Health Insurance, Retirement Decisions and the Value of Medicare

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Abstract

This paper presents new evidence on the effects of health insurance and Medicare eligibility on labor supply. There is a substantial portion of the population who retire at precisely the age of 65 even though Social Security no longer incentivize this age. Using non-parametric bunching estimators, I find this bunch can be explained by individuals who do not have employer-provided early retirement health insurance and thus would be uninsured if they retired before the Medicare eligibility age of 65. Given the importance of Medicare eligibility on retirement decisions, I build a retirement model to quantify the value (willingness-to-pay) of Medicare. Using observed income and retirement timing, I back out a value of Medicare of approximately $15,000 a year. With my retirement model, I estimate counterfactual retirement patterns under policy reforms such as shifting Medicare eligibility age and providing health insurance premium subsidies.

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1 Introduction

Retirement timing is one of the most important late-career decisions in a person’s life. Over the last four decades in the United States, the median age of the population has increased by 10 years from 28 to 38, and the median age of the labor force has increased by 4 years (Bureau of Labor Statistics 2015). The average retirement age has also increased from 56 in 1992 to 64 in 2012. With the aging of the American population and questions of the sustainability of the Social Security Trust Fund and Medicare trust funds\footnote{The 2016 Annual Report of the Board of Trustees to Congress predicts a depletion date of 2035 for Social Security Trust Fund and 2028 for the two Medicare trust funds (Hospital Insurance Trust Fund and the Supplementary Medical Insurance Trust Fund.}, the labor market decisions of the near-elderly population is a crucial issue.

Economic theory predicts retirement decisions are heavily driven by financial factors such as retirement savings, Social Security and pensions, or joint household labor supply decisions. Traditionally, the literature has largely focused on effects of Social Security, wealth and pensions. Both reduced form analysis of incorporating the increase in wealth from working an additional year and structural models of retirement using a lifetime budget constraint conclude that financial incentives affect retirement behavior (Boskin and Hurd 1978, Gruber and Wise 1999)\footnote{For a thorough overview, see Chapter 32 in Handbook of Public Economics, Volume 4}. There is also a literature on treating retirement decisions as a function of the household. These papers (Hurd 1990, Blau 1998, Gustman and Steinmeier 2000, Gustman and Steinmeier 2004, Johnson and Favreault 2001, Coile 2004) generally estimate structural models of couples’ retirement and find complementarity of leisure is more important in explaining joint retirement than correlation in preferences or shared household finances.

In a recent 2016 Retirement Confidence Survey conducted by the Employee Benefit Research Institute, 35% of working age Americans reported being not confident about having enough money for a comfortable retirement. They cite job uncertainty, debt, making ends meet and lack of savings as the primary concerns preventing them from entering retirement. In regards to their confidence about the affordability of retirement, long-term care expenses and medical expenses are listed as the top reasons, with over 49% being not confident. With the degree of financial constraints most working individuals suffer from, it is not surprising...
that medical expenses are a primary concern. This is especially true because both health care costs and insurance premiums have been steadily increasing in the last two decades.

Given the lack of financial confidence regarding retirement and potentially high medical costs, especially if uninsured, health insurance will affect the decision of whether to retire. Although all individuals are eligible for government provided health insurance — Medicare — upon reaching the age of 65, many individuals prefer to retire earlier (58% of individuals preferred to retire before 65, with 16% stating an age younger than 60 as their ideal, according to a 2015 National Journal Heartland Monitor Poll). For some, this is not an issue because their employers will provide some form of early retirement health insurance, which is often at least as good as Medicare. However, the majority of workers are not entitled to this benefit and cannot afford to purchase coverage in the private insurance market to bridge the gap between their desired retirement age (the age the worker would have preferred to retire if they had sufficient health coverage) and their actual retirement age. As a result, many individuals may find it optimal to delay retirement until just reaching 65 to avoid being uninsured.

Medicare has three features that distinguish it from other insurance policies and allow for cleaner identification of its role in retirement decisions. First, Medicare eligibility is fixed at 65 with no early accessibility age like Social Security. Second, Medicare only covers the individual and not their spouse, children or dependents like many employer-provided insurance plans. Lastly, Medicare does not discriminate on pre-existing conditions. Together these characteristics make Medicare eligibility salient and clean for all individuals who prefer to retire early if provided with sufficient health coverage.

In this paper, I have two research agendas which split the empirical analysis into two sections. The first is to study the role of health insurance on individual labor supply decisions. Specifically, whether there is a portion of the population delaying retirement until they are eligible for Medicare, resulting in a bunching of retirement ages at 65. In addition, are individuals without employer-provided retirement health insurance more likely to bunch at 65? After establishing that Medicare eligibility induces some individuals to delay retirement, the second exercise is to build a retirement model to back out a value (willingness-to-pay) of Medicare given their wages and retirement decisions. With this estimated value of Medicare and
the retirement model, I can also study the counterfactual and retirement patterns under various policy reforms such as a change in Medicare eligibility age or providing health insurance premium subsidies.

In the first part, I remove Social Security effects and show that health insurance and Medicare eligibility are major factors in one’s labor supply decision, especially at age 65. Previous work on the relationship between health insurance and retirement has failed to reach a consensus, primarily because of the difficulty in separating the effect of Medicare eligibility age from Social Security’s normal retirement age\(^3\) (both have traditionally coincided at age 65). Beginning in 2000, the Social Security normal retirement age shifted by birth cohort such that by 2005 all individuals with a normal retirement age of 65 were at least 68, allowing me to mechanically isolate the effect of Medicare eligibility from Social Security\(^4\). I translate the retirement decision into an optimization problem with a non-linear lifetime budget set with a convex kink at Medicare eligibility induced by medical costs for workers without early retirement insurance. There has been a recent surge of research in public finance and labor economics using non-parametric bunching techniques developed by Saez (2010) and Chetty et al. (2011) to study non-linear budget sets. I rely on these bunching techniques to better statistically quantify the degree to which Medicare impacts retirement at 65. I utilize all waves of the Health and Retirement Study from 1992 to 2012, which is a superior data set to prior studies which suffered from imprecise information on retirement dates or lacked data on pensions or health insurance. Equipped with both a superior data set and a Social Security normal retirement age that is distinct from the current Medicare eligibility age, I am able to make conclusions about the role of health insurance on retirement decisions that previous studies could not.

The non-linear budget set analysis yields two stark testable predictions. First, there should be a bunching of individuals retiring precisely at age 65. Second, this bunching should be due to those without retirement health insurance. Consequently, there should be no bunching at

\(^3\)The normal retirement age is defined as the age when one could begin claiming Social Security benefits and receive the full amount relative to claiming earlier or later. More on this in the next section.

\(^4\)Although this mechanically removes the effects of Social Security’s normal retirement age, there may still be customary and reference effects. I further remove these with bunching estimation methods and difference-in-bunching.
65 for those with retirement health insurance. I provide both graphical and statistical evidence rejecting the null hypothesis that Medicare does not induce any incentives to retire precisely at 65. The bunching estimates suggest that there are 2.5 times more individuals retiring at precisely 65, than one would expect without Medicare eligibility and with a smooth linear budget set at 65. Although not statistically significant, regression results show they are 25% (1 percentage point) more likely to bunch precisely at 65, controlling for observables. Among those without retirement health insurance, I find differential responses from those that had employer coverage while employed, but lose it if they retire, and those who never had health insurance to begin with. Workers who receive their health coverage from their employer exhibit stronger propensity to time their retirement; this result can be explained by loss aversion and illustrates the importance of employee benefits, consistent with the job lock literature.

After presenting compelling evidence that health insurance is a major factor that can induce individuals to delay retirement until they are eligible for Medicare, I ask the question of how much individuals without employer-provided early retirement coverage value Medicare. This is the focus of the second part of the empirical analysis. I build a simple retirement model similar to Stock and Wise’s 1990 option value model of retirement, in which an individual incurs health risk if they are uninsured. The model measures the expected gain in utility from delaying retirement, which preserves the option of retiring later. Equipped with retirement timing decisions and annual incomes, I back out a key parameter of the model: the value (willingness-to-pay) of Medicare. My model estimates the value of Medicare for an individual without continuation of employer-provided health insurance after retirement, just prior to 65, to be approximately $12,000-15,000 per year. Workers value a year of Medicare at roughly a third of their salary. With the increased government spending on Medicare in recent years and longer life expectancy of Americans, many policy makers have proposed policy reforms affecting Medicare or other forms of health insurance. Using my retirement model and an estimate of value of Medicare, I simulate counterfactual retirement patterns under two types of policy reforms: shifting Medicare eligibility age and providing health insurance premium subsidies.
This paper builds on the literature of the effects of health insurance on retirement decisions. Madrian, Burtless, and Gruber 1994 use data from the National Medical Expenditure Survey and Survey of Income and Program Participation and find individuals with employer-provided retirement health insurance retire 5-16 months earlier than those without, but Medicare cannot explain the excess spike in retirement at age 65. Lumsdaine, Stock and Wise 1996 use data from a single firm and model Medicare at the expected value of per capita reimbursements on top of monthly Social Security benefits and also find Medicare eligibility is not an important determinant of the spike in retirement at 65. On the other hand, Gustman and Steinmeier 1994, Rust and Phelan 1997 and Nyce et al. 2013 arrive at the opposite conclusion. Gustman and Steinmeier 1994 use early waves of the Retirement History Study and build a structural retirement model and find individuals do delay retirement until the age of eligibility for retirement health benefits. Nyce et al. 2013 use data from 64 diverse firms and conclude Medicare eligibility influences workers retirement decisions, specifically for those who are younger than 65 and do not have access to subsidized retiree health coverage. The key takeaway from this literature is that health insurance has an effect on retirement decisions but there is no consensus on whether Medicare eligibility incentivizes delayed retirement, primarily for reasons discussed earlier.

