Predicting labor force participation of the older population

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Introduction

Labor force participation (LFP) rates are changing—and, at least for some groups, changing dramatically. These trends have important societal implications. For the most part, they indicate longer stays in the labor force and later retirement. Such trends may allow for the accumulation of greater wealth by the time an individual reaches retirement age, allowing for higher levels of income replacement and less pressure for increases in Social Security benefits. These trends may also reduce the financial stress borne by the working generation in supporting the retiring generation.

Given the importance of these and other potential effects of changing LFP rates, the ability to predict the future of such rates could be helpful to decision-makers. While LFP trends to date have been well documented, there have been few projections of trend lines that have instilled confidence. The purpose of this paper is to report on new LFP projections based on novel but rigorous methods taking advantage of panel data from the Health and Retirement Study.

We begin with LFP rates based on the Current Population Survey, then move to two-year labor force retention rates and retirement hazards from HRS data. We then introduce the prediction tool, the HRS respondent's subjective probability of retention in the labor force at age 62 (or 65). We show the trends in this measure over the course of the past two decades and demonstrate its favorable comparability with actual retention behavior. We present individual- and population-level predictions of LFP rates based on subjective probabilities. We conclude with some data about possible cause of the increased LFP rates.

Trends in LFP from CPS data

Since 1990, participation rates of men (see Figure 1) have been declining slightly—by 10% or less--for men under 60, while those at older ages have sharply increased; those between 65 and 69 have increased their LFP rates by some 50%. Among women (see Figure 2), the long-term trend in LFP rates have been peaking and then falling—in the early 2000's for women aged 45-49, in the late 2000's for 50-54-year olds, but among women 65 to 69 the trend is still upward. For all age groups of women between 50 and 69, though, LFP rates are higher than they were in 1990. An implication of flat or decline LFP rates at younger ages and increasing LFP at older ages is that retirement hazard rates at older ages have been decreasing.

Trends in retention rates from panel data

Based on these participation trends retirement is growing later. This can be seen directly in labor force transitions observed in the Health and Retirement Study (HRS) from 1994 to 2010. Figures 3 and 4 show, for 60-to-64-year-old men and women respectively, the labor force retention rate $P(LF_{t+2} \mid LF_t)$; that is, the probability that someone in the labor force at t will still be in the labor force at $t+2$ where t is in years. Again, these rates are the average of those observed for specific individuals in panel.

The result is an upward trend, interrupted by the Great Recession of 2008 to 2010. Large increases in unemployment rates over those years show up as lower labor force retention. On the whole, though, the two-year retention rate increased from 0.70 in 1994 to 0.78 in 2010. A regression line through the nine points in Figure 3 has a slope of about 0.002, which means that the retention rate increased by 0.002 per year. Over the 16 years of these data, the regression suggests an increase of about 0.032 in

the retention rate. Said differently, the retirement hazard decreased by 0.032 from a base of about 0.75. These trends were even more dramatic for women (Figure 4).

Similar graphs can be drawn for other age bands and the retention rates from 1994 to 2010 can be estimated by regression for each age band. The resulting estimates of the change in the retention rate over time are shown in Figures 5 and 6. Men in their sixties have had annual retention rate increases of 0.001 to 0.002. Those in their fifties show much smaller changes, whereas, for those aged 70 to 74, retention rates have actually been decreasing. For 75-to-79-year-old men, though, retention rates have increased and at relatively high rates. The latter are reflected in LFP increases for these older men in the CPS, from 7.6% in 2002 to 11.3% in 2013.

As shown in Figure 6, women in all age bands had increases in the retention rate. For those aged 60-64, it was greater than it was in men, whereas for 75-to-79-year-olds, the rate was very small.

Trends in transition rates

Given that LFPs are still increasing for older cohorts, the expectation would be for later retirements. Figure 7 compares two cohorts in the HRS: the one born in 1936 (observed from age 56 on) and the one born in 1941 (observed from age 51 on). The graph shows, by year of age, the retirement hazard, or the probability that, given LFP at time *t,* an individual will no longer be in the labor force at *t + 2,* that is, $P(LF_{t+2} \mid LF_t)$.

The retirement hazards, of course, increase for both cohorts with age, and according to the same pattern, except for ages between 60 and 65, where the older cohort left the labor force at a substantially higher rate. Thus, if an individual was five years older (born in 1936 vs. 1941), he or she would have had a higher retirement hazard than a younger individual reaching that age. The difference is concentrated at ages 60-65. Thus we see in cohort comparisons the same pattern as in cross-section LFP and in cross-section retention rates.

Subjective probability of working past age 62 and 65

An important research and policy question is whether this trend to later retirement will continue. One approach to answering this question is through subjective probabilities elicited by questions on the HRS instrument. For example,

> Thinking about work in general and not just your present job, what do you think the chances are that you will be working full-time after you reach age 62?

This question, termed P62 for short, is asked of anyone working whose age is less than 62. It has strong predictive powers for future work status (Hurd, 2009). Although the question refers only to working full time after reaching age 62, we will not make a distinction between full-time or part-time work, but just refer to labor force participation.

Figure 8 shows the trend in successive cross-section in P62, expressed as a percentage, for three age bands between 55 and 60. For each age band, P62 generally trends upward between 1992 and 2012, starting out near 55% and topping out in the sixties, for a gain of about one-fifth. (Note the higher values for older workers, as would be expected because they are closer to the target age of 62.)

Among women (see Figure 9), the expected probability of working at age 62 also trends upward, but somewhat more sharply. It begins in the forties in 1992 and reaches the fifties before falling back some. Thus for women, P62 has risen somewhat more sharply, showing a gain of roughly one-quarter over a 20-year period.

P65, or the expected probability of working at age 65 is, of course, lower than P65. It shows an even greater increase in P65 than P62 does. In 1992, for men, P65 was about 30% in each of the age bands (see Figure 10). Twenty years later, P65 had increased to 49% for the oldest age band—an increase of close to two-thirds (almost 20 percentage points). For women, the expectation of working at age 65 has increased even more quickly over the passage of time, starting between 20% and 25% in 1992 and almost doubling to around 40% in 2012.

Predictive accuracy of P62

Clearly, HRS respondents are more inclined with the passage of time to believe they will still be working at age 62 (or 65). But how reliable is P62 at predicting the future? To find out, we use data on three groups of workers: those aged 51-55 in 1992, those aged 51-55 in 1998, and those aged 53-55 in 2004. These ages were chosen because they are from the new cohorts inducted into the HRS in those years, so that the composition of these age-specific populations is not affected by any differential attrition in panel, and because in panel we can observe their actual labor force status when they are 62 and 63 and compare it to their P62. (We present data from both ages because there is some ambiguity in the question about the subjective probability of working: it asks about working "…after you reach age 62" which could refer to labor force status at the 62nd birthday, while age 62, or even at the 63rd birthday.)

In 1992 among workers aged 51-56, average P62 was 48.4% (see Figure 12). When those same workers were 62 (as observed in later HRS waves) their average participation rate (LF62) was 47.8%, and when they were 63 their participation rate (LF63) was 44.6%. Tests with the other two groups confirm that P62 predicts labor force status within four or five percentage points.

Predicting future labor force status

For this analysis, we use detailed labor force transition rates, specifically, two-year labor force retention rates $P(LF_{t+2} \mid LF_t)$. These rate are calculated separately for each single-year birth cohort from 1937 to 1941 from 1992 to 2010 as they age from 51-55 to 71-75. Based on retention rates and beginning with 100% participation at ages 51 and 55, we simulate future labor force participation. Figure 13 shows the curves for remaining in the labor force (which we will call "survival in the labor force") by age for the 1937 and 1941 cohorts using these panel transition rates. The survival rates are very close until the early 60s, when the younger cohort has greater survival. This shows that, with the passage of time, retention in the labor force (decline in the retirement hazard) has increased among workers in their 60s but not in their 50s.

