205***	0.615
	(0.155)	(0.130)	(0.322)
DC in current job	0.955	1.235***	0.551**
	(0.066)	(0.055)	(0.148)
DB in a previous job	1.293***	1.587***	1.513***
	(0.063)	(0.048)	(0.124)
Log of net worth (excluding DB, 401(k), and IRA wealth)	0.985**	1.036***	1.009
	(0.007)	(0.004)	(0.012)
Log of 401(k) and IRA wealth	1.010*	0.990***	1.016
	(0.006)	(0.004)	(0.011)
Peak difference x DB	0.941***	0.885***	0.833**
	(0.014)	(0.013)	(0.067)
Peak difference x DC	1.001	0.997	0.950
	(0.011)	(0.008)	(0.066)
Peak difference x no pension	0.993	1.031***	1.012
	(0.008)	(0.005)	(0.012)
Past peak	1.493	1.250	0.656
	(0.587)	(0.219)	(0.287)
Social Security wealth	0.966*	0.960***	0.994
	(0.018)	(0.009)	(0.023)
At or over FRA	1.037	0.943	0.629
	(0.868)	(0.116)	(0.234)
Log of Earnings	0.989	0.781***	0.757***
	(0.011)	(0.003)	(0.008)
Retiree health insurance	1.033	1.120***	0.988
	(0.054)	(0.038)	(0.088)
HI through own employer	0.666***	1.033	1.250**
	(0.041)	(0.040)	(0.124)
HI through spouse's employer	0.896	1.161***	1.291**
	(0.065)	(0.053)	(0.153)

(continued)

Table 1. *Multinomial Logit Regression Results for Job Transitions* (cont'd)

Dependent variable	Job-to-job	Voluntary separation	Involuntary separation
Poor health	0.900	2.544***	3.518***
	(0.201)	(0.277)	(0.979)
Fair health	1.071	1.603***	2.153***
	(0.099)	(0.091)	(0.342)
Good health	0.981	1.314***	1.801***
	(0.066)	(0.059)	(0.238)
Very good health	0.954	1.183***	1.443***
	(0.061)	(0.052)	(0.189)
Work limitation	1.110	1.345***	0.943
	(0.110)	(0.072)	(0.146)
Any ADLs or IADLs	0.884*	1.048	0.938
	(0.061)	(0.043)	(0.105)
Homeowner	0.867**	1.136***	0.945
	(0.059)	(0.055)	(0.116)
Blue collar	0.840***	1.120***	1.026
	(0.055)	(0.041)	(0.097)
Industry: Agriculture, mining, construction	1.328***	1.095	1.504**
	(0.133)	(0.067)	(0.239)
Industry: Manufacturing and transportation	1.183***	1.067*	1.859***
	(0.075)	(0.042)	(0.189)
Industry: Trade, nonprofessional	1.131**	0.861***	1.118
	(0.070)	(0.036)	(0.124)
Firm size less than 25	0.713***	1.264***	1.280
	(0.043)	(0.063)	(0.240)
Firm size 25 to 99	1.094	1.104	1.105
	(0.074)	(0.070)	(0.272)
0 to 4 years of tenure	7.758***	0.806***	1.062
	(0.538)	(0.028)	(0.098)
5 to 9 years of tenure	1.824***	0.706***	1.104
	(0.171)	(0.029)	(0.114)
Married	0.936	0.841***	0.845
	(0.059)	(0.032)	(0.088)
One child	1.245*	2.004***	2.168***
	(0.146)	(0.151)	(0.396)
Two children	1.228**	2.012***	2.045***
	(0.122)	(0.128)	(0.317)

(continued)

Table 1. *Multinomial Logit Regression Results for Job Transitions* (cont'd)

Dependent variable	Job-to-job		Voluntary Separation		Involuntary Separation	
Three or more children	1.283	***	1.972	***	1.565	***
	(0.122)		(0.119)		(0.233)	
Black	0.849	**	0.872	***	0.875	
	(0.063)		(0.038)		(0.104)	
Hispanic	0.901		0.971		0.922	
	(0.087)		(0.057)		(0.140)	
Male	1.022		0.865	***	0.851	
	(0.076)		(0.039)		(0.102)	
Less than high school	0.890		0.878	***	0.885	
	(0.069)		(0.039)		(0.103)	
At least some college	1.058		0.945		0.936	
	(0.063)		(0.036)		(0.100)	
Number of observations	57,811		57,811		57,811	

Source: Authors' estimates from the *Health and Retirement Study* 1992-2010 waves.