My paper also relates to the recent surge in the public finance literature which uses bunching methods to study non-linear budget sets. Specifically, there are two related papers that study the decision to stay in the labor force under different financial incentives. Manoli and Weber 2015 study a rule in Austria that mandates severance pay to workers based on non-linear tenure requirements. In a similar setting, Brown 2013 looks at the effect of pension payments on retirement timing for teachers. Both papers formulate the problem in the form of a kinked budget set and find bunching at retirement ages consistent with the location of the kink. There are also other papers that exploit non-linear budget sets to study earnings elasticity, drug spending elasticity with respect to health insurance kinks (Einav et al. 2015a, b), and debt responses to mortgage interest notches (Best et al. 2015).

This paper’s results demonstrate an important link between health insurance and labor markets. Policies aimed at altering workers retirement age cannot concentrate solely on financial incentives and ignore health insurance policies. Many individuals are willing to shift retirement if Medicare eligibility changes or subsidies are given to health insurance premiums. My estimates indicate workers place significant financial value on Medicare (roughly a third of their income). Consequently, my paper contributes to the literature on the value and impacts of Medicare (Finkelstein and McKnight 2008 and Khwaja 2010). These results are consistent with government cost and spending on Medicare. Given the high value placed on health insurance, policies aimed at supplying health insurance may be more cost effective and salient for the government than cash transfers like Social Security. The willingness-to-pay estimate can guide policy makers to reasonable private market premium caps or per capita spending on Medicare. If one is willing to take a stance on how many quality-adjusted life years (QALY) a year of Medicare provides, my estimate can also shed light on a reasonable QALY threshold, which is often used in some countries to compare the cost-effectiveness of different drugs and technologies. This willingness-to-pay for a QALY threshold is extremely outdated and relies on stated preferences in surveys. Consequently, an almost mythical benchmark of $50,000 has stuck around for too long (See Weinstein 2008).

The paper is organized as follows. Section 2 gives a brief overview of the institutional details of Social Security and Medicare. Section 3 describes the data source and reports summary statistics. Section 4 studies the role of health insurance on individual labor supply decisions. After establishing that Medicare eligibility induces some individuals to delay retirement, section 5 builds a simple retirement model to estimate a value of Medicare and study counterfactual policies. Section 6 concludes.

2 Social Security and Medicare

Social Security is traditionally the primary channel the government operates through to affect people’s retirement behavior. The Social Security System was initially established in 1935 with a normal retirement age (NRA) of age 65. The NRA is defined as the age when one could begin
claiming Social Security benefits and receive the “full” amount relative to claiming earlier or later. This “full” benefit amount is a function of an individual’s highest 35 years of earnings, adjusted by an index that accounts for yearly fluctuations in economic outcomes. Claiming benefits early relative to the normal retirement age means forgoing one’s full retirement benefit. The earliest possible age to claim Social Security benefits is 62. Delayed claimings are rewarded with increased benefits.

In 1983, amendments were passed to slowly increase the full retirement age from 65 to 67, so as to increase credits for delaying claims, as well as increase the early claim penalty. The early retirement age of 62 was left unchanged. The increase of normal retirement age from 65 to 66 began in 2000 based on birth cohort. Anyone born before 1937 still retained their NRA of 65, but anyone born after 1936 had a later NRA. Figure A.1 summarizes the changes in the NRA for each birth cohort. Rationales for increases of the NRA include depletion of the Social Security Trust Fund and substantial increases of life expectancy for Americans over the past decades. By 2005, the cohort with a NRA of 65 were at least 68 years old and no one retiring at 65 had a NRA of 65. As a result, no one retiring at 65 after 2005 is directly incentivized by the NRA. The benefits schedule is convex starting at the early retirement age 62 and caps out at age 70. Figure 1 illustrates the schedule for an individual born between 1943 and 1954 (NRA of 66). There are kinks in the benefits structure at ages 63 and 66, but none at 65, the old NRA.

There are four reasons that the Social Security benefits schedule should not incentivize workers to retire at any specific age, especially not at 65. First, the “normal retirement age” defined as the age that one receives “full” or 100% of benefits, is merely an arbitrary normalization. Second, the kink in the benefits schedule at the NRA is marginal and non-existent at 65 for those retiring after 2005. In fact, the convexity in the benefits schedule is marginal at all three kinks (See Figure 1). Third, Social Security is designed to be actuarially fair for those of average life expectancy: one collects more installments of Social Security

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6Myers and Schobel (1990) argue that penalties for early take-up associated with NRA are reasonably close to the theoretically correct values for beneficiaries retiring in 1990 and 2030. However, various authors have documented actuarial premiums and losses for various demographics (see Heiland and Yin (2014) and Duggan and Soares (2001)).
payments by retiring early, but each installment is of a lower amount. Lastly, and most importantly, Social Security “retirement age” is actually the age one begins to first claim Social Security benefits, which is independent of the age one retires. This is particularly confusing because Social Security uses the language of “normal retirement age” and “early retirement age” even though a worker can continue to work for pay while claiming Social Security benefits. The first two properties immediately imply that after 2005, Social Security alone does not (financially) incentivize retiring at 65. Furthermore, the actuarially fair property of Social Security benefits and the distinction between claiming age and retirement age imply that from a lifetime benefits perspective, rational individuals only need to consider their retirement age (the age they stop working for pay) when contemplating retirement. I rely on this reasoning for my empirical analysis.

Medicare is a national social insurance program that provides health insurance coverage for the elderly. It operates in complete isolation of Social Security or retirement; one can receive Medicare regardless of when they retire or claim Social Security benefits. It is primarily funded through payroll taxes, but can include premium costs and deductibles. For example, inpatient hospital care is (usually) premium-free, but there is a deductible. Other aspects of the program such as non-hospital care and drug expenditures have both premiums and deductibles, but enrollment in these programs is optional. On average, Medicare covers 53% of total personal health care expenditures for individuals over the age of 65. All Americans are eligible for Medicare at the age of 65. Unlike Social Security, there is no early accessibility age except under special circumstances relating to disability. Medicare only covers the individual and not their spouse, children or other dependents. It also does not discriminate on pre-existing conditions. In summary, except under special circumstances, one receives Medicare if and only

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7One can continue to work while claiming benefits. However, if one begins claiming benefits before the NRA while continuing to work, these benefits are withheld subject to an earnings test. Social Security withhold benefits if one’s earnings exceed a certain level. There are two thresholds, a lower threshold and a higher threshold. Half and a third of every dollar earned in excess of the lower and higher threshold, respectively, are withheld. The withheld amounts are not lost, they are returned after one reaches the NRA. Therefore, the total lifetime benefits amount remain unchanged.

8Due to differential life expectancies, preferences, liquidity constraints, and risk aversions for individuals, retiring at 65 or other ages may still be optimal for certain individuals. See Coile et al. 2002, Hurd et al. 2004. There may also be behavioral aspects present and I attempt to control for them in my empirical strategy.

9National Health Expenditure Data Tables (Source: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group)
if they are over the age of 65.

3 Data

For my analysis, I data from the Health and Retirement Study (HRS). The Health and Retirement Study is a panel survey of just over 20,000 respondents with 6 cohorts and 11 waves every two years from 1992 to 2012. The survey asks individuals over age 50 and their spouse about subjects like health care, housing, assets, pensions, employment and disability. I also use monthly data from the Current Population Survey (CPS) from January 2009 to May 2016 to supplement the HRS data when I analyze retirement decisions after the Affordable Care Act.

My key dependent variable is an individual’s retirement age. In each wave, the HRS asks the respondents if they are retired and the month they retired. Starting with the most recent wave (2012) response, I construct a retirement age variable if I observe both their retirement year and month. If their 2012 wave response is missing, I use the second most recent survey response and so on. By taking the difference between their retirement date and birth date, I construct a retirement age variable as the most recent self-reported retirement age specific to the month. My independent observable variables include wage, pension, health, medical expenditures, race, years of education, sex, marital status and health insurance type dummy variables. Because I am interested in factors that enter an individual’s retirement decisions, these independent variables are all pre-retirement observables. For each respondent, I use the most recent non-missing survey response prior to their retirement date to construct pre-retirement variables. To classify a respondent’s health insurance type, I create three indicator variables. HealthIns is a dummy variable for whether the respondent had any health insurance coverage prior to retirement. Employer and EmployerRetire are both dummies for whether the respondent receives health insurance from their employer while employed, but the former loses their coverage if they retire prior to 65 and the latter retains it. The two variables are constructed out of the following survey question: “If you left your current employer now could you/can you continue this health insurance coverage up to the age of 65?” For the majority of
this paper, except Section 5, I restrict the sample to individuals who report their retirement in 2005 or later, when the Social Security’s NRA no longer confounds Medicare eligibility, leaving me with 3511 observations with non-missing health insurance type indicators.

