NBER WORKING PAPER SERIES

DOES RETIREMENT IMPROVE HEALTH AND LIFE SATISFACTION?

Aspen Gorry
Devon Gorry
Sita Slavov

Working Paper 21326
http://www.nber.org/papers/w21326

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
July 2015

We thank Chanup Jeung and Brittany Pineros for excellent research assistance. We are grateful to Lisardo Bolaños, Maria Casanova, John Earle, Kyung Min Lee, Thomas Stratmaan, and seminar participants at George Mason's School of Policy, Government, and International Affairs, Utah State University, and Weber State University for helpful comments. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

Does Retirement Improve Health and Life Satisfaction?
Aspen Gorry, Devon Gorry, and Sita Slavov
NBER Working Paper No. 21326
July 2015
JEL No. I10,I31,J26

ABSTRACT

We utilize panel data from the Health and Retirement Study to investigate the impact of retirement on physical and mental health, life satisfaction, and health care utilization. Because poor health can induce retirement, we instrument for retirement using eligibility for Social Security and employer sponsored pensions and coverage by the Social Security earnings test. We find strong evidence that retirement improves both health and life satisfaction. While the impact on life satisfaction occurs within the first 4 years of retirement, many of the improvements in health show up 4 or more years later, consistent with the view that health is a stock that evolves slowly. We find little evidence that retirement influences health care utilization.

Aspen Gorry
Department of Economics and Finance
Utah State University
3565 Old Main Hill
Logan, UT 84322-3565
aspen.gorry@gmail.com

Devon Gorry
Department of Economics and Finance
Utah State University
3565 Old Main Hill
Logan, UT 84322-3565
devon.gorry@usu.edu

Sita Slavov
School of Policy, Government and
International Affairs
George Mason University
3351 Fairfax Drive
Arlington, VA 22201
and NBER
sslavov@gmu.edu

I. Introduction

Life expectancy has improved dramatically over the past half century. Conditional on turning 65, men and women born in 1940 could expect to live for an additional 12.7 and 14.7 years, on average. In contrast, men and women born in 1990 can expect to live an additional 16.1 and 19.5 years, respectively.[1] Since working lives have not kept pace with this increase in life expectancy, the length of retirement has increased (see, e.g., Cushing-Daniels and Steuerle (2009); Milligan and Wise (2012)). Faced with impending budget shortfalls in entitlement programs, this fact has led policymakers to raise the normal retirement age for collecting some retirement benefits and increased interest in policies that further extend working lives. Such policies are fiscally attractive as longer working lives can both reduce benefits and increase tax revenue. Beyond their direct impact on revenue, they can also affect individual health and well-being, and as a result they may have additional, indirect fiscal and individual impacts.

To fully evaluate the welfare and budgetary consequences of policies that extend the time that individuals spend working, it is important to understand these indirect effects. For example, if retirement worsens health and generates increased health care utilization, then policies that delay retirement may further improve Medicare's finances and make individuals better off. Alternately, if retirement improves health, then policies that promote delayed retirement to shore up the fiscal budget may have hidden fiscal costs and negatively impact individuals. To this end, this paper studies the effect of retirement on the health and well-being of individuals and on their health care utilization, with the latter providing a direct assessment of the impact of retirement on public health care expenditures.

There are a number of channels through which retirement might affect health and well-being. Some channels imply that retirement has negative effects on health. For instance, if health is viewed as an investment good that serves as an input into individuals' market output (Grossman (1972)), then retirement may reduce investment in health as these investments no longer affect the individual's

[1] These data come from Table V.A4 of the 2014 Social Security Trustees report, available at http://www.ssa.gov/oact/tr/2014/lr5a4.html.

wages in the labor market. In addition, unanticipated retirement that is associated with a negative income shock could reduce subjective well-being and the ability to invest in health. Retirement can also lead to social isolation and a diminished sense of purpose (Bradford (1979)), which may worsen health and subjective well-being. On the other hand, several avenues imply a positive relationship between retirement and health outcomes. Investment in health may increase as retired individuals have a lower marginal value of time, making health investment less costly. Retirement also increases leisure, which may reduce physical and mental stress, improving both subjective well-being and health.[2]

Likewise, the effect of retirement on health spending is also ambiguous, not only because health care spending depends on health status but also because it may be an input into health outcomes. While improved health in retirement may reduce health care utilization, if the improvement in health is the result of increased investment in health, then health care utilization could increase. Similarly, a worsening of health during retirement may be associated with either increases or decreases in health care utilization over the life cycle.

Early studies on the relationship between retirement and health often find a negative correlation (see, for instance, Dave et al (2008)). However, correlations between retirement and health or life satisfaction do not indicate a causal effect of retirement because retirement decisions are endogenous. In particular Dwyer and Mitchell (1999) have shown that individuals who experience negative shocks to health or life satisfaction disproportionately select into retirement. In fact, McGarry (2004) argues that health may drive retirement expectations to a greater degree than changes in income or wealth. In addition, anticipated health changes due to retirement are likely to be factored into the individual's optimal choice of retirement date. Indeed, we find that retirement is correlated with negative health outcomes in simple OLS specifications that do not control for endogeneity. We address this endogeneity with panel data from the Health and Retirement Study (HRS) by instrumenting for retirement using age-

[2] See Coe and Lindeboom (2008) for a more detailed theoretical discussion of the interactions between health and retirement.

based variation in eligibility for Social Security retirement benefits, applicability of the Social Security earnings test, and eligibility for retirement benefits in an employer sponsored pension. We also account for individual fixed effects. These age based retirement eligibility instruments should not be directly correlated with health except through their effect on retirement behavior, as we would not expect discrete jumps in health status at these ages beyond what is controlled for with age trends.

In addition to addressing endogeneity, we specify our model to study the post-retirement dynamics of health and well-being. Dynamic considerations are important for both health and subjective well-being. Objective health indicators such as mobility restrictions and diagnosed conditions are stock variables that respond slowly to changes in health investments. Thus, health effects may not show up immediately upon retirement. In addition, a number of studies have demonstrated that subjective well-being tends to return to a baseline level after a life change.[3] By studying dynamic changes after retirement, we are able to detect changes in the stock of health and differentiate between short-term and long-term effects that are obscured by only focusing on average changes.

Our instrumental variables estimates show that retirement improves both health and life satisfaction. The improvements in life satisfaction and reported health are immediate and remain 4 or more years after retirement. The improvements in objective health measures are not apparent immediately, but show up 4 or more years after retirement. The delayed health impact is not surprising considering that health is a stock variable that is unlikely to rapidly change over time. Because we are able to analyze outcomes several years after retirement, we find significant improvements in objective health measures that have not been detected in past studies.

In addition to studying the impact of retirement on health and well-being measures, we also examine its impact on health care utilization. While past studies have focused only on changes in health to assess likely changes in costs to the retirement system, we assess these costs directly. Estimating

[3] See Clark et al (2008), Oswald and Powdthavee (2008), Frederick and Lowenstein (1999), and Lykken and Tellegen (1996).

these changes is important for understanding how retirement policy will affect public health care expenditures. Our estimates show no statistically significant effects of retirement on health care utilization. Therefore, we can establish that post-retirement health gains are not likely to be driven by increased use of the medical system and that the fiscal externalities from retirement on medical expenses are unlikely to be large.

Many previous studies examine the impact of full or partial retirement on health and well-being, with mixed results. However, only a subset of these studies carefully account for the fact that retirement is endogenous. The studies that address endogeneity take a variety of approaches. Avorn and Soumerai (1983) perform a small randomized trial. Other studies use broadly representative panel data, which allows the use of individual fixed effects, or fixed effects augmented by conditioning on good initial health.[4] While this approach controls for unobservable, time-invariant health factors that may influence future health shocks and retirement, it does not account for unexpected health shocks that induce retirement. To estimate the causal impact in the presence of health shocks, another set of studies uses instrumental variables. Instruments that are used for retirement include age-specific retirement probabilities (Becchetti et al. (2012)), age-based retirement incentives in public and private pensions (Horner (2014); Behncke (2012); Coe and Zamorro (2011); Rohwedder and Willis (2010); Neuman (2008); Bound and Waidmann (2007); and Charles (2004)), changes in earnings test rules (Charles (2004)), and early retirement offers (Coe et al. (2012); Coe and Lindeboom (2008)).