Table 2. *Logit Regression Results for Returning to Work*

Dependent variable	Return after voluntary separation	Return after involuntary separation
Not employed 1 to 3 years	0.360***	0.960
	(0.040)	(0.184)
Not employed over 3 years	0.109***	0.119***
	(0.017)	(0.047)
DB in a previous job	0.929	1.246
	(0.093)	(0.236)
Log of net worth (excluding DB, 401(k), and IRA wealth)	1.032**	1.067**
	(0.014)	(0.028)
Log of 401(k) and IRA wealth	0.970**	0.964*
	(0.012)	(0.021)
Peak difference	1.067**	1.122**
	(0.028)	(0.053)
Past peak	1.254	1.163
	(0.428)	(0.872)
Social Security wealth	1.006	0.913*
	(0.024)	(0.049)
At or over FRA	0.791	1.719
	(0.256)	(1.307)
Retiree health insurance	0.962***	0.925***
	(0.010)	(0.009)
HI through spouse	0.952	0.885
	(0.129)	(0.215)
Poor health	0.175***	0.308
	(0.084)	(0.245)
Fair health	0.486***	0.580
	(0.100)	(0.223)
Good health	0.776*	0.941
	(0.115)	(0.276)
Very good health	0.908	0.906
	(0.126)	(0.253)
Work limitation	0.803	0.488**
	(0.121)	(0.164)
Any ADL or IADL	0.860	0.963
	(0.130)	(0.259)

(continued)

Table 2. *Logit Regression Results for Returning to Work* (cont'd)

Dependent variable	Return after voluntary separation	Return after involuntary separation
Homeowner	1.197	1.026
	(0.213)	(0.312)
Married	0.848	1.324
	(0.111)	(0.345)
One child	1.3728308	1.025
	(0.376)	(0.432)
Two children	1.202	0.750
	(0.281)	(0.269)
Three or more children	1.603**	0.994
	(0.355)	(0.339)
Black	1.198	1.459
	(0.173)	(0.392)
Hispanic	1.150	1.948**
	(0.228)	(0.619)
Male	1.340**	0.837
	(0.194)	(0.231)
Less than HS	0.920	1.006
	(0.138)	(0.272)
College degree	1.082	1.223
	(0.127)	(0.291)
Number of observations	14,665	2,412

Source: Authors' estimates from the *Health and Retirement Study* 1992-2010 waves.

Table 3. *Logit Regression Results for Pension Coverage in New Job*

	Pension coverage in new job
Unemployed last year	1.817***
	(0.307)
Any pension in the most recent job	6.155***
	(0.723)
DB in any previous job	1.790***
	(0.190)
Log of net worth (excluding DB, 401(k), and IRA wealth)	1.005
	(0.016)
Log of 401(k) and IRA wealth	1.006
	(0.013)
Peak difference	1.005
	(0.011)
Past peak	0.634
	(0.415)
Social Security wealth	0.993
	(0.025)
At or over FRA	3.346
	(3.231)
Log of earnings in new job	1.167***
	(0.028)
Retiree health insurance	1.390**
	(0.216)
Own employer health insurance	4.587***
	(0.660)
HI through spouse	2.049***
	(0.349)
Poor health	0.794
	(0.419)
Fair health	0.736
	(0.156)
Good health	0.967
	(0.142)
Very good health	0.898
	(0.124)
Work limitation	0.989
	(0.221)

(continued)

Table 3. *Logit Regression Results for Pension Coverage in New Job* (cont'd)

	Pension coverage in new job
Any ADL or IADL	0.999
	(0.159)
Homeowner	0.876
	(0.139)
Blue collar	0.861
	(0.127)
Agriculture, mining, construction	0.714
	(0.163)
Manufacturing, transportation	0.675***
	(0.094)
Trade, non-professional	0.702**
	(0.100)
Firm size < 25	0.580***
	(0.072)
Firm size 25-99	0.785*
	(0.113)
0-4 years of tenure in old job	0.844
	(0.102)
5-9 years of tenure in old job	0.801
	(0.131)
Married	0.974
	(0.141)
One child	1.373
	(0.357)
Two children	1.269
	(0.278)
Three or more children	1.321
	(0.279)
Black	0.918
	(0.149)
Hispanic	1.002
	(0.223)
Male	1.140
	(0.198)

(continued)

Table 3. *Logit Regression Results for Pension Coverage in New Job* (cont'd)

	Pension coverage in new job
Less than HS	1.035
	(0.186)
College degree	1.061
	(0.135)
Number of observations	2,622

Source: Authors' estimates from the *Health and Retirement Study* 1992-2010 waves.