Table 1 reports summary statistics of the main variables for three samples. Column 1 displays the mean and standard deviation for the entire sample. Roughly 80% of the sample have some form of health insurance just prior to retirement, and 50% receive it from their employer. The samples in columns 2 and 3 both have employer-provided health insurance while employed, however, the former lose this coverage if they retire before turning 65 and the latter retain it. Conditional on receiving health insurance from their employer, approximately a 75% of these individuals receive retirement health insurance. Some interesting facts immediately stand out. Workers with employer-provided health insurance are more likely to have an employer-created pension, more likely to be white and are more educated than the general population. Perhaps surprisingly, the hourly wages do not differ across samples. Conditional on having employer-provided health insurance while employed, those also with retirement health insurance are slightly more likely to be male and to report being in slightly worse health and spend less on medical expenditures just prior to turning 65. Employer-provided insurance plans that include retirement health insurance are also likely better on many dimensions when compared to the plans without retirement health coverage. Therefore, it is not surprising that those with the superior plans, column 3, are paying less for out-of-pocket health care while being slightly sicker. Already, the summary statistics suggest the group without employer-provided retirement health insurance are more likely to retire at 65 (defined retiring in the first 3 months of turning 65) than those with employer-provided retirement health insurance. This is not driven by a general propensity to retire later. In fact, the reverse is true; workers with early retirement health insurance are more likely to retire at age 65 or later.

4 Health Insurance and Retirement

In this section, I study the role of health insurance and Medicare eligibility on retirement decisions. I formulate the retirement decision into a non-linear budget set analysis where Medicare
eligibility creates a convex kink at the retirement age of 65. From this non-linear budget set, I derive two testable predictions. The observed bunching pattern clearly demonstrates that certain individuals are delaying retirement to avoid being retired and uninsured. In other words, this section provides a compelling rejection of the null hypothesis that retirement patterns do not respond to incentives created by health insurance and Medicare.

4.1 Non-Linear Lifetime Consumption Budget Set

Consider an individual who earns a constant income $y$ for each period he is employed. While he is employed, he receives health insurance cost-free from his employer. However, if he retires, he loses this health insurance and must either purchase his own insurance in the private market or incur some medical expenditure cost. Suppose the cost of private health insurance or medical expenditure cost will cost him $c$ each period. Upon turning 65, he receives health coverage from Medicare at zero cost, which covers him fully for the cost $c$. For each period he retires after 65, he gains $y$ in lifetime consumption, and for each period he retires before 65, he gains $y + c$. Ignoring Social Security benefits (which I provided justification for in Section 2), this individual faces a convex budget set as seen in Figure 2 (the solid line). The convex kink is at the Medicare eligibility age, driven by medical costs associated with being retired and uninsured. If however, his employer were to continue offering health insurance even after he retired, his budget set would be linear; as long as health insurance provided by his employer is at least as good as Medicare, Medicare is redundant and the eligbility age is irrelevant. This budget set is depicted with the dotted line in Figure 2. Absent this kink, individuals would locate along the budget line depending on their preferences. In the presence of the kink, standard economic theory predicts as long as preferences are convex and smoothly distributed in the population, we should observe individuals bunching at the convex kink. Saez (2010) provides a formal discussion. The individual initially located tangent to the budget set at retirement age of $r^*$ will find it optimal to delay their retirement to 65. This person is the marginal bunching individual; without optimization frictions, all individuals initially with retirement age located on the interval $[r^*, 65]$ will move to the kink point of 65.

Immediately, two predictions come out of this lifetime consumption budget set analysis.
First, there should be a bunching of individuals retiring at the kink induced by Medicare eligibility. The bunching should primarily be due to those without retirement health insurance (facing a convex budget set). Consequently, there should be no bunching at 65 for those with retirement health insurance (facing a linear budget set). I proceed to test these two predictions with data from the Health and Retirement Study.

4.2 Quantifying the Bunch

I begin by presenting the distribution of retirement ages for all individuals in the sample in Figure 3. The left panel presents the data for all individuals who retire prior to 2000, when everyone retiring at and around 65 have a NRA of 65. There is an obvious spike in the distribution in the first three months of turning 62. This is the early retirement age in which individuals can begin claiming Social Security benefits. Retiring prior to the early retirement age means individuals will receive no income and no Social Security installments until 62, and will need to reach into their retirement savings. This suggests individuals generally prefer to retire earlier if they are unconstrained. There is also a spike in the first few months of turning 65. The right panel plots the data for all individuals who retire after 2005, when no one retiring at 65 have a NRA of 65. The cohort with a NRA of 65 are at least 68 years old by 2005. For the remainder of this paper, I restrict my sample to only those retiring after 2005. Even though no one retiring at 65 is directly incentivized by the NRA, there is equally large bunching at 65. Very few individuals retire after 67, suggesting that workers generally prefer to retire earlier. The thicker right tail after 2005 shows that there is a general trend of individuals retiring later in life. Retirement numbers peaks at the first month of each age, however, the data does not appear to follow any obvious cyclical trend. The key takeaway from the distribution of retirement ages is the large amount of bunching at the retirement age corresponding to Medicare eligibility, supporting the first prediction.

To graphically test the second prediction, I create two groups of individuals. The left panel in Figure 4 plots the retirement age distribution for individuals with employer-provided health coverage while employed but without retirement health insurance. The right panel plots retirement age distribution for individuals with both employer-provided health coverage while
employed, and retirement health insurance. The two groups are constructed to be consistent with the budget set framework presented in the previous section. The left and right panels are made up of individuals who face convex and linear lifetime budget sets, respectively. Immediately, we see that there is obvious bunching at 65 for those without retirement health insurance and the bunching is almost non-existent for individuals with retirement health insurance. This is suggestive graphical evidence that Medicare eligibility and health insurance are major factors in retirement decisions, consistent with the non-linear lifetime budget set framework.

It is important to go beyond graphical evidence that Medicare eligibility affects retirement decisions. In the following analysis, I statistically test the null hypothesis that Medicare eligibility does not incentivize bunching at the retirement age of 65. To quantify and test this hypothesis, I draw on non-parametric bunching estimation techniques proposed by Saez 2010 and Chetty et al. 2011\textsuperscript{10}. Intuitively, a bunch is identified and a counterfactual is fit non-parametrically using nearby observations not influenced by the mechanism driving the bunching. An excess mass is defined as the proportional difference in number of individuals retiring at age 65 between what is observed and the predicted counterfactual. This is the statistical object to interest to quantify bunching. First, I compute this excess mass for the general distribution of retirement ages and test whether it is statistically different from zero. Then, I test whether the excess mass for those facing a convex budget set (individuals without retirement health insurance) is larger than the excess mass for individuals facing a linear budget set (individuals with retirement health insurance). The latter excess mass should not be statistically different from zero.

In order to measure the excess mass, denoted by $b$, I must first estimate a counterfactual density — what the distribution of retirement ages would look like if individuals faced a linear lifetime budget set at age 65. To estimate this counterfactual, I first fit a polynomial to the retirement counts, in monthly bins, excluding the data near the kink, by estimating the following regression:

\textsuperscript{10}See Kleven 2016 for a comprehensive review on the estimation and applications of the bunching technique.
\[ C_j = \sum_{i=0}^{q} \beta^0_i (Z_j)^i + \sum_{i \in \mathcal{R}} \gamma^0_i \mathbb{1}\{Z_j = i\} + \epsilon^0_j \]  

(1)

where \( C_j \) is the number of individuals retiring in month \( j \), \( Z_j \) is retirement age in months, \( q \) is the order of the polynomial, and \( \mathcal{R} \) denotes the bunching set, which is the excluded region around the kink. I normalize the bunching point to be zero and do not restrict the bunching set \( \mathcal{R} \) to be symmetric around zero. Let \( B_N \) denote the excess number of individuals who locate at the kink. An initial estimate of the excess number of individuals can be obtained from the predicted values from Equation 1, omitting the contribution of the dummies in the bunching set: \( \hat{B}_N^0 = \sum_{j \in \mathcal{R}} C_j - \hat{C}_j = \sum_{i \in \mathcal{R}} \hat{\gamma}_i^0 \). However, this will over-estimate the amount of bunching because the counterfactual does not account for the individuals who are bunching would be dispersed among the counterfactual; the counterfactual density does not satisfy the constraint that the area under the counterfactual must equal the area under the observed empirical distribution. Chetty et al. perform an adjustment for the counterfactual by shifting the counterfactual distribution just right of the kink upward until it satisfies the integration constraint. They argue that bunching at their kink comes from just right of the kink due to individuals under-reporting their income for tax purposes. In the context of delaying retirement until 65 for Medicare eligibility, the counterfactual should be adjusted analogously for bunching that comes from the left:

\[ C_j \ast \left( 1 + \mathbb{1}\{j < \min\{\mathcal{R}\}\} \frac{\hat{B}_N}{\sum_{j=-L}^{\min\{\mathcal{R}\}-1} \hat{C}_j} \right) = \sum_{i=0}^{q} \beta_i (Z_j)^i + \sum_{i \in \mathcal{R}} \gamma_i \mathbb{1}\{Z_j = i\} + \epsilon_j \]  

(2)

where \( \hat{B}_N = \sum_{j \in \mathcal{R}} (C_j - \hat{C}_j) \) is the number of individuals that bunch at the kink.

