THE EFFECT OF SOCIAL SECURITY ON ELDERLY MIGRATION AND LOCATION CHOICE

ELAINE TANG

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ABSTRACT

Increasing taxation, reducing benefits, and raising the retirement age are popular topics of debate surrounding the Social Security program. Past research has shown that lower benefits decrease independent living and homeownership, and increases poverty amongst the elderly. However, the ability to live in desirable locations also impacts welfare. How do Social Security benefits reductions impact elderly migration and location choice? Higher local wages generally compensate higher local housing costs. However, unlike their children, Social Security recipients have mostly retired. With soaring metropolitan real estate prices and rent hikes, are those relying on Social Security benefits forced to move from high-cost to low-cost locations? What are the impacts on welfare if the elderly must live in lower-cost areas or potentially live farther from their children? I shed light on these questions by exploiting the Social Security notch to examine the effects of an exogenous decrease in Social Security benefits on where the elderly have chosen to live.
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I. Introduction

About 83 percent of the $808 billion of Social Security outlays (about one quarter of federal spending) in fiscal year 2013 were paid to recipients of Old-Age and Survivors Insurance.\(^1\) Since 2010, Social Security outlays have exceeded annual tax revenues, and the Congressional Budget Office (CBO) estimates that these outlays will exceed tax revenues by an average of 12 percent for the next decade. With higher life expectancies, increasing numbers of the baby-boom generation reaching retirement age, and tax revenues remaining almost constant, the CBO projects that the Social Security program will have exhausted its funds by 2033.

Increasing taxation, reducing benefits, and raising the eligible retirement age have been popular topics of national debate. None of these suggestions is widely supported. While most people that pay payroll taxes would not support increasing their taxes, reducing benefits or raising the eligible retirement age decrease the resources of those who depend on Social Security as their primary source of income. In his American Economic Association Ely Lecture, Jim Poterba reveals that within the elderly group of individuals aged 65 and older, individuals who are younger or married are “more likely to be in the top quartile of the income distribution” amongst elderly individuals, and the oldest members of this group are “more likely to depend on Social Security as their primary income source.”\(^2\) Moreover, the oldest of this group are disproportionately women, and women comprise 77 percent of the individuals in the lowest income quintile. Thus, Poterba’s statistics suggest that decreases in Social Security benefits would disproportionately impact older, divorced, widowed, never married, or female Social Security beneficiaries.

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Over the years, several notable economists have studied the impact of decreases in Social Security benefits on elderly living arrangements (Engelhardt, Gruber, and Perry 2005), elderly homeownership (Engelhardt 2007), elderly poverty (Engelhardt and Gruber 2004), elderly labor supply (Krueger and Pischke 1992), and elderly mortality (Snyder and Evans 2006). Existing research has thus examined how decreases in Social Security benefits impact some elderly behaviors, including whether they have shifted from buying to renting houses and whether they live independently or live in shared living arrangements, such as with their adult children. The conclusions suggest that homeownership and independent living are normal goods, where an increase in income would lead to an increase in the number of elderly individuals that own houses or live independently. The studies of home ownership and shared living arrangements provide compelling evidence that living arrangements change in response to Social Security income, but these are not the only aspects of living arrangements that matter for elderly welfare. Researchers have not yet examined the effect of decreases in Social Security benefits on elderly behavior with respect to other amenities, such as those that come with living in more desirable locations. Thus, the impact of decreases in Social Security benefits on location choice is an important dimension to study.

In this paper, I examine how Social Security benefits impact elderly migration and location choice in the U.S. With soaring metropolitan real estate prices preventing even the working adult middle-class from buying homes and steep rent hikes further deterring them from renting, retirees relying on Social Security benefits may be forced to move from high-cost locations to low-cost locations as benefits decrease.³ Unfortunately, it is a reality that low-cost

areas tend to be correlated with higher crime rates. Additionally, if retirees’ children are earning high wages that enable them to live in high-cost areas, decreases in Social Security income may force the elderly, who are no longer wage earners, to live farther away from their children or move from independent to shared living arrangements (perhaps with their children). Upon finding the relationship between Social Security benefits levels and the house values of the areas in which the elderly live, I estimate the impact of an inevitable cut in Social Security benefits on elderly location choice. I explore whether the elderly are migrating, and whether this migration has contributed to the rise of “retirement communities,” communities with predominantly elderly populations and amenities and services targeting the elderly. Although these communities have historically been located in suburbs, developers are considering building more elderly communities in urban areas—revealing shifting preferences favoring urban amenities. Finally, I consider whether the elderly end up living in shared or independent living arrangements in high or low-cost areas. By answering these questions, I hope to shed light on previously unconsidered ramifications of reductions in Social Security benefits.

A simple comparison of elderly with higher versus lower Social Security benefits would be problematic because people with higher Social Security benefits differ in many ways from people with lower Social Security benefits. In particular, people with higher Social Security benefits will have earned higher incomes during their careers, will have more savings, will perhaps have higher pension benefits from their jobs, and thus may have different preferences for certain standards of living. To identify the effect of changing Social Security benefits, I exploit the Social Security notch, which enables me to observe otherwise identical individuals who


receive different Social Security benefits based on the years they were born due to variations in Social Security policy. I examine the effects of an exogenous decrease in Social Security benefits on where the elderly have chosen to live—whether the decrease in benefits has caused a statistically significant shift in the proportion that choose to live in higher or lower cost areas. I also investigate whether their migration rates have shifted in response to changes in Social Security benefits. I use an instrumental variables strategy that isolates variation driven by differences in the legislative treatment of different birth cohorts, and compare results obtained using an ordinary least squares (OLS) regression on cross-sectional data from the Census with my instrumental variables results.

In the next section, I discuss the Social Security notch in more detail, outline the construction of the instrument, and summarize what has been examined in previous literature, including research that utilizes the Social Security notch and other studies of elderly behavior. In Section 3, I discuss the data. Section 4 contains my empirical strategy. Results are outlined in Section 5. Finally, in Section 6, I discuss the implications of my findings and conclude with suggestions on what further research should be conducted.

II. BACKGROUND

The Social Security Notch

Before 1972, Social Security benefits levels were primarily based on an individual’s average nominal monthly earnings, with exclusions for some years of low earnings. The Social Security benefits formula included progressive replacement rates: upon retirement, individuals would receive a portion of their pre-retirement income as Social Security income. Each time Congress wanted to account for inflation or other cost-of-living adjustments, it had to change the benefits formula. The 1972 amendments to the Social Security Act were intended to
automatically adjust Social Security benefits for cost-of-living increases beginning in 1975. However, the formula was poorly designed: average nominal monthly earnings increased with inflation over an individual’s lifetime, but Congress had also set the replacement rate for each earnings bracket in the benefits formula to increase with inflation. The resulting double indexation caused benefits to increase faster than inflation. Furthermore, those that retired after the “early” retirement age of 62 could significantly increase their benefits payments because benefits were linked to nominal earnings. Higher earnings later in life would displace lower earnings from earlier years, increasing the person’s average monthly earnings history and subsequent benefits payments. Coupled with the high inflation rates of the 1970’s, benefits increased rapidly for those who were receiving Social Security payments—specifically, those that were born in 1910 or earlier who retired at the “normal” retirement age of 65. For some recipients, the double indexation was projected to eventually cause benefits to exceed their pre-retirement earnings. Without enacting any changes, the program would exhaust its funds. Thus, Congress changed the benefits formula in the 1977 amendments to the Social Security Act, creating the benefits “notch.”

The 1977 amendments to the Social Security Act created variation in benefits across birth cohorts. Specifically, the benefits formula differed for those born before 1917, from 1917-1921, and after 1921. Those born before 1917 remained on the old, double-indexed benefits calculation formula. Those born between 1917 and 1921 were either retiring or soon-to-retire when the new benefits calculation would kick-in, so they served as transition cohorts with transitional rules. They could receive the higher of either the benefit they would receive under the new 1977 amendments or the transitional guarantee, a modification of the pre-1977 amendment formula
that “produced declining real benefits for subsequent cohorts.”

Most beneficiaries would receive higher benefits with the transitional guarantee, which also resulted in different levels of benefits payments for otherwise identical individuals, solely based on their birth cohort. Finally, those born after 1921 would receive the much lower benefits levels calculated by the post-1977 amendment formula. This new formula removed the double indexation by indexing lifetime earnings to overall average wage growth and keeping the replacement rates for each earnings bracket constant. The brackets would be widened each year to account for inflationary wage growth. The new formula also made the benefits formula more actuarially fair by indexing average earnings and earnings brackets to the year in which the beneficiary turns 62; retiring later (with higher wages) would no longer displace lower earnings from earlier years.

**Instrumenting for Social Security Income**

As previously mentioned, analyzing the impact of Social Security benefits on where the elderly have chosen to live is problematic because the level of benefits they receive is contingent on their average lifetime monthly earnings. Those that have earned and saved based on different levels of earnings may have different preferences based on their past privileges and experiences. For example, those that have historically earned higher wages in the city may prefer to stay in higher-cost cities even after retirement, while those that have historically earned lower wages may prefer to live in suburban areas. The advantage of my strategy of using the Social Security notch is that I will observe otherwise identical individuals who receive different Social Security benefits based on the years they were born, rather than based on different lifetime earnings. Any difference in their migration behavior will be attributable to the different Social Security benefit payment levels that resulted from the variation in Social Security policy. Several scholars have

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utilized this instrumental variables strategy to analyze the effects of Social Security on the elderly and their behavior.

**Literature Review**

Existing research has taken advantage of the Social Security notch to examine how decreases in Social Security benefits impact the elderly and their decisions. Typically, they find that benefits decreases cause the elderly to reduce their consumption of normal goods and services.

Engelhardt, Gruber, and Perry (2005) use an instrumental variables approach that exploits the Social Security notch to estimate the impact of Social Security benefits on elderly living arrangements.\(^6\) They find that the estimated elasticity of living with others with respect to Social Security income is -0.4 for all elderly households, -1.3 for widows, and -1.4 for divorcees, with most of the effects concentrated on those without a college education. In contrast, individuals who were never married have an insignificant estimated elasticity of -0.4; there is no evidence to suggest that income levels affect the decision of married couples to live in shared arrangements. Their estimates suggest that widows and divorcees’ respond very differently from the never married and married elderly—the living arrangements of widows and divorcees are very sensitive to changes in income, and reductions in benefits would induce those elderly individuals to move from independent to shared living arrangements. In particular, they assume that if the behaviors of these cohorts can be extended to all of the current elderly, a 10 percent reduction in Social Security benefits would lead over 600,000 elderly households currently living independently to live in shared living arrangements.