These instrumental variables studies consider a wide range of health and well-being outcomes, including life satisfaction ratings, physical health, and mental health but their findings remain mixed. For cognitive function, Coe et al. (2012) find that retirement has no statistically significant impact while Bonsang et al. (2012) and Rohwedder and Willis (2010) find that it is associated with declines. Charles (2004) focuses on the effect of retirement on two indicators for mental health and finds that retirement

[4] See for instance Kerkhofs and Lindeboom (1997), Kerkhofs et al (1999), and Dave et al. (2008).

improves in both indicators. For health, Neuman (2008) and Coe and Lindeboom (2008) find that retirement improves individuals' subjective assessment of their health, but not objective health measures like indices for specific functional limitations, specific diseases, or scores on a depression scale. Coe and Zamorro (2011) study several European countries and find that retirement improves contemporaneous self-reported health outcomes, but has no effect on depression scales or cognitive function. In contrast to these findings, Behnke (2012) uses both non-parametric matching and instrumental variable specifications to find that retirement increases the risk of being diagnosed with a chronic condition and worsens self-assessed health in the United Kingdom. Horner (2014) and Becchetti et al. (2012) find that retirement improves subjective well-being among older Europeans, though Horner finds that life satisfaction tends to return to baseline a few years after retirement.

Our paper extends and updates the results of Coe and Lindboom (2008), Charles (2004), and Neuman (2008). Relative to these papers, we consider additional measures of health, as well as life satisfaction indicators that were added to the HRS in 2004. To our knowledge we are the first to directly study the impact of retirement on health care utilization, which is arguably the most important factor in estimating the fiscal impact arising from the link between retirement and health. We also perform a detailed analysis of the dynamics of post-retirement health and well-being by estimating the impact of retirement immediately after retirement and in the period 4 or more years after retirement. In contrast to Coe and Lindeboom (2008), we find that retirement has significant health effects in the long run. Our approach to estimating dynamic effects on health and well-being differs from Coe and Lindboom (2008) in several ways. First, we consider life satisfaction and health care utilization in addition to health. Second, we assess how retirement generates changes in individual well-being by estimating a fixed effects model. Fixed effects provide an additional control for time invariant endogeneity. Finally, our larger sample size (with additional years of the HRS) allows us to estimate the impact of retirement

more precisely and to study dynamic effects over a longer time horizon. Thus, we find new statistically significant long-run effects for objective health outcomes.

II. Data and Methodology

We use data from the Health and Retirement Study (HRS), a biennial survey constructed to be representative of Americans over the age of 50. The HRS spans the period between 1992 and 2012. The survey began with an initial cohort of individuals and their spouses in 1992, and subsequent cohorts were added to keep the sample representative of the target population. We keep the original HRS cohort, the Children of the Depression and War Babies cohorts, which entered the sample in 1998, the Early Baby Boomer cohort, which entered the sample in 2004, and the Mid Baby Boomer cohort, which entered the sample in 2010. Most of the variables used in our analysis come from the RAND version of the HRS, a cleaned dataset containing a subset of variables from the raw survey. However, the life satisfaction variables and the eligibility ages for defined benefit (DB) pension plans are merged in from the raw HRS. All of our analysis is performed at the person-wave level and utilizes the respondent-level weights provided in the RAND dataset.

It is important to define retirement carefully for our analysis. We begin by selecting a sample of individuals who report at least 20 years of work experience in the wave in which their cohort first entered the survey (hereafter referred to as the baseline wave).[5] Thus, our analysis excludes career homemakers, for whom retirement status might not be very meaningful. In each wave, the RAND HRS classifies individuals as either working full-time, working part-time, retired, partially retired, disabled, unemployed or not in the labor force.[6] We define retirement as a transition from working full- or part-time to full or partial retirement. We drop from the sample individuals who are disabled, unemployed, or out of the labor force in any wave, individuals whose labor force status is missing in any wave, and

[5] We drop individuals who did not respond, or who responded via proxy, in the baseline wave.
[6] Individuals who are working part time but mention being retired are classified as partly retired.

individuals who shift from retirement to non-retirement at any point during the sample period.[7] Individuals who are retired throughout the sample period are retained as long as they have a valid retirement date in the RAND data in their baseline wave.[8] We drop individuals whose first wave of retirement occurred before the age of 50.

The HRS includes several summary measures of physical and mental health that are updated in each wave. The first health measure we use is a self-reported health status, ranging from 1 (excellent health) to 5 (poor health). While self-reported health measures can be problematic due to potential reporting bias, they have an advantage of providing a measure of overall health and have been shown to be correlated with mortality.[9] The second is an index containing the number of major health conditions that the respondent has ever had out of a possible eight, including high blood pressure, diabetes, cancer, chronic lung disease, heart problems, stroke, psychiatric problems, and arthritis. The final summary measure is a mental health score based on the Center for Epidemiologic Studies Depression (CESD) scale. It is the sum of six indicators of negative sentiments during the past week, plus the sum of one minus two indicators of positive sentiment. The negative sentiments are feeling depressed, feeling that everything is an effort, experiencing restless sleep, feeling alone, feeling sad, and being unable to get going and the positive sentiments are feeling happy and enjoying life.[10]

In addition to the summary health measures, we study measures of overall life satisfaction. Starting in 2004 (wave 7), respondents were asked a series of questions about life satisfaction. Studies show that reports of subjective well-being are correlated with objective physiological and psychological measures. Moreover, they are correlated with changes in circumstances and can impact future decisions. While

[7] Maestas (2010) shows that "unretirement" is quite common and is generally planned in advance, although some individuals who "unretired" do so because they realized that retirement reduced their happiness.

[8] Retirement dates are used to compute the time since retirement for individuals who have been retired throughout the sample. Within this subset of individuals, we drop those whose reported retirement date is after the end date of their baseline interview. If retirement year is available but retirement month is missing, we set the retirement month to June.

[9] See Coe and Zamarro (2011) for a useful discussion.

[10] A consistently measured CESD score is only available from wave 2 onwards.

these measures can be affected by short-term contexts or mood, these fluctuations should average out and only add noise that makes significant findings less likely.[11] In the HRS, respondents are asked to rate their agreement with the following statements:

- "In most ways my life is close to ideal."
- "The conditions of my life are excellent."
- "I am satisfied with my life."
- "So far, I have gotten the important things I want in life."
- "If I could live my life again, I would change almost nothing."

In each case, the scale ranges from 1 (strongly disagree) to 7 (strongly agree).[12] To impute life satisfaction scores for waves before 2004, we regress each life satisfaction measure on the individual components of the CESD index, a set of dummies for self-reported health, the health care utilization measures, indicators for Medicare and other health insurance coverage, the components of the major health condition index, a set of dummies for each functional limitation index, and dummies for education, race and Hispanic ethnicity, age, marital status, and gender.[13] We substitute the predicted values of the satisfaction variables whenever reported values are missing. In addition to the summary health and life satisfaction measures, the HRS includes several objective health measures on functional limitations. The first of these is the number of activities of daily living (ADLs) with which the respondent has difficulty. The ADLs included in the index include bathing, dressing, eating, getting in and out of bed,

[11] See Kahneman and Krueger (2006) for a more detailed overview of life satisfaction measures.

[12] In waves 9-11, the options are strongly disagree (1), somewhat disagree (2), slightly disagree (3), neither agree nor disagree (4), slightly agree (5), somewhat agree (6), and strongly agree (7). In wave 7, the scale is reversed, with 1 corresponding to strongly agree and 7 corresponding to strongly disagree. We recode the wave 7 satisfaction variables to make them consistent with the other waves. In wave 7 as well, the "somewhat agree"/"somewhat disagree" options are replaced with "agree"/"disagree." In wave 8, the scale ranges from 1 (strongly disagree) to 6 (strongly agree) because a "neither agree nor disagree" (corresponding to a score of 4 in the other waves) option is not available. We rescale the wave 8 responses by multiplying them by 6/5 and subtracting 1/5, a transformation that results in variables that range from 1 to 7.