Even with this adjustment, this non-parametric counterfactual does not control for non-financial effects of Social Security which can result in some individuals bunching at 65. There are two primary concerns. First, there may be “round-number” effects where individuals may plan and envision their life using precise age milestones. In addition, there may be customary, reference point effects where policies including Social Security and Medicare create a focal
point for retirement over many decades. The second point is a valid concern and one way
around this would be to use another reference point that is not confounded with the incentive
of interest (Kleven 2016). Later in this section, I perform a robustness check where I adjust
Adjusting for reference effects in this way make little difference. In the meantime, I address the
first issue concerning “round-number” effects. Following Kleven and Waseem 2013 and Best
and Kleven 2015, I include individual fixed effects for the first month of each retirement age,
except ages are multiples of five years, and a separate fixed effect for retirement ages that are
multiples of five years (60 months) to Equation 2. Let $A = \{Z_j/60 \in \mathbb{N}\}$ denote the set of ages
that are multiples of five years and $W = \{Z_j/12 \in \mathbb{N}\}$ denote the set of ages that are whole
numbers. The new counterfactual regression equation adjusting for the integration constraint
and “round-number” effects is:

$$C_j* \left(1 + \mathbb{1}\{j < \min\{\mathcal{R}\}\} \frac{\hat{B}_N}{\sum_{j=-\infty}^{\min\{\mathcal{R}\}-1} C_j} \right) = \sum_{i=0}^{q} \beta_i(Z_j)^i + \sum_{i \in \mathcal{R}} \gamma_i \mathbb{1}\{Z_j = i\}$$

$$+ \sum_{i \in W} \rho_i \mathbb{1}\{Z_j \in W \setminus A\} + \alpha \mathbb{1}\{Z_j \in A\} + \epsilon_j \quad (3)$$

Estimation of this equation where the parameters appear in both the right and left hand
side is done by iteration. The counterfactual is constructed with the predicted values from
Equation 3, omitting the contribution from dummies around the kink, but not omitting the
round number fixed effects. Standard errors are computed by standard bootstrap with resam-
pling weights corresponding to survey weights. The empirical estimate of $b$, the excess mass
around the bunching point relative to the average density of the counterfactual is given by:

$$\hat{b} = \frac{\hat{B}_N}{\sum_{j \in \mathcal{R}} \hat{C}_j/(2R + 1)} = \frac{\sum_{i \in \mathcal{R}} \gamma_i}{\sum_{j \in \mathcal{R}} \hat{C}_j/(2R + 1)} \quad (4)$$

Panel A in Table 2 displays the estimates for $b$ and its standard errors (computed via 1000
bootstrap samples) for varying degree of polynomial, $q$, and bunching set $\mathcal{R}$. The bunching
set is determined by eye to be within the first few months of turning 65. The sample uses
all individuals who retire after 2005, regardless of type of health insurance (no insurance, self-insured, Medicaid, spouse, employer coverage, etc.). The excess mass is roughly between $2.3 - 3$. My preferred estimate is a bunching window of the first quarter of turning 65 (65 to 65 and 2 months) and a fifth degree polynomial: $2.469 \times$ more individuals retire at 65 than one would expect based on retirement numbers in the months nearby. Figure 5 illustrates the counterfactual under this parameterization. This number is statistically significant, rejecting the null hypothesis that Medicare eligibility and its associated convex lifetime budget set do not influence retirement timing.

Next, I test the prediction that the majority of the bunching at 65 should be due to those without retirement health insurance and there should be no bunching at 65 for those with retirement health insurance. The former do not face a kink in their budget set, and have no incentive to retire precisely at 65. I repeat the bunching analysis from Equation 3 using the same grouping of individuals in Figure 4 for individuals retiring after 2005. I continue to use a fifth degree polynomial and a bunching window of the first quarter of turning 65 as the bunching parameters. Panel B and C in Table 2 display the bunching estimates for the two groups. The excess mass for those without early retirement health insurance is 4.556 while the excess mass of those with early retirement health insurance of $-0.095$. The excess mass for the former group is statistically significant while the excess mass for the latter group is not statistically different from zero. To summarize, I find an excess number of individuals without retirement health insurance retiring at precisely 65. Among those with retirement health insurance, I find no bunching at the retirement age of 65, which is consistent with economic theory involving linear budget sets.

4.3 Robustness Checks

In this section I provide robustness checks and address concerns of how the observed retirement patterns and the bunching at 65 may be induced by other factors not related to Medicare. There is a concern that the bunch at 65 is mechanical. Retirement for individuals who work part-time, or are not “fully retired” is not well defined, thus individuals may report a retirement age of 65 on a survey for convenience. Recall that my retirement age variables are defined only when
individuals report both a retirement year and retirement month. If individuals are reporting
retirement dates blindly, then it seems more plausible they would leave the month blank or
perhaps even report January. I do not find any particular retirement month appearing more
frequently than others. I repeat the bunching analysis for individuals who report to be working
full-time (working over 35 hours a week) in the most recent survey before retirement. Figure 6
replicates Figure 4 using only full-time employees. Using the same bunching parameters as
before, I find an estimate of excess mass relative to the counterfactual of 1.773 with a standard
error of 0.788. The bunching estimates for those with and without retirement health insurance
are −0.383 (standard error of 0.857) and 4.872 (standard error of 2.614) respectively. These
numbers are roughly similar to the ones for the full sample including part-time employees, and
are qualitatively consistent with the predictions of the lifetime consumption budget set.

One may also worry that individuals are retiring at precisely at 65 due to factors that are
not financial. These may include behavioral effects such as customary and reference effects.
I attempt to partial out these effects induced by government policies or certain customs for
retiring at 65. Kleven 2016 suggests using another reference point that is not confounded by
the incentive of interest. I use the group of individuals who have employer-provided health
coverage both while employed and retired as a counterfactual for the group of individuals who
only receive employer-provided health coverage while employed and lose it when they retire.
The intuition is that both groups are affected by the same reference and customary effects,
but only those who lose employer-provided health coverage after retirement are incentivized
by Medicare eligibility. Under the assumption that reference effects have homogeneous impact
on those with and without early retirement coverage, conditional on having health insurance
through their employer, a differences-in-bunching method (Brown (2013), Best et al. (2014))
uncovers a bunching estimate controlling for reference effects. One may worry that due to
selection, those with early retirement employer coverage do not serve as a valid control for
those without, thus violating the differences-in-bunching assumption. However, I emphasize
that both the treatment and control groups have employer-provided coverage, and it is more
plausible that conditional on having employer-provided coverage, individuals are not selecting
into jobs based on whether they can maintain their coverage after retirement. Most employees
in my sample have worked at the same job for decades, and likely were not choosing jobs based on early retirement health benefits. Panel D in Table 2 display the differences-in-bunching estimates\textsuperscript{11} of the excess mass. The estimates are almost identical to those from Panel B in Table 2 which is not surprising given that the excess mass for those with retirement health insurance are not statistically different from zero.

Lastly, one may worry that the bunching of individuals at 65 may be driven by married couples timing their retirement together. It is well documented in the literature that retirement is more of a household decision than an individual one (See for example, Gustman and Steinmeier 2000 and Casanova 2011). The underlying idea is that spouse’s leisure are complements for each other. I am able to observe spouse’s retirement decision because the HRS also surveys the spouses of the main respondents. The average age difference between husband and wife is precisely three years, suggesting the bunching at 65 may be a byproduct of their spouses bunching at 62, the early retirement age, which is also the most common age to retire at. The average age of the spouses of men who bunch at 65 is 60.75 and the average age of spouses of women who bunch at 62 is 62.5. In addition, only around 15% of individuals bunching at 65 are retiring within 3 months of their spouse. This number is similar for individuals retiring at other ages. Therefore, I reject the notion that couples are timing their retirement to ages 65 and 62.

4.4 Heterogenous Propensities to Bunch

Thus far in the analysis, I have only concentrated on individuals who receive their health insurance from their employer, but may or may not receive extended coverage post-retirement. I have ignored all other types of health insurance include those without any health coverage and those who are insured by other non-employer means. In this section, I study the effects of various forms of receiving health insurance on the propensity to delay retirement until Medicare eligibility. These propensities will likely be heterogenous. To study the heterogenous

\textsuperscript{11}The excess mass with the differences-in-bunching approach is estimated by computing the number of excess individuals who locate at the kink ($\hat{B}_N$ in Equation 3) for the treatment and control groups. I adjust both the number of excess individuals and the counterfactual distribution for differences in sample size between the treatment and control groups. Taking a difference of number of excess individuals, $\hat{B}_N^{\text{treatment}} - \hat{B}_N^{\text{control}}$, Equation 4 provides an estimate of the excess mass.
propensities, I differentiate between the following four groups: i) None: those without any form of health insurance, ii) Self: those with health insurance, but not through their employer, iii) Employer: those with employer-provided health insurance but without retirement coverage, and iv) Employer-Retire: those with employer-provided coverage during both employment and retirement. I study the differences between the propensities to precisely time retirement at 65 for the four groups using the following regression framework:

\[ Y_i = \beta_0 + \beta_1 \text{HealthIns}_i + \beta_2 \text{Employer}_i + \beta_3 \text{EmployerRetire}_i + \theta' X_i + \epsilon_i \quad (5) \]

where \( Y_i \) is an indicator for retiring at precisely 65 (defined as the first 3 months of turning 65\(^{12}\), consistent with my preferred bunching region), \( \text{HealthIns} \) is a dummy for whether an individual has any health insurance coverage, \( \text{Employer} \) is a dummy variable for whether their health insurance is provided by their employer and \( \text{EmployerRetire} \) is a dummy for whether an individual is able to continue their employer coverage after retirement. Each of these variables behave like an interaction. For example, \( \text{Employer} \) takes on a value of one only if they have health insurance and their insurance is through their employer. It takes on a value of zero if either of those two statements are false. \( X \) include observable characteristics for controls, which can also include fixed effects. All variables are pre-retirement variables constructed from the last survey prior to their self-reported retirement.