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Engelhardt and Gruber (2004) studied the impact of Social Security benefits on elderly poverty. They analyzed the March Current Population Survey (CPS) from 1968 to 2001 and restricted their analysis to the birth cohorts of 1880 to 1935, using the Social Security notch to construct their instrument.\(^7\) Over this time period, the poverty rate for their CPS sample fell from 28.3 percent to 11.6 percent, while their instrument indicated that Social Security benefits rose by $5760, or 91 percent. Thus, their IV linear estimate implies that the $5760 increase in benefits would lead to a 17.8 percent decline in poverty rates. Since this estimate was almost exactly the same as the 16.7 percent decline in poverty experienced by these elderly, they believe that the change in Social Security benefits can explain all of the decline in elderly poverty. Using their instrument to analyze the CPS data, they find that Social Security has a stronger effect on poverty for elderly families than households. This is not surprising, since their definition of an elderly “family” only includes a Social Security beneficiary, his or her spouse, and any children under the age of 18 in the household. On the other hand, elderly households may include other (non-elderly) income-earning adults. The stronger effect on elderly families than elderly households may be caused in part by the increase in independent living as a response to rising Social Security benefits. Independent living keeps the number of elderly families constant, but increases the number of elderly households. This creates a downward bias in estimates concerning elderly households, since the elderly may direct all of their additional Social Security income towards independent living arrangements while continuing to live in poverty. For elderly families, the elasticity of poverty to benefits is around one, indicating that reductions in Social Security benefits significantly increase elderly poverty.

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Krueger and Pischke (1992) utilize the notch to analyze the labor force participation of older men. They use panel data and measure the impact of Social Security benefits by performing a logit regression on a reduced-form labor-supply equation. They find little evidence to support that fluctuations in Social Security income influence the labor supply of older men. However, they do find a significant increase in labor force withdrawal at ages 62 and 65, the “early” and “normal” Social Security retirement ages, perhaps as a response to liquidity constraints. They suggest that the elimination of double indexation by the 1977 amendments reduced the incentive for older men to remain in the workforce and thus encourage early retirement. However, their analysis indicates that the growth in Social Security benefits in the 1970’s could explain less than one-sixth of the decline in male labor force participation during that time. Interestingly, they find that for later cohorts, who faced declining Social Security wealth, labor supply continued to fall as well—indicating that the trend in decreasing labor supply was correlated with, but not a result of, declining Social Security wealth. They suggest that the impact of Social Security wealth on male labor force participation may be small because Social Security wealth is only a small portion of overall wealth.

Snyder and Evans (2006) investigate the impact of Social Security benefits on elderly mortality using difference-in-difference and regression discontinuity models. Unlike the studies previously cited, which examined numerous birth cohorts before and after the notch, Snyder and Evans only examine half of two birth cohorts: those born in the second half of 1916 and the first half of 1917. They found that the people in these two groups were very similar in terms of income, labor force participation rates, and work intensities—differing only in the amounts of

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Social Security benefits they received because of their birth cohorts. Interestingly, they find that those born in 1916, who ended up receiving significantly higher Social Security benefits (triggering an income effect), had higher mortality rates than the 1917 cohort. They attribute this to the fact that the 1917 cohort did more part-time work post-retirement and were also 5 percentage points more likely to work while they were 68-70 years old. In this case, part-time work keeps the elderly engaged and may help prevent social isolation, which is a cofactor in mortality. These results would not necessarily contradict those found by Krueger and Pischke (1992), since the 1917 cohort was performing part-time work while “retired” and collecting Social Security benefits. For these two cohorts, they suggest that the amount of income and the source of income (via part-time work) may be equally important. However, they note that different results may occur if the income effect was generated through a wage change instead. For example, if the 1917 cohort received higher incomes from wage increases rather than from engaging in part-time work, higher income may increase mortality (like it did for the 1916 cohort) rather than decrease mortality. Finally, they suggest that these implications are significant, but may differ for later birth cohorts, perhaps because of the changing nature of jobs, lifestyles, etc.

Engelhardt (2007) examines the effect of Social Security benefits on elderly homeownership. He notes that while Social Security benefits have been rising significantly over the last twenty-five years, the homeownership rate of elderly households (65+ years) has risen, while the homeownership rate of 35-64 year old households has not changed significantly. An IV approach enables him to isolate the causal effect of Social Security benefits; he estimates that the elasticity of homeownership to Social Security benefits ranges from 0.26 to 0.49 for all

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the elderly. When broken down by marital group, widows are most responsive to benefits changes. His results suggest that between half to all of the rise in elderly homeownership can be attributable to the rise in Social Security benefits over the last twenty-five years; thus, reducing those benefits would significantly alter the rate of elderly homeownership.

My project uses the empirical strategy from these previous studies and builds on their results by shedding further light on the effect of Social Security on elderly living arrangements. In particular, my research is consistent with Engelhardt, Gruber, and Perry’s finding that the elderly prefer independent living arrangements. Engelhardt (2007) also supports my finding that there is no evidence to support that Social Security income impacted elderly migration within the past five years, perhaps because rising Social Security benefits have led to high homeownership rates among the elderly.

III. Data

Sample Selection

I analyze the 5 percent sample from the U.S. Census, years 1980, 1990, and 2000, at the individual unit of observation. From this 5 percent sample, I take a random 20 percent subsample of households for data workability while ensuring that my subsample would still be representative of each Census sample. In constructing my sample, I follow the methodology used by Engelhardt and Gruber (2004), Engelhardt, Gruber, and Perry (2005), and Engelhardt (2007). I first classify the observations into “families,” separate from households. Families consist of a household head, his or her spouse, and any children in the family aged 18 or under. Thus, in any Census household, there may be more than one family as I have defined above. Adults who are not the spouse of the household head are considered to be part of a separate family. Three
unmarried adults would constitute three separate families. These would include other relatives, adult children over 18 years of age, and other inhabitants living in the same house.

Next, I assign one member in each family to be a Social Security beneficiary if they fit the following criteria. I assume that people start collecting Social Security benefits when they become eligible to do so at age 65, as most do in practice. Thus, men and never-married women who are at least 65 years of age, and divorced or widowed women who are at least 62 years of age are assigned to be Social Security beneficiaries. The first two groups are most likely to receive Social Security benefits based on their own past earnings histories. However, since men have tended to earn higher incomes than women, I assume that widowed and divorced women choose to receive higher benefits based on their former or deceased spouses’ earnings histories rather than lower benefits based on their own earnings histories. As Engelhardt, Gruber, and Perry outline, widowed and divorced Social Security beneficiaries are assumed to be at least 62 years of age because the median age difference between spouses for the widowed and divorced elderly is three, as tabulated from the 1982 Social Security New Beneficiary Survey. Widowed and divorced elderly are thus assumed to be able to collect Social Security benefits at age 62, when their former spouses who would be eligible to receive Social Security at age 65 would start collecting benefits. Families where the Social Security beneficiary’s marital status is separated are not included, since it is unclear how Social Security benefits would impact the behavior of the beneficiary vs. the beneficiary’s separated spouse.

Once Social Security beneficiaries are assigned, the sample is restricted to only families containing a Social Security beneficiary. Thus, my sample consists of 511,663 families from a random 20 percent subsample of the 1980, 1990, and 2000 5 percent U.S. Census samples.
Geographic Specifications

I base my analysis of elderly location choice on the Census’ Public Use Microdata Areas (PUMAs). PUMA definitions are constant over time. In addition, PUMAs cover the entirety of the United States, are geographically contiguous, are based on census tracts and counties, and contain at least 100,000 people. However, since the 1980 sample uses county groups for geographic areas instead of PUMAs, I use broader geographic areas (consistent PUMAs) that remain consistent from 1980 to 2000 so that their definitions do not change for my three Census samples. There are a total of 543 consistent PUMAs in my samples. For the rest of this paper, “geographic area” or “area” refers to the consistent PUMA in which a beneficiary resides.

Summary Statistics

Table 1 presents sample means for selected variables, with standard deviations in parentheses. All monetary figures are presented in 1982-1984 dollars. The median house value of the consistent PUMAs in which the elderly reside is about $73,000. The median rent per month is about $287. In comparison, annual Social Security income is about $5,609, or $467 a month on average. Total family income (the income of the Social Security beneficiary and his or her spouse) is about $17,000 a year, or $1,400 a month. On average, about 12.4 percent of residents of a consistent PUMA are Social Security beneficiaries.

The mean proportion living in shared living arrangements ranges from about 16 percent of married Social Security beneficiaries and 46 percent of never married beneficiaries, and is about 28 percent pooled over all Social Security beneficiary families. About 15 percent live in shared living arrangements in high-priced areas (as defined later in this section), while 12 percent live in shared living arrangements in low-priced areas. In comparison, about 36 percent live in independent living arrangements in high-priced areas, while another 36 percent live in
independent living arrangements in low-priced areas. Most beneficiaries did not move within the past five years, with 78 percent living in the same house. About 5 percent moved from outside the state or country within the past five years.

Construction of the Instrument

While there is variation across the different papers that have used the Notch instrument, such as differences in the specific birth cohorts included, the instruments largely follow the same strategy.\textsuperscript{11} The goal of the instrument is to isolate variation in Social Security benefits driven by policy differences across birth cohorts rather than systematic differences in characteristics or pre-retirement behavior. In this project, I use an instrument created by Professors Engelhardt, Gruber, and Perry, and modified by Professor Engelhardt, to control for these confounding factors so that I can assess the impact of Social Security benefits levels on elderly migration and location choice.

Engelhardt, Gruber, and Perry (2005) assign an earnings history to the 1916 birth cohort based on the median earnings of the males in that cohort, as recorded in the Social Security Administration’s Annual Statistical Supplement. They assign this same earnings history for never-married women, since their analysis of CPS data revealed that the earnings of never married women are correlated more with that of men than with that of other women.\textsuperscript{12} The 1938 supplement is used to assign the earnings level at age 22, 1943 supplement for age 27, etc. Since the data is given for the age ranges 20-24, 25-29, etc., they assume linear wage growth between the intervals. In assigning earnings levels beyond age 60, they index the cohort’s median earnings at age 60 to Consumer Price Index (CPI) inflation. Since many workers no longer

\textsuperscript{11} I would like to thank Professor Gary Engelhardt from Syracuse University for providing his instrument for use in my project.

worked full-time after reaching age 60, the median earnings would be much lower than what an average worker would have earned full-time.

Since people with advanced degrees tend to earn higher levels of income and thus receive higher levels of Social Security income, Engelhardt (2007) modifies the instrument to accommodate this variation. Education levels are separated into four groups: less than high school, high school diploma, some college, and completed college or advanced degree. Engelhardt scales the median earnings history for each of these education groups using the percent difference in mean male annual earnings from the median annual earnings at age 54 in the March 1971 CPS for males in the 1916 birth cohort. These real earnings histories are thus based on the male median annual earnings of the 1916 birth cohort, with variation based on education level.