We calculate similar transition rates from not in the labor force to in the labor force: $P(LF_{t+1} \mid NLF_t)$.(not shown). We use them in the simulations to account for labor force (re)entry at older ages.

For transitions at ages greater than 70, we take the average of every transition whenever they are observed in the waves of the HRS.

To simulate LFP rates of individuals in the work force, we use a Cox proportional hazard model to adjust $P(LF_{t+2} \mid LF_t)$ so that the labor force participation rate of workers who were 51-55 in 1992 averaged over ages 62 and 63 is the same as the average of their stated P62's in 1992. This adjustment produces the simulated labor force participation rate of workers aged 51-55 in 1992 centered at age 53. The labor force participation rate averaged over ages 62 and 63 is 48.3, which is the average stated P62 by those workers in 1992. In this case the Cox factor (the multiplicative factor applied to each retirement hazard) is just 0.984, because without any adjustment, the simulated curve almost matches P62: with no adjustment the average simulated labor force participation rate of 62- and 63-year-olds is 47.7%. As shown in Figure 14, the labor force participation rate begins at 100% (recall that the analysis is restricted to individuals in the work force at the outset) and declines rapidly; yet even at age 70, 17.5% of those working at ages 51-55 would still be in the labor force.

Predicting population labor force participation

To simulate population labor force participation rates, we begin at ages 51-55 with an observed LFP rate in the HRS of 77.4% at those ages. LFP is simulated forward according to the observed $P(LF_{t+2} \mid LF_t)$ for those in the work force at any age and $P(LF_{t+2} \mid NLF_t)$ for those not in the work force at any age. The $P(LF_{t+2} \mid LF_t)$ are adjusted by the Cox factor of 0.984, which is the result of matching P62 observed in 1992 to simulated LFP at ages 62-63. The resulting LFP curve incorporates:

1. Initial LFP in 1992 among those 51-55
2. P62 among workers from those ages
3. Observed transitions into and out of the labor force by those cohorts in panel

These curves match observed LFP from the CPS quite closely, as shown in Figure 15.

To predict labor force participation in future years, we use observed P62 by workers in HRS 2010 in the same age band to adjust the Cox factor so that the average LFP rate of 62- and 63 year-olds matches the 2010 value of P62. Thus this is approximately a 10-year-ahead forecast. The average P62 was 52.3, so this matching required reducing the Cox factor to 0.895. Because we have no comparable data on the subjective probability of re-entering the labor force, and because there is no obvious trend in the actual transition rates we assume that the transition rates from not in the labor force to in the labor force $P(LF_{t+1} \mid NLF_t)$ are unchanged from the HRS values.

Figure 16 shows the baseline simulation and the simulation with altered P62. The line "HRS P62 2010" shows the result of the simulation using P62 from HRS 2010. It lies above the line based on P62 from HRS 1992 because P62 was greater in 2010 than in 1992. The largest increase in LFP is at age 67, where it amounts to 3.4 percentage points or a 10% increase.

The area under the curve is the expected work life from age 53 to 92, including those not in the labor force. In the baseline simulation, expected work life is 11.4 years, and in the altered simulation it is 12.2 years, a gain of 0.8 years. Thus, this method predicts that the cohort aged 51-55 in 2010 will work about 0.8 years longer than the cohort aged 51-55 in 1992.

An alternative to using P62 is to use P65 to find the Cox factor. P65 increased at a greater rate than P62: whereas P62 increased from 48.3 to 52.3, an increase of 8%, P65 increased from 26.5 to 36.9, an

increase of 39%. Thus matching labor force participation at 65/66 to P65 rather than the labor force participation at 62/63 to P62 will produce a greater increase in LFP between 1992 and 2010.

Using P65 the largest increase in labor force participation is 8.2 percentage points at age 66 (see Figure 17). Population work life among those aged 51-55 in 1992 is 10.4 years, less than under P62, but population work life under P65 in 2010 is 12.3 years, a gain of 1.9 year or 17.5%.

Possible causes of increases in LFP

Previous sections of this paper have demonstrated evidence from various sources and methods to the effect that people are retiring later than they have in the past. What is driving this trend? There are several possible explanations.

Better health. People sometimes cut back on their working hours or stop working entirely because of health shocks. Conversely, a trend toward better health at a given age might help explain longer stays in the work force. But actually, among HRS respondents, health has actually worsened. The graphs in Figure 18 tell this story for survey responses between 1992 and 2010 for a number of conditions. Overall, the percent of men aged 51-56 who rated their health as fair or poor increased from 17% in 1992 to 23% in 2010; the percent of women who rated their health similarly increased from 19% to 24%. Between 1998 and 2010 the percentage of both men and women with at least one limitation on activities of daily living (ADL) increased. The prevalence of diabetes increased sharply, almost doubling among both men and women. Heart disease was approximately constant for men but increased substantially among women. The percentage who have or have had cancer almost tripled among men and increased by 50% among women. For both men and women, the prevalence of BMI of 30 or greater increased by 15 percentage points. All indicators point to a worsening of health.

Fewer physically demanding jobs. Similarly, as arguably less physically demanding jobs replace the more so, retirement will be deferred because fewer people's jobs will depend on avoiding the physical frailties of age. We do not have the data to test this hypothesis.

Greater survival prospects. Perhaps people are waiting longer to retire because they expect to live longer, and are using greater wealth accumulated from longer LFP to finance a longer retirement. But according to Figures 19A and 19B, subjective survival probabilities have not increased, and at least for men, they have actually decreased. For example, for men ages 55-59 and 60-64, the average subjective survival probability to age 75 deceased from about 63% to 58% from 1994 to 2012. According to a 1990 life table, this is equivalent to aging by about seven years. For women the pattern is less clear, but with the exception of 2008, the average decreased after about the year 2000.

Joint retirement. It is possible that increased LFP among wives induced husbands to remain in the labor force longer. This, however, does not explain what caused the increased LFP among wives.

Decline of defined-benefit pensions. DB pensions have strong incentives to retire at specific ages, often prior to age 62. A drop in the prevalence of DB pensions would thus work towards later retirement. An examination of HRS responses reveals, however, that, while DB pensions among men have fallen by about one-third, the drop among women is much less—around 10% (Figure 20).

Changes in the Social Security system. The Full Retirement Age increased from 65 to 66 over a six-year period ending in 2009. This change has moved the peak retirement hazard rate from age 65 to age 66.

This probably played some role in the deferment of retirement. However, the increase in labor force participation began before the change in the Social Security full retirement age

Changes in individuals' expectations about future Social Security benefits. If individuals believe that future Social Security benefits are likely to be less generous, they will need to consider to either work longer or save more or both. In HRS we observe trends across cohorts of people in their early 50s that show people think it is increasingly likely that benefits will be less generous (see Figure 21). Respondents 51-56 years old in 1992 thought that the chance that Social Security reform would lead to less generous benefits sometime in the future was 60 percent on average. By 2010, eighteen years later, the same cohorts thought the chance of lower benefits was 72 percent on average.

