

Who Owns a Home? Householders and Homeownership

Kevin A. Park*

Fannie Mae

May 25, 2023

Abstract

How sensitive are descriptions of homeownership to designation of a householder? Using data from the Survey of Income and Program Participation (SIPP), I jointly estimate models of headship and homeownership as a function of demographics, income, and wealth. I re-estimate these models after imputing and randomly selecting the householder among adult members of the household rather than using the survey reference person. Although the directions of estimated effects are mostly consistent, the magnitudes vary by householder designation.

Keywords: Households, Homeownership, Wealth

JEL Classification: D12, G21, R20

* Email: kevin_park@fanniemae.com. I would like to thank Michael Lacour-Little, Nuno Mota, William McClain, Briana Sullivan, Sharon O'Donnell, William Doerner, and Ross Batzer for helpful comments, suggestions, and technical assistance. The findings and conclusions expressed are solely those of the author and not those of Fannie Mae or the Federal Housing Finance Agency.

1 INTRODUCTION

Who owns a home is a deceptively complex question. Observed homeownership patterns involve not who can afford to buy a home, but also how households are formed and characterized. Some of the terminology used to describe households has changed over time to better reflect evolving social dynamics, but the impact of those dynamics on how we measure and understand homeownership is underexamined.

The commonly referenced homeownership rate is the number of owner-occupied housing units as a share of all occupied housing units. These housing units are occupied by households, simply defined as everyone living in the same housing unit, who may or may not be related to each other. Similarly, the headship rate is the number of households per capita. All else equal, a decrease in the headship rate reduces the denominator of the homeownership rate. Whether these “missing” households would have been renters or owners also affects the observed pattern of homeownership.

Households are commonly described by the characteristics of just a single person in that household. The Census Bureau discontinued the use of the term “head of household” in 1980, along with the practice of always classifying a husband as the reference person among married couples. The Federal Reserve Board’s Survey of Consumer Finances continued using “household head” until 2019. Today, the terms “householder” or “reference person” are used (Census Bureau 2021). Female-headed households (i.e., households where the householder is female) have increased over time. But some of this is simply due to who is listed as the householder; among married couples, the share designating a female as the householder has increased from under 22 percent in 1990 to over 46 percent in 2019 (Goodman, Choi and Zhu 2021). Likewise, the persistent Black-White homeownership gap is typically based on the race of only these householders.; however, the share of couples from different races has been increasing steadily over time (Bialik 2017).

The contributions of this paper are to examine how measurement (householder designation), selection (headship), and omitted variables (wealth) impact our understanding of homeownership patterns. While some of these issues have been examined separately, they have not been analyzed together to the best of my knowledge. For example, while studies have identified household wealth barriers to homeownership, they have not simultaneously accounted for the importance of wealth with respect to household formation.

I use the Survey of Income and Program Participation (SIPP) because it includes information on both individual and household assets and liabilities, which is not collected by many other household surveys, and oversamples lower income areas, which might yield more insight on marginal homebuyers. Although wealth is both a cause and consequence of homeownership, ignoring wealth creates a significant omitted variable bias problem. I address the endogeneity of wealth by re-estimating models on a sub-sample of recent movers. Although SIPP is a survey of multiple, overlapping panels, I only use a cross-sectional sample based on the first wave of each panel; inter-temporal dynamics are beyond the scope of this paper.

I follow Haurin and Rosenthal (2007) in using a bivariate probit model to jointly estimate headship and homeownership, allowing correlation between the two equations. Accounting for differences in headship will provide a clearer understanding of differences in homeownership. I also use a conditional logistic regression to estimate the likelihood of householder designation within a household. Then I use the results to impute a householder and re-estimate headship and homeownership models.

The following section provides a brief background on existing research and conceptual problems surrounding homeownership and headship. Then I describe the methodology and SIPP data in more detail. The results are presented in three subsections: intra-household likelihood of

householder designation, likelihood of headship, and likelihood of homeownership. I find that householder designation is not random nor based solely on the relative age, income, and wealth of household members. I also find wealth is a significant factor for both homeownership and headship, and omitting wealth tends to overestimate the importance of income. Accounting for headship and householder designation also affects the magnitude of other determinants of homeownership. These findings are summarized and discussed in the conclusion.

2 BACKGROUND

There is an extensive literature on tenure choice. However, research is often limited by the available data, particularly on household savings and debt (see Moulton (2022)). Homeownership studies also often take household formation and particularly householder designation as given, when it is actually correlated with homeownership and its determinants. The following section briefly discusses these issues in the existing literature.

2.1 Homeownership

The homeownership rate rode a wave of favorable demographics in the 1990s (Gabriel and Rosenthal 2005). But after reaching unprecedented rates by the mid-2000s, it fell to 50-year lows following the Great Recession (Figure 1). Several studies at the time projected that homeownership rates would be below 63 percent in 2020 and could potentially fall much further if problems of housing affordability and access to mortgage credit persisted (Acolin, Goodman, and Wachter 2016; Haurin 2016; Myers and Lee 2016; Nelson 2016). Instead, the homeownership rate rebounded and is currently over 65 percent.

The financial merits of homeownership relative to renting can be expressed as the “user cost of housing,” which is a function of the real mortgage rate, marginal tax rate, maintenance costs,

transaction costs, length of tenure, physical depreciation, real constant-quality appreciation, etc. (Herbert and Belskey 2008). For example, higher income households have greater incentive to be homeowners given favorable treatment of homeownership within a progressive system of income taxation. House prices have increased faster than inflation over the last several decades, generating capital gains for existing homeowners and higher downpayments for homebuyers. Rents have also increased, making it more difficult for first-time homebuyers to save for a downpayment. On the other hand, mortgage interest rates have generally fallen, lowering the monthly cost of homeownership relative to renting. Riley, Ru, and Feng (2013) compute *ex post* user costs of housing and find homeownership was less expensive than renting for the median low-income homeowner between 2003 and 2011. Although relative costs varied by timing and region, the authors find price appreciation of less than 1 percent would have been sufficient to make homeownership preferable for 75 percent of low-income homeowners.

Most home purchases, particularly by first-time buyers, are financed with mortgage credit, but not every household that wants to purchase a home can obtain a loan. Linneman and Wachter (1989) identify households that are likely constrained from purchasing their desired house value due to insufficient income or wealth to meet common mortgage underwriting criteria. The authors then estimate the effect of these constraints on the likelihood of homeownership. Although information on assets and liabilities is often not as readily available as income (Moulton 2022), studies which analyze both typically find wealth is a larger barrier to homeownership (Linneman and Wachter 1989; Calem, Firestone, and Wachter 2010; Barakova, Calem, and Wachter 2014; Anderson, Han, and Hisnanick 2021).

However, wealth is endogenous to tenure choice. Households wanting to be homeowners may build wealth by earning more and spending less. Homeowners subsequently benefit from house price appreciation that increases their home equity and overall wealth (or suffers when house prices fall).

Killewald and Bryan (2016) estimated that after accounting for dynamic tenure choice selection every additional year of homeownership added nearly \$6,800 to household wealth by 2008, including \$2,000 in non-housing wealth (but only \$4,400 in 2012). Economic analyses could focus on non-housing forms of wealth for renters and owners, but this would ignore differences in how household asset portfolios are allocated. For example, a renter saving for homeownership may have funds stored in a bank account which will then be converted in home equity as a downpayment, reducing their non-housing wealth as soon as they become homeowners. Several studies instead focus on households that recently moved and therefore likely liquidated any home equity and made a new decision on tenure (Linneman and Wachter 1989; Barakova, Calem, and Wachter 2014; Park, Herbert and Quercia 2014).¹

Credit history and characteristics have become increasingly important in mortgage underwriting. Calem, Firestone, and Wachter (2010) define “credit impaired” households as ones that are at the maximum limit on more than one credit card, have been rejected for credit in the past five years, or have declared bankruptcy in the past nine years. They find the endogeneity of income and wealth may hide the impact of credit. Using instruments for income and wealth, they conclude that credit impairment is the single largest constraint to homeownership. These borrowing constraints vary in strength across time (Linneman and Wachter 1989; Park, Herbert, and Quercia 2014; Barakova, Calem, and Wachter 2014; Acolin et al. 2016). Even households with similar demographics and financial characteristics may have different odds of homeownership based on when and where they live. Gabriel and Rosenthal (2015) show the rise and fall of homeownership in the 2000s was driven more by market conditions than demographics.

¹ Which households move may not be random. However, Barakova, Calem, and Wachter (2014) use a Heckman selection model to account for selection bias and find the estimated relationship between constraints and tenure “essentially unchanged.”

The correlation between some household demographics and tenure choice can be explained within the user cost of housing formula. For example, younger households are often more mobile, reducing the expected length of time over which the transactions costs of homebuying are amortized and therefore decreasing the benefits of owning relative to renting. As people settle into families and careers, homeownership becomes more desirable. The marginal probability of becoming a homeowner is highest between the ages of 36 and 45 (Dey and Brown 2022). Figure 2 shows the homeownership rate among these middle-aged households swelled between 1940 and 1980, aided by new mortgage products provided by federal institutions created by the New Deal and a strong economy (Fetter 2013). That bulge has aged since then, while younger households have experienced declining rates of homeownership. Households headed by someone under 50 years old had a lower homeownership rate before the COVID-19 pandemic than they did in 1960. The relatively low rates of homeownership rate among younger Americans may persist as they age and depress overall homeownership in the future (Myers and Lee 2016).

Household composition, including marriage, divorce, and presence of children, may also affect the likelihood of homeownership. Marriage and child-rearing may reflect a predisposition correlated with homeownership, but marriage also entails a legal structure for taxation and inheritance that may facilitate homeownership. For example, Miller and Park (2018) find legalization of same-sex marriage led to an increase in mortgage applications from same-sex households that was much stronger than domestic partnerships or other anti-discrimination policies. However, marriage rates have been declining for decades, from over 70 percent of adults in the United States in the 1960s to just half today according to the Current Population Survey. Fertility has been falling for years: the number of births per woman reached a record low in 2020 according to the National Center for Health Statistics (CDC 2022).