Because increases in human capital and productivity may lead to wage growth over time, causing variation in Social Security benefits levels that do not result from variations in Social Security policy, Engelhardt, Gruber, and Perry (2005) assign the earnings profile of the 1916 cohort to all of the birth cohorts, indexed to CPI inflation. Thus, for any particular education level group, the real earnings history is the same, regardless of birth cohort.

These earnings histories are then inputted into the Social Security Administration’s ANYPIA program, which calculates an individual’s monthly benefit (PIA) at retirement based on the individual’s date of birth, date of retirement, and earnings history. Birthdays of June 2 are assigned to every birth cohort, and they assume that people retire and claim their benefits in June. While different cohorts may have different average actual retirement ages, variation in retirement age may generate differences in benefit levels (i.e. identical individuals that retire at age 62 would receive lower benefits than those that retire at 67) not attributable to variation in
Social Security policy. To get a retirement-age-weighted PIA for each cohort, they first calculate the benefits for each possible retirement age for each cohort. Then, they apply the same weight to the retirement-age-specific benefits for each cohort, based on the actual distribution reported in the 1985 *Annual Statistical Supplement*. Since wives can claim their own benefits or benefits equal to half of their spouse’s, married couples are assigned 150 percent of the retirement-age-weighted PIA. Finally, they account for the Social Security Administration’s periodic increases in nominal benefits, which adjust for “cost of living adjustments” (COLA’s) and inflation, and produce a COLA-adjusted Social Security monthly benefit for each cohort. They complete their instrument by multiplying the COLA-adjusted benefit level by 12 to get the predicted annual benefit for each cohort. In my project, the instrument, Social Security income, house values, and monthly rents are all adjusted to 1982-1984 dollars for comparability across years.

Since I am analyzing the exogenous changes in Social Security benefits levels resulting from the Social Security notch, my birth cohorts of interest must span the years before, during, and after the birth cohorts affected by the changes in policy. As such, my instrument covers Social Security beneficiaries from birth cohorts 1900 to 1928.

Figures 1a-1c present graphs of Social Security income against the instrument by birth cohort. Figure 1a presents the graph based on Social Security income data from the 1980 Census, and includes birth cohorts 1900-1915, with some divorcees and widows from birth cohorts 1916-1918. Figure 1b is based on Social Security income data from the 1990 Census and expands upon the birth cohorts included in Figure 1a to include all birth cohorts from 1900-1925, with divorcees and widows from cohorts 1926-1928. Figure 1c only includes birth cohorts 1906-1928, since there are no observations from the 1900-1905 birth cohorts in the 2000 Census sample.
A few factors may explain why the instrument and actual Social Security income match less well in Figure 1a than in the other figures. While my instrument assumes that people are retiring at age 65 and accounts for variation in average retirement age between cohorts, as previously mentioned, it was possible for those born in cohorts 1916 and earlier to increase their Social Security benefits by delaying retirement and earning higher wages in their later years. These higher wages would displace low wages from earlier years or increase their average lifetime earnings, so that they would receive higher benefits upon retirement. It is also possible that those in my sample lived longer than their peers because they continued to work and retired later, an idea supported by Snyder and Evans (2006). Additionally, while high inflation during the 1970’s raised benefits for all cohorts that had retired, those born after 1910 had the additional benefit of wage increases during their last few years of work, resulting in even higher Social Security payments—the “double indexation” corrected by the 1977 amendments. Although the double indexation impacted Social Security income data in the 1980 Census, its effects were magnified over the years and more visible in the 1990 Census data. Finally, people that have higher incomes tend to have longer lifespans, so members of the 1900 birth cohort who are reflected in the 1980 Census may have had higher than average incomes (and thus higher Social Security benefits) than their deceased peers. This effect would be weaker for older beneficiaries in the 1990 and 2000 Census, since the expected lifespan of an adult in the U.S. increased from 74 in 1980 to 77 in 2000.\footnote{World Bank. “Life expectancy at birth, total (years).” Accessed April 22, 2015. \url{http://data.worldbank.org/indicator/SP.DYN.LE00.IN}.}

Figures 1b and 1c are most illustrative of the variation in benefits, since they include the Social Security income data of beneficiaries of all marital statuses for the birth cohorts affected by the changes in the benefits formulas. As shown in Figures 1b and 1c, benefits for males with
the median earnings history rise steadily until the 1909 birth cohort, rise steeply for the 1910-1916 birth cohorts, fall sharply for the 1917-1921 birth cohorts, and then rise more slowly for subsequent cohorts. In Figures 1b and 1c, the graph of actual Social Security incomes by cohort follows the instrument well, with the notch evident in the empirical data. Thus, there is a good first-stage relationship: the trends in my instrument predict the trends in actual Social Security incomes. This instrument accounts for variation in benefits by birth cohort and education level.

*Dependent Variables*

I use a variety of dependent variables to analyze the impact of Social Security benefits on elderly migration and location choice.

To analyze the impact of Social Security benefits on elderly location choice, I first find the median house value (monthly rent) in each consistent PUMA for Census years 1980, 1990, and 2000. Then, I create two variables: the natural log of median house value and the natural log of median monthly rent. I analyze the impact of Social Security benefits on the log of the median house value (monthly rent) of the geographic area in which my observations reside because the median house values (monthly rents) are skewed to the right, as shown in Figures 4-5.

My next dependent variable accounts for both migration and location choice. I examine the joint decision of housing costs and shared living arrangements: whether the elderly may be moving into shared or independent living arrangements, and whether there is a shift in the proportion that live in high or low-cost areas. Engelhardt, Gruber, and Perry (2005) find that decreases in Social Security benefits lead to the elderly living in shared instead of independent living arrangements, where shared living arrangements mean that there is more than one family (as delineated for this paper) living in a particular Census household. If the elderly are moving into shared living arrangements in areas with high median house values, this movement can
likely be associated with the elderly moving in with their children or other relatives, rather than with other elderly families. Thus, I create variables to describe whether the elderly are living in shared arrangements in high median house value areas, shared arrangements in low median house value areas, independent arrangements in high median house value areas, or independent arrangements in low median house value areas.

In classifying which areas are high versus low median house value areas, I find the median of the median house values (monthly rents) in each consistent PUMA in each Census year. This median house value is the median house value (monthly rent) of all the consistent PUMAs in the U.S. as defined by the Census. Then, I consider anyone who resides in a consistent PUMA with a median house value (monthly rent) that is greater than this median house value (monthly rent) to be living in a high-cost area. I define those who reside in consistent PUMAs with a median house value (monthly rent) that is less than or equal to this median house value (monthly rent) as residing in a low-cost area. High and low-cost areas are redefined for each Census year, since changing metropolitan dynamics may redefine which areas are comparatively high or low-cost. If consistent PUMAs retain their high or low-cost status throughout my three Census samples, I would not be able to accurately assess the income impact of Social Security benefits on elderly location choice. I must also acknowledge the limits of my analysis: although I can estimate the impact of increases in Social Security income on the proportion of elderly that are living in shared or independent living arrangements in high or low-cost areas, I am unable to tell whether the elderly are moving into or just not moving out of shared or independent living arrangements in high or low-cost areas.

Furthermore, I analyze whether the elderly are living in geographic areas in which the residents are older on average. Are they potentially choosing areas with strong retirement
communities? Or, are the elderly being increasingly forced to move to these areas as a result of changes in Social Security benefits levels?

Finally, I examine whether the elderly are migrating. I analyze elderly migration based on their self-reported migration history over the past five years in the Census. I classify the elderly as having moved if they have moved within their state, from a different state, or from abroad. My Census sample would not include anyone that moved abroad in the past five years since they are no longer in the U.S. I also examine whether Social Security benefits impact whether the elderly are making big moves, which include moves across states or moving abroad.

Overall, my analyses on migration and location choice enable me to look at how Social Security income impacts where the elderly have chosen to live and whether they have moved within the past five years.

IV. EMPIRICAL STRATEGY

To examine the effect of Social Security on elderly migration and location choice, I use the following specifications, with different dependent variables to assess effects on migration and location choice:

**Ordinary Least Squares Regression**

(1) \( Y_{it} = \alpha X_{it} + \beta SSIncome_{it} + \gamma Z_{it} + \epsilon_{it} \)

For this Ordinary Least Squares (OLS) specification, \( i \) signifies observation at the individual level and \( t \) signifies observation from a particular Census year. \( Y \) is the dependent variable being observed (i.e. natural log of median house value, natural log of median monthly rent). \( X \) is a vector of all demographic variables, including education level, race, sex, marital status (in the pooled sample), and age and year fixed effects. \( SSIncome \) is the amount of Social Security income a beneficiary receives, in \$'000's for ease of interpretation. I use the level rather
than the log of Social Security income because of the high percentage of Social Security beneficiaries with zero Social Security income (as shown in Figure 7). However, because the distribution of Social Security income is skewed towards the right, I look at log-log specifications as a robustness check in Section V. $Z$ is a vector of spouse age and spouse education fixed effects (only for the married samples). By controlling for these demographic characteristics, I control for other trends that may be correlated with both effects of the changes in policy and the places that people from these birth cohorts have chosen to live. $\epsilon$ is an error term, clustered by cohort and education level. Parameters $\alpha$ and $\gamma$ indicate the change in dependent variable $Y$ resulting from the set of demographic variable controls and spouse fixed effects (only for the married samples). Finally, the coefficient of interest, $\beta$ indicates the impact on dependent variable $Y$ for a $1,000 increase in Social Security income.

I expect $\beta$ to be biased upward due to the endogenous impact of higher earnings histories on higher Social Security benefits levels. People with higher earnings histories (and higher Social Security benefits) are likely to have higher savings, which they can use to purchase homes. The higher their earnings history, the more they would have been able to save over the years, and the more they would have been able to put towards purchasing a house. Thus, $\beta$ would pick up both the effects of a $1,000 increase in Social Security income and a higher earnings history. However, $\beta$ may also be biased downward due to attenuation bias. If Social Security income were measured incorrectly, the variance of the measurement error appears in the denominator and not the numerator of the regression coefficients, biasing the coefficients towards zero. The larger the measurement error, the closer the regression coefficients will be to zero. Next, I move to a discussion of my Instrumental Variable regression, which in theory
eliminates both of these biases and suggests the causal effect of changes in Social Security benefits on my dependent variables.