The coefficient \( \beta_1 \) identifies the difference in propensity of retiring at 65, for individuals in the Self group with None. Conditional on having health insurance, \( \beta_2 \) captures the difference in propensities between those with employer-provided health insurance (but no early retirement coverage) and without employer coverage. This is the difference between Employer and Self group. Lastly, \( \beta_3 \) captures the difference in propensities between those with retirement health insurance and those without, conditional on having employer-provided health insurance. This is equivalent to comparing Employer-Retire and Employer groups.

The regression output is presented in Table 3. Linear probability model coefficients are displayed in columns 1–3 while standard marginal effects of probit regressions are in displayed

\(^{12}\)The results are relatively robust to the definition of ‘precisely 65’.
in columns 4 – 6. Columns 1 and 4 correspond to a regression without any controls, column 2 and 5 includes controls for wage, pension, self-reported health, whether health affects work, medical expenditures, race, years of education, sex, and marital status. Column 3 and 6 include industry and year of retirement fixed effects to control for cross industry variation and time-varying effects, in addition to the controls in columns 2 and 5. Selection bias caused by adverse selection into various insurance types is almost definitely present. Even if selection into health insurance plans were completely random, moral hazard can affect retirement timing if those with the best health plans are neglecting their health, forcing them to exit the labor force earlier. Hence, my regression estimates can only be interpreted as correlations and not causal effects.

With the exception with the $\beta_3$ coefficient, the regression coefficients are not statistically significant. This is expected due to relatively few individuals who retire at precisely 65. However, the signs are consistent with economic intuition. The $EmployerRetire$ coefficient is negative across all specifications which suggest that conditional on receiving health insurance from their employer, having coverage during retirement will decrease the probability of precisely retiring at 65 by approximately $1 - 2$ percentage points (25%). This can be thought of as the regression analog of the bunching analysis, controlling for observables. Conditional on having health insurance, those who receive it from an employer but only while working, are more likely to time retirement to precisely 65 than those with some other form of health insurance. Lastly, the Self group is less likely to time retirement to 65 than those without health insurance; these individuals either receive insurance through their spouse, some other government insurance program, or privately purchased their own coverage, and thus have no reason to delay retirement for Medicare$^{13}$.

$^{13}$This can also be framed in a linear vs non-linear budget set analysis. The Self group faces a linear budget set around 65 with a slope of their income minus the cost of their insurance premium. Individuals without any health insurance (None group) face a convex budget set with a kink at 65. Suppose such an individual is contemplating retirement prior to 65. Because they are uninsured and likely financially constrained, each period with some probability they face a large negative health shock they cannot afford. As long as they are employed and earning income, this probability is reduced. This can be due to the increased earned income directly decreasing the medical cost threshold they cannot afford, or a healthier lifestyle while employed which reduces the probability of receiving a health shock. After 65, Medicare kicks in and fully insures against all health shocks. Thus the budget set is an expected lifetime consumption budget set and $c$ in the earlier framework can be interpreted as the expected reduction in medical costs from being insured by an additional $y$ units of income.
The direction of the regression coefficients are all consistent with economic intuition. Thus, naturally the next step is to compare the magnitudes. The coefficient on EmployerRetire is the largest. This is intuitive because individuals with early retirement coverage usually have the best health plans through their employer and are likely paying low premiums and truly have no rational reason for Medicare to influence their retirement decision. This also confirms that comparing bunching estimates based on retirement health insurance was the correct breakdown. The coefficient on Employer is larger in magnitude than the coefficient on HealthIns. In other words, relative to the Self group (those who have insurance through Medicaid, their spouse or other non-employer means), those who have coverage from their employer only while working\textsuperscript{14} are more likely to retire precisely at 65 than those who have never had insurance to begin with. This can be rationalized by loss aversion; individuals receiving insurance from their employer (often free or heavily subsidized) lose this benefit by retiring, whereas those without any health insurance have nothing to lose. This is consistent with the job lock literature (for example Madrian (1994), Gruber and Madrian (2002)) that find strong ties between lack of labor market mobility and employee benefits.

5 Value of Medicare

Given the compelling evidence that Medicare eligibility influences retirement decisions, I build a simple model of individuals’ retirement timing. Because individuals are delaying retirement substantially to avoid being uninsured, they must place high value on Medicare. This is the motivation behind the model. The key component of the model is the cost of being uninsured that Medicare mitigates. Equipped with the model, I then investigate counterfactual retirement patterns under two types of policy reforms: shifting Medicare eligibility age and providing premium subsidies similar to the ACA.

\textsuperscript{14}This is the Employer group, and 90% of them only have this one plan.
5.1 The Model

Consider a model economy where individuals, indexed by $i$, earn income $y_{i,t}$ from employment at age $t$ while working. Individuals know their current and future income with certainty. When they retire, they earn $l$ units of utility from leisure. All individuals in this economy receive health insurance from their employer while working. However, there are two types of individuals: those who receive health insurance from their employer even after retirement and those who lose coverage once they retire. I denote them as $emp = 1$ and $emp = 0$ respectively. For each period an individual does not have health insurance, they incur a cost of $c$, regardless of whether they are in the labor force. I further assume all individuals begin contemplating retiring at age $t_0$ and live until period $T$. Everyone is forced to retire by period $T$. Starting at age $t_{Medicare}$, all individuals receive Medicare. Medicare is costless and completely mitigates the cost $c$. Apart from the characterization of leisure, the model is conceptually similar to Section 4.1 and the non-linear budget set in Figure 2.

In this setting, I am assuming employer-provided health insurance and Medicare are perfectly identical in the sense that both provide full coverage, and come at no cost to the individual. Thus, the cost $c$ can be interpreted as a measure of expected medical costs or the average willingness-to-pay for health insurance premium on the private market just prior to Medicare eligibility. I also assume individuals have perfect foresight of future earnings, no risk of unemployment and are alive with probability one until the last period $T$. In addition, the retirement decision is permanent. Most importantly, a major limitation of my model is the fact that I am treating retirement health insurance as exogenous. Under these assumptions, the parameter $c$ is the cost of living a period without Medicare or health insurance. In other words, it can be interpreted as the value of Medicare or willingness-to-pay for Medicare. This is the parameter of interest.

I will work with units of utility and a random utility model. The sequence of events are such that at the beginning of every period, the individual realizes their utility from retiring today, including random noise, and then decides whether to retire. If they choose to retire that period, they do not receive that period’s income but do receive leisure $l$. The lifetime utility
for individual $i$ who retires at age $t$ is $U_{i,t}^{ret} = V_{i,t}^{ret} + \epsilon_{i,t}^{ret}$ where

$$V_{i,t}^{ret} = \begin{cases} 
\sum_{t'=t_0}^{t-1} \delta^{t'-t_0} y_{i,t'} + \sum_{t'=t}^{T} \delta^{t'-t_0} (l - c_1 \{t' < t_{Medicare}\}) & \text{for } i \text{ s.t. } emp = 0 \\
\sum_{t'=t_0}^{t-1} \delta^{t'-t_0} y_{i,t'} + \sum_{t'=t}^{T} \delta^{t'-t_0} l & \text{for } i \text{ s.t. } emp = 1
\end{cases}$$

and $\delta$ is the discount rate and $\epsilon$ is random noise which I assume to be independently and identically distributed type I extreme value. For example, at the beginning of period $t_0$, individual $i$ realizes their total lifetime value if he retires in period $t_0$: $V_{i,t_0}^{ret}$. This individual choose to retire if their value of retiring this period is greater than their expected maximum lifetime value from delaying retirement. That is, if $V_{i,t_0}^{ret} > V_{i,t_0}^{not} = \mathbb{E} \left[ \max_{t' > t_0} V_{i,t_0}^{ret} + \epsilon_{t,t_0}^{ret} \right]$. If this inequality is not satisfied, they will delay retirement and re-consider retiring at period $t_0 + 1$ and so forth. The model is forward looking at each point in time based on expectation of future events.