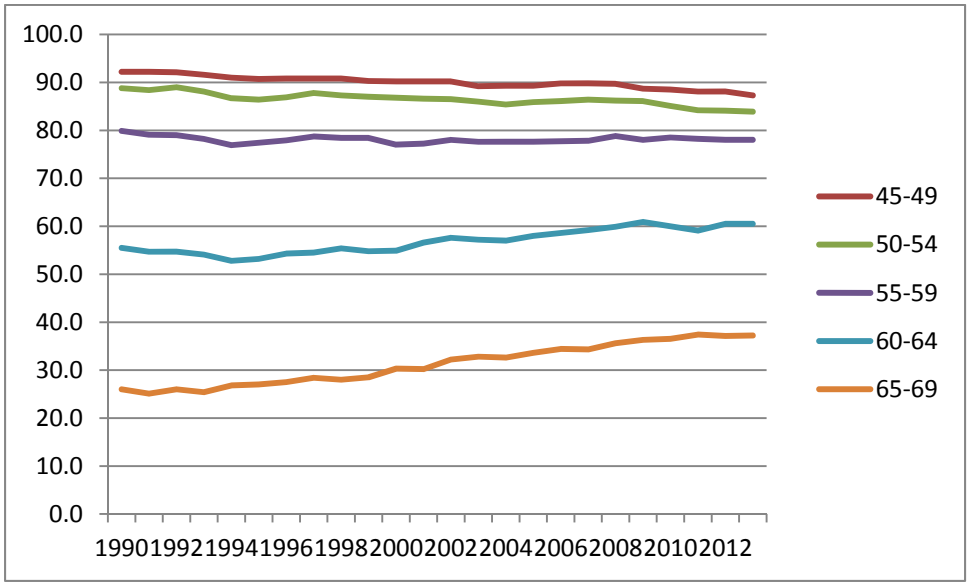
Conclusion

The subjective probabilities of working past 62 and 65 have predicted the increase in LFP at older ages that we have observed over the past 20 years. A cohort analysis shows that these subjective probabilities have continued to increase among recent cohorts of workers in their early 50s. These facts suggest that the LFP rates of older workers will continue to increase at least for another10-15 years.

References

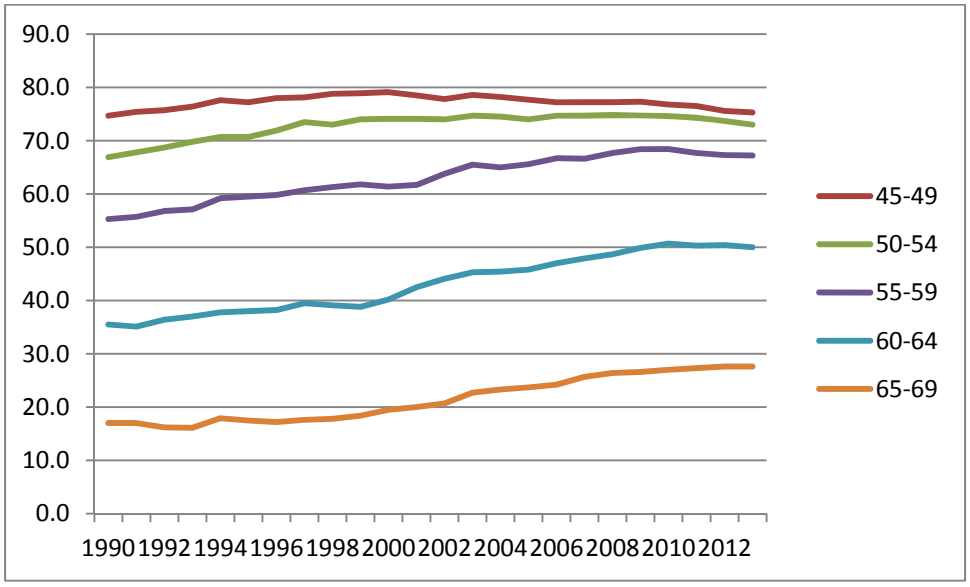
Hurd, Michael D., 2009, "Subjective Probabilities in Household Surveys," *Annual Review of Economics,* Vol 1, 543-562

Figure 1. Labor force participation of men



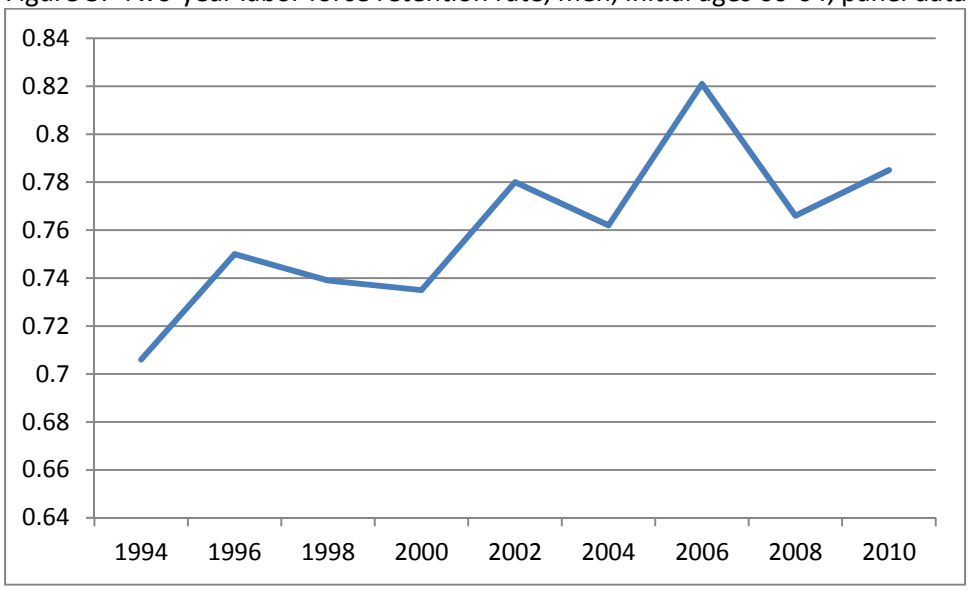
Source: CPS

Figure 2. Labor force participation of women



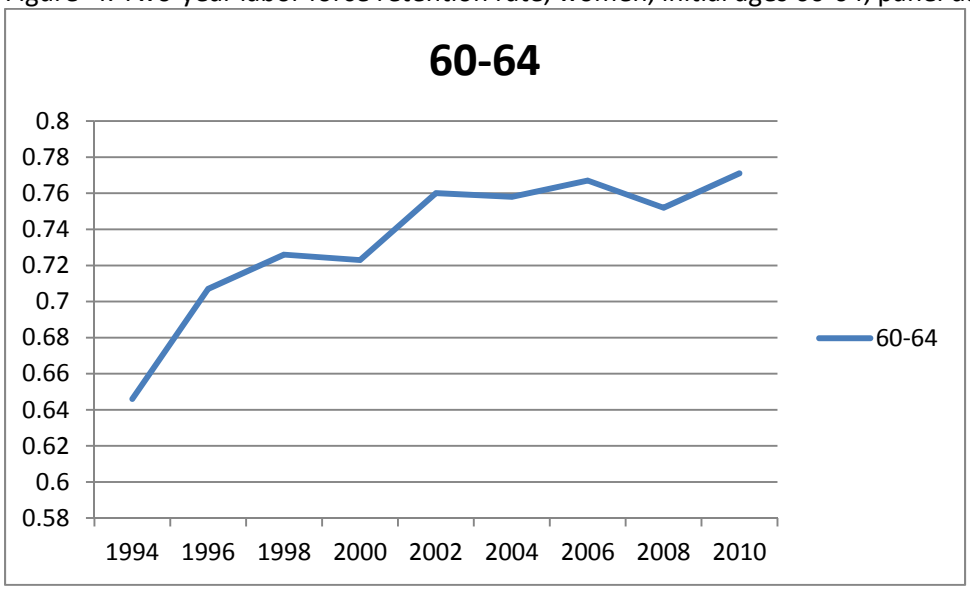
Source: CPS

Figure 3. Two-year labor force retention rate, men, initial ages 60-64, panel data