\textit{Instrumental Variable Regression}

(2) Two-Stage-Least-Squares Regression

First-Stage: \( \text{SSIncome} = \delta \text{X}_{it} + \rho \text{Instrument}_{it} + \sigma Z_{it} + \upsilon_{it} \)

Second-Stage: \( Y_{it} = \alpha \text{X}_{it} + \beta \text{SSIncome}_{it} + \gamma Z_{it} + \epsilon_{it} \)

I instrument for Social Security income using my instrument constructed from predicted Social Security benefits based on median earnings histories, with variations in benefits levels for different education levels. With this instrument, I assume that my instrument is not correlated with any of my other independent variables. Once the demographic and fixed effects outlined above are controlled for, the instrument is uncorrelated with the error term. Thus, the only way my instrument affects my various dependent variables is through its effect on Social Security income. My first stage regressions test whether my instrument is correlated with Social Security income; results for these regressions are presented with the IV regression results.

My Instrumental Variable (IV) regression is a two-stage-least-squares regression. The independent control variables in the IV regressions are the same as those in the OLS regressions. In this two-stage-least-squares regression, the first-stage regression isolates the part of Social Security income that is uncorrelated with the error term \( \epsilon \). Predicted values of Social Security income that account for observations’ demographic characteristics are obtained by applying the coefficients from the first-stage. The second-stage regression then takes these predicted Social Security income values as the independent variable (in place of the observed Social Security income values from the Census in the OLS specifications).
**Dependent Variables and Regression Transformations**

For my main results, I analyze OLS and IV regressions with the natural log of median house value and the natural log of median monthly rent as the dependent variables. Dependent variable $Y$ in the specifications outlined above would be the log of the median house value (monthly rent) for the consistent PUMA in which the unit of observation resides.

As previously mentioned, I analyze the log of my dependent variables because the median house values and median monthly rents of the consistent PUMAs are skewed towards the right. Taking the log of these values makes the distribution of the values more normal.

For these sets of regressions, a possible interpretation would be: a $1000 increase in Social Security income predicts that a Social Security beneficiary will remain in (move to) an area with a $100 \times \beta$ percent higher median house value (monthly rent). Explanations for the other dependent variables I analyze are explained in the results section.

**V. Results and Discussion**

A preliminary look at the relationship between my instrument and the median house value (monthly rent) in each consistent PUMA reveals that there appears to be a positive relationship between the Social Security benefits predicted by my instrument and the median house value (monthly rent) in the consistent PUMAs in which the elderly live. This relationship is shown in Figures 2a-2c for median house values and Figures 3a-3c for median monthly rents. The graphed values represent the mean of the median house values (monthly rents) of all consistent PUMAs for each birth cohort. Although all house values (monthly rents) are presented in 1982-1984 dollars, data from each Census sample is presented separately so that changes in these median house values (monthly rents) that result from shifting proportions of Social
Security beneficiaries living in higher or lower-cost areas are not conflated with natural increases in house values.

My regressions support my initial observation of a positive relationship between Social Security income and the median house value (monthly rent) of the consistent PUMAs in which the elderly live. My regressions analyze the median house value (monthly rent) because the median is less sensitive to abnormally large or low values. Small communities of high (low) house values (monthly rents) may bias the mean house value (monthly rent). All regression models use person weights as provided in the Census data. Standard errors are included in parentheses below each coefficient. For easier interpretation, Social Security and instrument levels are divided by 1,000. Unless indicated otherwise, each coefficient represents the predicted impact of a real $1,000 increase in annual Social Security benefits on each dependent variable.

Columns 2-5 and 7-10 in each Tables 2-6 and Table 8 present the coefficients for subsamples of my pooled sample, with each column representing the results for observations with different marital statuses. I examine the effect of Social Security income on the migration and location choices of beneficiaries with different marital statuses because their marital status may affect how they respond to changes in Social Security income in regards to where they choose to live. For example, married couples tend to live independently from adults who are not in their family (as defined for this project), and may have multiple sources of income that can impact where they choose to live. On the other hand, widows and divorcees may be more dependent on Social Security income, have fewer additional sources of income, and thus may be more responsive to changes in Social Security income. All three of these groups differ from beneficiaries that have never married, since they are all more likely to have had children whose costs they may have to cover. Perhaps they have chosen to live in higher-cost areas with better
public school systems in the past, or they may have sold their houses in order to pay for their children’s college tuition. Additionally, widows, divorcees, and never married individuals can move more easily, since they tend to have fewer or zero family members who may need to relocate and find new jobs if they were to move as a family. No matter what reasons each group may have for staying in (moving to) higher (lower) cost areas, as mentioned in Section II, previous authors have found widows and divorcees to be particularly sensitive to changes in Social Security income. Thus, I expect these two groups to be particularly sensitive in my analysis as well.

*Location Choice: Social Security income level impact on log (median house values / rents)*

Table 2 presents the regression results for the natural log of median house value as the dependent variable. Panel A presents the OLS estimates, with Social Security income in levels, while Panel B presents the first-stage and instrumental variable estimates, with the instrument for Social Security income in levels. The coefficient of 0.002 for the pooled sample is significant at the 1-percent level, indicating that for each $1,000 increase in annual Social Security income, an elderly individual is predicted to live in an area with a 0.2 percent higher median house value. However, the OLS estimates may be biased due to endogeneity, since those that receive higher Social Security benefits have had higher lifetime earnings histories. Panel B presents the first-stage and instrumental variable estimates. All of the first-stage coefficients are significant at the 1-percent level, indicating that my instrument fits well as a predictor of Social Security income. The IV results suggest that for each $1,000 increase in annual Social Security income, an elderly individual with the median earnings history is predicted to live in an area with a 1.5 percent higher median house value.
For both the OLS and IV results, the coefficients are significant for the pooled and married samples. Results are significant at the 1-percent level in both OLS and IV regressions for the never married sample. It is interesting that I find statistically significant effects on the opposite set of marital groups to Engelhardt, Gruber, and Perry (2005). My results suggest that while married and never-married Social Security beneficiaries are not responsive to Social Security income on the shared living arrangements margin, they are responsive to Social Security income in their decisions about where to live.

The effects of Social Security income seem to differ across subsamples as well. Social Security income has the largest effect on the median house value of the consistent PUMA where never married beneficiaries live. My OLS results suggest that for each $1,000 increase in Social Security income, there is an estimated 1.1 percent increase in the median house value for never married beneficiaries, compared to only 0.1 percent for married beneficiaries and 0.2 percent for the pooled sample. Similar differences magnitude are suggested by my IV results: there is an estimated 8 percent increase in the median house value for never married beneficiaries, compared to 1.1 percent for married beneficiaries and 1.5 percent for the pooled sample. Perhaps these results are indicative of a combination of factors that have differing effects on each group. For example, the never married beneficiaries may have no dependents, so changes in Social Security income would have a more substantial impact on where they choose to live. Additionally, married beneficiaries receive more Social Security income as a unit (1.5 times, since the spouse would also receive benefits), so any change in Social Security benefits levels would be magnified when considering the total amount of Social Security benefits received by the family. This interpretation relies on my assumption of economies of scale in housing costs—a married couple requires less than twice as much housing (value) as two single individuals do.
Notably, the coefficients on Social Security income for the IV are all larger orders of magnitude than those in the OLS regressions, suggesting that the coefficients in my OLS regressions are biased downward.

Table 3 presents the regression results for natural log of median monthly rent as the dependent variable. As expected, these results are similar to those for log (median house value). In the OLS results, the coefficient of 0.004 for the pooled sample is significant at the 1-percent level, indicating that for each $1,000 increase in annual Social Security income, an elderly individual is predicted to live in an area with a 0.4 percent higher median monthly rent. Again, the OLS estimates may be biased due to endogeneity. The first-stage coefficients are the same for this set of regressions, since the instrument still instruments for Social Security income levels. The IV results suggest that for each $1,000 increase in annual Social Security income, a typical elderly individual is predicted to live in an area with a 1.4 percent higher median monthly rent. Again, for both the OLS and IV results, the coefficients are significant for the pooled and married samples, and results are statistically significant at the 1-percent level in both OLS and IV regressions for the never married sample. For log (median monthly rent), however, results are also statistically significant for both the widowed and divorced samples in the OLS. These results may be indicative of the same factors mentioned above, which have differing effects on never married and married beneficiaries. Again, the coefficients on Social Security income for the IV are all larger orders of magnitude than those in the OLS regressions, even though the coefficients are no longer statistically significant for the widowed and divorced samples.

Based on the evidence from the above regressions, my IV results suggest that the Social Security income beneficiaries receive has a very real and significant impact on the area in which they choose to live.
Migration: Are the elderly moving?

Next, I examine if and how changes in Social Security income impact elderly migration. I first look at whether the elderly move at all (within state, across states, or abroad), with the dependent variable being the proportion of Social Security beneficiaries that have moved within the past five years. I also look at whether the elderly make big moves (across states or abroad), with the dependent variable being the proportion that have made big moves within the past five years. My results for these two sets of regressions would indicate that a $1000 increase in Social Security income predicts that the proportion of beneficiaries that moved at all or made a big move within the past five years would increase by 100 x β percentage points.

Table 4 presents my results for whether Social Security income impacts whether the elderly have moved within the past five years. My results for the OLS regressions in Panel A indicate that Social Security benefits levels have a significant impact on whether the elderly choose to move. In particular, for the pooled sample, a $1,000 increase in Social Security income predicts a 0.4 percentage point increase in the probability that the beneficiaries’ families moved in the past five years. However, in this case, the OLS estimates may be biased, perhaps due to endogeneity. The IV results presented in Panel B indicate that there is no evidence that a $1,000 increase in Social Security income has had a significant impact on the probability that beneficiaries’ families moved in the past five years. In fact, the predicted impact changes from increasing the probability beneficiaries’ families have moved (OLS results) to decreasing the probability for all samples, except for the never married sample.

These results are not surprising, since choosing to move is a big decision, and most people do not move frequently if they own their homes. On average, at the time each Census was taken, 79 percent of my sample lived in the same house as they did five years earlier, and 76
percent either owned their home or had taken out loans with the intention of eventually owning their homes.\textsuperscript{14} With such a high homeownership rate, it is not surprising that changes in Social Security benefits levels would not have substantial effects on elderly migration. The OLS regression is probably picking up the endogenous impact of higher lifetime earnings on higher Social Security income, and including the impact of earnings and savings on whether beneficiaries’ families have chosen to move versus staying in a home they may own.

Table 5 presents my results for whether changes in Social Security benefits levels impact whether Social Security beneficiaries are making big moves, meaning that they moved from another state or country. Although I did not find that Social Security income had any statistically significant effects on whether the elderly moved at all, it is worth examining whether Social Security income has effects on whether the elderly make big moves, since moves to higher or lower cost areas may be obscured by small moves within the same area. A quick look at the sample indicates that 14 percent of my sample has moved within the same state in the past five years. Unfortunately, I can only examine where people are moving at the state level—I do not have information on which consistent PUMAs the elderly are moving to or from.

