Housing Investment and Wealth Accumulation

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Abstract

We study the differences in wealth accumulation channels between homeowners and renters, focusing on asset allocation, rate of return, and saving rates. Notably, our findings indicate that, on average, homeowners maintain a more diversified portfolio, consequently yielding higher overall returns. When scrutinizing individual assets, renters also achieve competitive returns. Additionally, homeowners exhibit a higher saving rate than renters, a phenomenon attributed to the mortgage serving as a forced-saving mechanism.

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1 Introduction

The wealth inequality in the U.S. is increasing over the years (Saez and Zucman, 2016), with wealth becoming more and more concentrated in the hands of the wealthiest. Why do some people accumulate more wealth while others don't? Admittedly, the rich tend to have high earnings (Kaymak, Leung, and Poschke, 2020), possess entrepreneurial spirit (Cagetti and De Nardi, 2006), own more diversified portfolio that brings higher returns (Fagereng et al., 2020), and of course, be lucky enough to inherit a huge amount (De Nardi, 2004).

To promote the wealth accumulation for low- and middle-income households, government involves by increasing the homeownership rate. There are quite a few housing policies that aim to facilitate homeownership among Americans, and they generally fall into two types. The first type is that government provides some assistance in financing home purchases, which includes a variety of loan programs. The second type is that there are some tax policies favoring homeowners. For example, homeowner's mortgage interest payment and property tax payment could be deducted from the federal income tax.

In order to justify government's involvement in the homeownership market, there is a strand of literature studying the impact of homeownership on the wealth level. Di, Belsky, and Liu (2007) shows that after controlling for the propensity to save, those who own homes for longer time periods from 1989 to 2001 have higher net wealth in 2001. Turner and Luea (2009) also supports the view that each additional year of homeownership increases wealth holdings, after controlling for unobserved heterogeneity. Also in their study, the increase in wealth holding associated with additional year of homeownership is larger for high-income households ($15K) than for low- and moderate- income households ($6 to $10K). Newman and Holupka (2016) highlight that race plays an important role: black first-time homeowners experience decrease in net worth while timing matters for white first-time homeowners. Under a difference-in-difference framework, Wainer and Zabel (2020) identify that timing matters for low-income households who own their homes for the first time. Households enjoy significant gains in wealth if they purchased homes in times with relatively stable real house prices (1980's and 1990's), but obtain little gains if they purchased homes in times with relatively volatile house prices (2000's and early 2010's).

However, in examining the causal effect of homeownership on the wealth level, there is always a subtle issue of the simultaneous causality problem. Basically, when households have considerable income and are on the right track to accumulate wealth, they are more capable of affording the down payment and more likely to invest in the housing market. Without a good instrument variable to address the simultaneous causality problem, the interpretation of the causal effect of homeownership on the wealth level may not be very convincing.

While existing literature focuses on explaining the relationship between homeownership and the *level* of wealth, few has studied the *channel* of wealth accumulation. This paper aims to fill in this gap, by exploring the differences in the channel of wealth accumulation between homeowners and renters. We examine the following three wealth accumulation channels.

First, we explore the household's portfolio composition. For homeowners, housing wealth takes up the majority of total wealth. As for other assets' shares of non-housing wealth, homeowners and renters have similar pattern along the wealth distribution.

Second, we investigate the rate of return on wealth. Overall, homeowners have higher average return on non-housing wealth than renters. This is due to the fact that, on average, homeowners have a more diversified portfolio and invest more heavily on assets that carry higher returns. For individual asset returns, renters have as competitive returns as homeowners. What's more, renters have statistically significantly higher return on business and farm wealth than homeowners.

Third, we study the saving rate. There are two measures of saving rate, gross saving rate and active saving rate, as defined in Dynan, Skinner, and Zeldes (2004). Our results show that homeowners have higher saving rate in terms of both measures, after controlling for demographic differences. Moreover, we identify that mortgage payment provides a forced-saving mechanism, which drives up the saving rate for homeowners.

The rest of the paper is organized as follow. Section 2 lays out the wealth accumulation accounting framework. Section 3 describes the data. Section 4 presents the comparison of wealth accumulation channel between homeowners and renters. Finally, Section 5 concludes.