Demographics are often correlated with financial characteristics that explain differences in homeownership. Dey and Brown (2022) use anonymized credit bureau data to decompose racial disparities and find 43-45 percent of the White-Black gap in homebuying and 66-77 percent of the White-Hispanic homebuying gap is explained by differences in credit profiles. “Blacks and Hispanics are more likely than Whites to have low credit scores, missing scores, delinquencies, bankruptcies, and high debt liabilities, making them less likely to transition to acquiring new mortgages” (p. 277).

However, significant differences in homeownership by race and ethnicity persist even after controlling for demographics and financial characteristics (Linneman and Wachter 1989; Calem, Firestone, and Wachter 2010; Barakova, Calem, and Wachter 2014). The average difference (without accounting for other factors) in homeownership rates between non-Hispanic Blacks and non-Hispanic Whites has been increasing since 1980 and is now worse than it was before passage of the Fair Housing Act prohibited racial discrimination in housing (Figure 3). Myers and Lee (2016) note that if these racial disparities persist, the declining population share of non-Hispanic White households alone would lower the overall homeownership rate by 2 percentage points by 2050.

Lower homeownership rates are a combination of both lower rates of entering homeownership and higher rates of exiting (Killewald and Bryan 2016; Anderson, Han, and Hisnanick 2021). Dey and Brown (2022) find 34 percent of the White-Black difference in rates of transition into homeownership, and 21 percent of the White-Hispanic difference, are not explained by demographics, income, or credit characteristics. Park (2022) finds Hispanic, Asian, and female mortgage applicants are more likely to be denied by lenders than White and male applicants even after controlling for *ex ante* and *ex post* credit risk. Killewald and Bryan (2016) find wealth gaps are driven by both differences in length of tenure as well as differences in annual returns to homeownership. However, this is not necessarily because minority homeowners experience lower house price appreciation (Immergluck, Earl, and Powell 2018).

Instead, Kermani and Wong (2021) find disparities in housing returns are mostly driven by differences in distressed home sales.

2.2 Headship

The homeownership rate is impacted not only by the number of homeowners (the numerator) but also the number of households (the denominator), which is determined by the propensity of individuals to form their own households. The headship rate increased over the second half of the 20th century but peaked in the early 2000s (Figure 4). Although the degree of the decline since then depends on which survey is used.²

Household formation is often overlooked but may confound how homeownership rates are computed (Haurin, Herbert and Rosenthal 2007). Haurin and Rosenthal (2007) find headship and homeownership are correlated, but also non-stationary. For example, they show a positive correlation conditional on observed covariates for individuals in their 30s which turns negative for older individuals, particularly in more recent decades. Yu and Myers (2010) find that lower headship raised the observed homeownership rate by up to 3.8 percentage points. “Therefore, homeownership increases in recent years were largely an artefact of declining renter household formation... This suggests that renter failure, not homeowner success, is what underpinned the rising homeownership rate in recent years” (2634-2635).

Both Haurin and Rosenthal (2007) and Yu and Myers (2010) find Black individuals are more likely to form their own households than White individuals and this higher rate of headship depresses their observed homeownership rate. In fact, Yu and Myers (2010) estimate that if Black individuals had headship rates similar as White individuals, then their homeownership rate would have been nearly 12

² See Cresce, Cheng and Grieves (2013) for an explanation of the “household estimates conundrum.”

percentage points higher in 2000. If all racial and ethnic groups had the same propensity to form households as Whites, then there would be more households in total and the overall homeownership rate would be about 2 percentage points higher. They conclude, “Minority-White homeownership disparity is largely attributable to variable rates of household formation” (p. 2634). However, Haurin and Rosenthal (2007) does not include personal income and neither study includes wealth. Wealth has been found crucially important, if endogenous, for predicting homeownership and likely has similar importance for household formation.

The confounding issue of headship leads to further questions about the social dynamics of survey response. The Census Bureau replaced the term “head of household” with “householder,” who may or may not be the survey respondent but is typically defined as the first person listed as the owner or renter of the housing unit (DeMaio and Bases 1992; Census Bureau 2021). This conceptual change was considered more “objective” (Plotkin 1978a) and reflecting “the changing economic and social values in the nation” (Plotkin 1978b). The approach is often also applied in mortgage lending research. For example, the Federal Housing Finance Agency’s (2022) Annual Housing Report reports mortgage originations by the race and ethnicity of the “primary borrower.”³

However, the listing order on a property title or lease may also reflect biases or hidden household dynamics. Agarwal et al. (2018) find that relative economic resources explain the order individuals are listed on mortgage applications most of the time, yet a gender gap is also present: among mixed-gender couples, the man earns more in 72 percent of mortgage applications but signs first in 89 percent.

³ For comparison, the Consumer Financial Protection Bureau includes a category of “Joint” if one applicant is non-Hispanic white and a co-applicant is a different race or ethnicity, and if the applicants each report a different minority race, then the application is reported as “two or more” or “other” race.

Similarly (Lin et al. 2022) find that males were listed first on married couples' federal income tax returns 88 percent of the time in 2020 (down from 97 percent in 1996).

Multiple generations living in one household is also challenging. The share of the population in multigenerational homes increased from 7 percent in 1971 to 18 percent in 2021 (Cohn et al. 2022). Retired individuals living with their children may have wealth but less income and be less responsible for financial planning. Among adults at least 40 years of age living with a parent, 56 percent pay more than half of household expenses (Cohn et al. 2022). Yet whether the older generation is classified as the householder or related to the householder will determine the number of "senior households" that exist. Consequently, some of the observed patterns in headship and homeownership may be influenced by how households respond to surveys.

3 DATA AND METHODOLOGY

I use the Survey of Income and Program Participation (SIPP) to analyze both headship and homeownership. SIPP is chosen because it includes questions on assets and liabilities not available in other household surveys, such as the Current Population Survey, American Community Survey, or American Housing Survey, or by the Home Mortgage Disclosure Act commonly used in mortgage lending research. In addition, SIPP oversamples households in lower income areas, which might yield more insight on the marginal homeowner. For comparison, the Survey of Consumer Finances also includes assets and liabilities but oversamples wealthier individuals to obtain more accurate aggregate statistics. SIPP attempts to interview all household members who are at least 15 years old, which is the minimum age SIPP allows a respondent to be designated the householder, but allows proxy interviews from other household members when necessary. A person is considered a household member if they sleep in the household the majority of the time (Census Bureau 2021).

I restrict the data to individuals not living in group quarters and at least 15 years old with complete income and wealth information. SIPP was redesigned in 2014 to utilize an Event History Calendar to recall events over the previous calendar year. However, the value of assets and liabilities are reported for only the last day of the reference period (i.e., December). Although the SIPP is designed to be a panel database tracking individuals over a few years, I only use the first wave of each new panel to build a cross-sectional sample of 137,226 adults in 69,927 households, of which 64 percent are homeowners. Table 1 presents descriptive statistics of the households.

As a baseline, I estimate separate binary probit model of the likelihood of being the householder (*SRef*) and homeownership (*HOown*) among those householders:

$$SRef = (x\beta + \varepsilon_1 > 0) \quad \varepsilon_1 \sim N(0,1) \quad (1)$$

$$(HOown|SRef = 1) = (z\gamma + \varepsilon_2 > 0) \quad \varepsilon_2 \sim N(0,1) \quad (2)$$

However, Haurin and Rosenthal (2007) argue selection bias may be present when estimating tenure choice only among householders. “[E]stimating homeownership over household heads without taking their select status into account could yield biased estimates of the unconditional propensity for homeownership” (p. 418).⁴ Following their lead, I also estimate a probit model with sample selection, where the likelihood of being the householder is simultaneously estimated with the likelihood of owning, and errors are allowed to be correlated between the two equations.⁵

$$corr(\varepsilon_1, \varepsilon_2) = \rho \quad (3)$$

⁴ Yu and Myers (2010) note that the selection model “does not differentiate the formation of owner households from renter households. In other words, the model assumes that all groups have the same relative rates of owner and renter household formation” (2623). Instead, they use a multinomial model that combines headship and homeownership. However, this limits available explanatory variables to individual-level characteristics when tenure choice is likely dependent on household-level characteristics. Even household formation is likely affected by the pooled resources potentially available to a latent new household.

⁵ Using the heckprobit command in Stata 16.1.

Variables x used to predict headship include demographics and financial characteristics previously found to be correlated with household formation.

Age	Categorical variables indicating the age of the individual in 5-year increments. The reference category is 65 to 69 years old.
Gender	A binary indicator of whether the individual is female.
Race/Ethnicity	Categorical variable indicating whether the individual is (1) non-Hispanic Black, (2) Hispanic of any race, or (3) other non-white race or ethnicity (3). Non-Hispanic white is the reference category.
Citizenship	Categorical variable indicating whether the individual is a (1) non-citizen or (2) naturalized citizen. Natural born citizen is the reference category.
Language	A binary indicator of whether the individual speaks a language other than English at home.
Marital Status	Categorical variable indicating whether the individual is (1) currently married, (2) divorced/separated, or (3) widowed. Never married is the reference category.
Education	Categorical variable indicating whether the highest level of education completed by the individual is (1) less than a high school degree or (2) high school degree or some college. A completed bachelor's degree is the reference category.
Veteran Status	Categorical variable indicating whether individual is (1) veteran or (2) active-duty military. Civilian is reference category.
Labor Force	A series of non-mutually exclusive binary indicators of why the individual is not working, including (1) attending school, (2) pregnancy or caring for family, (3) retirement, and (4) other.
Income	Total income received by the individual, adjusted for inflation and regional price differences ⁶ , converted into deciles.
Wealth	Net worth of the individual, adjusted for inflation and regional price differences, converted into deciles.
Metro	A binary indicator of whether the individual is in a metropolitan statistical area.
State	Fixed effects for each state.
Panel	Categorical variable indicating SIPP panel.