Similar to the results for whether the elderly are moving at all, the OLS results are statistically significant, but probably biased. The IV results are not statistically significant. My OLS results indicate that for each $1,000 increase in Social Security income, there is an estimated 1 percentage point reduction in the probability that the elderly are making big moves. My IV results suggest that there is no evidence of an effect of Social Security income on whether the elderly are making big moves. It is interesting that a $1,000 increase in Social Security income marginally (0.2 percentage points) increases the probability divorcees will make big

\textsuperscript{14} Statistics based on pool of 357,189 observations (56,318 observations with N/A for the migrated in the past 5 years variable were omitted from these statistics).
moves in the OLS specification but decreases (1.2 percentage points) the probability they will make big moves in the IV specification; it marginally decreases (0.2 percentage points) the probability that never married beneficiaries will make big moves in the OLS specification but increases (0.5 percentage points) the probability that they will make big moves in the IV specification. These mixed results indicate that Social Security income does not have a statistically significant impact on elderly migration, since there is not much impact even when I only look at big moves.

Migration: Does Social Security income impact the rise of retirement communities?

To assess whether the elderly are moving into retirement communities or retiree-oriented cities, I create a variable for the mean age of the consistent PUMAs in which the elderly live. A possible interpretation would be: a $1000 increase in Social Security income predicts that a Social Security beneficiary will remain in (move to) an area with $\beta$ years higher (lower) mean age.

Table 6 presents my analysis on whether Social Security income impacts the rise of retirement communities. As with my results on whether the elderly are moving, my results are statistically significant for most OLS regression samples and not statistically significant for most of my IV regression samples. Interestingly, I find marginally statistically significant impacts in my IV regression of the widowed sample. My results indicate that for each $1,000 increase in Social Security income, there is a predicted 0.100 increase in the mean age of the area in which widowed beneficiaries have chosen to live. This suggests that increases in Social Security income would lead widowed beneficiaries to move to retirement communities. Although my IV results are not statistically significant for the divorced, married, and never married samples, my coefficients suggest that increases in Social Security income would lead all three groups of
beneficiaries to move away from retirement communities. These areas with lower mean ages are likely to have other amenities—perhaps the beneficiaries are able to remain in more convenient metropolitan areas with younger people who are still in the workforce. I would conclude that Social Security income has no substantial impact on the rise of retirement communities at the consistent PUMA level, but a closer analysis of more narrowly defined geographic areas may be fruitful.

Location Choice: The joint decision of living arrangements and location

In Table 8 in the Appendix, I have included my replication of the study done by Engelhardt, Gruber, and Perry (2005). I find similar results: all coefficients in my OLS and IV regressions are statistically significant at the 1 percent level, with the exception of never married beneficiaries in the IV model. My OLS results suggest that for each $1,000 increase in Social Security income, there is an estimated 1.3 percentage point decrease in the proportion of Social Security beneficiaries living in shared living arrangements for the pooled sample. As a comparison, Engelhardt, Gruber, and Perry find an estimated 0.88 percentage point decrease in their OLS model. Again, my IV model suggests stronger impacts: for each $1,000 increase in Social Security income, there is an estimated 2.6 percentage point decrease in the proportion of Social Security beneficiaries living in shared living arrangements for the pooled sample. Engelhardt, Gruber, and Perry find similar changes in magnitude between their OLS and IV models: they find an estimated 2.1 percentage point decrease in their IV model.

I extend Engelhardt, Gruber, and Perry’s analysis to assess whether the elderly are moving into shared or independent living arrangements in high or low-cost areas. I assume that it costs the most to live in an independent living arrangement in a high-cost area, and costs the least to live in a shared living arrangement in a low-cost area. Since the elderly have retired, if the
elderly are moving from independent to shared living arrangements, specifically shared living arrangements in high-cost areas, I would predict that some of this movement can be explained by the elderly moving to live with their children. However, if they are moving from independent to shared living arrangements in lower cost areas, the explanation is less clear. For these sets of regressions, a possible interpretation would be: a $1000 increase in Social Security income predicts that a Social Security beneficiary is $1000 \times \beta$ percentage points more likely to remain in (move to) a shared (independent) living arrangement in a high (low) cost area.

Table 7 presents the regression results. My interpretation relies on my assumption that if the elderly are living in shared living arrangements in high-cost areas, some of them are living with their children (or other relatives). Since Social Security beneficiaries are retired, they may no longer have the means via high-paying wages to enable them to live in higher cost areas such as metropolitan areas. Thus, if they are living in a shared living arrangement, they may be living with their children who are still in the labor force. In the table, “high price” signifies living in an above-median house price area, while “low price” signifies living in an at or below-median house price area.

Notably, I find statistically significant results for changes in shared living arrangements in high and low-cost areas and independent living arrangements in high-cost areas. These results build on the results presented in Tables 4 and 5, perhaps capturing the effect of Social Security income on beneficiaries’ local moves. For example, increases in Social Security income may enable them to move from shared living arrangements in high-cost areas to independent living arrangements in the same high-cost areas. These results may also indicate that increases in Social Security benefits would enable beneficiaries to remain in high-cost areas rather than having to move to low-cost areas because of their reduced income. If increases in Social Security income
do have a statistically significant effect on whether the elderly are living in high-cost areas, but 76% of the elderly own or will own their homes, this relationship may also explain why there is a low proportion of Social Security beneficiaries that have been moving within the past five years.

The coefficient of -0.007 in Column (1) of Panel A in my OLS results suggests that for each $1,000 increase in Social Security income, there is a predicted 0.7 percentage point reduction in the probability that a Social Security beneficiary is living in a shared living arrangement in a high-cost area. Similarly, the coefficient of -0.008 in Column (2) suggests that for each $1,000 increase in Social Security income, there is a predicted 0.8 percentage point reduction in the probability that a Social Security beneficiary is living in a shared living arrangement in a low-cost area. Since the $1,000 increase in Social Security income predicts that the beneficiaries are moving out of shared living arrangements, they must be moving into independent living arrangements—as supported by the coefficient in Column (3). The coefficient of 0.010 in Column (3) suggests that for each $1,000 increase in Social Security income, there is a predicted 1 percentage point increase in the probability that a Social Security beneficiary is living in an independent living arrangement in a high-cost area. These results are in line with the conclusions of Engelhardt, Gruber, and Perry (2005), suggesting that with increases in Social Security income, beneficiaries would move from shared living arrangements in both high and low-cost areas to independent living arrangements in high-cost areas.

The IV regressions indicate similar results, with larger orders of magnitude. As shown in Columns (5), (6), and (7), an $1,000 increase in Social Security income predicts a 1.7 percentage point reduction in the probability a Social Security beneficiary is living in a shared living arrangement in a high-cost area, a 0.8 percentage point reduction in the probability a Social Security beneficiary is living in a shared living arrangement in a low-cost area, and a 3.2
percentage point increase in the probability a Social Security beneficiary is living in an independent living arrangement in a high-cost area.

Thus, increases in Social Security income actually enable beneficiaries to move from shared living arrangements to independent living arrangements, and from low-cost areas to high-cost areas.

Robustness Check

As shown in Figure 6, the distribution of Social Security income is skewed towards the right, motivating an analysis of Social Security income in a log transformation rather than in levels. However, because over 20 percent of those who are age-eligible for Social Security receive zero Social Security income in my Census samples, I use my instrument as an instrument for total family income. As shown in Figure 7, a smaller proportion of beneficiaries have zero total family income. For these sets of regressions, a possible interpretation would be: a 1 percent increase in total family income (as an indicator for Social Security income) predicts that a Social Security beneficiary will remain in (move to) an area with a 100 x β percent higher median house value (monthly rent). It is reassuring that I find similar trends in my results even with log-log specifications.

(1) Location Choice: Log (Total Family Income) Impact on Log (Median House Values)

Results are presented in Table 9. My OLS results indicate that for a 1 percent increase in total family income, there is an estimated 0.08 percent increase in the median house value of the consistent PUMA where a beneficiary lives. Again, the IV results suggest a stronger relationship: for a 1 percent increase in total family income, there is an estimated 0.15 percent increase in the median house value of the consistent PUMA where a beneficiary lives. Comparing my results from my IV log-log specifications to those from my Social Security income – log (median house
value) in Table 2, I lose statistical significance for my married sample in my IV results, but my coefficient is still statistically significant for the never married sample—suggesting an estimated 0.33 percent increase in median house value for each percent increase in total family income.

(2) Location Choice: Log (Total Family Income) Impact on Log (Median Monthly Rent)

Results are presented in Table 10. My OLS results indicate that for a 1 percent increase in total family income, there is an estimated 0.06 percent increase in the median house value of the consistent PUMA where a beneficiary lives. Again, the IV results suggest a stronger relationship: for a 1 percent increase in total family income, there is an estimated 0.11 percent increase in the median house value of the consistent PUMA where a beneficiary lives. Comparing these results to those from my Social Security income – log (median monthly rent) results from Table 3, I retain statistical significance for both my married and never married samples—suggesting an estimated 0.09 and 0.21 percent increase, respectively, in median monthly rent for each percent increase in total family income.

Long-Term Impact

According to the Social Security and Medicare Board of Trustees 2014 report, the Disability Insurance trust fund will be depleted as early as 2016. The Old Age and Survivors Insurance trust fund will be depleted in 2034. As a response to the depletion of the Disability Insurance trust fund, payroll taxes may be reallocated between the two trust funds. As a result, they project that the Old Age, Survivors And Disability Insurance Trust Fund will be depleted by 2034. After the reserves are depleted, tax income would be able to pay for 77 percent of scheduled benefits in 2033 and 72 percent in 2088. As such, I project what will happen to elderly location choice once there is a 23 percent benefits cut.

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Overall, a 23 percent benefits cut would lead to a 1.95 percent decrease in the median house value of the consistent PUMA in which a Social Security beneficiary lives. For widowed and divorced beneficiaries, the magnitude of the impact is smaller—only a 1.02 percent decrease for widows and a 1.81 percent decrease for divorcees. Married beneficiaries fare about the same as the pooled sample, with the 23 percent benefits cut leading to a 1.98 percent decrease in the median house value. Never married beneficiaries appear to be most responsive to Social Security income, with a 23 percent benefits cut leading to never married beneficiaries living in consistent PUMAs with 6.59 percent lower median house values.