2 Wealth Accumulation Accounting Framework

For a household i, at time t, its total wealth, $W_{i,t}$, is composed of wealth in different assets, $W^a_{i,t}$. Each asset wealth, $W^a_{i,t}$, takes up $\phi^a_{i,t}$ share of the total wealth:

$$W_{i,t} = \sum_{a=1}^{A} W^a_{i,t} = \sum_{a=1}^{A} \phi^a_{i,t} W_{i,t}. \tag{1}$$

And for each asset wealth, $W^a_{i,t}$, it is the difference between the market value of the asset, $V^a_{i,t}$, and the debt outstanding on this asset, $D^a_{i,t}$:

$$W^a_{i,t} = V^a_{i,t} - D^a_{i,t}. \tag{2}$$

Household i has labor income, transfer income, and social security income, $Y_{i,t}$, during the period t to $t+1$. Each asset generates capital income at rate $\kappa^a_{i,t}$ out of the asset wealth. Household also enjoys capital gain at rate $\pi^a_{i,t}$ from each asset wealth. Household's consumption, $C_{i,t}$, and saving, $S_{i,t}$, are subject to the budget constraint:

$$\begin{aligned} C_{i,t} + S_{i,t} &= \underbrace{(1-\tau_{i,t})\left(Y_{i,t} + \sum_{a=1}^{A} \kappa^a_{i,t} W^a_{i,t}\right)}_{I_{i,t}\text{: disposable income}} + \underbrace{(1-\tau_{i,t}) \sum_{a=1}^{A} \pi^a_{i,t} W^a_{i,t}}_{G_{i,t}\text{: capital gain}}, \\ &= I_{i,t} + G_{i,t}, \end{aligned} \tag{3}$$

where $\tau_{i,t}$ is the marginal income tax rate. The after-tax labor income, transfer income, social security income and capital income constitute the household's disposable income, $I_{i,t}$. And the total capital gain, $G_{i,t}$, is the after-tax capital gain from all assets. Among the total income, $I_{i,t} + G_{i,t}$, household chooses to save a fraction, $s^{\text{tot}}_{i,t}$, and consumes the rest part.

At the beginning of time $t+1$, the household's total wealth, $W_{i,t+1}$, would be its initial wealth, $W_{i,t}$, plus its saving, $S_{i,t}$, during the period t to $t+1$. Therefore, the accumulated wealth, $W_{i,t+1} - W_{i,t}$, is how much the household has saved:

$$W_{i,t+1} = W_{i,t} + S_{i,t}, \Longrightarrow \Delta W_{i,t+1} = S_{i,t}. \tag{4}$$

Then, household will reallocate its wealth, $W_{i,t+1}$, among different classes of assets. And the wealth accumulation process repeats.

If we take a closer a look at the accumulated wealth:

$$\Delta W_{i,t+1} = s_{i,t}^{\text{tot}} \left[(1-\tau_{i,t}) Y_{i,t} + (1-\tau_{i,t}) \sum_{a=1}^{A} \left(\kappa_{i,t}^{a} + \pi_{i,t}^{a} \right) \phi_{i,t}^{a} W_{i,t} \right], \tag{5}$$

it shows that wealth accumulation could be determined by:

(i) saving rate, $s_{i,t}^{\text{tot}}$;

(ii) asset allocation, $\phi_{i,t}^{a}$;

(iii) asset returns, $\kappa_{i,t}^{a} + \pi_{i,t}^{a}$;

Admittedly, labor/transfer/social security income, $Y_{i,t}$, also plays an important role in the wealth accumulation process. However, it is hardly influenced by the house tenure choice. Therefore, for the purpose of our study, we are going to focus on wealth accumulation channels in terms of saving rate, asset allocation, and asset returns, by comparing the differences between homeowners and renters. Next, we will explain how we measure these three wealth accumulation channels.

2.1 Measure of Saving Rate

In practice, it is challenging to calculate the saving rate precisely. Following Dynan, Skinner, and Zeldes (2004), we define two measures of saving rate.

The first measure of saving rate is the gross saving rate. It is defined as the change in real wealth divided by real disposable income:

$$s_{i,t}^{\text{grs}} = \frac{\Delta W_{i,t+1}}{I_{i,t}}. \tag{6}$$

This is a broad measure of saving rate, which includes active savings and passive gains.