By properties of the extreme value random variable, conditional on not having retired yet, the single year retirement probability is:

$$P_{t|t} = P(\text{retire at } t | \text{ have not retired by } t) = \frac{\exp(V_{t}^{ret})}{\exp(V_{t}^{ret}) + \exp(V_{t}^{not})}$$

where I have dropped index $i$ and $V_{t}^{not} = \mathbb{E} \left[ \max_{t' > t} V_{t}^{ret} + \epsilon_{t}^{ret} \right] = \ln \left( \sum_{t' > t} \exp \left( V_{t'}^{ret} \right) \right)$. This is also the inclusive value term that shows up in various logit models. The unconditional retirement probability for year $t$, $P_t$, is simply the product of conditional probabilities of not retiring in any of the years prior:

$$P_t = P(\text{retire at } t | \text{ have not retired by } t)P(\text{have not retired by } t)$$

$$= P(\text{retire at } t | \text{ have not retired by } t)$$

$$\times (1 - P(\text{retire at } t-1 | \text{ have not retired by } t-1)) \times \cdots \times (1 - P(\text{retire at } t_0))$$

$$= P_{t|t} \times \prod_{t'=t_0}^{t-1} (1 - P_{t'|t'})$$

(6)
With independent and identically distributed errors, the likelihood function is standard:

\[ \mathcal{L}(l, c, \delta) = \prod_{i} \prod_{t=t_0}^{T} (P_{it})^{R_{it}} \]  

(7)

where \( R_{it} = 1 \) if individual \( i \) retires in years \( t \) and zero otherwise.

Strictly speaking, the probabilities in Equation 6 are only appropriate if the individual is in the sample. That is, the individual must not have retired by \( t_0 \) and first consider retirement at age \( t_0 \). Conditioning on being in the sample would require a judgment about \( t_0 \) which is definitely idiosyncratic and would greatly complicates estimation. Therefore, I use Equation 6 and Equation 7 for estimation.

5.2 Estimation

Estimation of Equation 7 involves three parameters \( l, c \) and \( \delta \), data on individual-time period level income \( y_{i,t} \) and retirement indicator \( R_{i,t} \). Estimation also involves a judgment on the unit of time period, \( t_0 \) and \( T \). I continue to use the Health and Retirement Study data and work with time periods at the annual level. Because the date of retirement is specific to the year and month, the indicator \( R_{i,t} \) is updated every year. However, since the survey is conducted every two years, the income \( y_{i,t} \) is updated no more than once every two years. I use two different estimation samples depending on the age at which individuals retire. Construction of a sample corresponds to choosing \( t_0 \) and \( T \). The samples consist of all individuals surveyed since the first wave of the HRS (1992) who retire between the ages of 55 – 72 or 60 – 70. 70% and 48% of individuals in the HRS retire between these ages, respectively. To be consistent with my model economy, only individuals who have employer-provided health insurance are included. There are 3919 individuals in the 55 – 72 sample and 2681 in the 60 – 70 sample. I use an iterative Broyden–Fletcher–Goldfarb–Shanno (BFGS) algorithm over various grid points to ensure I find a global optimum. The BFGS is an improvement over Davidon–Fletcher–Powell (DFP), the first quasi-Newton method. Standard errors are obtained from an estimate of the numerically differentiated Hessian.

Table 4 displays the estimation results for the two samples. In rows 1 and 3, the discount
factor is imposed to be 0.90. This value is consistent with estimates of the discount factor in empirical settings. In rows 2 and 4, the discount factor is free to vary. The model fit is demonstrated by displaying the cumulative retirement probabilities between what is observed in the sample and what my model predicts. Figure 7 plots this for the sample and parameterization in row 3 of Table 4. The cumulative probabilities are similar for the other rows. My model overpredicts the number of individuals retiring at ages 60 and 61 relative to 62. This is expected because individuals delay retirement to 62, the earliest age one can receive Social Security benefits, and I do not incorporate Social Security into my model. The model does predict a slight convex kink at 64 to 65, but not to the extent of what is observed. This suggests that there are either other effects unrelated to Medicare that drive retirement at 65, or my model is too parsimonious. Overall, the model predicts rather reasonably the cumulative retirement rates each year.

The parameter estimates are robust to both the estimation sample and the discount factor. The estimates for \( l \) are between 45,000 and 70,000 depending on the sample. The average income near retirement for my sample is approximately 35,000 – 40,000, thus individuals value leisure at roughly 1.5 times their utility from working and earning income. The parameter \( c \) is approximately $12,000 – 15,000. Recall that this parameter is the average cost of living a year without health insurance. In other words, it is the value (willingness-to-pay) of Medicare. In a similar setting, Khwaja 2010 uses HRS data and a dynamic random utility model for health insurance in a human capital framework to calculate willingness-to-pay for Medicare. He finds the average willingness-to-pay for delaying the age of Medicare eligibility to 67 to be $39,435, which is not too far from my estimate. In addition, the federal government spent an average of $11,707 per individual on Medicare in 2014. Total personal health care per-capita spending for individuals over 65 was $18,988 in 2012. Because these numbers include all individuals over 65, they will be overestimated for individuals near Medicare eligibility age, which is the setting I have estimated. A 64 year old earning median income in 2016 can expect to pay an

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15 In a health setting, van der Pol and Cairns (1999, 2001) find a discount factor of 0.92 – 0.94 from survey experiments based on non-fatal health changes.

16 National Health Expenditure Data Tables (Source: Centers for Medicare and Medicaid Services, Office of the Actuary, National Health Statistics Group)
annual premium of $8,420 through the State Marketplace. In conclusion, $12,000-$15,000 is a reasonable estimate of the value of Medicare.

5.3 Counterfactuals

To illustrate the importance of health insurance on retirement rates, two types of policy reforms are simulated. The first is a simple shift in Medicare eligibility age. The second represents providing subsidies for health insurance premiums, in line with the Affordable Care Act provisions. I simulate retirement probabilities (Equation 6) using the estimated parameters and the sample corresponding to row 3 of Table 4. Under the first policy provision regarding shifting Medicare eligibility age (corresponds to shifting $t_{\text{Medicare}}$ in the model), the prediction is very straightforward. Individuals without retirement health insurance should retire earlier (later) if Medicare eligibility is shifted to before (after) 65. The cumulative retirement rates in Panel A of Figure 8 confirms this intuition for those without retirement health insurance, the only group that is impacted by this reform.

For the second type of policy reform, I consider a flat $400 a month premium subsidy to those without retirement health insurance, and a subsidy scheme that replicates that of the ACA. Health insurance premium subsidies act as a subsidy for early retirement for those with employer-provided health insurance while working, but without retirement coverage. Retirement patterns under premium subsidy reforms are simulated by subtracting from the parameter $c$ the subsidy amount. The model predicts that if individuals with retirement health insurance were provided a $400 per month insurance premium subsidy, the average retirement age would decrease by 3 months and the ACA’s subsidies would decrease the average retirement age by about 5 months. Panel B in Figure 8 displays the simulated cumulative retirement rates for those without retirement health insurance.

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17 Kaiser 2016

18 The Affordable Care Act provides premium subsidies based on the household federal poverty line. For each income bracket, the ACA has a target contribution amount, and an individual receives subsidies based on the difference between the marketplace price and this contribution amount. The target contribution are based on the maximum an individual should pay as a proportion of their income: less than 133% of FPL: 2.04%, 133% – 150% of FPL: 4.08%, 150% – 200% of FPL: 6.43%, 200% – 250% of FPL: 8.21%, 250% – 400% of FPL: 9.69%. I observe household income and household size in the HRS data, thus I construct individual specific subsidies by subtracting it from my estimates of $c$. 

26
There are a few caveats to note. These counterfactual retirement patterns are only for those without retirement health insurance, which is only a quarter of those with employer-provided coverage. Coupled with the fact that only 48% of individuals in the HRS data receive insurance from their employer, it should not be surprising if the actual distribution of retirement ages remains unchanged under the policy reforms I consider. Using data from both the HRS and the Current Population Survey (CPS) from January 2009 to May 2016, I find no evidence of an increase in early retirement or total retirement post-ACA. Figure A.4 and Figure A.5 show the average retirement age and proportion of individuals of a particular age group who retire in each month; I also look for differential trends for states that did and did not expand Medicaid. There are several potential explanations for why there is no evidence of early retirement. They include a limited population base affected by ACA, inertia of planning decisions, insufficient decreases in premium price, financial constraints, or heterogenous preferences. None of these are accounted for by my model.

6 Discussions and Conclusions

In this paper, I use modern bunching techniques to revisit the question of whether health insurance affects labor supply decisions. The evidence suggests that at least for the age of 65, there are a substantial amount of people delaying retirement until they reach Medicare eligibility. This has important policy implications because policy makers cannot think about near-elderly retirement decisions in isolation from health care, insurance, and employer-provided benefits. I build a simple retirement model to estimate a value of Medicare for individuals near the age of 65, without continued employer-provided health insurance, of approximately $15,000. This confirms that individuals place large value on Medicare and being insured against health risks. My estimates and observed retirement timing decisions point to relatively strong responsiveness to financial incentives at retirement.

My results highlight the important link between health insurance and retirement decisions. They imply that if the government wants to influence people’s average retirement age, then focusing solely on Social Security is not sufficient. Although it is not obvious to a casual ob-
server, it is crucial for policy to address how health insurance is supplied at near retirement age and Medicare eligibility age. With the Social Security Trust Fund’s questionable sustainability, policy makers need to consider other transfers. Given the uncertainty of health shocks and medical expenditures, and the high value placed on Medicare, it may be more cost effective and salient to implement policy reforms aimed at providing health insurance rather than cash.