[13] For the imputations, we use all available observations on the cohorts included in the analysis (provided they meet the sample selection criteria of being present in the baseline wave and having 20 or more years of work in the baseline wave), not just the ones that were retained for the main regressions.

and walking across a room. The second is the number of instrumental activities of daily living (IADLs) with which the respondent has difficulty. IADLs include managing money, using the phone, and taking medications. The third is the number of mobility limitations the respondent faces, including difficulty with walking one block, walking several blocks, walking across a room, climbing one flight of stairs, and climbing several flights of stairs. The fourth measure is an index of large muscle limitations, with one point added to the index for difficulty with each of the following activities: sitting for two hours, getting up from a chair, stooping, kneeling or crouching, and pushing or pulling large objects. Fifth, a gross motor activity limitation index adds one point for difficulty with each of the following: walking one block, walking across a room, climbing one flight of stairs, getting in or out of bed, and bathing. Finally, an index of fine motor activity limitations adds one point for difficulty with each of the following tasks: picking up a dime, eating, and dressing.[14]

Health care utilization variables include the number of hospital nights, nursing home nights, and doctor visits; indicators for whether the respondent used home care or prescription drugs; and the respondent's self-reported out-of-pocket health care spending. In wave 1, hospital nights, nursing home nights, doctor visits, use of home care, and out-of-pocket spending are measured over the past year. In subsequent waves, these variables are measured since the previous interview or in the past two years for new respondents.[15] Use of prescription drugs is only available for waves 2 and beyond, and it is always measured since the last interview (or over the past two years for new respondents).

Table 1 shows summary statistics for the main variables used in the analysis. We have 41,316 observations that have non-missing values for all the independent variables and instruments, as well as non-missing, non-singleton values for at least one of the outcome variables. The first-stage regressions are estimated on all of these observations, while the second-stage regressions use all available observations for each outcome variable.

[14] Consistently measured functional limitation indices are only available for wave 2 onwards.
[15] We do not adjust for this difference in reporting periods as it should be absorbed by the wave dummies.

We wish to capture the effect of retirement (R_{it}) on our measures of health, well-being, and health care utilization (H_{it}). That is, we wish to estimate β in the following equation.

$$H_{it} = \alpha + \beta R_{it} + u_{it}$$

Because retirement status could be endogenous, we instrument for retirement using variation in eligibility for Social Security and private DB pensions as well as applicability of the Social Security earnings test. Early, but reduced, Social Security benefits are available at age 62. "Full" benefits begin at the normal retirement age, which varies between age 65 and 66 for individuals in our sample, depending on their birth cohort. Finally, a person can receive delayed retirement credits until age 70 by postponing the start of Social Security benefits beyond full retirement age. Therefore, for the retired status indicator, our Social Security eligibility instruments are a set of indicators for whether a person-wave observation falls into each of the following age categories: below 62, 62 to normal retirement age, normal retirement age to (but not including) 70, and 70 or older. Our DB eligibility instruments are a set of dummies that indicate whether an individual who is covered by a current employer's DB pension (as of the baseline wave) is below the plan's early retirement age, has reached the early but not the normal retirement age, and has reached the normal retirement age.[16] Our measure of "no earnings test" is an indicator that takes on a value of 1 during a given wave if the individual is outside the age range that would be subject to the earnings test for worker benefits. Prior to 2000, the earnings test applied to workers between the ages of 62 and 70. In 2000 and later, the earnings test applied to workers between the ages of 62 and their normal retirement age.

[16] Depending on the baseline wave, an individual may report information on up to 3 or 4 current employer-sponsored pension plans. We use information in the RAND HRS to determine whether each plan is a DB, DC, or a combination. Eligibility ages for each DB or combination plan come from the raw HRS. An individual is determined to be eligible for an early (full) retirement if he or she has reached the lowest early (full) eligibility age for any of the DB or combination plans reported. If an individual responds that the plan has no age requirement, the age requirement is coded as zero. We also include an indicator for individuals who are covered by a DB or combination plan but have an unknown eligibility status due to missing data. For some plans, the early retirement age is either above the normal retirement or missing. In these cases, we replace the early eligibility age with the normal eligibility age.

Variation in eligibility for Social Security and DB pensions presents a plausible set of instruments for understanding how retirement influences health and well-being. With these instruments we are picking up the effect of voluntary retirements around the age thresholds that we instrument for. Of course, if there are different effects of retirement at different ages outside the window that we study, our model is not informative about their effect. Furthermore, there is no reason to believe that discrete age thresholds should directly influence health outcomes beyond the standard linear and quadratic trends in age that are included in the specifications. Two possible exceptions to this are the dummy for normal retirement age and the dummy for full DB pension eligibility. For around 42.5 percent of our sample, Social Security normal retirement age is 65. In addition, many individuals are covered by a DB plan with an early or full retirement age of 65. Since 65 is also the threshold for Medicare eligibility, reaching that age could directly affect health care utilization and health. We address this issue by controlling for Medicare and other insurance coverage in our regressions.[17] This approach allows us to use the normal retirement age threshold as an excluded instrument for the subset of individuals whose normal retirement age is greater than 65. Finally, our first stage regressions show that our instruments are strong predictors of individual retirement behavior.

The Social Security earnings test is also a plausible instrument as it effectively forces beneficiaries who earn above a certain threshold to defer part or all of their benefit. While any foregone benefits are received at a later date, with a relatively generous actuarial adjustment, there is evidence that most people view the earnings test as a tax on work.[18]

Our first stage regression becomes:

$$R_{it} = \alpha_0 + \alpha_1 Z_{it} + \alpha_2 X_{it} + u_i + n_t + e_{it}$$

[17] The other health insurance coverage indicator takes on the value of 1 if the individual is covered by Medicaid, CHAMPUS/VA, other (non-Medicare) government plan, current or former employer-sponsored plan, or other private plan. It is set to zero if the individual is covered by none of these kinds of insurance. The other government plan category is available for the first two waves only.

[18] See Shoven and Slavov (2014a,b) for the actuarial calculations of the gains to delaying retirement. Friedburg (2000) and Song and Manchester (2007) study the labor supply consequences of the earnings test.

where R_{it} is an indicator for whether an individual is retired at time t, Z_{it} is the set of instruments outlined above, X_{it} is a set of controls for age, age squared, and indicators of Medicare or health insurance coverage, and u_i and n_t represent individual and wave fixed effects.

We estimate first-stage linear probability models to explain retirement status indicators and then use the predicted values from these regressions as instruments in the second-stage model as follows:

$$H_{it} = \beta_0 + \beta_1 \hat{R}_{it} + \beta_2 X_{it} + \nu_i + \eta_t + \epsilon_{it}$$

where the dependent variable represents measures of health, life satisfaction, and utilization.[19]

To capture the average effect of retirement, we run regressions in which the key independent variable is a dummy for retired status. Since we are interested in the dynamics of health after retirement we also estimate specifications in which the post-retirement period is divided into two sub-periods. The first sub-period comprises the first 2 waves of the survey in which a person reports being retired, and it indicates that the individual has been retired for roughly 0-4 years. The second sub-period includes all post-retirement waves beyond the second and indicates that the individual has been retired for more than 4 years. This group includes people who have been retired between 3 and 19 waves (from 4-6 to 36-38 years); however, less than 1 percent of the sample has been retired for more than 13 waves (24-26 years). For individuals who have been retired throughout the sample, the sub-period indicators are assigned based on the number of months elapsed between the reported retirement date and the interview date.

When instrumenting for the two phases of retirement – 0-4 years retired and 4+ years retired – our instruments include indicators for being the specified number of years (0-4, or 4+) beyond each of the threshold ages. The indicators included in each first-stage regression are shown in Table 2. When instrumenting for the early stage of retirement, our no earnings test indicator takes on a value of 1 for

[19] Because of the difficulty of estimating nonlinear models with fixed effects, we estimate linear regressions that treat all of these dependent variables as continuous.

individuals who are either under 62 or 70-74 (before 2000) or 0-4 years past normal retirement age (in 2000 or later). When instrumenting for being 4 or more years post retirement, our no earnings test indicator takes on a value of 1 for individuals who are either under 66 or older than 74 (before 2000) or 4 or more years past normal retirement age (in 2000 or later).