⁶ Income and wealth are adjusted for inflation using the Bureau of Labor Statistics' Consumer Price Index for All Urban Consumers and adjusted for regional price differences using the Bureau of Economic Affairs' state-level Regional Price Parities.

The homeownership equation includes z , the characteristics of the householder, with income and wealth redefined at the household level, and household size.

HH Size	Number of people in household
HH Income	Total income received by all individuals in the household, adjusted for inflation and regional price differences, converted into deciles.
HH Net Worth	Total net worth of all individuals in the household, adjusted for inflation and regional price differences, converted into deciles.

Standard errors are adjusted for the survey sampling design.⁷

The householder is typically defined as the survey reference person. However, the headship and homeownership results may be sensitive to which adult within a household is designated as the householder. As a robustness check, I estimate a conditional logistic⁸ regression that estimates the likelihood a given member of the household (m) is the reference person, among households with more than one adult ($J > 1$).

$$Pr(SRef = m) = \frac{e^{x\beta}}{\sum_{j=1}^J e^{x\beta}} \text{ for } m = 1 \text{ to } J \quad (4)$$

The only characteristics that vary within a household are used to predict the reference person, which generally excludes time and geography. Income, wealth, and age are expressed as both the rank and share within the household. Sampling weights are computed as the average of all members of the household rather than the individual.

Importantly, the conditional logistic regression differs from models of headship because the sum of probabilities within a household must equal one. It addresses the question of who in the

⁷ Using `svyset ghlfsm [pw = wpfinwgt], strata(gvarstr)` in Stata 16.1.

⁸ Using the `clogit` command in Stata 16.1. A logistic regression is used because there is no method to compute a conditional probit model. According to the Stata manual, “there does not exist a sufficient statistic allowing the fixed effects to be conditional out of the likelihood.”

household is the householder, not the likelihood of forming a household. I then impute the householder as the household member with the highest probability of being the survey reference person. This methodology likely understates potential discrepancies because it is still based on estimating who the reported reference person is, not a distinct conception of who is the householder. As an additional comparison, I also randomly select the householder from all adult member of each household with equal probability.

4 RESULTS

The following section presents the results of estimating who in the household is the householder, overall headship, and homeownership.

4.1 Householder

Table 2 shows the results of the conditional logistic regression estimating the designation of the survey reference person, among households with two or more adults. The first column includes only the relative income, wealth, and age of the household members. The likelihood of being the survey reference person generally increases with each of these characteristics measured by either household rank or share. The only exception is that the *second* oldest adult is more likely to be the survey reference person than the oldest household member.

The second column includes additional demographic characteristics. The likelihood of being the survey reference person is positively correlated with being female, currently or (to a lesser extent) formerly married, higher educational attainment, previous military service, *not* working (particularly due to caring for children or other family members or due to retirement), United States citizenship, and speaking English at home. In addition, Black household members are *less* likely to be designated the survey reference person. Note that race would not be factor in households where all adult members are

the same race; the significance of race can only be due to households with two or more races or ethnicities.

As a null test, the final column of Table 2 re-estimates the model after randomly selecting an adult household member as the dependent variable. As expected, the overall model is not statistically significant (F-statistic is 0.71). A couple of variables exhibit spurious significance at the 5 percent level, which is also expected given the number of variables being tested.

The correlation between these demographic characteristics and the survey reference person raises concerns about using that single person to represent the entire household. As a robustness check, I use the results of the first column to impute a householder as the adult with the highest probability of being the survey reference person based only on the income, wealth, and age. The imputed householder is the survey reference person nearly 78 percent of the time (66 percent among households with two or more adults). As noted, this is likely an understatement of the potential difference in householder designation because it is still based on the likelihood of being the survey reference person, not a distinct conception of “head of the household”. For comparison, randomly selecting an adult household member identifies the survey reference person 63 percent of the time (44 percent among households with two or more adults).

4.2 Headship

Table 3 shows the results of the probit regression estimating headship. The first two columns estimate the likelihood using the survey reference person, with (2) and without (1) including individual net worth. Alternatively, the third column estimates headship using the imputed householder derived from the previous section (and includes wealth). Although many of the estimated coefficients are similar, imputing the householder results in a significantly different model overall ($F = 46.45^{***}$). The

fourth column uses the randomly selected household member. Unlike the intra-household likelihood of being the householder, the model estimating the likelihood of headship is statistically significant even when randomly selecting the householder.⁹ This is partly due to including single-adult households for which the dependent variables are necessarily identical; however, the overall model is significant even if restricting to households with more than one adult.¹⁰ More generally, the results after randomly selecting a household member could be seen as more descriptive of the household rather than only the householder.

Some characteristics are associated with headship regardless of how the householder is designated. For example, Black, formerly married (i.e., separated, divorced, or widowed), veterans and active-duty military, immigrants, individuals that speak a language other than English at home, and individuals in rural (i.e., not metropolitan) areas are more likely to form households. Married couples might be expected to form their own household but, counterintuitively, the headship rate is lower for married individuals. However, by definition there is at least one other adult in the household, so the headship rate among married householders cannot exceed 50 percent (Yu and Myers 2010). Consistent with the observed decline in overall headship rates, household formation is lower in 2017 and 2019 than it was in 2014.

The direction of effects for other characteristics depends on how the householder is chosen. Women are associated with a lower likelihood of headship when using the survey reference person and especially when imputing the householder, but positively correlated with headship when randomly selecting a householder. Hispanic and “other” racial and ethnic groups are associated with higher

⁹ The model using random selection is also significantly different from Column 2 using the survey reference person ($F = 86.8^{***}$).

¹⁰ The F-statistics for columns two through four when restricted to households with more than one adult (not shown) are 236.4^{***} , 336.4^{***} , and 26.6^{***} , respectively.

headship using either the survey reference person or imputed householder, but the estimated effects are not significant when randomly selecting an adult as the householder. Higher education is associated with a greater likelihood of headship (as long as not currently out of the labor force to attend school) when using the survey reference person or random selection, but a lower likelihood when imputing the householder. Aside from school, being out of the labor force is generally associated with a higher likelihood of headship, particularly if caring for family, when using the survey reference person or random selection, but retirement is associated with a lower likelihood of headship when imputing the householder.

Figure 5 plots the estimated coefficients associated with age, income, wealth. Headship increases sharply among young adults. Imputing the householder (orange line) lowers the headship rate among individuals under 65 years of age relative to using the survey reference person (blue lines), but increases it among seniors. Randomly selecting the householder (green line) increases the headship rate among individuals under 35 years of age but causes a dip among individuals in their 40s and 50s, potentially because children living in the household reach adulthood.¹¹ Income is correlated with headship. While accounting for personal wealth somewhat flattens the curve, imputing the householder rather than using the survey reference person shows an even stronger correlation between income and headship. Wealth is also associated with headship, although the second, third, and fourth deciles have lower rates than the lowest decile, particularly when using an imputed householder. Randomly selecting an adult as the householder sharply reduces the correlation between income or wealth and headship, although it remains statistically significant.

¹¹ Individuals 15 years or older are eligible to be householders in SIPP.

4.3 Homeownership

Table 4 shows the results of the models estimating the likelihood of homeownership. The first two specifications show baseline probit models, with (2) and without (1) including household wealth, where the householder is defined as the survey reference person. The next three columns show the second stage of a bivariate probit model that accounts for the potential selection bias of headship, with householder defined as the survey reference person, imputed, and randomly selected, respectively. Table 5 replicates these specifications while restricting observations to recent movers to account for the endogeneity of wealth. Movers are identified as the roughly 13 percent of individuals that changed residences in the previous 12 months.

Every model, including randomly selecting the householder, is statistically significant. In addition, imputing or randomly selecting the householder is significantly different than using the survey reference person.¹² The correlation between the residuals of the first and second stages is negative and statistically significant using either the survey reference person or (to a lesser extent) imputed household, but positive and significant using a randomly selected householder. Either way, headship has a statistically significant correlation with homeownership even conditional on observable characteristics, whether using all households or only recent movers.

In addition, several characteristics consistently associated with headship consistently have the opposite effect on homeownership. For example, Black individuals and non-naturalized immigrants are more likely to form households but are less likely to be homeowners, in every specification. Married individuals have intrinsically lower headship, but higher homeownership rates. In contrast, living in a metropolitan area is associated with both lower headship and lower homeownership in all

¹² The F-statistics for imputing and randomly selecting the householder are 61.0*** and 101.3***, respectively, using all observations. Among recent movers, the comparable values are 11.2*** and 12.3***.

specifications. Larger households are consistently associated with an increase in the likelihood of homeownership across all specifications.

Figure 6 shows the estimated coefficients for age, income and wealth. The likelihood of homeownership generally peaks between ages 65 and 75, but somewhat earlier among recent movers. The age curve is also much flatter after accounting for wealth and headship. Similarly, the effect of income on homeownership is drastically reduced after accounting for wealth, and the effects of both income and wealth are reduced after accounting for household formation. Income is a stronger predictor of homeownership among recent movers than all households, while wealth is somewhat weaker.

The remaining characteristics are not consistently significant across both Tables 4 and 5, possibly because of the smaller sample size of movers; however, several characteristics are consistently significant in Table 4 using all households. Active-duty military households are less likely to be homeowners while retired individuals are more likely. Conditional on wealth, higher educational attainment is associated with *lower* likelihood of homeownership. Notably, the overall likelihood of homeownership fell between 2014 and at least 2018 but panel year is generally not significant when using only recent movers.

5 CONCLUSION

There is an extensive economic literature on the determinants and disparities in homeownership. A few of these examine the cause and effect of household wealth, while others account for the role of household formation in determining the denominator of the homeownership rate. I build on the existing research by jointly estimating the likelihood of both headship and homeownership. I find statistically significant effects of personal and household wealth, and an inverse

correlation conditional on observed characteristics, meaning households more likely to form households are less likely to purchase homes.