The second measure of saving rate is the active saving rate. It is defined as a measure of the "active saving" divided by real disposable income:

$$s_{i,t}^{\text{act}} = \frac{\text{active saving}}{I_{i,t}}. \tag{7}$$

Here, active saving is calculated as the change in real wealth, net of capital gains from assets and windfall gains, and adjust for inflation. The measure of active saving closely resembles the traditional way of defining the saving, which is income minus consumption. Appendix A presents how we construct the active saving in details.

2.2 Measure of Asset Allocation

We will examine two measures of asset allocation. First, we look at the share of each asset's wealth out of total wealth. Second, we explore the share of each asset's wealth out of non-housing wealth.

2.3 Measure of Rate of Return

We measure the return on asset wealth, instead of return on asset value. If there is debt outstanding on the asset, the return will be leveraged. There are also two measures of asset returns. The first measure is the return that includes capital income and capital gain:

$$r_{i,t}^{a,\text{wkg}} = \kappa_{i,t}^{a} + \pi_{i,t}^{a} = \frac{K_{i,t}^{a} + \Pi_{i,t}^{a}}{W_{i,t}^{a}}, \tag{8}$$

where $K_{i,t}^{a}$ and $\Pi_{i,t}^{a}$ are the capital income and capital gain from period t to $t+1$, respectively. Capital gain is the change in asset value minus the net investment in the period. By including capital gain, this is a more comprehensive measure of returns.

The second measure is the return rate without capital gain:

$$r_{i,t}^{a,\text{nkg}} = \kappa_{i,t}^{a} = \frac{K_{i,t}^{a}}{W_{i,t}^{a}}, \tag{9}$$

which is a measure of returns that are actually realized.

3 Data

3.1 Data Source

The data comes from the Panel Study of Income Dynamics (PSID), which is the longest running panel household survey in the world and is directed by faculty at the University of Michigan. PSID includes detailed survey information on American household demographics, income, wealth, and other relevant variables. From 1999 onward, the surveys are conducted biennially. In this paper, we use the data from 1999 to 2017.

PSID provides household's pre-tax income information. To estimate the federal income tax, we use NBER TAXSIM32, following Feenberg and Coutts (1993).

In calculating rate of return and saving rate, all wealth variables and income variables are inflation adjusted to the real value in 2019 dollar, using the CPI-U from the Federal Reserve Bank of Minneapolis. Stock variables (i.e., asset price, debt level, wealth level, etc.) are adjusted using the CPI of the interview year, while flow variables (i.e., net investment, inheritance, etc.) are adjusted using the CPI of the year between two interviews.

3.2 Measure of Wealth in PSID

In PSID, the total family wealth is the sum of net worth in the following 8 assets: (1) home equity; (2) checks/savings accounts, certificates of deposit, etc; (3) directly hold stocks; (4) annuity/IRA; (5) other real estate; (6) business and farm; (7) vehicles; and (8) other assets, net of debt values. The debt values include credit card debt, student loan debt, medical debt, legal debt, family loan debt, and other debt.

Following the suggestion by Cooper, Dynan, and Rhodenhiser (2019), we also augment wealth in employer-sponsored pension plans. We add pension wealth in both current employer-sponsored plans and leftovers in previous employer-sponsored plans, with missing values imputed if value range brackets are provided. By augmenting PSID measure of wealth with employer-sponsored pension wealth, it will give us a more comprehensive picture of total household wealth in the US.

3.3 Sample Selection

We choose households such that between two waves, there's no change in the head person, and there is no change in the head's marital status. In this way, we avoid dealing with change in wealth resulting from family composition variations. We restrict our sample to households whose heads are less than 65 years old. We also drop households which switch housing tenure between two waves, or is neither owning nor renting the main residence.

3.4 Characterization of Homeowner and Renter

Table 1 presents the summary statistics that characterize the demographic differences between homeowners and renters. On average, homeowners are older, more likely to be married,

Table 1: Summary Statistics

	Homeowner	Renter
Age	59.75	46.31
Married?	65%	25%
Family size	2.34	1.95
Education	13.98	13.19
Total family income	$102,527.28	$49,685.39
Total wealth	$708,120.57	$54,599.34

Notes: The table presents weighted average using data in 2017. Income and wealth in 2017 dollars.

have larger family size, and higher years of education. What's more, homeowners have much higher total family income and total wealth.