III. Results

a. Main Findings

Table 2 shows the results of our first-stage regressions. We report standard errors clustered at the household level in parentheses and all regressions use the respondent-level weights provided with the HRS. The coefficients in the first-stage regressions have the expected signs. Not being subject to the earnings test reduces the probability of being in any phase of retirement. Reaching the Social Security eligibility ages increases the probability of being retired. Being 0-4 years past 62 increases the probability of having been retired for 0-4 years. The other Social Security eligibility indicators reduce the probability of being in this phase of retirement, possibly indicating the popularity of retiring at 62 and earlier. All of the Social Security eligibility indicators increase the probability of being retired for 4 or more years. All of the DB eligibility indicators increase the chances of being in any given phase of retirement. For the first two regressions (the retired status indicator and the 0-4 years indicator), the coefficient on age is positive and the coefficient on age-squared is negative, indicating that the probability of retirement increases with age at a decreasing rate. However, these signs are reversed in the regression for the 4+ years indicator.[20] The F-statistics for the excluded instruments are greater than 10 in all cases and exceed the Stock-Yogo critical values, which suggests that the instruments explain

[20] We suspect that this is a compositional effect. Because retirement may be triggered by adverse health shocks, a number of individuals die before reaching 4+ years post retirement. Moreover, our sample also includes individuals who never retire. Thus, as age increases, the composition of the sample is likely to shift towards those who never retire. Indeed, if the sample is restricted to individuals who are observed 4 or more years beyond retirement, the coefficient on age becomes positive for all three regressions. These results are not shown but are available upon request.

significant variation in retirement status and there will not be biased or inconsistent results due to weak instruments.[21]

Table 3 shows the results for general health outcomes. The OLS estimates show that retirement is associated with a statistically significant increase in the number of health conditions with which the respondent has been diagnosed. The only positive association between retirement and health shows up as a moderate reduction in CESD score. These negative effects are consistent with past literature that does not account for endogeneity.

The IV estimates are substantially different, showing that retirement improves self-reported health on average. It also has no statistically significant effect on the number of health conditions with which the respondent has been diagnosed. An examination of the individual health conditions that make up the index suggests that retirement has no statistically significant relationship with any of them (at the 5 percent level).[22] These results are similar to previous studies that use the HRS. Coe and Lindeboom (2008) and Neuman (2008) both find short term increases in subjective health, but no significant effects on objective health measures. Unlike Coe and Lindeboom (2008), we find that retirement is also associated with larger and statistically significant reductions in CESD score relative to OLS.[23] This aligns with the Charles's (2004) results showing some significant improvements in reports of loneliness and depression.

We expand on previous studies by looking more closely at a variety of life satisfaction measures. Table 4 shows the results for these measures. Most of the OLS regressions show modest, positive associations between retirement and life satisfaction. In the IV specifications, retirement has a much

[21] See Bound et al. (1995), Staiger and Stock (1997), and Stock and Yogo (2005) for a discussion of weak instruments.

[22] There is an average and long-run reduction in high blood pressure that is significant at the 10 percent level. Results for the individual components are not shown but are available upon request.

[23] Coe and Lindeboom (2008) use an indicator for having a CESD score above 5 where we use the continuous score. Coe and Zamarro (2011) find retirement is associated with improved depression scores for Europe, but the relationship is statistically insignificant.

larger impact on life satisfaction. Retirement increases agreement with the first three life satisfaction statements by around half a standard deviation and increases agreement with the last statement by about a fifth of a standard deviation (though the latter effect is only significant at the 10 percent level). The IV estimates suggest that the impact of retirement is immediate and persists in the long run (in 4 out of 5 instances, the magnitude of the effect is larger in the long run). This finding is interesting as the literature on life satisfaction often shows that people return to a set point of well-being or adapt after life changing events and Horner (2014) suggests that the effects of retirement on well-being fade. Our results, however, suggest that retirement has long lasting benefits to individual well-being.

Table 5 shows the association between retirement and functional limitations. The OLS results suggest that retirement is associated with an increase in functional limitations, but the IV specifications indicate that on average, there is no statistically significant association between retired status and functional limitations. This aligns with results in Neuman (2008) and Coe and Lindeboom (2008) who only look at changes shortly after retirement. The dynamic regressions, however, tell a more interesting story. Most measures are actually associated with a short-run increase in functional limitations, but that association disappears and most functional limitations indices significantly improve 4 or more years after retirement. These results indicate that retirement does have positive effects on objective health measures, but they take time to present themselves. The coefficients indicate statistically significant long-run improvements in five out of six categories. This provides new evidence that retirement in the US has positive effects on objective health measures.

Table 6 considers the impact of retirement on health care utilization. Given that the literature shows no adverse health effects of retirement, one may conclude that utilization is not affected. However, previous studies have not directly estimated this relationship. Moreover, measuring expenses directly is useful as it is possible that retirees avoid health decline or see gains through increased use of the medical system. Indeed, the OLS results suggest a positive relationship between retirement and the

number of hospital nights, nursing home nights and doctor visits on average. This shows up as a short run effect and a possibly longer-term relationship between retirement and the number of hospital nights and nursing home nights. However, the IV results show no statistically significant effect of retirement on most measures of utilization either in the short-run or the long-run. The main exception is a short-run reduction in the use of prescription drugs. The rest of the coefficients are not significant at the 5 percent level. These results suggest that regardless of the impact of retirement on health, policies that either delay or hasten retirement are unlikely to have much of a lasting, direct impact on health care costs.

Finally, we examine the average impact of retirement on summary health measures for various subsamples, including individuals with a high school education or less, individuals with physically demanding jobs, women, nonwhite race or Hispanic ethnicity, and unmarried individuals. We do this by interacting dummies for group membership (during the baseline wave) with our predicted retired status indicator, then using both predicted retirement and its interaction with group membership as instruments.[24] Our results (not shown but available upon request) suggest that the coefficients on retirement are not statistically significantly different for most summary health and life satisfaction measures. This is in line with the findings of Coe and Lindeboom (2008) who find only a few differences across occupation and education. There are, however, a few exceptions in our data. The number of health conditions rises after retirement for the less-educated group, although the reduction in depression scores is larger. The reduction in depression scores is larger for individuals with more physically demanding jobs. Women experience a smaller increase in one of the life satisfaction measures after retirement. Nonwhite race or Hispanic ethnicity is associated with a larger drop in depression

[24] For these regressions, we drop individuals with missing subgroup information.

scores. Single people experience a larger drop in depression scores and a larger increase in two of the life satisfaction measures compared to married people.[25]

Our results align with previous research as we do not find negative effects of retirement on a variety of health measures, and we find improvement in self-reported health. However, our results extend previous findings with evidence of improvements in objective physical and mental health measures in addition to self-reported health and long lasting impacts that occur 4 or more years after retirement. One explanation for these new results could simply be that our sample is larger, as it utilizes additional waves of the HRS that were unavailable when earlier papers were written. The additional waves also allow us to examine the impact of retirement further into the future, which is important given that health is a stock that adjusts to investments slowly and many of the health improvements only occur 4 years or more beyond retirement. Another explanation might be that some of these studies consolidate health outcomes into broader categories. For example, all of the dependent variables in Neuman (2008) are indicator variables for whether a particular health measure improved between two waves. Since we use the actual index number for these variables, we might be able to pick up on smaller changes in the indicators relative to the other studies.

b. Robustness

One potential concern regarding our long-run results could be that they suffer from survivor bias. That is, individuals who survive to 4 or more years post retirement are likely to be in better health, biasing the results in favor of finding that retirement improves long-run health. To address this issue, we re-estimate our results using only individuals who are observed until 4 or more years after retirement. The results are not qualitatively different from those reported above. That is, retirement is still associated with an overall reduction in depression scores and self-reported health, an increase in many life satisfaction measures, a long-run reduction in most functional limitations, a short-run reduction in

[25] We report here only the interaction term coefficients that are significant at the 5 percent level.

prescription drug use, and a short-run increase in out-of-pocket medical spending. Fewer of our coefficients are statistically significant, however, possibly reflecting the reduction in power that comes from a smaller sample.[26]

Another potential concern is that, because we use all available observations for each outcome variable, the differences we find across outcome variables is driven by sample selection. To address this, we re-estimate our results using only observations with no missing values. This results in a sample of 37,705 observations. Again, the results that are not substantially different from those reported above.

To test that our results are not driven by the way we define retirement, we re-estimate our results defining partially retired individuals as working. That is, the definition of retirement is based solely on whether an individual is working (either full-time or part-time), rather than on whether he or she self-identifies as retired. Our results are generally similar. We also estimate the average effects of retirement with the inclusion of individuals who retire and return to work.[27] If these are the individuals for whom retirement does not have beneficial effects, leaving them out could bias our results towards positive findings. However, the average effects remain similar when we include them in the sample.[28]

IV. Conclusions

The question of whether retirement affects health and well-being is important not only when making individual retirement decisions but also when designing public policies that influence retirement behavior. As policymakers consider policies to further lengthen working lives and resolve shortfalls in funding for public retirement programs, it is important to take into account the impact these policies have on the health and well-being of working individuals. Moreover, changes in health due to

[26] On the other hand, this specification suggests a statistically significant long run reduction in prescription drug and home care use, and an average increase in nursing home nights.