Personal wealth is an important factor in household formation just as household wealth is an important factor in tenure choice. However, wealth is often an omitted variable because it is not collected in many household surveys. The Survey of Income and Program Participation is unique in that it includes questions on assets and liabilities and oversamples households in high poverty areas, which might yield more insight on the marginal homebuyer. Accounting for wealth increases the association of race with headship but decreases its association with homeownership. The direction of the estimated effect of educational attainment on homeownership flips after including wealth.¹³ And wealth, along with headship, reduces the estimated effects of age and especially income. While wealth is both a cause and consequence of homeownership, the importance of wealth to household formation and homeownership is evident even among a subsample of recent movers, which is intended to address this endogeneity.

The other primary contribution of this paper is reconsidering how headship and homeownership are defined. Households are typically described by the characteristics of a single person in the household. Although no longer called the “head of household,” the “householder” serves as the reference for defining familial relationships within a household and is usually the first person in whose name the home is owned or rented. Yet the designation is somewhat arbitrary among adult members of a household, particularly if the home is owned or rented jointly. Arbitrary but not random.

¹³ The association between higher educational attainment and lower homeownership after controlling for wealth may be due to sorting of highly educated people into areas with a high cost of living. Using the 2019 5-year American Community Survey, I find the share of the population in a tract with at least a bachelor’s degree is associated with an increase in the ratio of median house value to median household income, even after controlling for state and whether the tract is a metropolitan statistical area. I broadly accounted for cost of living differences using state-level regional price parity adjustments to income and wealth. Unfortunately, SIPP does not provide the geographic granularity necessary to better account for housing market conditions.

The designation of householder is associated not only with the age, income, and wealth of household members, but also race, marital status, educational attainment, labor force participation, military service, citizenship, and language. Contrary to Agarwal et al.'s (2018) and Lin et al.'s (2022) finding that men are more likely to be listed first on mortgage applications and taxes, respectively, I find women are more likely to be listed as the householder, all else equal.

The observed patterns in householder designation raise concerns about using the survey reference person as the dependent variable in models of headship or the representative of the household in models of tenure choice. Alternatively, I impute the householder using only age, income, and wealth and re-estimate the models. Although the direction of most estimated effects is the same, the magnitudes vary and are significantly different overall.

Notably, women become less likely to form a household but more likely to own a home when using the imputed householder instead of the survey reference person. The estimated average marginal probability of homeownership increases from +1.8 percentage points to +3.0 percentage points. Meanwhile, non-Hispanic Black individuals become even more likely to form a household relative to non-Hispanic whites and less likely to own a home, with the average marginal probability of homeownership falling from -9.0 percentage points to -9.3 percentage points. These general differences between White and Black households are even evident when randomly selecting a householder from adult household members, demonstrating how race is often a common characteristic within a household.

Future work should carefully reflect on how designation of the householder may impact the findings. Particular attention should be given to gender and age. Household surveys may want to follow the Health and Retirement Survey in separately asking respondents if they are the most knowledgeable about financial or family matters and identifying those respondents, which may be different individuals.

The highest earning individual may not be the wealthiest, or the one listed on the property deed or lease. Uncritically using the survey reference person or primary mortgage applicant as the householder may be a form of measurement error that introduces attenuation bias into research results. However, what variables are available and should be used to impute the householder, or whether results should be bootstrapped across adult household members, is not clear and merits further investigation.

WORKS CITED

- Acolin, Arthur, Jesse Bricker, Paul Calem, and Susan Wachter (2016). "Borrowing Constraints and Homeownership." *American Economic Review* 106 (5): 625-629.
- Acolin, Arthur, Laurie S. Goodman, and Susan M. Wachter (2016) "A Renter Or Homeowner Nation?" *Cityscape* 18 (1): 145-158.
- Agarwal, Sumit, Richard Green, Eric Rosenblatt, Vincent W. Yao, and Jian Zhang (2018). "Gender Difference and Intra-Household Economic Power in Mortgage Signing Order." *Journal of Financial Intermediation* 36: 86-100.
- Anderson, D. Augustus, Hye-Sung Han, and John Hisnanick (2021). "The Effect of Household Debt and Wealth on Subsequent Housing Tenure Choice." *City & Community* 20 (4): 297-325.
- Barakova, Irina, Paul S. Calem, and Susan M. Wachter (2014). "Borrowing constraints during the housing bubble." *Journal of Housing Economics* 24: 4-20.
- Bialik, Kristen (2017). "Key facts about race and marriage, 50 years after Loving v. Virginia." Pew Research Center. <https://www.pewresearch.org/short-reads/2017/06/12/key-facts-about-race-and-marriage-50-years-after-loving-v-virginia/>
- Calem, Paul S., Simon Firestone, and Susan M. Wachter (2010). "Credit Impairment and Housing Tenure Status." *Journal of Housing Economics* 19 (3): 219-232.
- Centers for Disease Control and Prevention (2022). "Births: Provisional Data for 2021." National Vital Statistics System, Vital Statistics Rapid Release, Report No. 20, May 2022.
- Cohn, D'Vera, Juliana Menasce Horowitz, Rachel Minkin, Richard Fray, and Kiley Hurst (2022). "Financial Issues Top the List of Reasons U.S. Adults Live in Multigenerational Homes." Pew Research Center. <https://www.pewresearch.org/social-trends/2022/03/24/the-demographics-of-multigenerational-households/>
- Cresce, Arthur R., Yang Cheng, and Christopher Grieves (2013). "Household estimates conundrum: Effort to develop more consistent household estimates across surveys." *Proceedings of the 2013 Federal Committee on Statistical Methodology (FCSM) Research Conference*. US Census Bureau Washington DC.
- DeMaio, Theresa J. and Nancy A. Bates (1992). "Who Fills Out the Census Form?" Center for Survey Measurement, US Census Bureau, Survey Methodology 1992-06.
- Dey, Jaya and Lariece M. Brown (2022). "The Role of Credit Attributes in Explaining the Homeownership Gap between Whites and Minorities since the Financial Crisis, 2012–2018." *Housing Policy Debate* 32 (2): 275-336.

- Federal Housing Finance Agency (2022). "Annual Housing Report: January 1, 2021 – December 31, 2021." <https://www.fhfa.gov/AboutUs/Reports/ReportDocuments/Annual-Housing-Report-2022.pdf>
- Fetter, Daniel K. (2013).. "How do mortgage subsidies affect home ownership? Evidence from the mid-century GI Bills." *American Economic Journal: Economic Policy* 5 (2): 111-47.
- Gabriel, Stuart A., and Stuart S. Rosenthal (2005). "Homeownership in the 1980s and 1990s: aggregate trends and racial gaps." *Journal of Urban Economics* 57 (1): 101-127.
- Gabriel, Stuart A. and Stuart S. Rosenthal (2015). "The Boom, the Bust and the Future of Homeownership." *Real Estate Economics* 43 (2): 334-374.
- Goodman, Laurie, Jung Hyun Choi, Jun Zhu (2021). "More Women Have Become Homeowners and Heads of Household. Could the Pandemic Undo That Progress?" Urban Institute. <https://www.urban.org/urban-wire/more-women-have-become-homeowners-and-heads-household-could-pandemic-undo-progress>
- Haurin, Donald R. (2016). "The Future Course of U.S. Homeownership Rates." *Cityscape* 18 (1): 159-162.
- Haurin, Donald R. and Stuart S. Rosenthal (2007). "The Influence of Household Formation on Homeownership Rates Across Time and Race." *Real Estate Economics* 35 (4): 411-450.
- Haurin, Donald R., Christopher E. Herbert, and Stuart S. Rosenthal (2007). "Homeownership Gaps among Low-Income and Minority Households." *Cityscape*: 5-51.
- Herbert, Christopher E. and Eric S. Belsky (2008). "The Homeownership Experience of Low-Income and Minority Households: A Review and Synthesis of the Literature." *Cityscape* 10 (2): 5-59.
- Immergluck, Dan, Stephanie Earl, and Allison Powell (2019). "Black homebuying after the crisis: Appreciation patterns in fifteen large metropolitan areas." *City & Community* 18 (3): 983-1002.
- Kermani, Amir, and Francis Wong (2021) *Racial Disparities in Housing Returns*. National Bureau of Economic Research, Working Paper 29306.
- Killewald, Alexandra and Brielle Bryan (2016). "Does Your Home make You Wealthy?" *RSF: The Russell Sage Foundation Journal of the Social Sciences* 2 (6): 110-128.
- Lin, Emily Y., Joel Slemrod, Evelyn Smith, and Alexander Yuskavage (2022). "Who's on (the 1040) First? Determinants and Consequences of Spouses' Name Order on Joint Returns." University of Michigan, Ross Office of Tax Policy Research.
- Linneman, Peter and Susan Wachter (1989). "The Impacts of Borrowing Constraints on Homeownership." *Real Estate Economics* 17 (4): 389-402.
- Miller, Joshua J. and Kevin A. Park (2018). "Same-Sex Marriage Laws and Demand for Mortgage Credit." *Review of Economics of the Household* 16 (2): 229-254.
- Moulton, Stephanie (2022). "Researching Homeownership Inequalities." *Cityscape* 24 (2): 153-164.
- Myers, Dowell and Hyojung Lee (2016). "The Outlook to 2050; Cohort Momentum and Future Homeownership." *Cityscape* 18 (1): 131-144.
- Nelson, Arthur C. (2016). "On the Plausibility of a 53-Percent Homeownership Rate by 2050." *Cityscape* 18 (1): 125-130.
- Park, Kevin Alan and Herbert, Christopher E. and Quercia, Roberto G. (2014). "Tenure Choice and the Future of Homeownership." Available at SSRN: <https://ssrn.com/abstract=2820574>

- Park, Kevin A. (2022). *A Comparison of Mortgage Denial and Default Rates by Race, Ethnicity, and Gender*. Available at SSRN: <https://papers.ssrn.com/abstract=4030908>.
- Plotkin, Manuel D. (1978). "What's New in the 1980 Census." Address before the Committee on Population Statistics, Annual Meeting of the Population Association of America, April 13, 1978.
- Plotkin, Manuel D. (1978). "The 1980 Census Plans, Procedures and Products." Address before the Annual Conference of Urban and Regional Information Systems Association, August 7, 1978.
- Riley, Sarah F., Hong Yu Ru, and Qing Feng (2013). "The User Cost of Low-Income Homeownership." *Journal of Regional Analysis and Policy* 43 (2): 123-137.
- US Census Bureau. "Subject Definitions." (2021). <https://www.census.gov/programs-surveys/cps/technical-documentation/subject-definitions.html>
- Yu, Zhou and Dowell Myers (2010). "Misleading Comparisons of Homeownership Rates when the Variable Effect of Household Formation is Ignored: Explaining Rising Homeownership and the Homeownership Gap between Blacks and Asians in the US." *Urban Studies* 47 (12): 2615-2640.