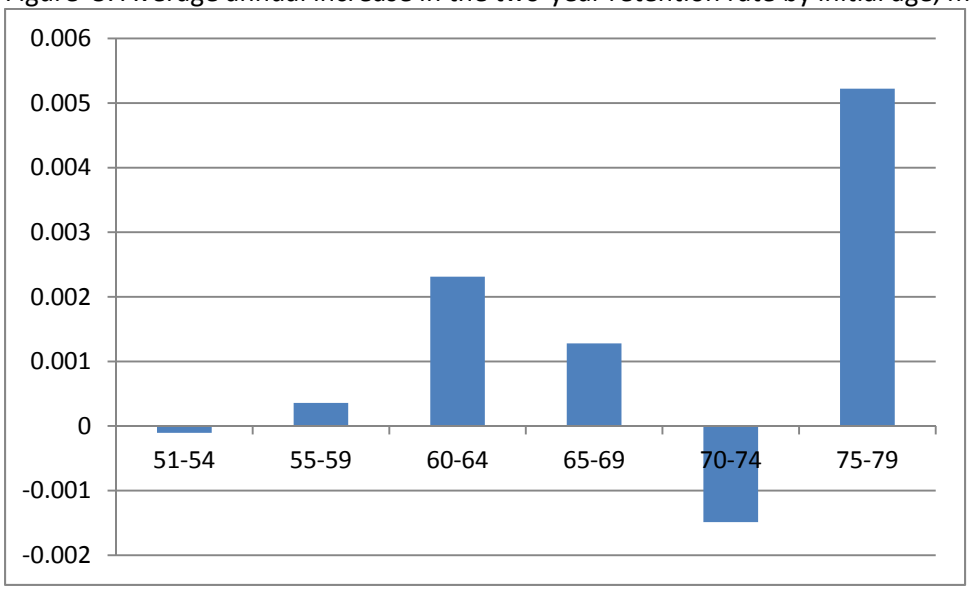
Source: Authors' calculations based on HRS

Figure 4. Two-year labor force retention rate, women, initial ages 60-64, panel data



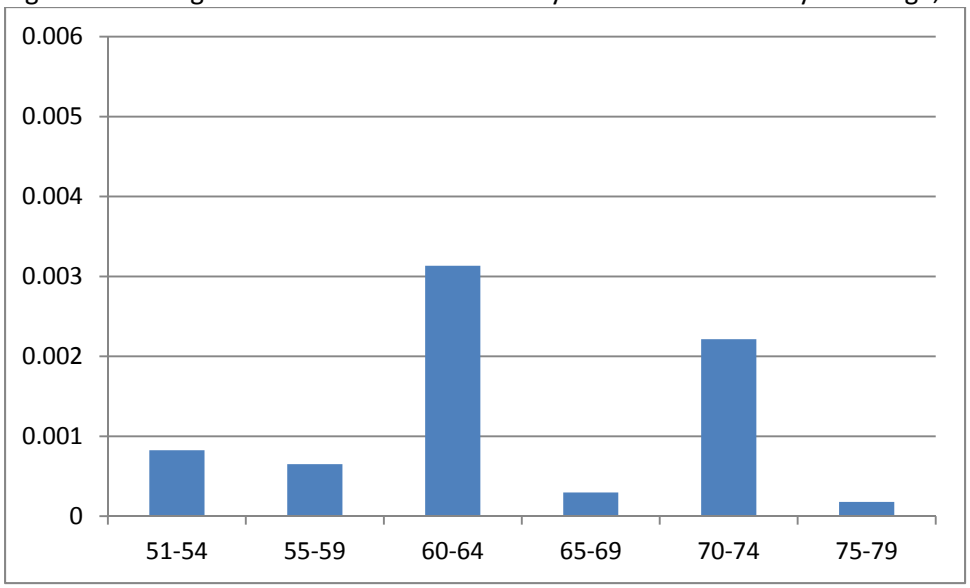
Source: Authors' calculations based on HRS

Figure 5. Average annual increase in the two-year retention rate by initial age, men



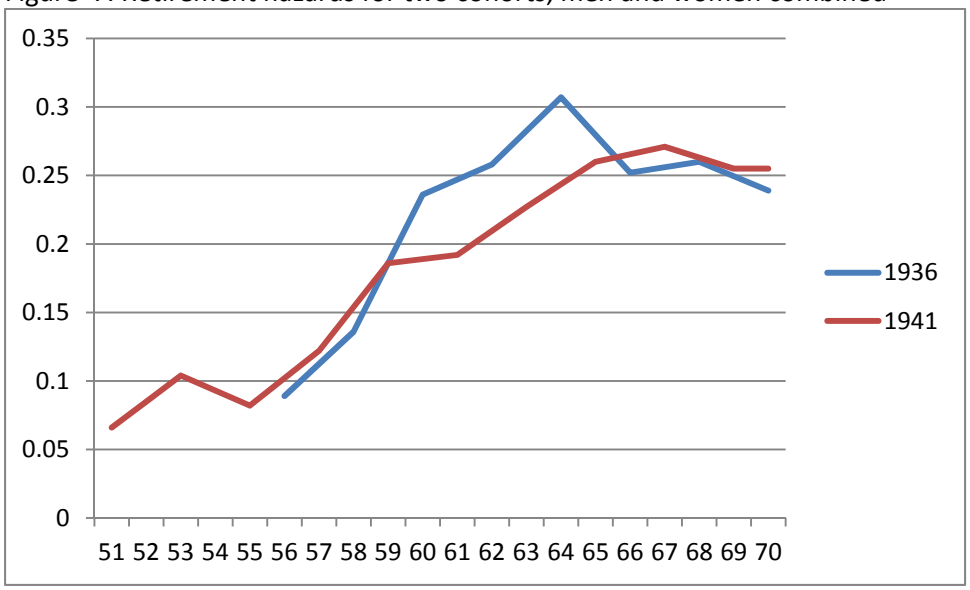
Source: Authors' calculations based on HRS

Figure 6. Average annual increase in the two-year retention rate by initial age, women



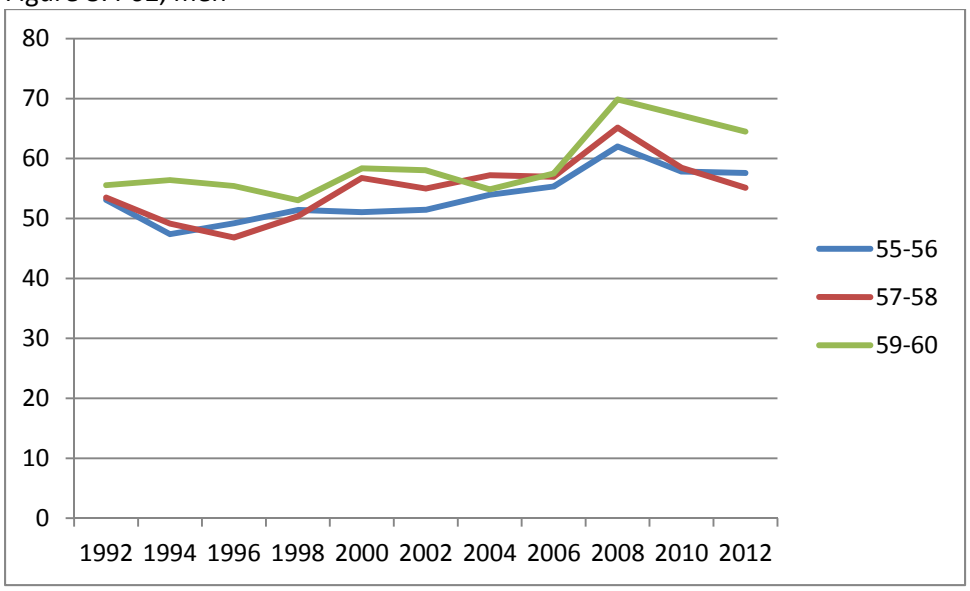
Source: Authors' calculations based on HRS