[27] Under this definition of retirement, we can only estimate average effects as defining time since retirement is problematic for those who unretire.

[28] Results from these robustness checks are not shown but are available upon request.

retirement can also influence health care utilization and therefore the solvency of programs that provide health insurance to the elderly. This paper provides new evidence to address these questions.

Without taking the endogeneity of retirement decisions into account, early studies often find negative impacts of retirement on health and well-being. Indeed, our OLS results confirm these findings. More recent studies correct for selection into retirement and find that the effects of retirement on objective health measures largely disappear, and that retirement improves self-reported health. Our IV results also show increases in self-reported health and no negative effects on other measures. In addition, by utilizing more recent data and studying dynamic changes in health outcomes, we find improvements in long-term health outcomes that have not been found in past studies. This is the first paper to discover positive long-term effects in measureable health outcomes for US retirees.

This evidence is consistent with the view that health is a stock variable that does not change immediately upon retirement but rather evolves over time. If this view is correct, it is likely that a longer horizon may uncover even more health benefits of retirement. Finally, consistent with improvements in health during retirement, we provide direct evidence that retirement has no statistically significant impact on health care utilization, at least in the long-run. That is, the health improvements that occur after retirement are likely to come without added expenses.

References

Andrews, F. M. and S. B. Withey. 1974. "Developing Measures of Perceived Life Quality - Results from Several National Surveys." *Social Indicators Research*, 1(1), 1-26.

Atchley, R. C. and J. L. Robinson. 1982. "Attitudes toward Retirement and Distance from the Event." *Research on Aging*, 4(3), 299-313.

Becchetti, L.; E. G. Ricca and A. Pelloni. 2012. "The Relationship between Social Leisure and Life Satisfaction: Causality and Policy Implications." *Social Indicators Research*, 108(3), 453-90.

Behncke, Stefanie. 2012. "Does Retirement Trigger Ill Health?" *Health economics*, 21(3), 282-300.

____. 2009. "How Does Retirement Affect Health?," IZA Discussion Papers,

Bonsang, E.; S. Adam and S. Perelman. 2012. "Does Retirement Affect Cognitive Functioning?" *Journal of Health Economics*, 31(3), 490-501.

Bound, John; David A Jaeger and Regina M Baker. 1995. "Problems with Instrumental Variables Estimation When the Correlation between the Instruments and the Endogenous Explanatory Variable Is Weak." *Journal of the American statistical association*, 90(430), 443-50.

Bound, John and Timothy Waidmann. 2007. "Estimating the Health Effects of Retirement." University of Michigan, Retirement Research Center Working Paper, 2007-168.

Bradford, L. P. 1979. "Can You Survive Your Retirement." *Harvard Business Review*, 57(6), 103-09.

Brickman, P.; D. Coates and R. Janoffbulman. 1978. "Lottery Winners and Accident Victims - Is Happiness Relative." *Journal of Personality and Social Psychology*, 36(8), 917-27.

Charles, Kerwin Kofi. 2004. "Is Retirement Depressing?: Labor Force Inactivity and Psychological Well-Being in Later Life." *Research in Labor Economics*, 23, 269-99.

Clark, A. E.; E. Diener; Y. Georgellis and R. E. Lucas. 2008. "Lags and Leads in Life Satisfaction: A Test of the Baseline Hypothesis." *Economic Journal*, 118(529), F222-F43.

Coe, Norma B and Maarten Lindeboom. 2008. "Does Retirement Kill You? Evidence from Early Retirement Windows."

Coe, N. B.; H. M. Von Gaudecker; M. Lindeboom and J. Maurer. 2012. "The Effect of Retirement on Cognitive Functioning." *Health Economics*, 21(8), 913-27.

Coe, N. B. and G. Zamarro. 2011. "Retirement Effects on Health in Europe." *Journal of Health Economics*, 30(1), 77-86.

Cushing-Daniels, Brendan and C Eugene Steuerle. 2009. "Retirement and Social Security: A Time Series Approach." *CRR WP*, (2009-1).

Dave, D.; I. Rashad and J. Spasojevic. 2008. "The Effects of Retirement on Physical and Mental Health Outcomes." *Southern Economic Journal*, 75(2), 497-523.

Diener, E. 2000. "Subjective Well-Being - the Science of Happiness and a Proposal for a National Index." *American Psychologist*, 55(1), 34-43.

Diener, E.; R. A. Emmons; R. J. Larsen and S. Griffin. 1985. "The Satisfaction with Life Scale." *Journal of Personality Assessment*, 49(1), 71-75.

Diener, E.; E. M. Suh; R. E. Lucas and H. L. Smith. 1999. "Subjective Well-Being: Three Decades of Progress." *Psychological Bulletin*, 125(2), 276-302.

Dwyer, D. S. and O. S. Mitchell. 1999. "Health Problems as Determinants of Retirement: Are Self-Rated Measures Endogenous?" *Journal of Health Economics*, 18(2), 173-93.

Frederick, S., and George Loewenstein, 1999. "Hedonic Adaptation." In *Well Being: The Foundations of Hedonic Psychology*, edited by Daniel Kahneman, Edward Diener, and Norbert Schwarz. Russel Sage.

Gallo, W. T.; E. H. Bradley; M. Siegel and S. V. Kasl. 2000. "Health Effects of Involuntary Job Loss among Older Workers: Findings from the Health and Retirement Survey." *Journals of Gerontology Series B-Psychological Sciences and Social Sciences*, 55(3), S131-S40.

Grip, Andries de; Maarten Lindeboom and Raymond Montizaan. 2012. "Shattered Dreams: The Effects of Changing the Pension System Late in the Game*." *The Economic Journal*, 122(559), 1-25.

Grossman, Michael. 1972. "On the Concept of Health Capital and the Demand for Health." *The Journal of Political Economy*, 223-55.

Hamermesh, Daniel S. and National Bureau of Economic Research. 2004. "Subjective Outcomes in Economics," *NBER working paper series working paper 10361.* Cambridge, MA: National Bureau of Economic Research.

Hetschko, Clemens; Andreas Knabe and Ronnie Schöb. 2014. "Changing Identity: Retiring from Unemployment." *The Economic Journal*, 124(575), 149-66.

Horner, E. M. 2014. "Subjective Well-Being and Retirement: Analysis and Policy Recommendations." *Journal of Happiness Studies*, 15(1), 125-44.

Johnston, David W and Wang-Sheng Lee. 2009. "Retiring to the Good Life? The Short-Term Effects of Retirement on Health." *Economics Letters*, 103(1), 8-11.

Kahneman, D. and A. B. Krueger. 2006. "Developments in the Measurement of Subjective Well-Being." *Journal of Economic Perspectives*, 20(1), 3-24.

Kerkhofs, M. and M. Lindeboom. 1997. "Age Related Health Dynamics and Changes in Labour Market Status." *Health Economics*, 6(4), 407-23.

Kerkhofs, Marcel; Maarten Lindeboom and Jules Theeuwes. 1999. "Retirement, Financial Incentives and Health." *Labour Economics*, 6(2), 203-27.

Kimball, Miles and Robert Willis. 2006. "Utility and Happiness." *University of Michigan*.

Loewenstein, George, Drazen Prelec, and Roberto A. Weber. 1999. "What, Me Worry? A psychological Perspective on Econoic Aspects of Retirement." In Behavioral Dimensions of Retirement Economics, ed. Henry J. Aaron. Washington, D.C.: Brookings Institution Press.

Lykken, David and Auke Tellegen. 1996. "Happiness Is a Stochastic Phenomenon." *Psychological science*, 7(3), 186-89.

Maestas, Nicole. 2010. “Back to Work Expectations and Realizations of Work after Retirement.” *Journal of Human Resources*, 45(3), 718-748.

McGarry, Kathleen. 2004. “Health and Retirement: Do Changes in Health Affect Retirement Expectations?” *Journal of Human Resources*, 39(3), 624-48.

Milligan, Kevin S and David A Wise. 2012. "Health and Work at Older Ages: Using Mortality to Assess Employment Capacity across Countries," *NBER working paper series working paper 18229.* National Bureau of Economic Research,

Neuman, K. 2008. "Quit Your Job and Get Healthier? The Effect of Retirement on Health." *Journal of Labor Research*, 29(2), 177-201.