FIGURES

Figure 1. Homeownership Rate

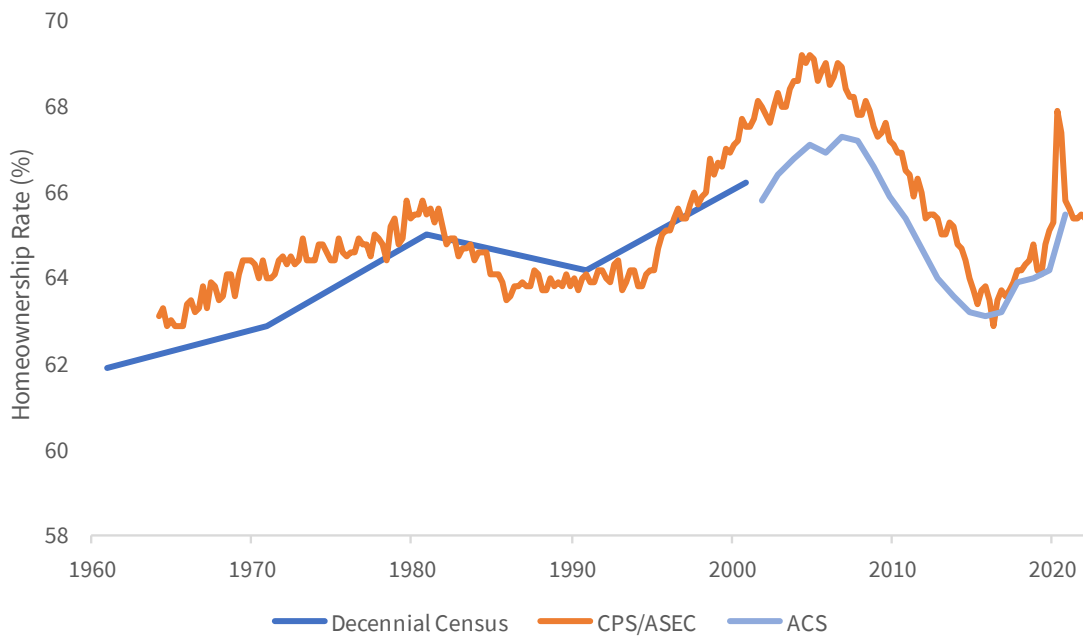


Figure 2. Homeownership Rate by Age

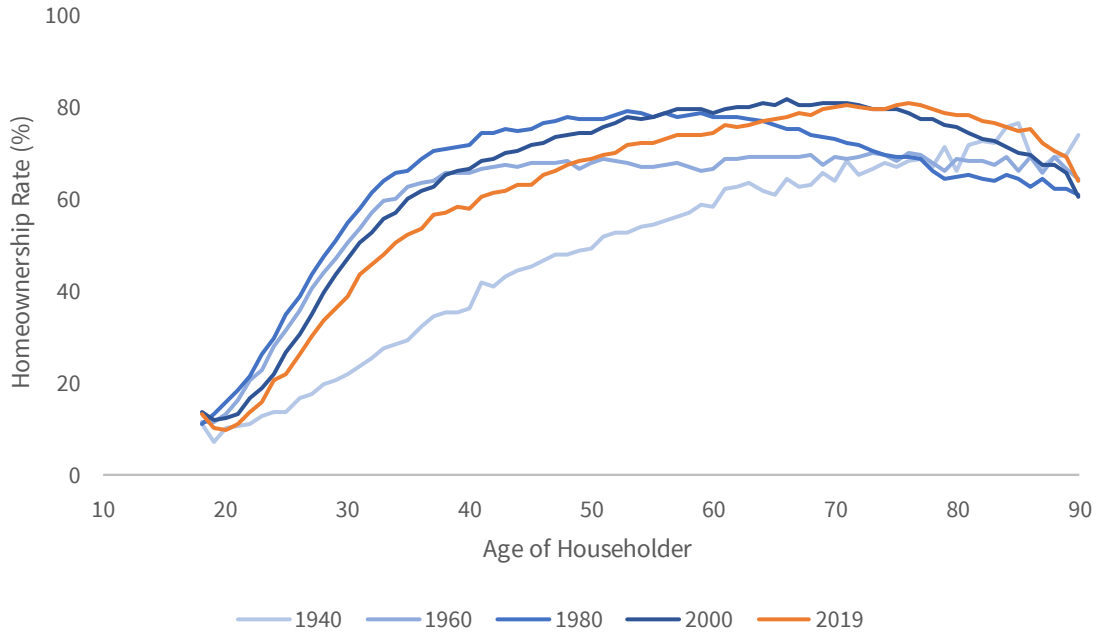


Figure 3. Homeownership Gap by Race/Ethnicity

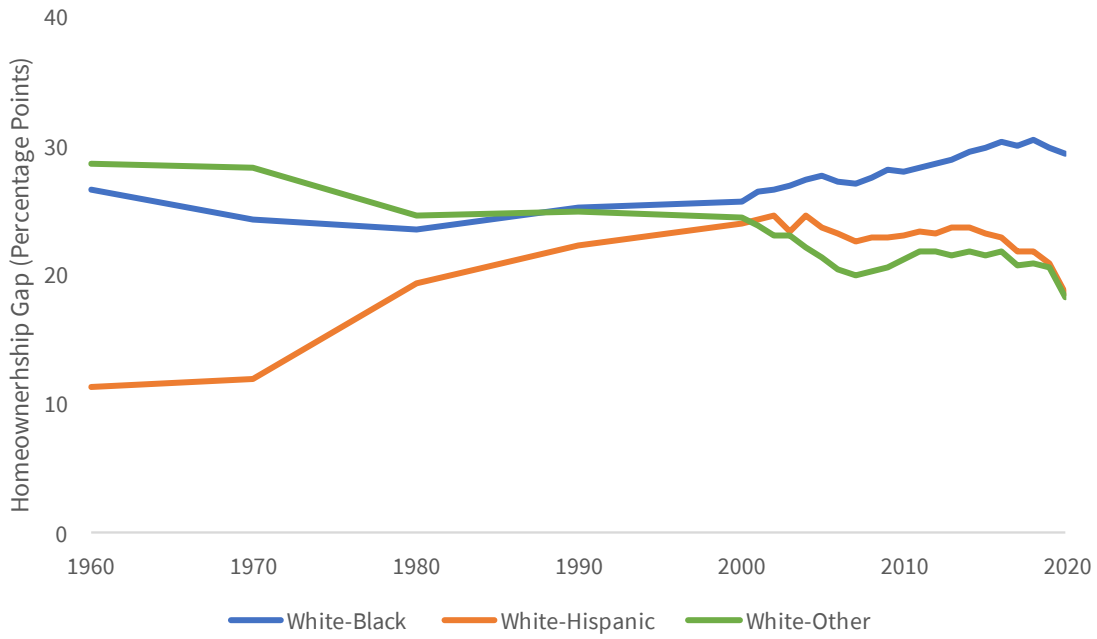


Figure 4. Headship Rate

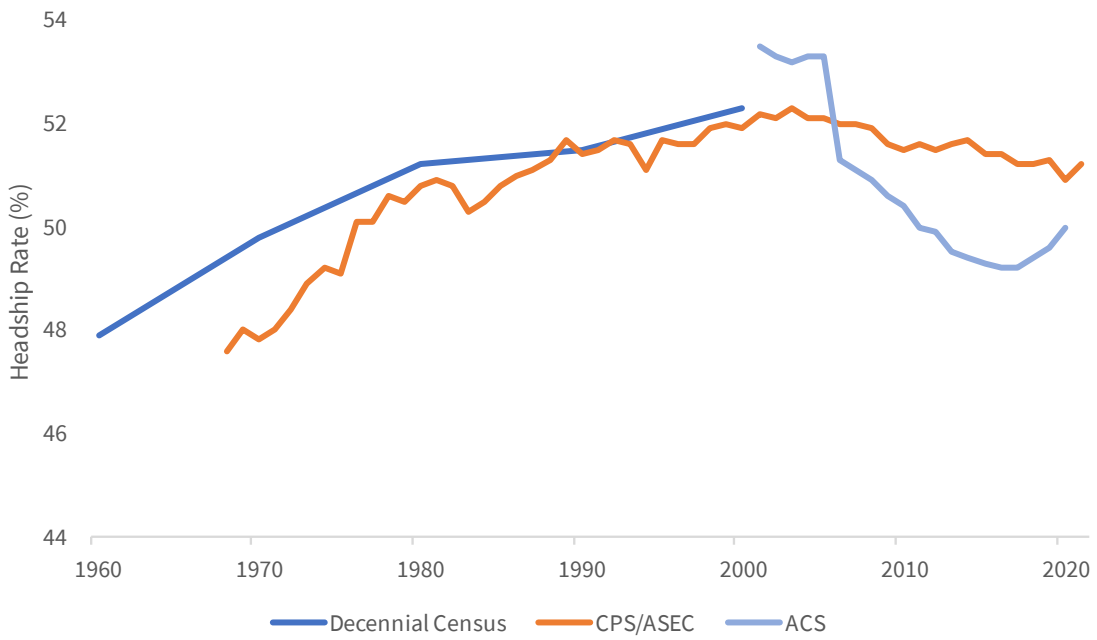
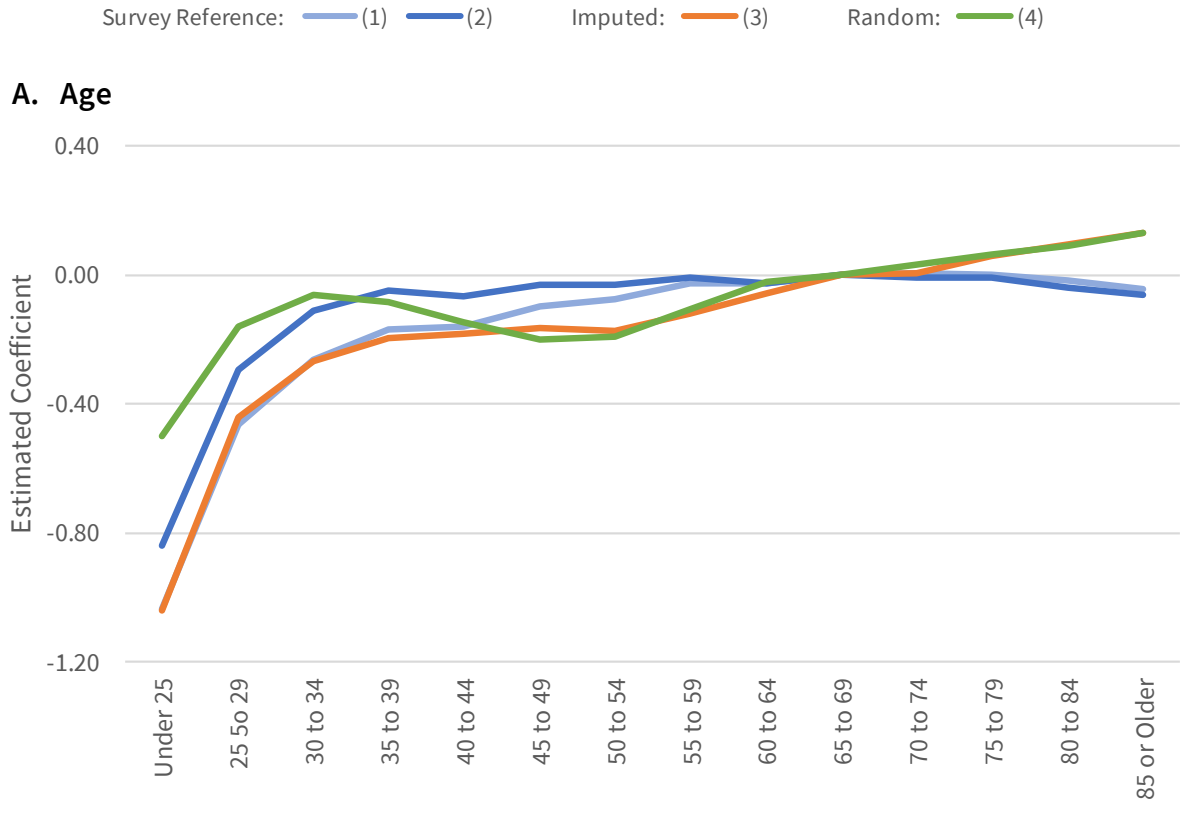
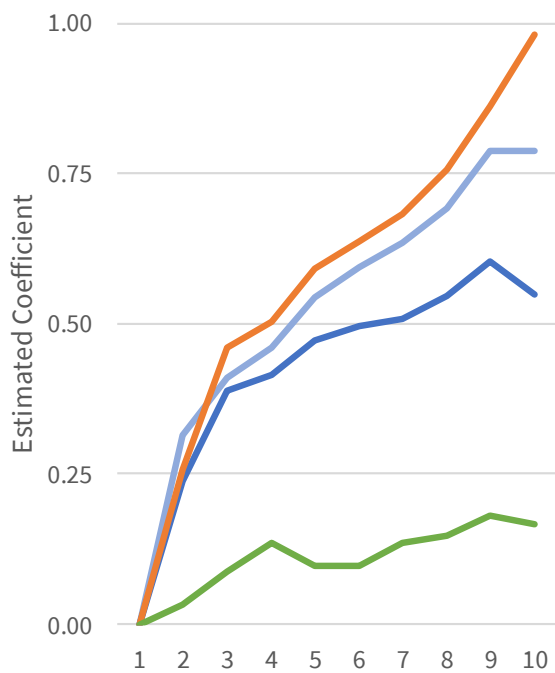