VI. Conclusion

My findings raise important questions about how location choice impacts elderly welfare. I find statistically significant impacts of increases in Social Security income on elderly location choice, but cannot say whether Social Security income enables the elderly to move to expensive areas or stay in expensive areas. This motivates a study on whether Social Security income has significant impacts on elderly migration. Although I do not find evidence of an effect of Social Security income on elderly migration, perhaps this is because I can only observe migration in the past five years and where they moved from at the state level. People may have made migration decisions more than five years ago, knowing about changes in their future income or Social Security benefits levels. Further research should investigate elderly migration patterns over longer time periods and between more narrowly defined geographic areas, and if possible, take into account their reasons for moving. Living in areas with higher median house values and rents is a normal good, as is living independently (Engelhardt, Gruber, and Perry 2005). My model indicates that with higher Social Security income, Social Security beneficiaries are likely to move from shared living arrangements in both high and low-cost areas to independent living.
arrangements in high-cost areas. Areas with higher median house values and monthly rents tend to have more amenities, lower crime, and higher average education levels. For elderly individuals, this may mean increased convenience and safety, and thus higher welfare. This implies that when Social Security income is reduced, Social Security benefits are likely to be living in areas with lower median house values and monthly rents, lower wages, and fewer amenities.
VII. Bibliography


VIII. FIGURES AND TABLES

Figure 1a. Social Security Income and Instrument by Year of Birth (1900-18), 1980

Figure 1b. Social Security Income and Instrument by Year of Birth (1900-28), 1990
Figure 1c. Social Security Income and Instrument by Year of Birth (1906-28), 2000

Figure 2a. Median House Value and Instrument by Year of Birth (1900-18), 1980
Figure 2b. Median House Value and Instrument by Year of Birth (1900-28), 1990

** Note: Cohorts (1900-1909) with small sample sizes removed

Figure 2c. Median House Value and Instrument by Year of Birth (1910-28), 2000
Figure 3a. Median Rent and Instrument by Year of Birth (1900-18), 1980

Figure 3b. Median Rent and Instrument by Year of Birth (1900-28), 1990
Figure 3c. Median Rent and Instrument by Year of Birth (1910-28), 2000

** Note: Cohorts (1900-1909) with small sample sizes removed

Figure 4a. Median House Values, 1980
Figure 4b. Median House Values, 1990

Figure 4c. Median House Values, 2000
Figure 5a. Median Monthly Rent, 1980

Figure 5b. Median Monthly Rent, 1990
Figure 5c. Median Monthly Rent, 2000
Table 1. Sample Means for Selected Variables, with Standard Deviations in Parentheses, for Years of Birth from 1900–28, Using the 1980, 1990, and 2000 Census

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<td>4442</td>
<td>3745</td>
<td>7855</td>
<td>3631</td>
</tr>
<tr>
<td>(3820)</td>
<td>(2663)</td>
<td>(2793)</td>
<td>(4308)</td>
<td>(2849)</td>
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<tr>
<td>Total Family Income</td>
<td>17059</td>
<td>11087</td>
<td>11911</td>
<td>26620</td>
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<tr>
<td>(27363)</td>
<td>(13292)</td>
<td>(14677)</td>
<td>(39238)</td>
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<td>Mean Age</td>
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<td>42.852</td>
<td>42.673</td>
<td>42.878</td>
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<td>(2.404)</td>
<td>(2.353)</td>
<td>(2.330)</td>
<td>(2.510)</td>
<td>(2.231)</td>
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<tr>
<td>Share Elderly in Area of Residence</td>
<td>0.1238</td>
<td>0.1236</td>
<td>0.1216</td>
<td>0.1243</td>
<td>0.1250</td>
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<td>(0.0292)</td>
<td>(0.0285)</td>
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<td>(0.0306)</td>
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<td>Shared Living Arrangement</td>
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<td>0.3283</td>
<td>0.3438</td>
<td>0.1638</td>
<td>0.4649</td>
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<td>(0.4476)</td>
<td>(0.4696)</td>
<td>(0.4750)</td>
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<td>Shared Living Arrangement</td>
<td>0.1538</td>
<td>0.1783</td>
<td>0.2031</td>
<td>0.0943</td>
<td>0.2516</td>
</tr>
<tr>
<td>in High Price Area</td>
<td>(0.3607)</td>
<td>(0.3828)</td>
<td>(0.4023)</td>
<td>(0.2922)</td>
<td>(0.4339)</td>
</tr>
<tr>
<td>Shared Living Arrangement</td>
<td>0.1234</td>
<td>0.1500</td>
<td>0.1408</td>
<td>0.0695</td>
<td>0.2133</td>
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<tr>
<td>in Low Price Area</td>
<td>(0.3289)</td>
<td>(0.3571)</td>
<td>(0.3478)</td>
<td>(0.2543)</td>
<td>(0.4097)</td>
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<tr>
<td>Independent Living Arrangement</td>
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<td>0.3254</td>
<td>0.3665</td>
<td>0.4225</td>
<td>0.2952</td>
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<tr>
<td>in High Price Area</td>
<td>(0.4809)</td>
<td>(0.4685)</td>
<td>(0.4819)</td>
<td>(0.4940)</td>
<td>(0.4561)</td>
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<tr>
<td>Independent Living Arrangement</td>
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<td>0.3462</td>
<td>0.2897</td>
<td>0.4137</td>
<td>0.2399</td>
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<tr>
<td>in Low Price Area</td>
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<td>(0.4758)</td>
<td>(0.4536)</td>
<td>(0.4925)</td>
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<td>Did not move, past 5 years*</td>
<td>0.7808</td>
<td>0.7622</td>
<td>0.6841</td>
<td>0.8266</td>
<td>0.7818</td>
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<tr>
<td>(0.4137)</td>
<td>(0.4258)</td>
<td>(0.4649)</td>
<td>(0.3786)</td>
<td>(0.4130)</td>
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<tr>
<td>Moved from out of state, past 5 years*</td>
<td>0.0484</td>
<td>0.0476</td>
<td>0.0620</td>
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<td>0.0373</td>
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<td>(0.2145)</td>
<td>(0.2129)</td>
<td>(0.2411)</td>
<td>(0.2144)</td>
<td>(0.1895)</td>
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<tr>
<td>Less Than High School</td>
<td>0.4132</td>
<td>0.4600</td>
<td>0.3566</td>
<td>0.3703</td>
<td>0.3874</td>
</tr>
<tr>
<td>(0.4924)</td>
<td>(0.4984)</td>
<td>(0.4790)</td>
<td>(0.4829)</td>
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<td>High School Diploma</td>
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<td>0.3404</td>
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<td>(0.4680)</td>
<td>(0.4738)</td>
<td>(0.4755)</td>
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<td>College Diploma</td>
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<td>0.0813</td>
<td>0.1276</td>
<td>0.1802</td>
<td>0.1982</td>
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<td>(0.3361)</td>
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<td>Female</td>
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<td>0.8471</td>
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<td>0.6261</td>
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<td>(0.5000)</td>
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<td>(0.4653)</td>
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<td>White</td>
<td>0.8946</td>
<td>0.8773</td>
<td>0.8576</td>
<td>0.9256</td>
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<td>(0.3071)</td>
<td>(0.3281)</td>
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<td>Observations</td>
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<td>197740</td>
<td>32000</td>
<td>156584</td>
<td>27183</td>
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<td>*Observations (migrate variables)</td>
<td>357189</td>
<td>172362</td>
<td>28046</td>
<td>133935</td>
<td>22846</td>
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</table>

Note: Median house value, median rent per month, Social Security income (annual), and total family income (annual) are presented in 1982-1984 dollars. For migration variable means, 56,318 observations with N/A for the migrated in the past 5 years variable were omitted from the sample.
Table 2: Regression results: Social Security Income Level Impact on Log (Median House Value)

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>Pooled</th>
<th>Widowed</th>
<th>Divorced</th>
<th>Married</th>
<th>Never Married</th>
<th>Pooled</th>
<th>Widowed</th>
<th>Divorced</th>
<th>Married</th>
<th>Never Married</th>
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<tbody>
<tr>
<td>(A) OLS</td>
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<td></td>
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</tr>
<tr>
<td>First-stage estimates</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Security Income</td>
<td>0.002*** (0.001)</td>
<td>0.004*** (0.001)</td>
<td>0.002</td>
<td>0.001** (0.001)</td>
<td>0.011*** (0.001)</td>
<td>0.015* (0.008)</td>
<td>0.010</td>
<td>0.021</td>
<td>0.011* (0.016)</td>
<td>0.011* (0.021)</td>
</tr>
<tr>
<td>High School Diploma</td>
<td>0.114*** (0.003)</td>
<td>0.113*** (0.004)</td>
<td>0.125*** (0.007)</td>
<td>0.094*** (0.004)</td>
<td>0.114*** (0.008)</td>
<td>0.106*** (0.006)</td>
<td>0.110*** (0.010)</td>
<td>0.117*** (0.012)</td>
<td>0.091*** (0.004)</td>
<td>0.041</td>
</tr>
<tr>
<td>Some College</td>
<td>0.155*** (0.006)</td>
<td>0.130*** (0.007)</td>
<td>0.200*** (0.010)</td>
<td>0.154*** (0.006)</td>
<td>0.137*** (0.015)</td>
<td>0.145*** (0.009)</td>
<td>0.125*** (0.015)</td>
<td>0.189*** (0.016)</td>
<td>0.150*** (0.006)</td>
<td>0.064***</td>
</tr>
<tr>
<td>College</td>
<td>0.200*** (0.006)</td>
<td>0.158*** (0.007)</td>
<td>0.255*** (0.012)</td>
<td>0.206*** (0.005)</td>
<td>0.139*** (0.012)</td>
<td>0.189*** (0.009)</td>
<td>0.152*** (0.015)</td>
<td>0.242*** (0.021)</td>
<td>0.201*** (0.006)</td>
<td>0.087***</td>
</tr>
<tr>
<td>White</td>
<td>-0.108*** (0.009)</td>
<td>-0.081*** (0.009)</td>
<td>-0.056*** (0.011)</td>
<td>-0.181*** (0.013)</td>
<td>-0.119*** (0.013)</td>
<td>-0.128*** (0.018)</td>
<td>-0.091*** (0.026)</td>
<td>-0.072*** (0.024)</td>
<td>-0.199*** (0.020)</td>
<td>-0.204***</td>
</tr>
<tr>
<td>Female</td>
<td>0.000 (0.004)</td>
<td>-0.010** (0.005)</td>
<td>0.031*** (0.007)</td>
<td>0.013 (0.009)</td>
<td>0.007 (0.005)</td>
<td>-0.007 (0.010)</td>
<td>0.044** (0.018)</td>
<td>0.026** (0.012)</td>
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<tr>
<td>Married</td>
<td>-0.060*** (0.006)</td>
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<td></td>
<td></td>
<td></td>
<td>-0.108*** (0.031)</td>
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<tr>
<td>Widowed</td>
<td>-0.051*** (0.005)</td>
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<td></td>
<td></td>
<td>-0.063*** (0.009)</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>0.006 (0.007)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.001 (0.008)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Constant</td>
<td>11.142*** (0.015)</td>
<td>11.080*** (0.015)</td>
<td>11.066*** (0.015)</td>
<td>11.187*** (0.040)</td>
<td>11.083*** (0.016)</td>
<td>11.148*** (0.018)</td>
<td>11.073*** (0.022)</td>
<td>11.061*** (0.017)</td>
<td>11.179*** (0.045)</td>
<td>10.887***</td>
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</table>