Figure 7. Retirement hazards for two cohorts, men and women combined



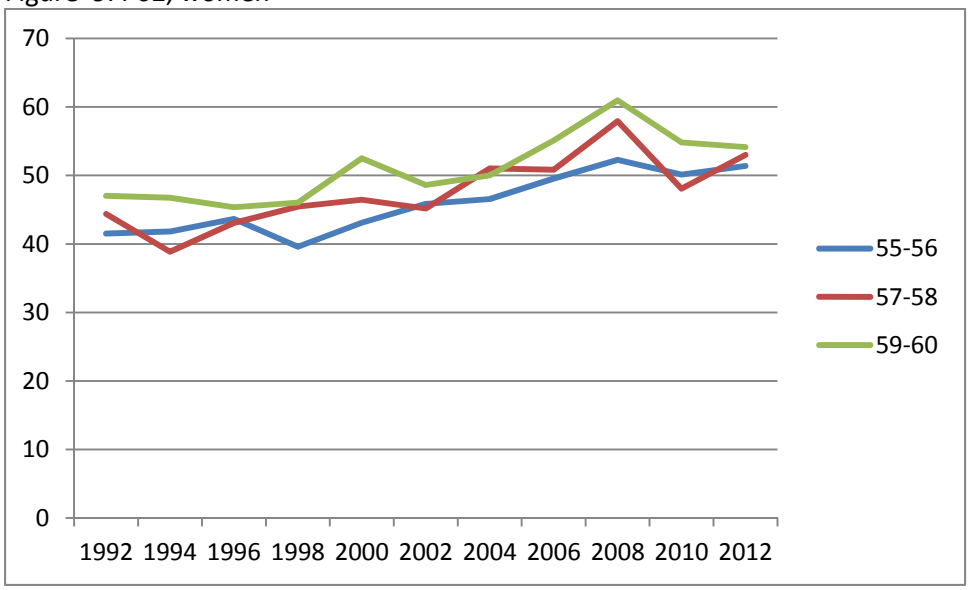
Source: Authors' calculations based on HRS

Figure 8. P62, men



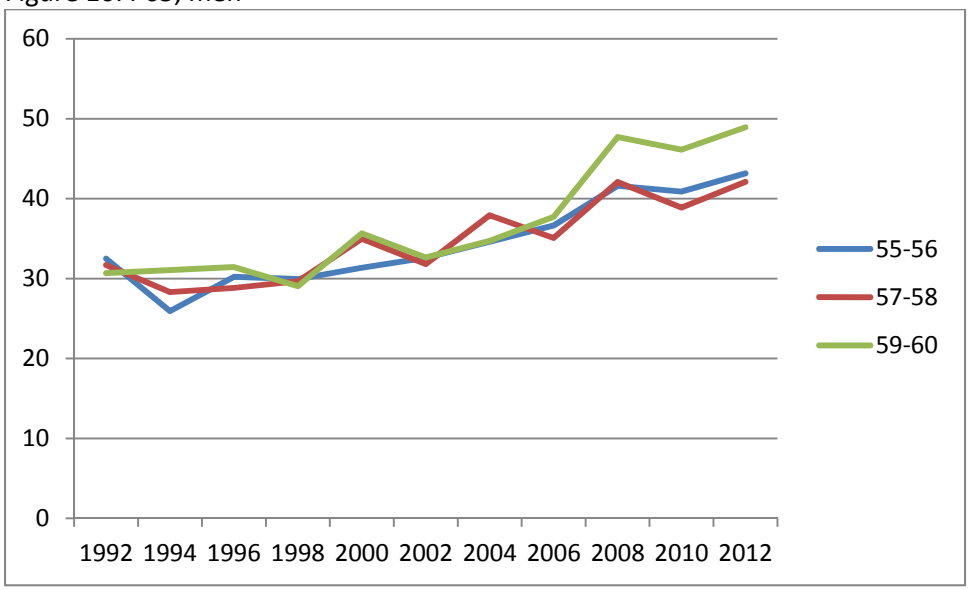
Source: Authors' calculations based on HRS

Figure 9. P62, women



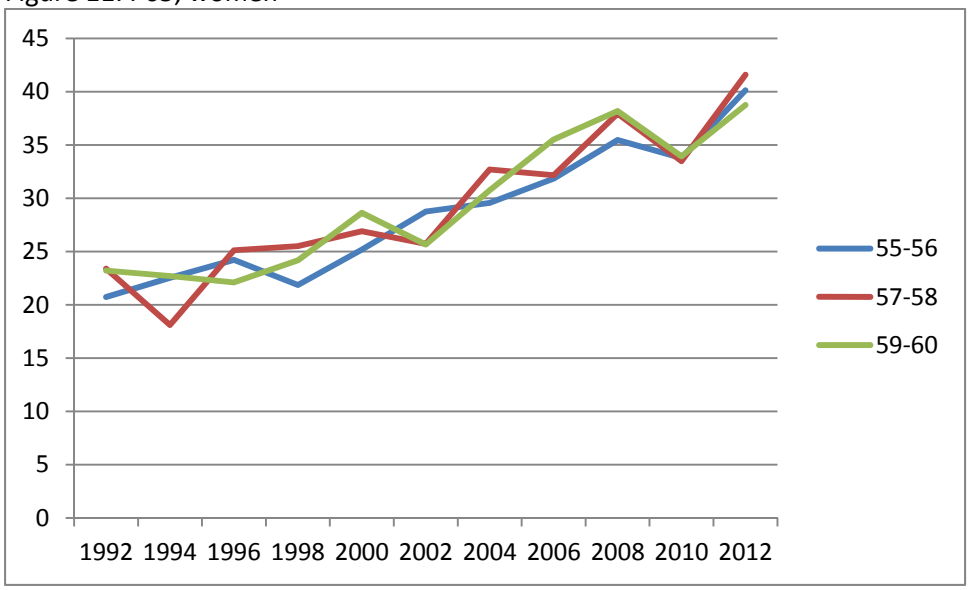
Source: Authors' calculations based on HRS

Figure 10. P65, men



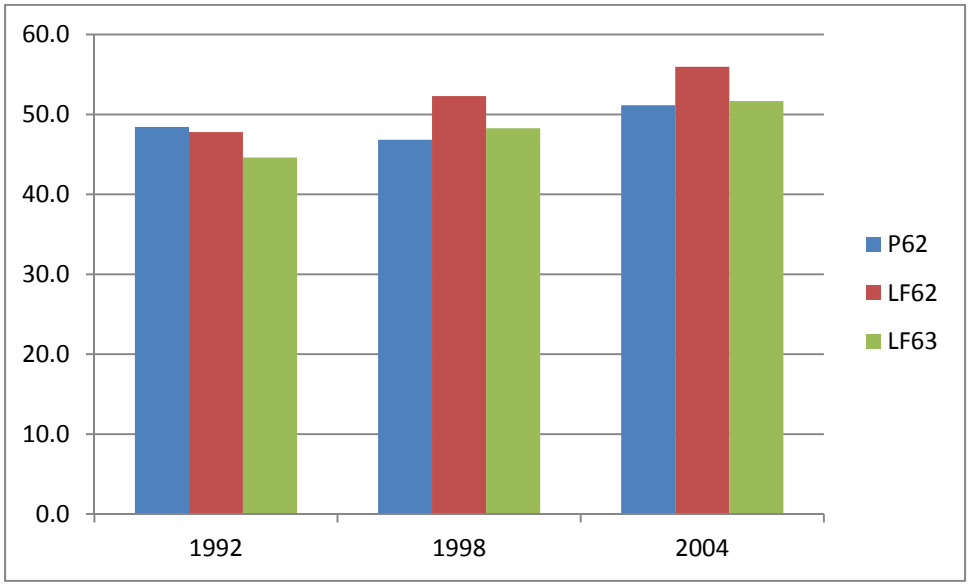
Source: Authors' calculations based on HRS