Figure 5. Likelihood of Headship
Corresponds to Table 3



B. Income Decile



C. Wealth Decile

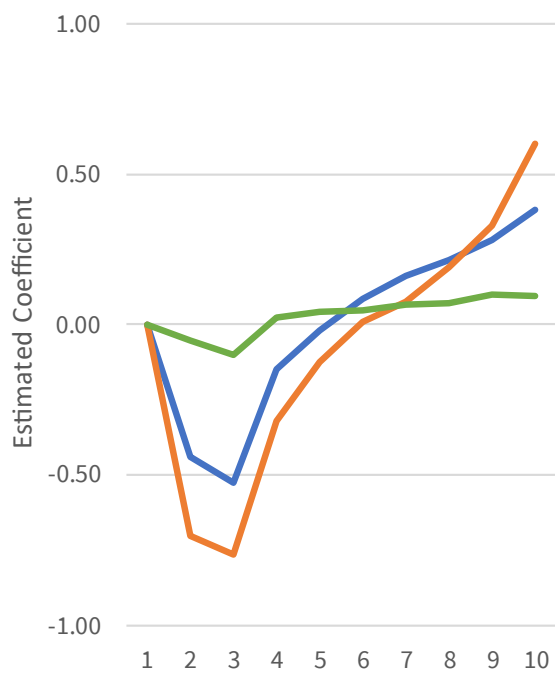


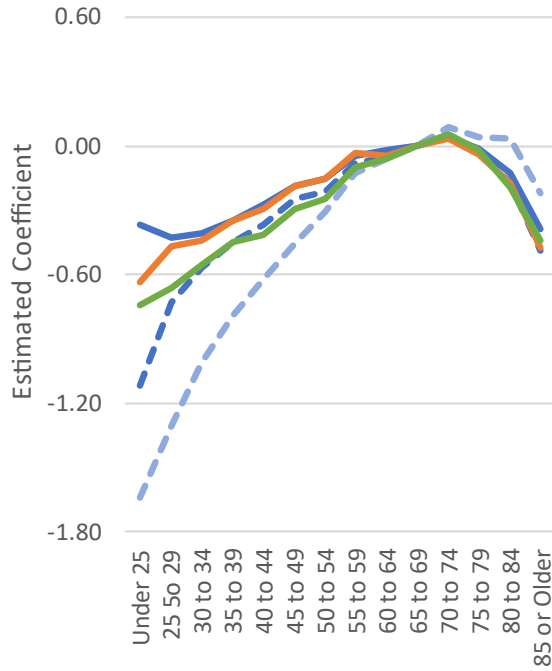
Figure 6. Likelihood of Homeownership

Corresponds to Table 4 (All Households) and Table 5 (Recent Movers)

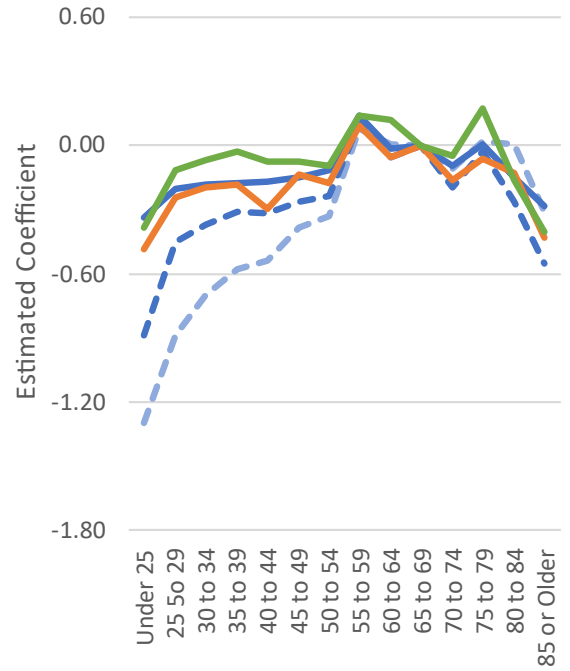
Survey Reference: (1) (2) (3)
 Imputed: (4) Random: (5)