7 References


Figure 1
Social Security Benefit Schedule (Post-2005)

Notes: The Social Security benefits schedule after 2005. This is equivalent to a mapping to individuals born between 1943 and 1954. From 2005 – 2016 the NRA is 66. In 2017, the NRA will begin increasing to 67 at a rate of 2 months per year.
Notes: The figure shows the effects of a non-linear budget set (convex kink). In the absence of employer-provided early retirement health coverage, the gain from delaying retirement by a period corresponds to a gain of $y + c$ in lifetime consumption prior to 65, where $y$ and $c$ are the income and cost of health coverage/risk each period, respectively. After 65, the gain in lifetime consumption is $y$; this creates the convex kink at 65. In the presence of employer-provided early retirement health coverage, the individual that chooses to retire at $r^*$ (where their indifference curve is tangential to the linear budget set) is the marginal bunching individual. With the non-linear budget set, this individual and every individual initially located on the interval ($r^*, 65$) bunch at the kink.
Figure 3

Notes: Distribution of individual’s retirement ages in monthly bins from the Health and Retirement Study (HRS). The left panel shows the distribution of retirement ages for individuals who retire before 2000, before any changes to the Normal Retirement Age. Hence, everyone retiring at 65 in the left panel have a NRA of 65. The right panel shows the distribution for after 2005. By 2005, the cohort with a NRA of 65 are at least 68 years old. Thus, no one retiring at 65 in the right panel has a NRA of 65.
Notes: Distribution of individual’s retirement ages in monthly bins from the Health and Retirement Study (HRS) for individuals retiring after 2005. The left panel shows the distribution of retirement ages for individuals who do not have employer-provided early health retirement coverage. The right panel shows the distribution for individuals who have employer-provided early retirement coverage. All individuals in both panels receive health insurance from their employer while employed. The left and right panels face convex and linear lifetime consumption budget sets, respectively.
Notes: Distribution of individual’s retirement ages in monthly bins from the Health and Retirement Study (HRS) for individuals retiring after 2005 and the counterfactual density estimated using non-parametric bunching techniques described in Equation 3. Bunching estimate is computed using a fifth degree polynomial and a bunching window (excluded region) of 65 to 65 years and 2 months. Standard error is calculated from 1000 bootstrap samples where resampling probabilities are taken from sampling probabilities.
Notes: Distribution of retirement for individuals who worked full time prior to retirement, defined as working over 35 hours a week for pay. The left panel shows the distribution of retirement ages for individuals who do not have employer-provided early health retirement coverage. This includes individuals who either do not have any health insurance, do not receive employer-provided coverage, or their have employer-provided coverage that does not extend beyond early retirement. The right panel shows the distribution for individuals who have employer-provided early retirement coverage.
Notes: Cumulative retirement rates using parameter estimates in row 3 in Table 4. The sample consists of individuals who retire between the ages of 60 – 70 and have employer-provided health insurance (regardless of retirement health insurance status). The black and red lines display the actual observed and model predicted cumulative retirement rates. Data is from the Health and Retirement Study.
Figure 8: Cumulative Retirement Rates (Without Retirement Health Insurance)

Panel A. Counterfactual: Shifting Medicare eligibility age

Panel B. Counterfactual: Premium subsidies

Notes: Cumulative retirement rates using parameter estimates in row 3 in Table 4. The sample consists only of individuals who retire between the ages of 60 – 70 and have employer-provided health insurance only while working. The black and red lines display the actual observed and model predicted cumulative retirement rates. Panel A displays counterfactual simulations under various different Medicare eligibility ages. Panel B displays counterfactual simulations under two different premium subsidies: fixed $400 per month premium subsidy or subsidies to bring premium costs down to those consistent with “expected” contribution amounts (defined by 2017 ACA targets) based on the federal poverty line. Data is from the Health and Retirement Study.
### Table 1

**Summary Statistics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Entire sample (1)</th>
<th>Employer (Retire = 0) (2)</th>
<th>Employer (Retire = 1) (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wage</td>
<td>24.27</td>
<td>25.22</td>
<td>24.48</td>
</tr>
<tr>
<td></td>
<td>(3.48)</td>
<td>(2.03)</td>
<td>(8.92)</td>
</tr>
<tr>
<td>Pension</td>
<td>0.51</td>
<td>0.79</td>
<td>0.81</td>
</tr>
<tr>
<td></td>
<td>(0.0053)</td>
<td>(0.013)</td>
<td>(0.0073)</td>
</tr>
<tr>
<td>Self-reported health*</td>
<td>2.62</td>
<td>2.66</td>
<td>2.52</td>
</tr>
<tr>
<td>(1=poor, 5=excellent)</td>
<td>(0.010)</td>
<td>(0.036)</td>
<td>(0.020)</td>
</tr>
<tr>
<td>Medical expenditures*</td>
<td>2935</td>
<td>3268</td>
<td>2692</td>
</tr>
<tr>
<td>(out-of-pocket)</td>
<td>(69.12)</td>
<td>(177.00)</td>
<td>(96.87)</td>
</tr>
<tr>
<td>Race</td>
<td>0.84</td>
<td>0.87</td>
<td>0.88</td>
</tr>
<tr>
<td></td>
<td>(0.0029)</td>
<td>(0.012)</td>
<td>(0.0071)</td>
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<tr>
<td>Years of education</td>
<td>13.01</td>
<td>13.60</td>
<td>13.75</td>
</tr>
<tr>
<td></td>
<td>(0.023)</td>
<td>(0.088)</td>
<td>(0.047)</td>
</tr>
<tr>
<td>Sex</td>
<td>0.45</td>
<td>0.46</td>
<td>0.54</td>
</tr>
<tr>
<td></td>
<td>(0.0035)</td>
<td>(0.015)</td>
<td>(0.0088)</td>
</tr>
<tr>
<td>Retire at 65</td>
<td>0.025</td>
<td>0.031</td>
<td>0.024</td>
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<tr>
<td></td>
<td>(0.0012)</td>
<td>(0.0055)</td>
<td>(0.0031)</td>
</tr>
<tr>
<td>Retire post 65</td>
<td>0.22</td>
<td>0.093</td>
<td>0.124</td>
</tr>
<tr>
<td></td>
<td>(0.0031)</td>
<td>(0.0098)</td>
<td>(0.0061)</td>
</tr>
<tr>
<td>HealthsIn</td>
<td>0.815</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Employer</td>
<td>0.476</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N</td>
<td>19971</td>
<td>1068</td>
<td>3173</td>
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</table>

*Computed at the time of last survey just before turning 65.

**Notes:** This table reports the mean and the standard deviation (in parentheses) of each variable in three different samples: the entire sample, individuals with employer-provided health insurance while employed but without retirement health insurance, and individuals with employer-provided health insurance while employed and retired. Wage is hourly wage, pension is a dummy for whether the employee has an employer created pension plan, race is a dummy for being white, sex is a dummy for being male. Retire at 65 is defined as retiring in the first quarter of turning 65. Wage, pension and married are constructed at pre-retirement values; see the text for how they are constructed. Self-reported health and medical expenditures are computed at most recent values just prior to turning 65. Data is from all years of the Health and Retirement Study.
Table 2