Osberg, Lars. 2005. "Work and Well-Being in an Aging Society." *Canadian Public Policy/Analyse de Politiques*, 413-20.

Oswald, A. J. and N. Powdthavee. 2008. "Does Happiness Adapt? A Longitudinal Study of Disability with Implications for Economists and Judges." *Journal of Public Economics*, 92(5-6), 1061-77.

Rohwedder, S. and R. J. Willis. 2010. "Mental Retirement." *Journal of Economic Perspectives*, 24(1), 119-38.

Shoven, John B and Sita Nataraj Slavov. 2014. "Does It Pay to Delay Social Security?" *Journal of Pension Economics and Finance*, 13(02), 121-44.

Shoven, John B and Sita Nataraj Slavov. 2014. "Recent Changes in the Gains from Delaying Social Security." *Journal of Financial Planning*, 27(3), 32-41.

Soumerai, Stephen B and Jerry Avorn. 1983. "Perceived Health, Life Satisfaction, and Activity in Urban Elderly: A Controlled Study of the Impact of Part-Time Work." *Journal of Gerontology*, 38(3), 356-62.

Sparks, K.; C. Cooper; Y. Fried and A. Shirom. 1997. "The Effects of Hours of Work on Health: A Meta-Analytic Review." *Journal of Occupational and Organizational Psychology*, 70, 391-408.

Staiger, D. and J. H. Stock. 1997. "Instrumental Variables Regression with Weak Instruments." *Econometrica*, 65(3), 557-86.

Stock, James H. and Motohiro Yogo. 2005. “Testing for Weak Instruments in Linear IV Regression” in James H. Stock and Donald W.K. Andrews, eds, *Identification and Inference for Econometric Models: Essays in Honor of Thomas J. Rothenberg,* New York: Cambridge University Press, 80-108.

Vodopivec, Milan and Primož Dolenc. 2008. "Live Longer, Work Longer: Making It Happen in the Labor Market." *Financial Theory and Practice*, 32(1), 65-81.

Table 1: Summary Statistics

Variable	Mean	Std. Dev.	Min	Max	Observations
Retired	0.50	0.50	0	1	41316
Retired 0-4 years	0.13	0.34	0	1	41316
Retired 4+ years	0.37	0.48	0	1	41316
Has Medicare	0.42	0.49	0	1	41316
Has non-Medicare health insurance	0.83	0.38	0	1	41316
Age	63.86	8.46	39	93	41316
No earnings test	0.86	0.35	1	1	41316
Age < 62	0.46	0.50	0	1	41316
NRA > Age ≥ 62	0.13	0.33	0	1	41316
NRA + 4 > Age ≥ NRA	0.12	0.32	0	1	41316
70 > Age ≥ NRA +4	0.02	0.15	0	1	41316
74 > Age ≥ 70	0.11	0.32	0	1	41316
Age ≥ 74	0.16	0.36	0	1	41316
No DB pension	0.63	0.48	0	1	41316
Ineligible for DB pension	0.10	0.30	0	1	41316
Eligible for early DB pension	0.05	0.21	0	1	41316
Eligible for full DB pension (< 4 yrs)	0.06	0.24	0	1	41316
Eligible for full DB pension (≥ 4 yrs)	0.14	0.35	0	1	41316
DB status unknown	0.02	0.13	0	1	41316
Self-reported health	2.49	0.99	1	5	41309
Number of health conditions	1.59	1.30	0	8	41315
CESD score	0.99	1.58	0	8	38784
Obese	0.29	0.45	0	1	41316
Life close to ideal	4.97	1.06	1	7	37854
Excellent life conditions	4.99	1.10	-0.43	7	37855
Satisfied with life	5.50	1.00	0.75	7	37852
Gotten important things in life	5.51	0.94	1	7.31	37854
Change nothing in life	4.46	1.14	0.65	7	37853
ADLs with some difficulty	0.11	0.47	0	5	39471
IADLs with some difficulty	0.04	0.26	0	3	39468
Mobility limitations	0.63	1.08	0	5	39472
Large muscle limitations	0.94	1.17	0	4	39468
Gross motor limitations	0.20	0.64	0	5	39472
Fine motor limitations	0.08	0.33	0	3	39471
Hospital Nights	1.16	5.35	0	285	41228
Nursing home nights	0.32	6.91	0	630	41292
Doctor visits	7.90	12.97	0	900	40622
Used home care	0.03	0.18	0	1	41301
Used prescription drugs	0.76	0.43	0	1	39461
Out of pocket medical expenses	2482.34	6475.68	0	536500	41316

Notes: Data are unweighted.

Table 2: First-Stage Regressions

Retired		I(0-4 years)		I(4+ years)	
No earnings test[a]	-0.0228	No earnings test[a]	-0.0764***	No earnings test[a]	-0.0442***
	(0.0148)		(0.0169)		(0.0167)
NRA > Age ≥ 62	0.138***	NRA > Age ≥ 62	0.0287	NRA + 4 > Age ≥ 66	0.0759***
	(0.0189)		(0.0213)		(0.0225)
70 > Age ≥ NRA	0.121***	NRA + 4 > Age ≥ NRA	-0.0308	74 > Age ≥ NRA + 4	0.258***
	(0.0166)		(0.0196)		(0.0163)
Age ≥ 70	0.146***	70 > Age ≥ NRA + 4	-0.230***	Age ≥ 74	0.279***
	(0.0181)		(0.0283)		(0.0189)
		74 > Age ≥ 70	-0.254***		
			(0.0257)		
		Age ≥ 74	-0.307***		
			(0.0273)		
DB Full > Age ≥ DB Early	0.0221	DB Full > Age ≥ DB Early	0.0910***	DB Full + 4> Age ≥ DB Early + 4	0.0148
	(0.0185)		(0.0200)		(0.0177)
Age ≥ DB Full	0.207***	DB Full + 4 > Age ≥ DB Full	0.182***	Age ≥ DB Full + 4	0.200***
	(0.0160)		(0.0196)		(0.0150)
DB status unknown	0.0882	Age ≥ DB Full + 4	0.0814***	DB status unknown	0.130*
	(0.0844)		(0.0185)		(0.0788)
		DB status unknown	0.0785		
			(0.0592)		
Age	0.0330***	Age	0.0560***	Age	-0.0250***
	(0.00735)		(0.00825)		(0.00691)
Age squared	-0.000412***	Age squared	-0.000456***	Age squared	7.44e-05*
	(3.67e-05)		(3.56e-05)		(3.85e-05)
Medicare	0.212***	Has Medicare	0.0533***	Has Medicare	0.156***
	(0.0132)		(0.0179)		(0.0120)
Non-Medicare health ins.	-0.0405***	Non-Medicare health ins.	-0.0387***	Non-Medicare health ins.	-0.00153
	(0.00757)		(0.00946)		(0.00728)
Observations	41,316	Observations	41,316	Observations	41,316
F-statistic for excl. instruments	78.48	F-statistic for excl. instruments	73.37	F-statistic for excl. instruments	94.05

Notes: Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights.
*** p<0.01, ** p<0.05, * p<0.1

a - In the first column, the no earnings test indicator takes on a value of 1 during a given wave if the individual is outside the age range that would be subject to the earnings test for worker benefits (from 62 to 70 before 2000 and from 62 to normal reitrement age in 2000 or later). In the second column, the no earnings test indicator takes on a value of 1 for individuals who are either under 62 or 70-74 (before 2000) or 0-4 years past normal retirement age (in 2000 or later). In the final colulmn, the no earnings test indicator takes on a value of 1 for individuals who are either under 66 or 74 or older (before 2000) or 4 or more years past normal retirement age (in 2000 or later).