(B) Instrumental Variable

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<tr>
<th>Explanatory Variable</th>
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<th>Widowed</th>
<th>Divorced</th>
<th>Married</th>
<th>Never Married</th>
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<tr>
<td>First-stage estimates</td>
<td></td>
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<tr>
<td>Instrument (IV only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Security Income</td>
<td>0.002*** (0.001)</td>
<td>0.004*** (0.001)</td>
<td>0.002</td>
<td>0.001** (0.001)</td>
<td>0.011*** (0.001)</td>
</tr>
<tr>
<td>High School Diploma</td>
<td>0.114*** (0.003)</td>
<td>0.113*** (0.004)</td>
<td>0.125*** (0.007)</td>
<td>0.094*** (0.004)</td>
<td>0.114*** (0.008)</td>
</tr>
<tr>
<td>Some College</td>
<td>0.155*** (0.006)</td>
<td>0.130*** (0.007)</td>
<td>0.200*** (0.010)</td>
<td>0.154*** (0.006)</td>
<td>0.137*** (0.015)</td>
</tr>
<tr>
<td>College</td>
<td>0.200*** (0.006)</td>
<td>0.158*** (0.007)</td>
<td>0.255*** (0.012)</td>
<td>0.206*** (0.005)</td>
<td>0.139*** (0.012)</td>
</tr>
<tr>
<td>White</td>
<td>-0.108*** (0.009)</td>
<td>-0.081*** (0.009)</td>
<td>-0.056*** (0.011)</td>
<td>-0.181*** (0.013)</td>
<td>-0.119*** (0.013)</td>
</tr>
<tr>
<td>Female</td>
<td>0.000 (0.004)</td>
<td>-0.010** (0.005)</td>
<td>0.031*** (0.007)</td>
<td>0.013 (0.009)</td>
<td>0.007 (0.005)</td>
</tr>
<tr>
<td>Married</td>
<td>-0.060*** (0.006)</td>
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</tr>
<tr>
<td>Widowed</td>
<td>-0.051*** (0.005)</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>0.006 (0.007)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>11.142*** (0.015)</td>
<td>11.080*** (0.015)</td>
<td>11.066*** (0.015)</td>
<td>11.187*** (0.040)</td>
<td>11.083*** (0.016)</td>
</tr>
</tbody>
</table>

Observations 413,466 197,712 31,997 156,577 27,180 413,466 197,712 31,997 156,577 27,180
R-squared 0.031 0.023 0.036 0.044 0.033 0.024 0.022 0.028 0.038

*** p<0.01, ** p<0.05, * p<0.1
Note: The dependent variable is the natural log of the median house value in the consistent PUMA in which the Social Security beneficiary lives. All models use weighted-instrumental-variable estimation with person weights as recorded in the Census. Robust standard errors clustered by cohort and education level are included in parentheses. Social Security income is measured in thousands of 1982–84 dollars for ease of interpretation. The specifications include controls for dummy variables for Social Security beneficiary age; calendar years 1980, 1990, and 2000; the age and educational attainment of the spouse (married sample only), race (white or not white), and sex.
Table 3: Regression results: Social Security Income Level Impact on Log (Median Monthly Rent)

<table>
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<th></th>
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<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Social Security Income</td>
<td>0.04*** (0.001)</td>
<td>0.005*** (0.001)</td>
<td>0.003*** (0.001)</td>
<td>0.002*** (0.001)</td>
<td>0.009*** (0.001)</td>
<td>0.014** (0.006)</td>
<td>0.011 (0.012)</td>
<td>0.011 (0.014)</td>
<td>0.009* (0.005)</td>
<td>0.056*** (0.018)</td>
</tr>
<tr>
<td>High School Diploma</td>
<td>0.092*** (0.003)</td>
<td>0.092*** (0.003)</td>
<td>0.096*** (0.005)</td>
<td>0.076*** (0.003)</td>
<td>0.077*** (0.005)</td>
<td>0.086*** (0.005)</td>
<td>0.080*** (0.008)</td>
<td>0.092*** (0.008)</td>
<td>0.074*** (0.004)</td>
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</tr>
<tr>
<td>Some College</td>
<td>0.124*** (0.005)</td>
<td>0.102*** (0.006)</td>
<td>0.148*** (0.007)</td>
<td>0.128*** (0.004)</td>
<td>0.092*** (0.008)</td>
<td>0.115*** (0.007)</td>
<td>0.099*** (0.012)</td>
<td>0.143*** (0.010)</td>
<td>0.126*** (0.004)</td>
<td>0.042**</td>
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<tr>
<td>College</td>
<td>0.152*** (0.005)</td>
<td>0.118*** (0.005)</td>
<td>0.173*** (0.007)</td>
<td>0.164*** (0.004)</td>
<td>0.094*** (0.008)</td>
<td>0.143*** (0.008)</td>
<td>0.113*** (0.013)</td>
<td>0.168*** (0.013)</td>
<td>0.161*** (0.005)</td>
<td>0.058***</td>
</tr>
<tr>
<td>White</td>
<td>-0.048*** (0.007)</td>
<td>-0.035*** (0.007)</td>
<td>-0.028*** (0.007)</td>
<td>-0.089*** (0.010)</td>
<td>-0.042*** (0.009)</td>
<td>-0.065*** (0.014)</td>
<td>-0.043*** (0.020)</td>
<td>-0.035*** (0.015)</td>
<td>-0.101*** (0.015)</td>
<td>-0.100***</td>
</tr>
<tr>
<td>Female</td>
<td>0.001 (0.003)</td>
<td>-0.008** (0.004)</td>
<td>0.024*** (0.004)</td>
<td>0.017*** (0.006)</td>
<td>0.007 (0.004)</td>
<td>-0.005 (0.007)</td>
<td>0.029*** (0.011)</td>
<td>0.026*** (0.008)</td>
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<tr>
<td>Married</td>
<td>-0.032*** (0.004)</td>
<td>-0.072*** (0.003)</td>
<td>0.023</td>
<td></td>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Widowed</td>
<td>-0.023*** (0.003)</td>
<td>-0.032*** (0.006)</td>
<td>0.015*** (0.005)</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Divorced</td>
<td>0.019*** (0.004)</td>
<td>0.544*** (0.011)</td>
<td>5.517*** (0.011)</td>
<td>5.519*** (0.011)</td>
<td>5.666*** (0.029)</td>
<td>5.512*** (0.013)</td>
<td>5.540*** (0.014)</td>
<td>5.512*** (0.015)</td>
<td>5.517*** (0.012)</td>
<td>5.558*** (0.032)</td>
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<tr>
<td>Constant</td>
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<td>0.064</td>
<td>0.059</td>
<td>0.040</td>
<td>0.038</td>
<td>0.053</td>
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</tbody>
</table>

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

Note: The dependent variable is the natural log of the median monthly rent in the consistent PUMA in which the Social Security beneficiary lives. All models use weighted-instrumental-variable estimation with person weights as recorded in the Census. Robust standard errors clustered by cohort and education level are included in parentheses. Social Security income is measured in thousands of 1982–84 dollars for ease of interpretation. The specifications include controls for dummy variables for Social Security beneficiary age; calendar years 1980, 1990, and 2000; the age and educational attainment of the spouse (married sample only), race (white or not white), and sex.
Table 4: Regression results: Are the elderly moving?

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>(A) OLS</th>
<th>(B) Instrument Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pooled</td>
<td>Widowed</td>
</tr>
<tr>
<td>First-stage estimates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instrument (IV only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Security Income</td>
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*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is the proportion of Social Security beneficiaries that have moved within the past five years of the Census year. All models use weighted-instrumental-variable estimation with person weights as recorded in the Census. Robust standard errors clustered by cohort and education level are included in parentheses. Social Security income is measured in thousands of 1982–84 dollars for ease of interpretation. The specifications include controls for dummy variables for Social Security beneficiary age; calendar years 1980, 1990, and 2000; the age and educational attainment of the spouse (married sample only), race (white or not white), and sex. For this set of regressions, 56,318 observations with N/A for the migrated in the past 5 years variable were omitted from the sample.
Table 5: Regression results: Are the elderly making big (out of state or country) moves?

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<td>172,334</td>
<td>28,043</td>
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<td>0.004</td>
<td>0.001</td>
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*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is the proportion of Social Security beneficiaries that have moved from another state or abroad within the past five years of the Census year. All models use weighted-instrumental-variable estimation with person weights as recorded in the Census. Robust standard errors clustered by cohort and education level are included in parentheses. Social Security income is measured in thousands of 1982–84 dollars for ease of interpretation. The specifications include controls for dummy variables for Social Security beneficiary age; calendar years 1980, 1990, and 2000; the age and educational attainment of the spouse (married sample only), race (white or not white), and sex. For this set of regressions, 56,318 observations with N/A for the migrated in the past 5 years variable were omitted from the sample.
### Table 6: Regression results: How does Social Security income impact the rise of retirement communities?

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<td>(0.086)</td>
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<td>-0.105***</td>
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<td>-0.140**</td>
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<td>(0.042)</td>
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<td>(0.023)</td>
<td>(0.086)</td>
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*** p<0.01, ** p<0.05, * p<0.1

Note: The dependent variable is the mean age of the consistent PUMA in which the Social Security beneficiary lives. All models use weighted-instrumental-variable estimation with person weights as recorded in the Census. Robust standard errors clustered by cohort and education level are included in parentheses.

Social Security income is measured in thousands of 1982–84 dollars for ease of interpretation. The specifications include controls for dummy variables for Social Security beneficiary age; calendar years 1980, 1990, and 2000; the age and educational attainment of the spouse (married sample only), race (white or not white), and sex.
Table 7: Regression results: Are the elderly moving into shared or independent living arrangements in high or low-cost areas?