Bunching Estimates at 65

<table>
<thead>
<tr>
<th>Panel A. Full Sample</th>
<th></th>
<th>Degree (q)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Bunching window</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>64 and 11 months - 65 and 2 months</td>
<td>2.597</td>
<td>2.797</td>
<td>2.421</td>
<td>2.600</td>
<td>2.618</td>
<td>3.191</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.658)</td>
<td>(0.679)</td>
<td>(0.642)</td>
<td>(0.664)</td>
<td>(0.666)</td>
<td>(0.728)</td>
<td></td>
</tr>
<tr>
<td>65 - 65 and 3 months</td>
<td>2.710</td>
<td>2.924</td>
<td>2.565</td>
<td>2.758</td>
<td>2.811</td>
<td>3.412</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.683)</td>
<td>(0.707)</td>
<td>(0.671)</td>
<td>(0.697)</td>
<td>(0.703)</td>
<td>(0.772)</td>
<td></td>
</tr>
<tr>
<td>65 - 65 and 2 months</td>
<td>2.454</td>
<td>2.610</td>
<td>2.323</td>
<td>2.469</td>
<td>2.512</td>
<td>2.966</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.594)</td>
<td>(0.612)</td>
<td>(0.581)</td>
<td>(0.600)</td>
<td>(0.606)</td>
<td>(0.658)</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Panel B. Without Retirement Health Insurance</th>
<th></th>
<th>Degree (q)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
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<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>64 and 11 months - 65 and 2 months</td>
<td>2.807</td>
<td>4.004</td>
<td>3.324</td>
<td>3.770</td>
<td>3.803</td>
<td>4.475</td>
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</tr>
<tr>
<td></td>
<td>(2.098)</td>
<td>(2.468)</td>
<td>(2.264)</td>
<td>(2.399)</td>
<td>(2.410)</td>
<td>(2.617)</td>
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<tr>
<td>65 - 65 and 3 months</td>
<td>3.413</td>
<td>4.816</td>
<td>4.108</td>
<td>4.675</td>
<td>4.783</td>
<td>4.475</td>
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<tr>
<td></td>
<td>(2.157)</td>
<td>(2.566)</td>
<td>(2.365)</td>
<td>(2.530)</td>
<td>(2.562)</td>
<td>(2.815)</td>
<td></td>
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<tr>
<td>65 - 65 and 2 months</td>
<td>3.532</td>
<td>4.672</td>
<td>4.068</td>
<td>4.556</td>
<td>4.649</td>
<td>5.367</td>
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<tr>
<td></td>
<td>(2.011)</td>
<td>(2.364)</td>
<td>(2.180)</td>
<td>(2.329)</td>
<td>(2.358)</td>
<td>(2.578)</td>
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<table>
<thead>
<tr>
<th>Panel C. With Retirement Health Insurance</th>
<th></th>
<th>Degree (q)</th>
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<tr>
<td>Bunching window</td>
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<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>64 and 11 months - 65 and 2 months</td>
<td>1.286</td>
<td>1.701</td>
<td>1.223</td>
<td>1.050</td>
<td>1.068</td>
<td>1.316</td>
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<tr>
<td></td>
<td>(1.071)</td>
<td>(1.162)</td>
<td>(1.070)</td>
<td>(1.053)</td>
<td>(1.057)</td>
<td>(1.120)</td>
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</tr>
<tr>
<td>65 - 65 and 3 months</td>
<td>0.671</td>
<td>1.039</td>
<td>0.636</td>
<td>0.460</td>
<td>0.504</td>
<td>0.699</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.021)</td>
<td>(1.105)</td>
<td>(1.023)</td>
<td>(1.001)</td>
<td>(1.011)</td>
<td>(1.076)</td>
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</tr>
<tr>
<td>65 - 65 and 2 months</td>
<td>0.077</td>
<td>0.290</td>
<td>0.029</td>
<td>-0.095</td>
<td>-0.067</td>
<td>0.040</td>
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<tr>
<td></td>
<td>(0.775)</td>
<td>(0.832)</td>
<td>(0.770)</td>
<td>(0.751)</td>
<td>(0.757)</td>
<td>(0.797)</td>
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</table>

<table>
<thead>
<tr>
<th>Panel D. Differences-in-Bunching</th>
<th></th>
<th>Degree (q)</th>
<th></th>
<th></th>
<th></th>
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<tbody>
<tr>
<td>Bunching window</td>
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<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>64 and 11 months - 65 and 2 months</td>
<td>1.026</td>
<td>1.663</td>
<td>1.522</td>
<td>2.064</td>
<td>2.076</td>
<td>2.429</td>
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</tr>
<tr>
<td></td>
<td>(1.349)</td>
<td>(1.591)</td>
<td>(1.462)</td>
<td>(1.563)</td>
<td>(1.570)</td>
<td>(1.729)</td>
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</tr>
<tr>
<td>65 - 65 and 3 months</td>
<td>2.244</td>
<td>3.180</td>
<td>2.933</td>
<td>3.657</td>
<td>3.710</td>
<td>4.313</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.235)</td>
<td>(1.475)</td>
<td>(1.369)</td>
<td>(1.476)</td>
<td>(1.493)</td>
<td>(1.673)</td>
<td></td>
</tr>
<tr>
<td>65 - 65 and 2 months</td>
<td>2.919</td>
<td>3.793</td>
<td>3.503</td>
<td>4.137</td>
<td>4.195</td>
<td>4.779</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.947)</td>
<td>(1.114)</td>
<td>(1.035)</td>
<td>(1.113)</td>
<td>(1.126)</td>
<td>(1.255)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: Bunching estimates for varying degrees of polynomial and bunching window. See the text for estimation procedures. Standard errors, in parentheses, are calculated from 1000 bootstrap samples where resampling probabilities are taken from sampling probabilities. The estimation is done using the restricted sample of individuals who retire after 2005; no one retiring at 65 has a Normal Retirement Age of 65, the cohort with a NRA of 65 are age 65.5 or older by 2005. Panel A displays the bunching estimation results for the whole sample, regardless of type of health insurance. Panel B displays the results for individuals with employer-provided health insurance while employed, but without retirement health insurance. Panel C include only individuals with employer health insurance while employed and retired. Panel D uses those with retirement health insurance as a counterfactual for those without retirement health insurance in a differences-in-bunching approach. The method is described in the text. Data is from the Health and Retirement Study.
### Table 3

**Effect of Health Insurance on Retiring at 65**

**Dependent variable:** Probability of precisely retiring at 65 (defined as the first quarter of turning 65)

<table>
<thead>
<tr>
<th></th>
<th>Linear Probability Model</th>
<th>Probit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Controls (1)</td>
<td>Controls (2)</td>
</tr>
<tr>
<td>HealthIns</td>
<td>-0.0161 (0.0114)</td>
<td>-0.00226 (0.00948)</td>
</tr>
<tr>
<td>Employer</td>
<td>0.0149 (0.0143)</td>
<td>0.00876 (0.0168)</td>
</tr>
<tr>
<td>EmployerRetire</td>
<td>-0.0194 (0.0139)</td>
<td>-0.0240 (0.0163)</td>
</tr>
<tr>
<td>N</td>
<td>3511</td>
<td>2567</td>
</tr>
</tbody>
</table>

|                      | No Controls (4)          | Controls (5)                | Controls + FE (6) |
| HealthIns            | -0.0150 (0.0106)         | -0.00144 (0.00860)          | -0.00574 (0.0108) |
| Employer             | 0.0140 (0.0124)          | 0.00547 (0.0119)            | 0.0101 (0.0116)   |
| EmployerRetire       | -0.0196 (0.0122)         | -0.02094 * (0.0118)         | -0.0114 (0.0119)  |
| N                    | 3511                     | 2567                        | 1871             |

**Notes:** Regression output of specification Equation 5 where the dependent variable is the probability of retiring at 65 (defined as being the first 3 months of turning 65). Standard errors are displayed in parentheses. Controls include wage, pension, self-reported health, whether health affects work, medical expenditures, race, years of education, sex, and marital status. Fixed effects include both industry and year of retirement fixed effects. Data is from the Health and Retirement Study, restricted to those who retire after the 2005. Both linear probability model and probit specifications are displayed. Coefficients for the probit regression are standard marginal effects reported at the mean.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. 

---

42
### Table 4

Parameter Estimates for Various Samples

<table>
<thead>
<tr>
<th></th>
<th>( l )</th>
<th>( c )</th>
<th>( \delta )</th>
<th>( \mathcal{L} )</th>
<th>Ages: ([t_0, T])</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>44869.23</td>
<td>12266.55</td>
<td>0.90(^a)</td>
<td>-13543.18</td>
<td>55-72</td>
</tr>
<tr>
<td></td>
<td>(432.61)</td>
<td>(749.30)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>44635.24</td>
<td>12932.75</td>
<td>0.598</td>
<td>-12141.70</td>
<td>55-72</td>
</tr>
<tr>
<td></td>
<td>(1483.52)</td>
<td>(1487.747)</td>
<td>(0.0145)</td>
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<tr>
<td>3.</td>
<td>61769.49</td>
<td>15070.08</td>
<td>0.90(^a)</td>
<td>-6829.35</td>
<td>60-70</td>
</tr>
<tr>
<td></td>
<td>(741.46)</td>
<td>(1657.94)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>65717.39</td>
<td>13694.81</td>
<td>0.737</td>
<td>-6537.87</td>
<td>60-70</td>
</tr>
<tr>
<td></td>
<td>(1061.47)</td>
<td>(2350.12)</td>
<td>(0.008)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Parameter value imposed.

**Notes:** Parameter estimates of Equation 7 for all individuals who have employer-provided health insurance. Some individuals have continued coverage for early retirement, and some do not. Both types are included in the estimation. Estimation is repeated for three different samples: those who retire between ages 55 – 72 and 60 – 70. The sample sizes are 3919 and 2681 respectively. The optimum was obtained using an iterative Broyden–Fletcher–Goldfarb–Shanno (BFGS) algorithm over various grid points to ensure a global optimum was found. The BFGS is an improvement over Davidon–Fletcher–Powell (DFP), the first quasi-Newton method. Discount factor, \( \delta \), is imposed at 0.90 for rows 1 and 3. Standard errors, obtained from the numerically differentiated Hessian, are in parentheses. Data is from the Health and Retirement Study.
9 Appendix

Figure A.1

Changes in Normal Retirement Age

Notes: Changes in Normal Retirement Age. In 2000, the NRA was increased from 65 to 65 and 2 months for those turning 62 in that year, i.e. the ones born in 1938. Those born prior to 1938 are not affected. This increase was slowly phased in by increasing NRA by 2 months per year. The retirement age remains at 66 for 11 years until 2017, for which individuals turning 62 then are affected, i.e. the ones born in 1955 and later.
Notes: The average retirement age of individuals retiring each year from 2000 to 2014. The confidence bars are at the 95% level. Data is from the Health and Retirement Study.
Figure A.5
Proportion of Individuals Who Are Retired

Notes: The proportion of individuals who are retired in each month. The plots are partitioned based on age groups and by state, depending on whether they expanded Medicaid. Data is January 2009 to May 2016 Current Population Survey (CPS).