Table 3: Impact of Retirement on Summary Health Measures

	Self-Reported Health (1 = excellent, 5 = poor)		Number of health conditions		CESD Score	
VARIABLES	OLS	IV	OLS	IV	OLS	IV
			Average Effect			
Retired	-0.0106	-0.149**	0.103***	0.000102	-0.0851**	-0.316**
	(0.0175)	(0.0732)	(0.0197)	(0.0765)	(0.0338)	(0.147)
Age	-0.0143	-0.00165	-0.0435***	-0.0341**	-0.100***	-0.0777**
	(0.0158)	(0.0171)	(0.0154)	(0.0165)	(0.0301)	(0.0336)
Age squared	0.000127*	1.78e-05	0.000411***	0.000330***	0.00104***	0.000846***
	(7.61e-05)	(9.64e-05)	(9.62e-05)	(0.000111)	(0.000140)	(0.000185)
Has Medicare	-0.0288*	0.00380	0.0246	0.0487**	-0.0312	0.0206
	(0.0163)	(0.0226)	(0.0167)	(0.0226)	(0.0320)	(0.0449)
Has non-Medicare HI	-0.00372	-0.00948	0.0446***	0.0404**	-0.0295	-0.0392
	(0.0144)	(0.0146)	(0.0161)	(0.0166)	(0.0282)	(0.0289)
Observations	41,309	41,309	41,315	41,315	38,784	38,784
Individuals	6,223	6,223	6,223	6,223	6,197	6,197
			Post-Retirement Dynamics			
0-4 years	-0.00808	-0.0780	0.0947***	0.0291	-0.0865**	-0.237
	(0.0174)	(0.0803)	(0.0193)	(0.0897)	(0.0341)	(0.157)
4+ years	-0.0264	-0.169*	0.153***	-0.0735	-0.0752*	-0.310*
	(0.0238)	(0.0867)	(0.0288)	(0.105)	(0.0424)	(0.164)
Age	-0.0152	-0.0115	-0.0406***	-0.0406**	-0.0999***	-0.0878**
	(0.0158)	(0.0178)	(0.0154)	(0.0175)	(0.0301)	(0.0346)
Age squared	0.000134*	9.83e-05	0.000389***	0.000381***	0.00104***	0.000929***
	(7.63e-05)	(0.000104)	(9.63e-05)	(0.000118)	(0.000140)	(0.000198)
Has Medicare	-0.0246	0.0110	0.0111	0.0689**	-0.0338	0.0217
	(0.0167)	(0.0261)	(0.0168)	(0.0288)	(0.0318)	(0.0508)
Has non-Medicare HI	-0.00367	-0.00677	0.0445***	0.0413**	-0.0295	-0.0360
	(0.0144)	(0.0146)	(0.0161)	(0.0167)	(0.0282)	(0.0291)
Observations	41,309	41,309	41,315	41,315	38,784	38,784
Individuals	6,223	6,223	6,223	6,223	6,197	6,197

Notes: Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights.

*** p<0.01, ** p<0.05, * p<0.1

Table 4: Impact of Retirement on Life Satisfaction

	Life Close to Ideal		Excellent Life Conditions		Satisfied with Life		Gotten Important Things		Change Nothing in Life	
VARIABLES	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
					Average effect					
Retired	0.0614***	0.469***	0.0863***	0.620***	0.0513**	0.445***	0.0640***	0.129	0.0504*	0.229**
	(0.0235)	(0.109)	(0.0237)	(0.105)	(0.0222)	(0.0960)	(0.0203)	(0.0883)	(0.0263)	(0.114)
Age	0.144***	0.103***	0.121***	0.0682***	0.0720***	0.0333	0.0515**	0.0451**	0.0339	0.0162
	(0.0241)	(0.0264)	(0.0239)	(0.0262)	(0.0222)	(0.0242)	(0.0207)	(0.0221)	(0.0260)	(0.0283)
Age squared	-0.000916***	-0.000576***	-0.000774***	-0.000330**	-0.000537***	-0.000209*	-0.000287***	-0.000233**	-0.000137	1.24e-05
	(0.000106)	(0.000138)	(0.000106)	(0.000136)	(9.88e-05)	(0.000126)	(8.58e-05)	(0.000111)	(0.000108)	(0.000139)
Has Medicare	0.154***	0.0620*	0.131***	0.0107	0.0965***	0.00763	0.0449**	0.0302	0.0843***	0.0439
	(0.0233)	(0.0336)	(0.0233)	(0.0330)	(0.0223)	(0.0309)	(0.0212)	(0.0293)	(0.0255)	(0.0359)
Has non-Medicare HI	0.123***	0.140***	0.145***	0.168***	0.155***	0.172***	0.132***	0.135***	0.0627***	0.0704***
	(0.0221)	(0.0227)	(0.0221)	(0.0228)	(0.0212)	(0.0217)	(0.0196)	(0.0199)	(0.0238)	(0.0242)
Observations	37,854	37,854	37,855	37,855	37,852	37,852	37,854	37,854	37,853	37,853
Individuals	6,136	6,136	6,137	6,137	6,136	6,136	6,137	6,137	6,137	6,137
					Post-retirement dynamics					
0-4 years	0.0582**	0.347***	0.0821***	0.460***	0.0464**	0.286***	0.0610***	0.0422	0.0470*	0.115
	(0.0237)	(0.117)	(0.0238)	(0.114)	(0.0223)	(0.105)	(0.0204)	(0.0950)	(0.0263)	(0.120)
4+ years	0.0837***	0.502***	0.116***	0.654***	0.0857***	0.393***	0.0856***	0.111	0.0751**	0.101
	(0.0314)	(0.123)	(0.0315)	(0.123)	(0.0299)	(0.113)	(0.0270)	(0.107)	(0.0352)	(0.130)
Age	0.145***	0.120***	0.122***	0.0904***	0.0737***	0.0524**	0.0526**	0.0559**	0.0352	0.0270
	(0.0242)	(0.0273)	(0.0240)	(0.0270)	(0.0223)	(0.0251)	(0.0207)	(0.0225)	(0.0260)	(0.0290)
Age squared	-0.000925***	-0.000716***	-0.000786***	-0.000511***	-0.000550***	-0.000368***	-0.000296***	-0.000323***	-0.000147	-7.92e-05
	(0.000107)	(0.000153)	(0.000107)	(0.000148)	(9.95e-05)	(0.000138)	(8.59e-05)	(0.000119)	(0.000108)	(0.000150)
Has Medicare	0.148***	0.0499	0.123***	-0.00297	0.0875***	0.0161	0.0393*	0.0321	0.0779***	0.0733*
	(0.0237)	(0.0377)	(0.0239)	(0.0377)	(0.0227)	(0.0361)	(0.0218)	(0.0342)	(0.0264)	(0.0399)
Has non-Medicare HI	0.122***	0.135***	0.145***	0.161***	0.155***	0.166***	0.132***	0.131***	0.0626***	0.0655***
	(0.0221)	(0.0228)	(0.0221)	(0.0229)	(0.0213)	(0.0217)	(0.0196)	(0.0201)	(0.0238)	(0.0243)
Obsevations	37,854	37,854	37,855	37,855	37,852	37,852	37,854	37,854	37,853	37,853
Individuals	6,136	6,136	6,137	6,137	6,136	6,136	6,137	6,137	6,137	6,137

Notes: Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights.
*** p<0.01, ** p<0.05, * p<0.1