Figure 11. P65, women



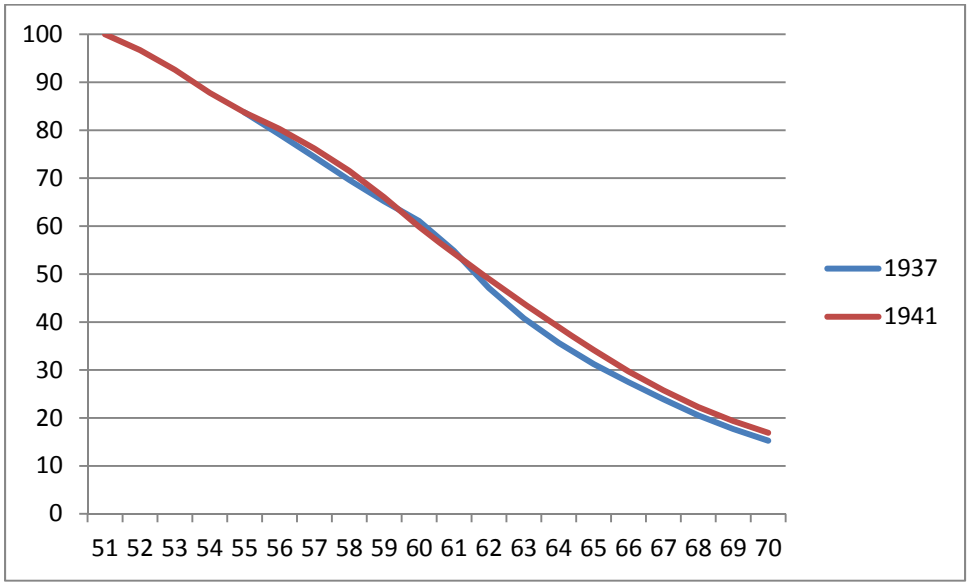
Source: Authors' calculations based on HRS

Figure 12. Average P62, average labor force participation rate at age 62 and at age 63, panel, men and women combined.



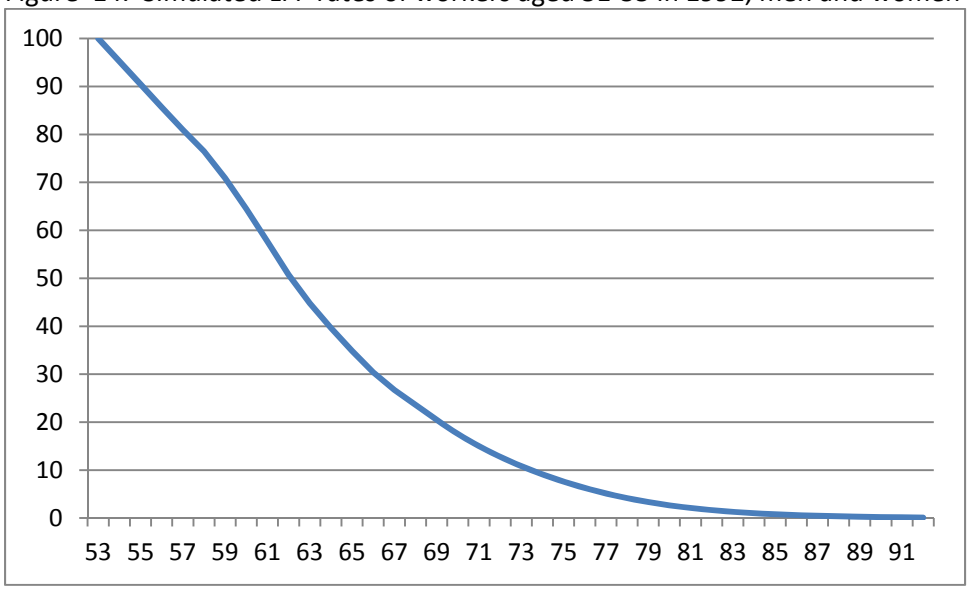
Source: Authors' calculations based on HRS

Figure 13. Conditional on working in 1992, survival in the labor force for birth cohorts 1937 and 1941, men and women combined.



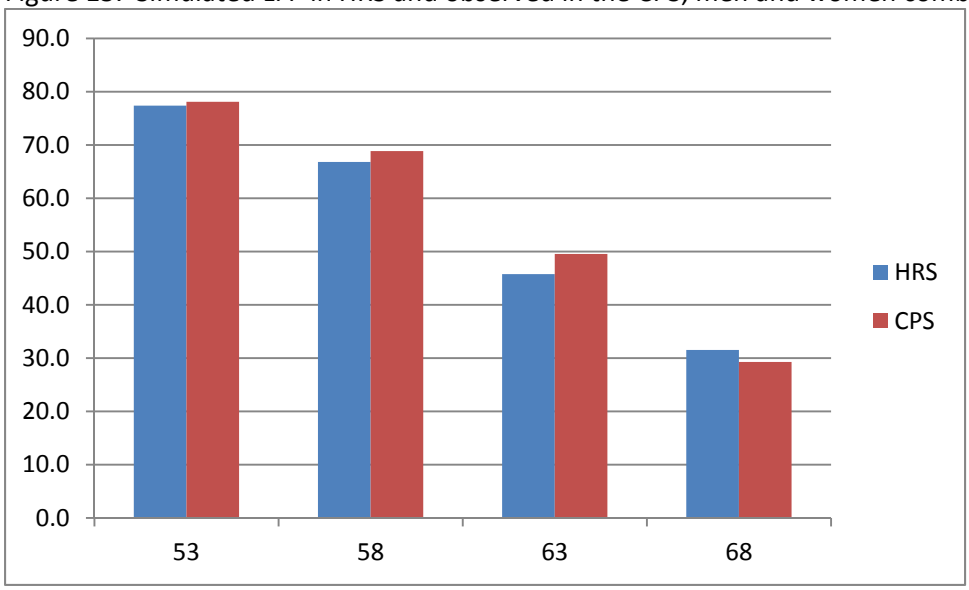
Source: Authors' calculations based on HRS

Figure 14. Simulated LFP rates of workers aged 51-55 in 1992, men and women combined.



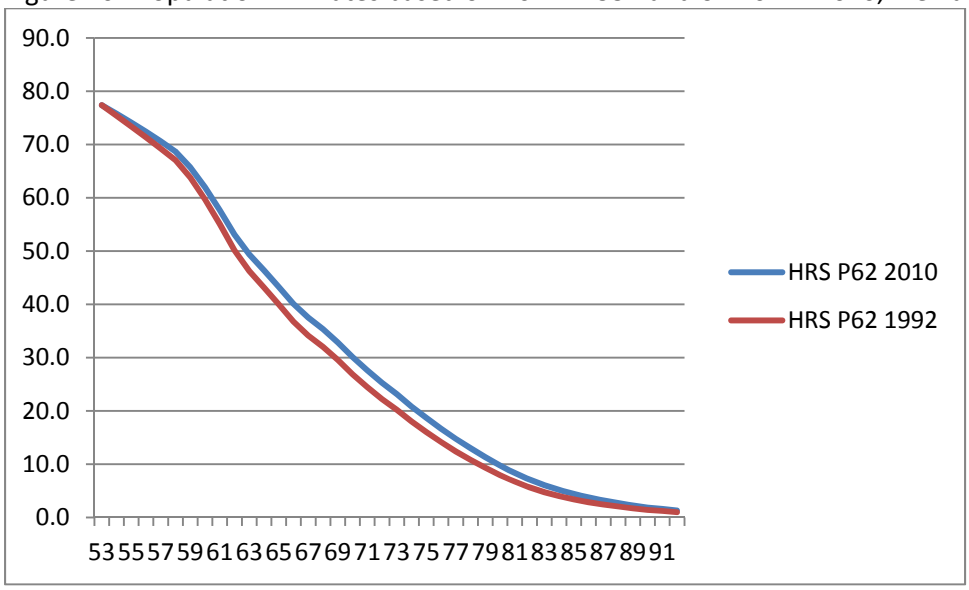
Source: Authors' calculations based on HRS

Figure 15. Simulated LFP in HRS and observed in the CPS, men and women combined.