Table 4. *HRS Sample Means at First Interview and SIPP Sample Means Projected to 50*

	HRS	SIPP
DB in current job	0.327	0.032
	(0.469)	(0.176)
DC in current job	0.331	0.521
	(0.470)	(0.499)
DB in previous job	0.402	0.215
	(0.490)	(0.410)
Real net worth(excluding DB, 401(k), and IRA wealth)	183,044.7	190,041.1
	(613,273.1)	(561,507.5)
[median]	[145,301.3]	[90,994.81]
Real 401(k) and IRA wealth	41,478.1	61,902.1
	(112,278.8)	(116,658.2)
[median]	[46,178.0]	[71,735.64]
Ratio of peak difference to lifetime earnings	3.206	3.180
	(1.434)	(1.721)
Peak Social Security wealth	177,516.7	219,233.1
	(72,337.5)	(84,154.1)
[median]	[168,350.7]	[211,536.9]
Ratio of Social Security wealth to lifetime earnings	4.072	4.007
	(1.832)	(1.956)
Social Security wealth	106,273.8	129,852.3
	(41462.3)	(65255.3)
[median]	[103,090.6]	[117,859.3]
Real earnings	28,961.0	34,103.1
	(61,228.3)	(21,329.1)
[median]	[20,868.14]	[28,968.26]
Retiree health insurance	0.400	N/A
	(0.489)	
Own employer sponsored HI	0.649	0.535
	(0.477)	(0.498)
HI provided by employer of spouse	0.211	0.149
	(0.408)	(0.356)
Poor health	0.018	0.035
	(0.133)	(0.183)
Fair health	0.102	0.112
	(0.302)	(0.315)

(continued)

Table 4. *HRS Sample Means at First Interview and SIPP Sample Means Projected to 50* (cont'd)

	HRS	SIPP
Good health	0.292	0.302
	(0.454)	(0.459)
Very good health	0.332	0.348
	(0.470)	(0.476)
Excellent health	0.256	0.203
	(0.436)	(0.402)
Work limitations	0.322	0.172
	(0.467)	(0.377)
Any ADLs or IADLs	0.054	0.067
	(0.225)	(0.249)
Homeowner	0.847	0.777
	(0.359)	(0.416)
Blue collar	0.275	0.226
	(0.446)	(0.418)
White collar	0.725	0.774
	(0.446)	(0.418)
Agriculture, mining, construction	0.086	0.109
	(0.280)	(0.312)
Manufacturing, transportation	0.251	0.147
	(0.433)	(0.354)
Public, professional	0.470	0.479
	(0.499)	(0.498)
Trade, nonprofessional	0.193	0.265
	(0.394)	(0.441)
Firm < 25	0.512	0.326
	(0.499)	(0.468)
Firm 25 to 99	0.152	0.127
	(0.359)	(0.332)
Firm 100 or more	0.336	0.547
	(0.472)	(0.497)
0 to 4 years of tenure	0.307	0.304
	(0.461)	(0.460)
5 to 9 years of tenure	0.184	0.187
	(0.387)	(0.389)

(continued)

Table 4. *HRS Sample Means at First Interview and SIPP Sample Means Projected to 50* (cont'd)

	HRS	SIPP
10 or more years of tenure	0.509	0.509
	(0.499)	(0.499)
Married	0.785	0.655
	(0.410)	(0.475)
No children	0.075	0.085
	(0.264)	(0.278)
One child	0.108	0.199
	(0.295)	(0.399)
Two children	0.292	0.302
	(0.454)	(0.459)
Three or more children	0.525	0.414
	(0.499)	(0.492)
Black	0.150	0.154
	(0.357)	(0.361)
White	0.850	0.846
	(0.419)	(0.361)
Hispanic	0.079	0.117
	(0.269)	(0.320)
Female	0.472	0.526
	(0.499)	(0.499)
Male	0.528	0.474
	(0.499)	(0.499)
Less than high school	0.160	0.090
	(0.366)	(0.287)
High school	0.592	0.553
	(0.491)	(0.497)
College educated	0.248	0.357
	(0.432)	(0.479)
Number of observations	9,581	59,796

Source: Authors' calculations from the *Health and Retirement Study* 1992-2010 waves and SIPP 2004 and 2008 panels.

Table 5. *Marginal and Cumulative Impact of Changing from HRS to SIPP Means on Average Retirement Age*

Explanatory variable	Marginal effect of changing to SIPP means	Difference from HRS age
HRS at baseline	61.84	----
DB in current job	61.94	0.10
DC in current job	61.86	0.02
DB in a previous job	62.86	1.02
Log of net worth (excluding DB, 401(k), and IRA wealth)	61.93	0.09
Log of 401(k) and IRA wealth	61.90	0.06
Social Security wealth and peak difference	61.89	0.05
Increase in the Social Security FRA	62.10	0.26
Log of earnings	61.90	0.06
Retiree health insurance	62.76	0.92
Own health insurance	62.03	0.19
Covered by spouse's HI	61.93	0.09
Health	61.42	-0.42
Work limitation	61.88	0.04
IADLs/ADLs	61.71	-0.13
Homeowner	61.92	0.08
Industry	61.79	-0.05
Occupation	61.80	-0.04
Firm size	61.68	-0.16
Tenure	61.79	-0.05
Marital status	61.73	-0.11
Children	61.87	0.03
Race	61.79	-0.05
Hispanic origin	61.81	-0.03
Gender	61.78	-0.06
Education	61.96	0.12

Source: Authors' calculations from the *Health and Retirement Study* 1992-2010 waves and SIPP 2004 and 2008 panels.

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