A. Age

(1) All Households

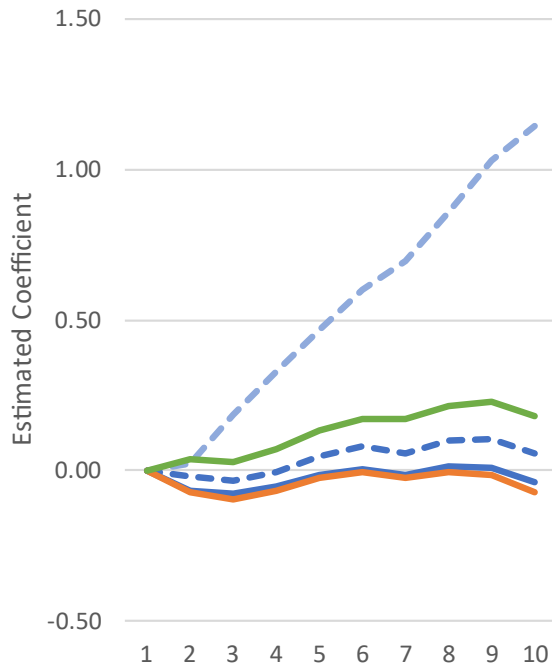


(2) Recent Movers

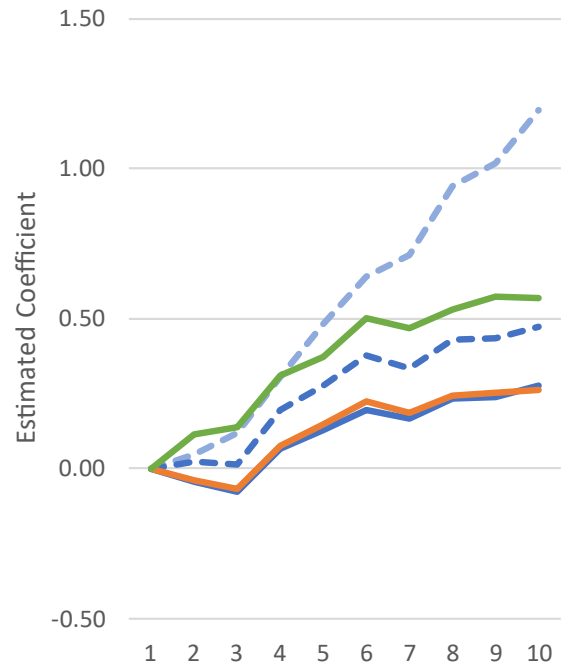


B. Income Decile

(1) All Households

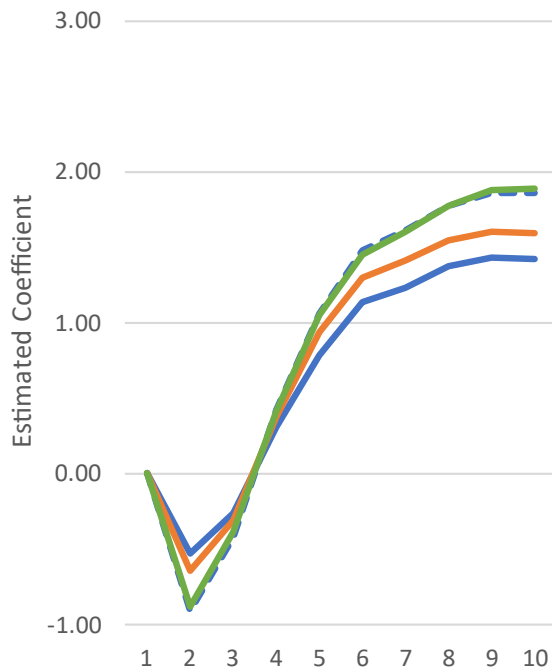


(2) Recent Movers

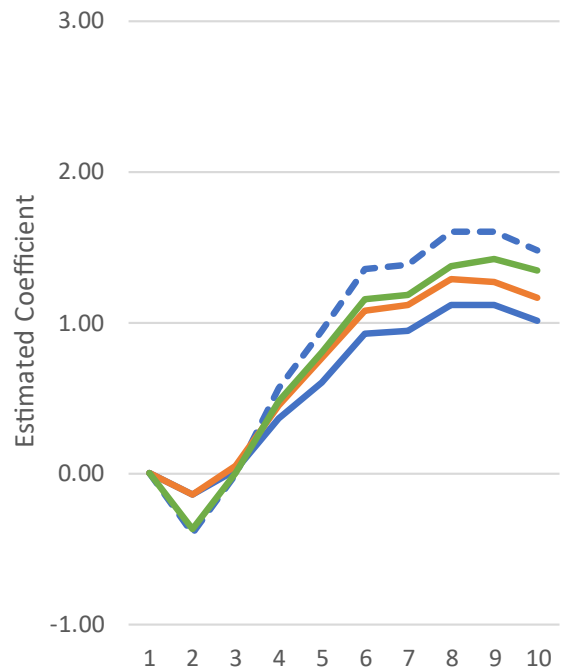


C. Wealth Decile

(1) All Households



(2) Recent Movers



TABLES

Table 1. Descriptive Statistics

	All Adults		Householders (Weighted)	
	Unweighted	Weighted	All	Homeowners
Median Monthly Income				
Personal	\$2,144	\$2,250	\$2,924	\$3,666
Household			\$4,947	\$6,498
Median Net Worth				
Personal	\$24,427	\$22,553	\$64,839	\$173,108
Household			\$97,817	\$262,456
Median Age	45	45	50	55
Gender				
Male	47.6%	48.3%	49.0%	50.7%
Female	52.4%	51.7%	51.0%	49.3%
Race/Ethnicity				
White	64.6%	63.8%	66.6%	75.9%
Black	12.0%	11.9%	12.7%	7.9%
Hispanic	15.8%	16.2%	13.6%	10.1%
Other	7.6%	8.1%	7.1%	6.1%
Marital Status				
Never Married	29.9%	32.1%	22.8%	11.5%
Married	50.0%	49.8%	49.1%	62.0%
Divorced/Separated	13.5%	12.6%	18.9%	16.1%
Widowed	6.6%	5.5%	9.2%	10.5%
Education				
Less than HS	16.6%	15.1%	10.1%	7.5%
HS or Some College	55.9%	54.5%	54.8%	52.3%
College or Higher	27.6%	30.5%	35.1%	40.2%
Military				
Civilian	91.3%	91.9%	89.3%	87.2%
Veteran	8.5%	7.8%	10.4%	12.6%
Active Duty	0.3%	0.3%	0.3%	0.2%
Reason for Not Working				
School	7.7%	8.0%	1.9%	0.5%
Family Care	4.6%	4.6%	3.7%	3.0%
Retirement	18.3%	16.0%	20.9%	26.7%
Other	15.9%	14.8%	14.1%	11.0%
Citizenship				
Non-Citizen	7.0%	7.3%	6.2%	3.4%
Naturalized	9.1%	10.0%	10.3%	10.2%
Natural Born	83.9%	82.6%	83.5%	86.4%
Language at Home				
English	84.5%	83.6%	88.3%	90.1%
Other	15.5%	16.4%	11.7%	9.9%
Metropolitan Area	77.7%	80.4%	79.9%	78.2%
Unweighted Observations		137,226	69,927	44,718

Householders identified as survey reference person.

Table 2. Intrahousehold Likelihood of Householder
Conditional Logistic Regression

		Survey Reference				Random	
		(1)	(2)	(3)	(4)	(5)	(6)
		Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Income							
Rank	2	-0.032	0.020	-0.019	0.021	0.004	0.020
	3	-0.264***	0.040	-0.175***	0.041	0.013	0.029
	4	-0.331***	0.070	-0.286***	0.071	-0.005	0.053
	5	-0.411***	0.104	-0.394***	0.106	-0.054	0.084
Share		0.002***	0.000	0.003***	0.000	0.000	0.000
Wealth							
Rank	2	-0.148***	0.015	-0.174***	0.015	0.001	0.012
	3	-0.672***	0.038	-0.592***	0.040	0.004	0.026
	4	-0.668***	0.061	-0.582***	0.065	0.022	0.043
	5	-0.881***	0.111	-0.806***	0.109	0.070	0.071
Share		0.010***	0.000	0.009***	0.000	0.000	0.000
Age							
Rank	2	0.081***	0.015	0.026	0.016	0.004	0.014
	3	-0.485***	0.043	-0.279***	0.044	-0.026	0.033
	4	-1.053***	0.093	-0.698***	0.097	0.036	0.051
	5	-1.693***	0.197	-1.283***	0.204	0.001	0.089
Share		0.048***	0.001	0.038***	0.002	-0.002	0.001
Female				0.076***	0.015	-0.004	0.014
Race/Ethnicity							
Black				-0.249*	0.109	0.102	0.084
Hispanic				0.050	0.057	-0.009	0.050
Other				-0.062	0.063	0.021	0.051
Marital Status							
Married				1.203***	0.056	-0.004	0.038
Divorced/Separated				0.386***	0.050	0.010	0.036
Widowed				0.357***	0.063	0.046	0.053
Education							
Less than HS				-0.447***	0.040	0.002	0.028
HS or Some College				-0.168***	0.027	0.019	0.020
Military							
Veteran				0.164***	0.029	-0.004	0.029
Active Duty				0.021	0.156	0.287*	0.130
Reason for Not Working							
School				-0.314***	0.070	0.003	0.036
Family Care				0.319***	0.043	-0.014	0.039
Retirement				0.193***	0.030	-0.019	0.030
Other				0.129***	0.031	0.020	0.024
Citizenship							
Non-Citizen				-0.339***	0.057	0.085	0.046
Naturalized				0.004	0.044	0.076*	0.037
Non-English at Home				-0.901***	0.042	0.005	0.032
F-statistic		773.72***		344.40***		0.71	

113,494 Observations. Statistically significant at the *** 0.001 ** 0.010 * 0.050 level.