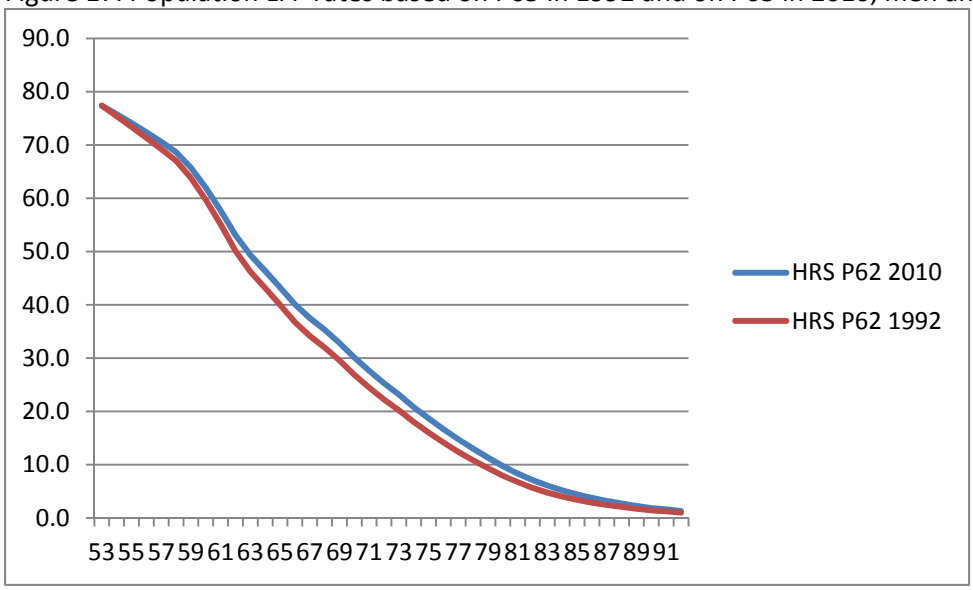
Source: Authors' calculations based on HRS

Figure 16. Population LFP rates based on P62 in 1992 and on P62 in 2010, men and women combined.



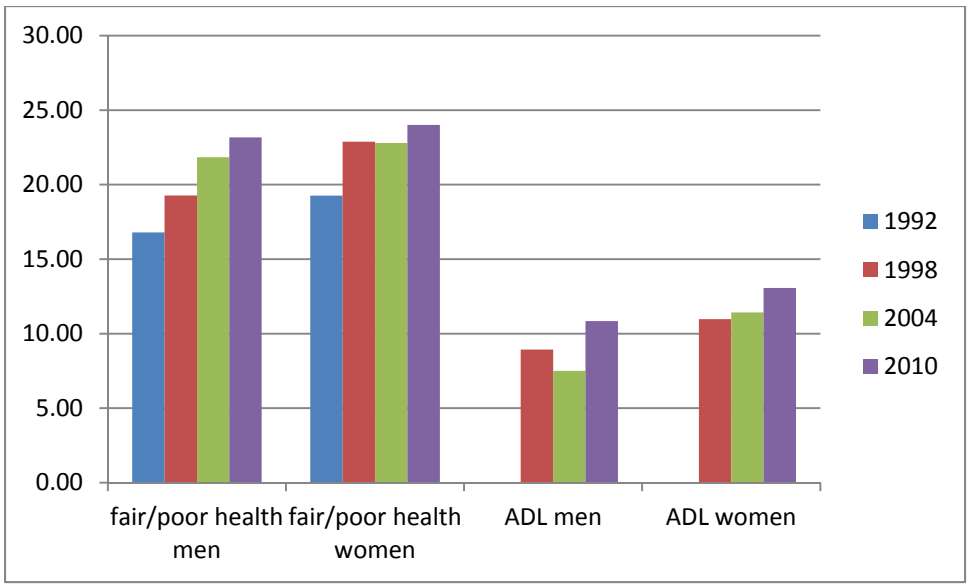
Source: Authors' calculations based on HRS

Figure 17. Population LFP rates based on P65 in 1992 and on P65 in 2010, men and women combined.



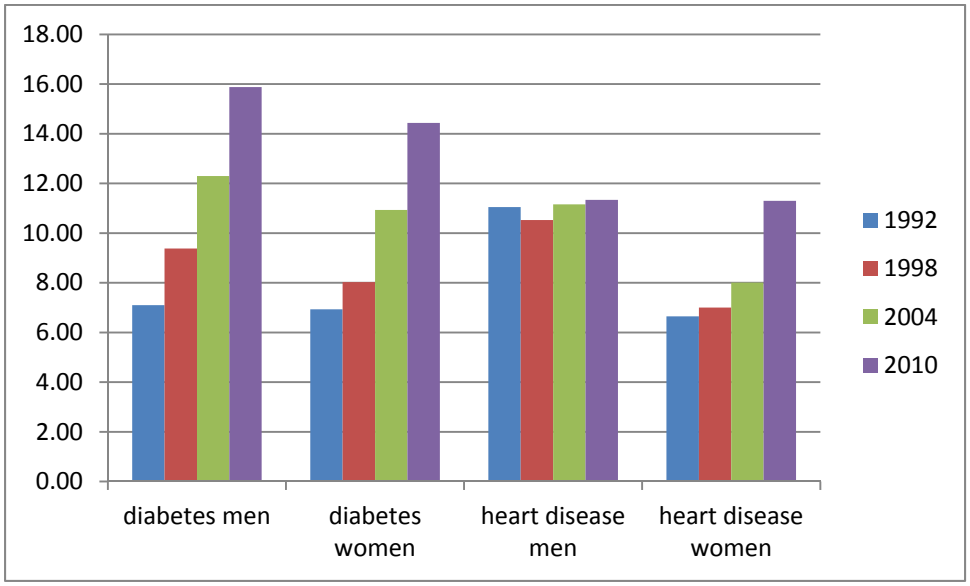
Source: Authors' calculations based on HRS

Figure 18A. Percent with fair or poor self-rated health; percent with an ADL limitation, ages 51-56



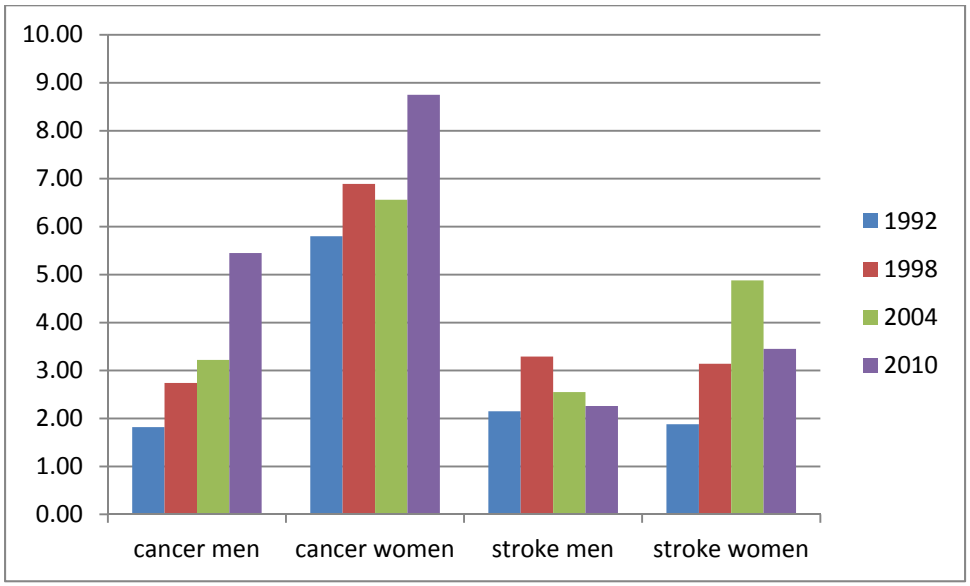
Source: Authors' calculations based on HRS