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<th>(B) Instrumental Variable</th>
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<td>0.004</td>
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<td>Divorced</td>
<td>-0.057***</td>
<td>-0.073***</td>
</tr>
<tr>
<td>Constant</td>
<td>0.390***</td>
<td>0.349***</td>
</tr>
</tbody>
</table>

Observations: 413,466
R-squared: 0.037

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

Note: The dependent variable is the proportion of Social Security beneficiaries living in a shared living arrangement in a high-cost/price area, shared living arrangement in a low-cost/price area, independent living arrangement in a high-cost/price area, or independent living arrangement in a low-cost/price area. Living in a high-price area means that the median house value of the area is higher than the median house value in the U.S. The table presents the parameter estimate of the effect of Social Security income on whether the beneficiaries live in shared or independent living arrangements in high or low-price areas. All models use weighted-instrumental-variable estimation with person weights as recorded in the Census. Robust standard errors clustered by cohort and education level are included in parentheses. Social Security income is measured in thousands of 1982–84 dollars for ease of interpretation. The specifications include controls for dummy variables for Social Security beneficiary age; calendar years 1980, 1990, and 2000; the age and educational attainment of the spouse (married sample only), race (white or not white), and sex.
Note: For the purposes of this histogram, 3 observations whose total family income were over $8m were dropped
Figure 7b. Total Family Income, Capped at $200k and under

Note: For the purposes of this histogram, 626 observations whose total family income were over $200k were dropped
Table 8. Replication of Engelhardt, Gruber, and Perry (2005)

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>(1) OLS</th>
<th>(2) Instrumental Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pooled</td>
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</tr>
<tr>
<td><strong>First-stage estimates</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instrument (IV only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Security Income</td>
<td>-0.013***</td>
<td>-0.019***</td>
</tr>
<tr>
<td></td>
<td>(0.001)</td>
<td>(0.001)</td>
</tr>
<tr>
<td>High School Diploma</td>
<td>-0.050***</td>
<td>-0.054***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>Some College</td>
<td>-0.079***</td>
<td>-0.093***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.005)</td>
</tr>
<tr>
<td>College</td>
<td>-0.082***</td>
<td>-0.102***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>White</td>
<td>-0.165***</td>
<td>-0.168***</td>
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<td>(0.004)</td>
<td>(0.007)</td>
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<tr>
<td>Female</td>
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<td>-0.004</td>
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<td>(0.003)</td>
<td>(0.003)</td>
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<tr>
<td>Married</td>
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<td></td>
<td>(0.006)</td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>-0.135***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>-0.126***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
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</tr>
<tr>
<td><strong>Constant</strong></td>
<td>0.754***</td>
<td>0.669***</td>
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<td>(0.007)</td>
<td>(0.010)</td>
</tr>
<tr>
<td><strong>Observations</strong></td>
<td>413,466</td>
<td>197,712</td>
</tr>
<tr>
<td><strong>R-squared</strong></td>
<td>0.086</td>
<td>0.052</td>
</tr>
</tbody>
</table>

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

Note: The dependent variable is the proportion of Social Security benefits living in shared living arrangements. All models use weighted-instrumental-variable estimation with person weights as recorded in the Census. Robust standard errors clustered by cohort and education level are included in parentheses. Social Security income is measured in thousands of 1982–84 dollars for ease of interpretation. The specifications include controls for dummy variables for Social Security beneficiary age; calendar years 1980, 1990, and 2000; the age and educational attainment of the spouse (married sample only), race (white or not white), and sex.
Table 9: Regression results: Log (Total Family Income) Impact on Log (Median House Value)

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>(A) OLS</th>
<th></th>
<th></th>
<th></th>
<th>(B) Instrumental Variable</th>
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<td>Pooled</td>
<td>Widowed</td>
<td>Divorced</td>
<td>Married</td>
<td>Never Married</td>
<td>Pooled</td>
<td>Widowed</td>
<td>Divorced</td>
<td>Married</td>
</tr>
<tr>
<td>First-stage estimates</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Instrument (IV only)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Family Income</td>
<td>0.081***</td>
<td>0.069***</td>
<td>0.087***</td>
<td>0.098***</td>
<td>0.074***</td>
<td>0.149*</td>
<td>0.035</td>
<td>0.107</td>
<td>0.110</td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.002)</td>
<td>(0.003)</td>
<td>(0.005)</td>
<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.079)</td>
<td>(0.137)</td>
<td>(0.125)</td>
<td>(0.068)</td>
</tr>
<tr>
<td>High School Diploma</td>
<td>0.088***</td>
<td>0.093***</td>
<td>0.096***</td>
<td>0.073***</td>
<td>0.090***</td>
<td>0.063**</td>
<td>0.105**</td>
<td>0.088*</td>
<td>0.071***</td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.003)</td>
<td>(0.004)</td>
<td>(0.007)</td>
<td>(0.004)</td>
<td>(0.009)</td>
<td>(0.029)</td>
<td>(0.048)</td>
<td>(0.049)</td>
<td>(0.015)</td>
</tr>
<tr>
<td>Some College</td>
<td>0.111***</td>
<td>0.095***</td>
<td>0.150***</td>
<td>0.117***</td>
<td>0.102***</td>
<td>0.070</td>
<td>0.114</td>
<td>0.137*</td>
<td>0.112***</td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.005)</td>
<td>(0.007)</td>
<td>(0.011)</td>
<td>(0.005)</td>
<td>(0.015)</td>
<td>(0.048)</td>
<td>(0.083)</td>
<td>(0.076)</td>
<td>(0.026)</td>
</tr>
<tr>
<td>College</td>
<td>0.126***</td>
<td>0.098***</td>
<td>0.171***</td>
<td>0.139***</td>
<td>0.078***</td>
<td>0.059</td>
<td>0.129</td>
<td>0.150</td>
<td>0.131***</td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.006)</td>
<td>(0.007)</td>
<td>(0.011)</td>
<td>(0.004)</td>
<td>(0.013)</td>
<td>(0.077)</td>
<td>(0.132)</td>
<td>(0.128)</td>
<td>(0.046)</td>
</tr>
<tr>
<td>White</td>
<td>-0.124***</td>
<td>-0.091***</td>
<td>-0.074***</td>
<td>-0.199***</td>
<td>-0.127***</td>
<td>-0.148***</td>
<td>-0.078</td>
<td>-0.079**</td>
<td>-0.203***</td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.009)</td>
<td>(0.009)</td>
<td>(0.012)</td>
<td>(0.014)</td>
<td>(0.013)</td>
<td>(0.032)</td>
<td>(0.057)</td>
<td>(0.034)</td>
<td>(0.026)</td>
</tr>
<tr>
<td>Female</td>
<td>0.015***</td>
<td>0.003</td>
<td>0.049***</td>
<td>0.014</td>
<td>0.030*</td>
<td>0.030</td>
<td>-0.005</td>
<td>0.053*</td>
<td>0.043**</td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.005)</td>
<td>(0.005)</td>
<td>(0.007)</td>
<td>(0.009)</td>
<td>(0.018)</td>
<td>(0.036)</td>
<td>(0.031)</td>
<td>(0.018)</td>
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<tr>
<td>Married</td>
<td>-0.106***</td>
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<td></td>
<td></td>
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<td>-0.151***</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.006)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.054)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed</td>
<td>-0.059***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-0.066***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.005)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(0.010)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Divorced</td>
<td>0.009</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.009</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.007)</td>
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<td></td>
<td></td>
<td></td>
<td>(0.007)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Log)</td>
<td>(0.026)</td>
<td>(0.030)</td>
<td>(0.045)</td>
<td>(0.046)</td>
<td>(0.037)</td>
<td>(0.067)</td>
<td>(1.180)</td>
<td>(1.092)</td>
<td>(0.613)</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.045</td>
<td>0.033</td>
<td>0.053</td>
<td>0.061</td>
<td>0.045</td>
<td>0.036</td>
<td>0.031</td>
<td>0.052</td>
<td>0.061</td>
</tr>
</tbody>
</table>

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

Note: The dependent variable is the natural log of the median house value in the consistent PUMA in which the Social Security beneficiary lives. All models use weighted-instrumental-variable estimation with person weights as recorded in the Census. Robust standard errors clustered by cohort and education level are included in parentheses. Social Security income is measured in thousands of 1982–84 dollars for ease of interpretation. The specifications include controls for dummy variables for Social Security beneficiary age; calendar years 1980, 1990, and 2000; the age and educational attainment of the spouse (married sample only), race (white or not white), and sex.
Table 10: Regression results: Log (Total Family Income) Impact on Log (Median Monthly Rent)

<table>
<thead>
<tr>
<th>Explanatory Variable</th>
<th>(A) OLS</th>
<th>(B) Instrumental Variable</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pooled</td>
<td>Widowed</td>
</tr>
<tr>
<td>First-stage estimates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instrument (IV only)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Family Income</td>
<td>0.063***</td>
<td>0.057***</td>
</tr>
<tr>
<td></td>
<td>(0.002)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>High School Diploma</td>
<td>0.072***</td>
<td>0.077***</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.003)</td>
</tr>
<tr>
<td>Some College</td>
<td>0.091***</td>
<td>0.075***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>College</td>
<td>0.096***</td>
<td>0.070***</td>
</tr>
<tr>
<td></td>
<td>(0.005)</td>
<td>(0.006)</td>
</tr>
<tr>
<td>White</td>
<td>-0.059***</td>
<td>-0.041***</td>
</tr>
<tr>
<td></td>
<td>(0.007)</td>
<td>(0.007)</td>
</tr>
<tr>
<td>Female</td>
<td>0.012***</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td>(0.003)</td>
<td>(0.004)</td>
</tr>
<tr>
<td>Married</td>
<td>-0.061***</td>
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</tr>
<tr>
<td></td>
<td>(0.004)</td>
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</tr>
<tr>
<td>Widowed</td>
<td>-0.027***</td>
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<td></td>
<td>(0.003)</td>
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</tr>
<tr>
<td>Divorced</td>
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</tr>
<tr>
<td>Constant</td>
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<tr>
<td>R-squared</td>
<td>0.066</td>
<td>0.053</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1
Note: The dependent variable is the natural log of the median monthly rent in the consistent PUMA in which the Social Security beneficiary lives. All models use weighted-instrumental-variable estimation with person weights as recorded in the Census. Robust standard errors clustered by cohort and education level are included in parentheses. Social Security income is measured in thousands of 1982–84 dollars for ease of interpretation. The specifications include controls for dummy variables for Social Security beneficiary age; calendar years 1980, 1990, and 2000; the age and educational attainment of the spouse (married sample only), race (white or not white), and sex.
Figure 8a. Mean Age of Consistent PUMA Areas, Census Years 1980-2000

Figure 8b. Mean Age of Consistent PUMA Areas in 1980
Figure 8c. Mean Age of Consistent PUMA Areas in 1990

Figure 8d. Mean Age of Consistent PUMA Areas in 2000