4 Wealth Accumulation Channel

4.1 Asset Allocation

Household's assets can be grouped into the following 6 categories: (1) safe financial assets, which includes cash, checking/saving accounts, certificate of deposits, bonds, bills, money market funds, cash value in a life insurance policy, bonds held indirectly in private annuity, IRAs, and employer-sponsored pension plans, etc.; (2) risky financial assets, which includes stocks held directly or indirectly in private annuity, IRAs, and employer-sponsored pension plans; (3) real assets, which includes business and farm; (4) home equity, which is the household's main residence; (5) other real estate, which includes a second home, land, rental real estate, and money owned on a land contract; (6) vehicles.

For the pension wealth composition, in PSID, they have a question asking households how the pension plans are invested. If the answer is mostly (or all) stocks, then we will assign all the pension wealth to risky financial assets; if the answer is mostly (or all) bonds, then we will assign all the pension wealth to safe financial assets; if the answer is some of

each, then we will split equally between safe and risky financial wealth. This is following the practice of Cooper, Dynan, and Rhodenhiser (2019).

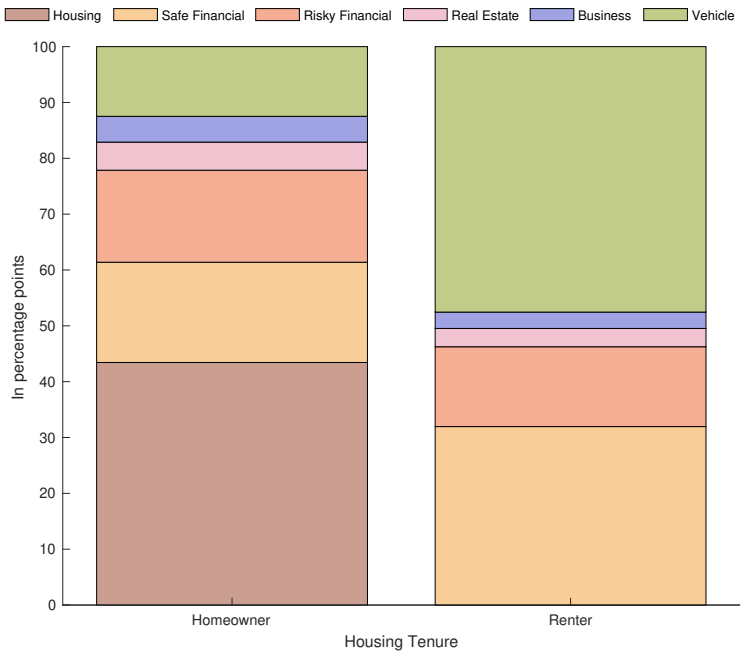
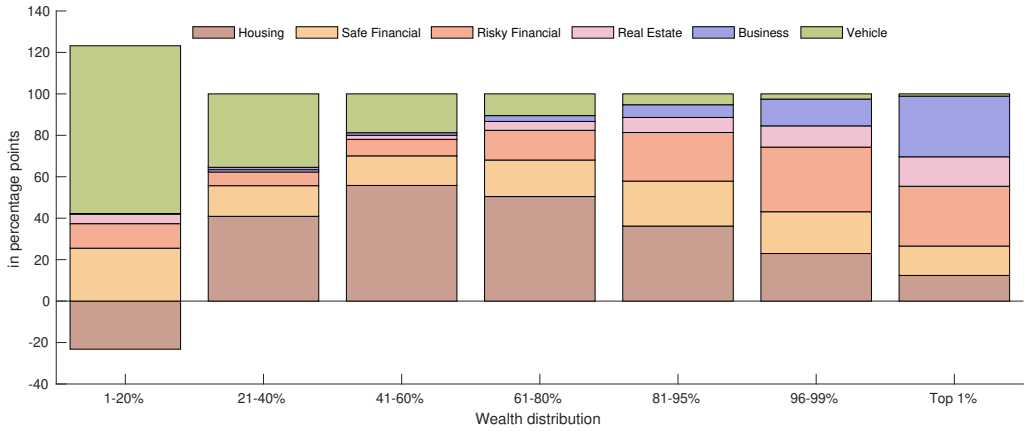