Figure 18B. Percent with diabetes; percent with heart disease, ages 51-56



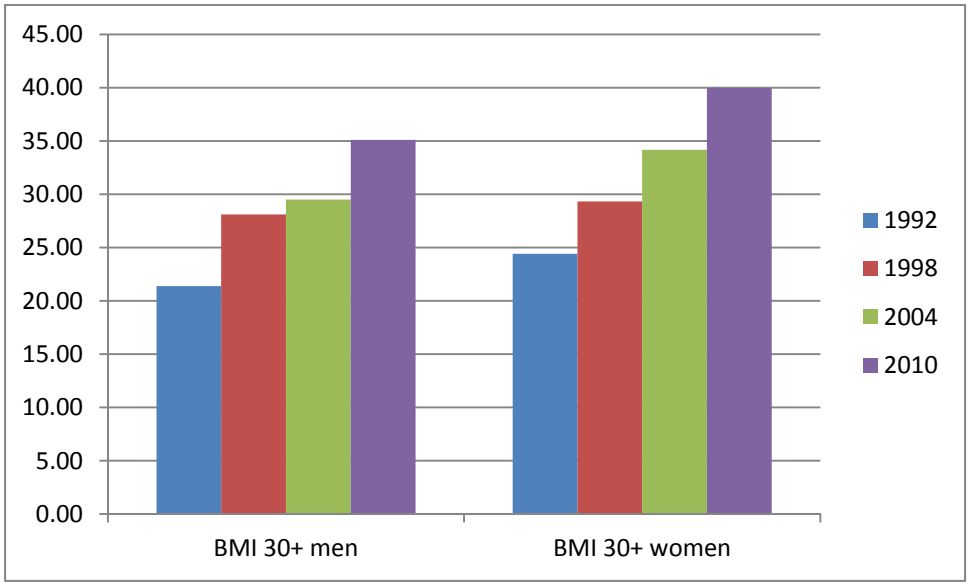
Source: Authors' calculations based on HRS

Figure 18C. Percent who have/have had cancer; percent who have had a stroke, ages 51-56



Source: Authors' calculations based on HRS

Figure 18D. Percent with BMI 30 or greater, ages 51-56

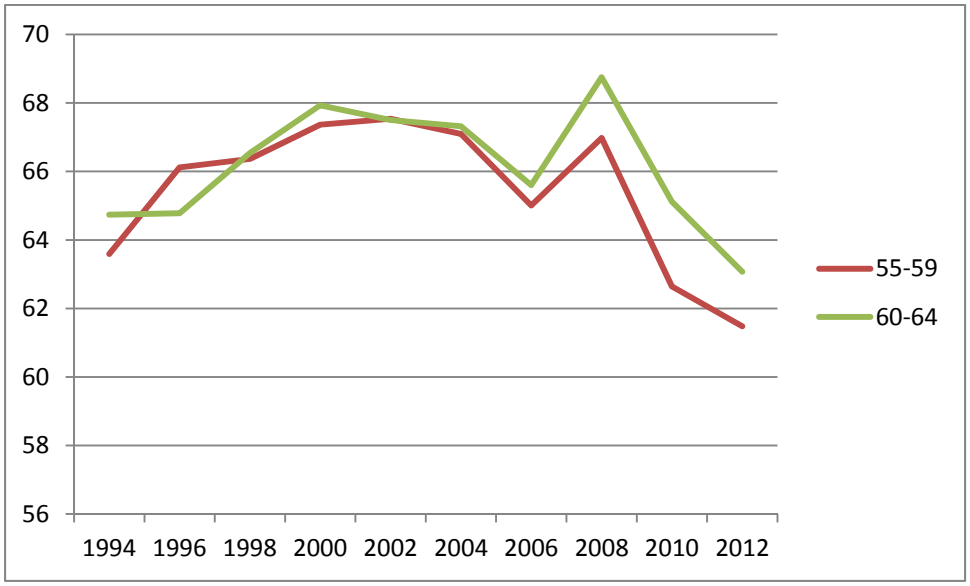


Source: Authors' calculations based on HRS

Figure 19A. Average subjective survival to age 75, males

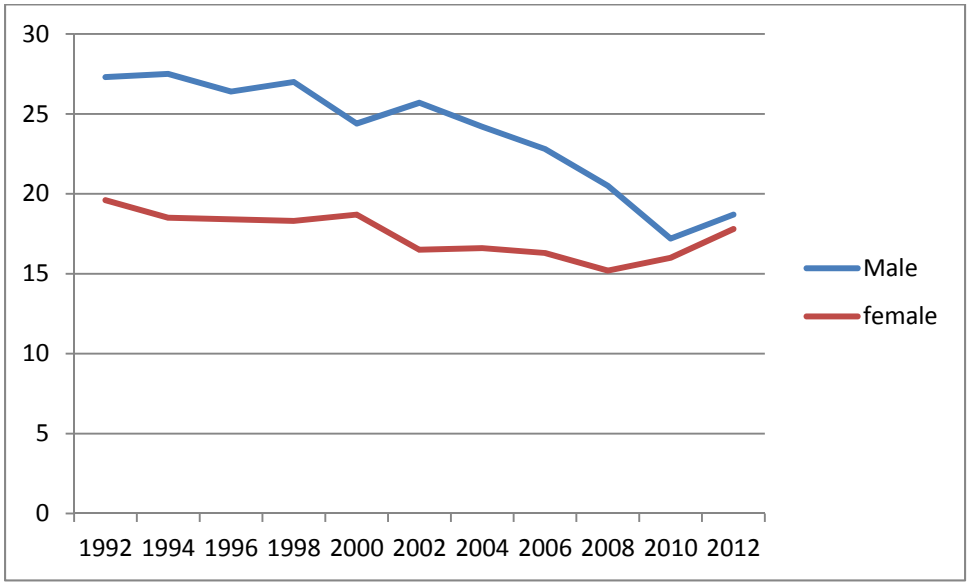
Source: Authors' calculations based on HRS

Figure 19B. Average subjective survival to age 75, females



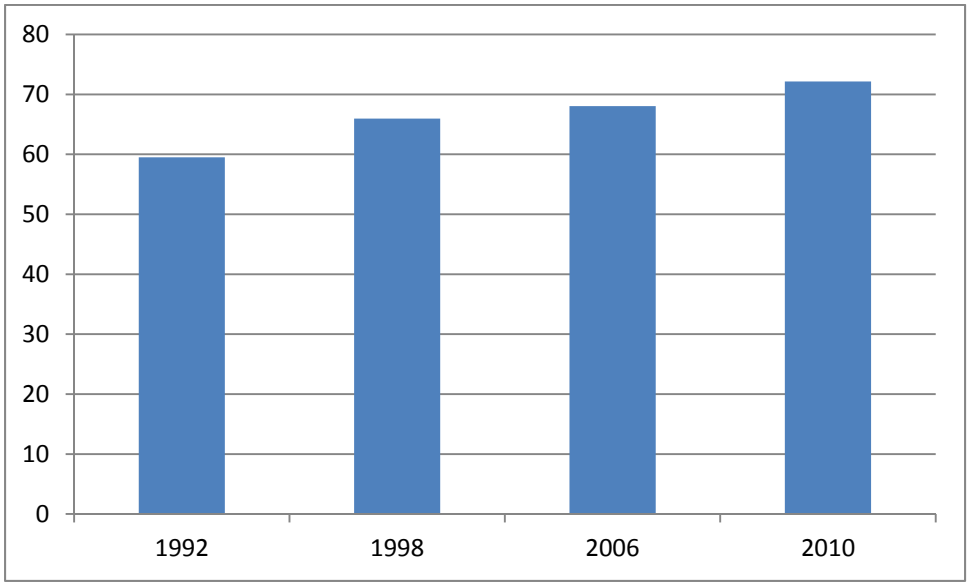
Source: Authors' calculations based on HRS

Figure 20. Percent with DB pension on present job



Source: Authors' calculations based on HRS

Figure 21. Subjective probability that Social Security benefits will be reduced, 51-56 year-olds



Source: Authors' calculations based on HRS