Table 5: Impact of Retirement on Functional Limitations

	ADLs with Some Difficulty		IADLs with Some Difficulty		Mobility Limitations		Large Muscle Limitations		Gross Motor Limitations		Fine Motor Limitations	
VARIABLES	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
						Average Effect						
Retired	0.0442***	0.0195	0.0211***	-0.000499	0.0851***	-0.0759	0.0967***	-0.147	0.0615***	-0.00230	0.0225***	-0.0339
	(0.0112)	(0.0418)	(0.00549)	(0.0198)	(0.0201)	(0.0864)	(0.0216)	(0.0907)	(0.0137)	(0.0554)	(0.00778)	(0.0268)
Age	-0.0691***	-0.0666***	-0.0449***	-0.0428***	-0.171***	-0.155***	-0.0646***	-0.0408*	-0.102***	-0.0961***	-0.0431***	-0.0375***
	(0.0100)	(0.0107)	(0.00598)	(0.00612)	(0.0189)	(0.0208)	(0.0196)	(0.0215)	(0.0128)	(0.0140)	(0.00714)	(0.00745)
Age squared	0.000546***	0.000525***	0.000404***	0.000386***	0.00127***	0.00113***	0.000543***	0.000340***	0.000828***	0.000775***	0.000326***	0.000279***
	(5.86e-05)	(6.66e-05)	(3.80e-05)	(4.14e-05)	(9.99e-05)	(0.000122)	(9.68e-05)	(0.000124)	(7.45e-05)	(8.67e-05)	(3.78e-05)	(4.25e-05)
Has Medicare	-0.0176	-0.0120	-0.0145**	-0.00956	-0.0372*	-0.000533	-0.0420**	0.0135	-0.0311**	-0.0165	-0.00940	0.00347
	(0.0126)	(0.0148)	(0.00610)	(0.00735)	(0.0204)	(0.0278)	(0.0206)	(0.0281)	(0.0146)	(0.0188)	(0.00878)	(0.0102)
Has non-Medicare HI	0.0103	0.00926	0.00933	0.00843	0.0178	0.0111	-0.00218	-0.0123	0.0144	0.0117	-0.00302	-0.00536
	(0.0109)	(0.0111)	(0.00597)	(0.00602)	(0.0192)	(0.0194)	(0.0184)	(0.0187)	(0.0139)	(0.0141)	(0.00727)	(0.00739)
Observations	39,471	39,471	39,468	39,468	39,472	39,472	39,468	39,468	39,472	39,472	39,471	39,471
Individuals	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223
						Post-Retirement Dynamics						
0-4 years	0.0462***	0.139***	0.0215***	0.0973***	0.0900***	0.164*	0.102***	-0.0172	0.0636***	0.189***	0.0240***	0.0329
	(0.0115)	(0.0516)	(0.00562)	(0.0295)	(0.0201)	(0.0994)	(0.0216)	(0.0982)	(0.0140)	(0.0688)	(0.00798)	(0.0319)
4+ years	0.0299**	-0.0689	0.0184**	-0.0720***	0.0503*	-0.360***	0.0601**	-0.230**	0.0466**	-0.216***	0.0122	-0.0847**
	(0.0142)	(0.0595)	(0.00725)	(0.0263)	(0.0281)	(0.109)	(0.0298)	(0.113)	(0.0183)	(0.0752)	(0.00943)	(0.0374)
Age	-0.0698***	-0.0851***	-0.0450***	-0.0579***	-0.173***	-0.196***	-0.0665***	-0.0605***	-0.103***	-0.128***	-0.0436***	-0.0479***
	(0.0101)	(0.0120)	(0.00605)	(0.00724)	(0.0189)	(0.0221)	(0.0196)	(0.0224)	(0.0129)	(0.0156)	(0.00721)	(0.00795)
Age squared	0.000551***	0.000673***	0.000405***	0.000506***	0.00128***	0.00145***	0.000557***	0.000497***	0.000834***	0.00103***	0.000330***	0.000362***
	(5.95e-05)	(8.15e-05)	(3.86e-05)	(5.43e-05)	(0.000101)	(0.000136)	(9.69e-05)	(0.000132)	(7.54e-05)	(0.000103)	(3.83e-05)	(4.99e-05)
Has Medicare	-0.0139	0.0143	-0.0138**	0.0117	-0.0281	0.0797**	-0.0325	0.0387	-0.0272*	0.0440*	-0.00671	0.0185
	(0.0123)	(0.0205)	(0.00581)	(0.00904)	(0.0204)	(0.0341)	(0.0210)	(0.0336)	(0.0144)	(0.0244)	(0.00846)	(0.0134)
Has non-Medicare HI	0.0103	0.0138	0.00934	0.0122**	0.0179	0.0200	-0.00204	-0.00731	0.0144	0.0189	-0.00298	-0.00281
	(0.0109)	(0.0113)	(0.00597)	(0.00618)	(0.0192)	(0.0197)	(0.0184)	(0.0187)	(0.0140)	(0.0145)	(0.00727)	(0.00756)
Observations	39,471	39,471	39,468	39,468	39,472	39,472	39,468	39,468	39,472	39,472	39,471	39,471
Individuals	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223	6,223

Notes: Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights.

*** p<0.01, ** p<0.05, * p<0.1

Table 6: Impact of Retirement on Medical Care Utilization

	Hospital Nights		Nursing Home Nights		Doctor Visits		Home Care Use		Prescription Drug Use		Out of Pocket Medical Expenses	
VARIABLES	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV	OLS	IV
						Average Effect						
Retired	0.387**	-0.361	0.301**	0.595	0.752**	-1.215	0.00685	-0.0230	0.0114	-0.111***	34.12	1,090*
	(0.189)	(0.527)	(0.127)	(0.541)	(0.379)	(1.318)	(0.00438)	(0.0168)	(0.00900)	(0.0405)	(140.4)	(583.2)
Age	-0.117	-0.0485	-0.615***	-0.642***	0.167	0.349	-0.0128***	-0.0101**	0.0154*	0.0273***	89.23	-7.159
	(0.129)	(0.141)	(0.149)	(0.158)	(0.272)	(0.270)	(0.00396)	(0.00425)	(0.00803)	(0.00867)	(118.2)	(139.7)
Age squared	0.00251***	0.00191**	0.00575***	0.00598***	0.00143	-0.000135	0.000181***	0.000157***	-0.000191***	-0.000292***	-0.505	0.329
	(0.000610)	(0.000766)	(0.00111)	(0.00116)	(0.00135)	(0.00157)	(2.22e-05)	(2.59e-05)	(4.16e-05)	(5.25e-05)	(0.581)	(0.848)
Has Medicare	-0.0644	0.112	-0.166	-0.235	0.233	0.696*	-0.000885	0.00614	0.0110	0.0388***	-277.4**	-525.5***
	(0.143)	(0.177)	(0.177)	(0.218)	(0.321)	(0.359)	(0.00466)	(0.00620)	(0.00812)	(0.0117)	(127.9)	(182.0)
Has non-Medicare HI	0.292**	0.261**	0.213	0.225	0.884***	0.800***	0.00742*	0.00618	0.0155**	0.0104	-15.71	28.18
	(0.119)	(0.122)	(0.151)	(0.157)	(0.296)	(0.282)	(0.00429)	(0.00436)	(0.00668)	(0.00699)	(165.5)	(177.1)
Observations	41,228	41,228	41,292	41,292	40,622	40,622	41,301	41,301	39,461	39,461	41,316	41,316
Individuals	6,220	6,220	6,223	6,223	6,205	6,205	6,223	6,223	6,223	6,223	6,223	6,223
						Post-Retirement Dynamics						
0-4 years	0.368*	-0.167	0.288**	1.244*	0.760**	-0.856	0.00764*	-0.0170	0.0124	-0.129***	64.38	963.2
	(0.196)	(0.605)	(0.127)	(0.724)	(0.382)	(1.633)	(0.00447)	(0.0193)	(0.00887)	(0.0435)	(143.3)	(605.0)
4+ years	0.506**	-0.830	0.385*	0.00328	0.698	-0.968	0.00184	-0.0414*	0.00424	-0.0805	-158.6	65.70
	(0.218)	(0.592)	(0.213)	(0.820)	(0.494)	(1.476)	(0.00572)	(0.0231)	(0.0129)	(0.0525)	(169.3)	(637.5)
Age	-0.110	-0.0910	-0.610***	-0.747***	0.164	0.312	-0.0131***	-0.0116**	0.0150*	0.0307***	78.19	-28.90
	(0.132)	(0.152)	(0.146)	(0.165)	(0.270)	(0.274)	(0.00398)	(0.00480)	(0.00802)	(0.00867)	(118.3)	(138.7)
Age squared	0.00245***	0.00225**	0.00571***	0.00683***	0.00145	0.000180	0.000183***	0.000168***	-0.000188***	-0.000319***	-0.421	0.469
	(0.000632)	(0.000921)	(0.00109)	(0.00135)	(0.00135)	(0.00179)	(2.25e-05)	(3.11e-05)	(4.14e-05)	(5.21e-05)	(0.586)	(0.887)
Has Medicare	-0.0963	0.240	-0.188	-0.0608	0.247	0.641	0.000456	0.0111	0.0129	0.0306**	-225.8*	-259.5
	(0.148)	(0.199)	(0.162)	(0.309)	(0.323)	(0.446)	(0.00481)	(0.00764)	(0.00842)	(0.0142)	(131.4)	(200.8)
Has non-Medicare HI	0.292**	0.268**	0.212	0.248	0.885***	0.816***	0.00744*	0.00637	0.0155**	0.00976	-15.06	20.50
	(0.119)	(0.124)	(0.151)	(0.161)	(0.296)	(0.284)	(0.00429)	(0.00437)	(0.00668)	(0.00703)	(165.5)	(176.1)
Observations	41,228	41,228	41,292	41,292	40,622	40,622	41,301	41,301	39,461	39,461	41,316	41,316
Individuals	6,220	6,220	6,223	6,223	6,205	6,205	6,223	6,223	6,223	6,223	6,223	6,223

Notes: Standard errors clustered by household in parentheses. All regressions include wave dummies, individual fixed effects, and use respondent-level weights.

*** p<0.01, ** p<0.05, * p<0.1