Table 3. Likelihood of Headship

Probit

	Survey Reference				Imputed Householder		Random	
	(1)	(2)	(3)	(4)				
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Female	-0.048***	0.010	-0.051***	0.011	-0.325***	0.012	0.028**	0.010
Race/Ethnicity								
Black	0.139***	0.012	0.228***	0.012	0.323***	0.014	0.062***	0.011
Hispanic	0.179***	0.014	0.234***	0.014	0.239***	0.016	-0.007	0.012
Other	0.069***	0.016	0.100***	0.016	0.104***	0.018	0.012	0.013
Marital Status								
Married	-0.282***	0.010	-0.365***	0.010	-0.492***	0.011	-0.458***	0.010
Divorced/Separated	0.424***	0.015	0.447***	0.015	0.471***	0.016	0.182***	0.014
Widowed	0.710***	0.022	0.718***	0.023	0.857***	0.025	0.300***	0.020
Education								
Less than HS	-0.285***	0.013	-0.122***	0.014	0.082***	0.014	-0.131***	0.012
HS or Some College	-0.102***	0.009	-0.028**	0.009	0.076***	0.010	-0.051***	0.009
Military								
Veteran	0.109***	0.015	0.126***	0.015	0.074***	0.017	0.033*	0.016
Active Duty	0.248**	0.086	0.270**	0.086	0.450***	0.084	0.257**	0.084
Reason for Not Working								
School	-0.163***	0.026	-0.172***	0.026	-0.088**	0.027	-0.026	0.019
Family Care	0.256***	0.025	0.262***	0.026	-0.014	0.026	0.064**	0.023
Retirement	0.082***	0.015	0.051**	0.015	-0.112***	0.017	0.047**	0.015
Other	0.036**	0.014	0.098***	0.014	0.048**	0.015	0.057***	0.012
Citizenship								
Non-Citizen	0.198***	0.016	0.249***	0.016	0.324***	0.020	0.109***	0.015
Naturalized	0.170***	0.016	0.167***	0.016	0.145***	0.017	0.037*	0.015
Non-English at Home	-0.440***	0.014	-0.430***	0.014	-0.277***	0.015	-0.206***	0.012
Metropolitan Area	-0.037***	0.008	-0.043***	0.008	-0.083***	0.010	-0.019**	0.007
Year								
2017	-0.045***	0.006	-0.052***	0.006	-0.078***	0.007	-0.027***	0.005
2018	-0.020	0.010	-0.019	0.011	-0.036**	0.013	0.009	0.009
2019	-0.069***	0.009	-0.076***	0.010	-0.114***	0.011	-0.029***	0.008
F-statistic	310.30***		301.23***		335.30***		134.70***	

137,226 Observations. Statistically significant at the *** 0.001 ** 0.010 * 0.050 level. Age, Income, and Wealth coefficients shown in Figure 5. State-fixed effects not shown.

Table 4. Likelihood of Homeownership

Bivariate Probit (Second-Stage)

	(1)		Survey Reference (2)		(3)		Imputed (4)		Random (5)	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Female	-0.002	0.015	0.057***	0.016	0.082***	0.014	0.144***	0.017	0.024	0.014
Race/Ethnicity										
Black	-0.590***	0.020	-0.341***	0.024	-0.384***	0.021	-0.410***	0.024	-0.286***	0.029
Hispanic	-0.153***	0.021	0.022	0.024	-0.077***	0.020	-0.029	0.025	0.018	0.025
Other	-0.216***	0.027	-0.154***	0.031	-0.175***	0.027	-0.144***	0.030	-0.105***	0.029
Marital Status										
Married	0.474***	0.020	0.386***	0.022	0.492***	0.019	0.534***	0.021	0.101	0.056
Divorced/Separated	0.001	0.020	0.083***	0.023	-0.106***	0.021	-0.028	0.024	0.080**	0.028
Widowed	0.261***	0.026	0.221***	0.031	-0.043	0.028	0.012	0.031	0.203***	0.037
Education										
Less than HS	-0.337***	0.022	0.087**	0.028	0.132***	0.024	0.129***	0.025	0.189***	0.035
HS or Some College	-0.130***	0.015	0.073***	0.018	0.081***	0.016	0.098***	0.017	0.121***	0.021
Military										
Veteran	-0.010	0.022	0.079**	0.025	0.018	0.022	0.043	0.024	0.041	0.022
Active Duty	-0.457***	0.125	-0.370**	0.134	-0.439***	0.115	-0.579***	0.122	-0.397**	0.119
Reason for Not Working										
School	-0.153*	0.061	-0.297***	0.065	-0.047	0.053	-0.249***	0.075	0.040	0.036
Family Care	-0.024	0.034	-0.090*	0.045	-0.050	0.038	0.135**	0.048	-0.138***	0.038
Retirement	0.219***	0.024	0.090***	0.027	0.086***	0.023	0.162***	0.025	0.107***	0.026
Other	-0.179***	0.018	-0.008	0.022	0.001	0.019	0.062***	0.018	0.054*	0.021
Citizenship										
Non-Citizen	-0.405***	0.031	-0.364***	0.036	-0.382***	0.030	-0.392***	0.032	-0.363***	0.043
Naturalized	0.013	0.024	-0.012	0.028	-0.075**	0.025	-0.046	0.027	-0.054*	0.027
Non-English at Home	-0.083***	0.023	-0.087**	0.026	0.120***	0.024	-0.019	0.026	-0.112***	0.032
Household Size										
Two	0.150***	0.019	0.197***	0.021	0.173***	0.018	0.173***	0.020	0.241***	0.025
Three	0.174***	0.024	0.282***	0.027	0.252***	0.023	0.245***	0.025	0.397***	0.036
Four	0.302***	0.027	0.438***	0.031	0.381***	0.026	0.383***	0.029	0.548***	0.043
Five	0.292***	0.030	0.448***	0.036	0.397***	0.030	0.402***	0.033	0.579***	0.046
Six or More	0.249***	0.037	0.449***	0.043	0.405***	0.036	0.390***	0.039	0.601***	0.051
Metropolitan Area	-0.211***	0.020	-0.263***	0.024	-0.201***	0.021	-0.214***	0.023	-0.248***	0.024
Year										
2017	-0.127***	0.013	-0.161***	0.015	-0.112***	0.013	-0.124***	0.014	-0.153***	0.014
2018	-0.244***	0.024	-0.271***	0.027	-0.218***	0.023	-0.233***	0.025	-0.234***	0.027
2019	-0.230***	0.020	-0.297***	0.024	-0.220***	0.021	-0.249***	0.023	-0.291***	0.024
Correlation					-1.018***	0.040	-0.652***	0.050	0.438*	0.178
F-statistic	135.61***		177.07***		92.94***		86.50***		101.22***	

69,927 second-stage observations. Statistically significant at the *** 0.001 ** 0.010 * 0.050 level. Age, Income, and Wealth coefficients shown in Figure 6. State-fixed effects not shown.

Table 5. Likelihood of Homeownership (Recent Movers)

Bivariate Probit (Second-Stage)

	(1)		Survey Reference (2)		(3)		Imputed (4)		Random (5)	
	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.	Coeff.	Std. Err.
Female	-0.060	0.038	-0.009	0.041	-0.001	0.035	0.062	0.039	-0.011	0.034
Race/Ethnicity										
Black	-0.535***	0.068	-0.355***	0.071	-0.397***	0.055	-0.454***	0.064	-0.227***	0.057
Hispanic	-0.165*	0.071	-0.050	0.076	-0.102	0.058	-0.116	0.069	-0.085	0.063
Other	-0.133	0.070	-0.118	0.078	-0.127*	0.063	-0.124	0.070	-0.057	0.060
Marital Status										
Married	0.279***	0.046	0.272***	0.050	0.356***	0.040	0.404***	0.046	0.016	0.046
Divorced/Separated	0.026	0.053	0.099	0.058	-0.075	0.051	0.002	0.054	0.154**	0.049
Widowed	0.136	0.091	0.172	0.097	-0.063	0.085	-0.066	0.090	0.198*	0.093
Education										
Less than HS	-0.331***	0.077	0.006	0.085	0.185**	0.071	0.116	0.078	0.119	0.062
HS or Some College	-0.169***	0.047	0.006	0.048	0.036	0.042	0.098*	0.044	0.088*	0.042
Military										
Veteran	0.087	0.065	0.149*	0.066	0.103	0.055	0.089	0.062	0.155*	0.062
Active Duty	0.136	0.210	0.118	0.183	-0.127	0.148	-0.142	0.179	0.111	0.179
Reason for Not Working										
School	-0.319*	0.127	-0.399**	0.150	-0.194	0.118	-0.298*	0.126	0.098	0.061
Family Care	-0.107	0.085	-0.181*	0.090	-0.099	0.077	0.120	0.101	-0.129	0.077
Retirement	0.276***	0.082	0.126	0.085	0.139	0.073	0.184*	0.074	0.143	0.077
Other	-0.122*	0.055	0.009	0.060	0.074	0.050	0.109*	0.053	0.095*	0.045
Citizenship										
Non-Citizen	-0.434***	0.085	-0.448***	0.088	-0.467***	0.073	-0.478***	0.081	-0.331***	0.086
Naturalized	-0.020	0.075	-0.073	0.079	-0.104	0.065	-0.099	0.074	-0.026	0.070
Non-English at Home	0.031	0.065	0.017	0.068	0.239***	0.058	0.126	0.070	-0.042	0.062
Household Size										
Two	0.284***	0.052	0.272***	0.058	0.214***	0.044	0.228***	0.051	0.216***	0.049
Three	0.373***	0.064	0.377***	0.069	0.296***	0.054	0.308***	0.061	0.318***	0.059
Four	0.594***	0.067	0.620***	0.070	0.484***	0.058	0.498***	0.061	0.496***	0.061
Five	0.607***	0.076	0.606***	0.087	0.482***	0.069	0.508***	0.077	0.525***	0.073
Six or More	0.588***	0.090	0.669***	0.093	0.526***	0.073	0.558***	0.081	0.539***	0.081
Metropolitan Area	-0.174***	0.051	-0.197***	0.056	-0.126**	0.047	-0.136*	0.053	-0.178***	0.047
Year										
2017	-0.015	0.036	-0.002	0.040	0.031	0.033	0.035	0.036	0.001	0.031
2018	-0.059	0.068	-0.102	0.075	-0.077	0.060	-0.063	0.067	-0.057	0.060
2019	-0.102	0.065	-0.112	0.069	-0.033	0.055	-0.044	0.063	-0.112*	0.055
Correlation					-1.128***	0.121	-0.795***	0.128	1.041***	0.175
F-statistic	23.01***		28.84***		8.69***		9.10***		11.13***	

9,086 second-stage observations. Statistically significant at the *** 0.001 ** 0.010 * 0.050 level. Age, Income, and Wealth coefficients shown in Figure 7. State-fixed effects not shown.