Figure 1: Total Portfolio Composition (Weighted Average 1999 − 2017)

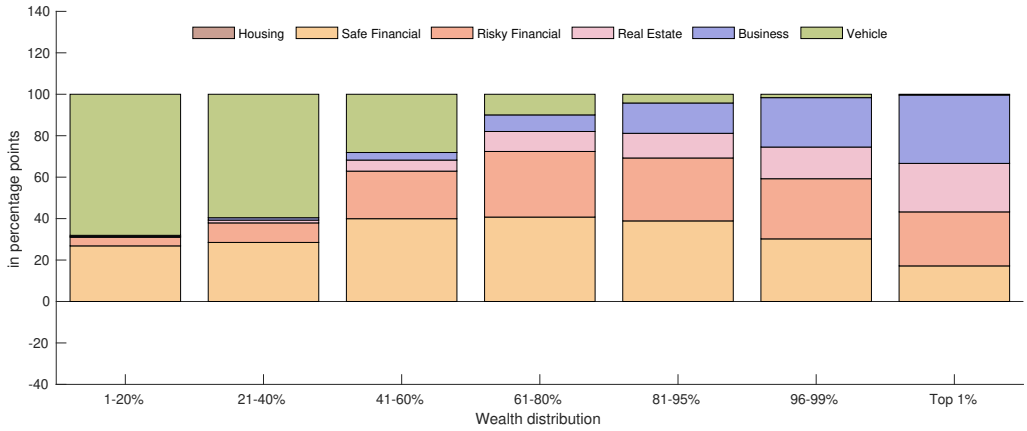
4.1.1 Portfolio Composition

Figure 1 presents the total portfolio composition for all homeowners and renters, using weighted average from 1999 to 2017. As we can see, around 43% of homeowner's wealth is taken up by the home equity. While for renters, the majority (around 47%) of their wealth is made up of vehicles, and safe financial assets also have a significant share (around 32%).

To account for the fact that homeowners are generally wealthier than renters, and wealth plays an important role in household's asset allocation. Figure 2 compares the portfolio composition along wealth distribution. The wealth distribution is assigned based on all homeowners and renters in a given wave, therefore, homeowners have comparable wealth with renters within the same wealth percentile. For homeowners in the bottom quintile, their mortgage outstanding are generally greater than the market value of the main home, thus leading to negative housing wealth. Moving up along the wealth distribution, housing's share



(a) Homeowner



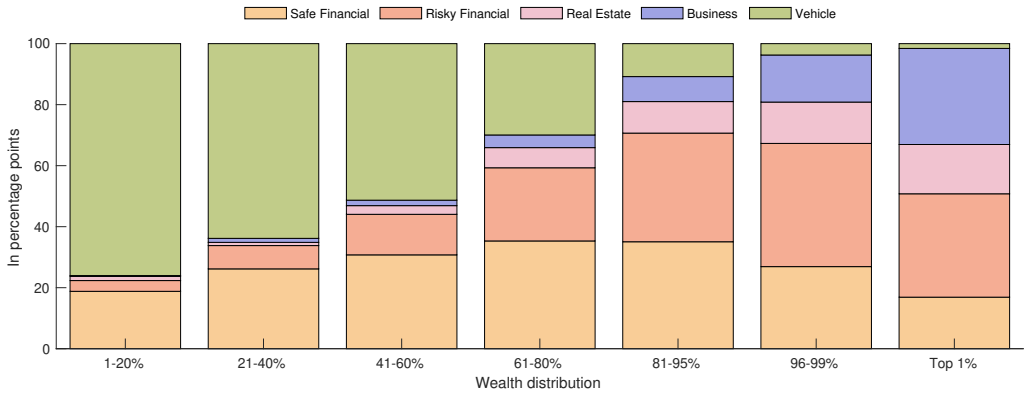
(b) Renter

Figure 2: Portfolio Composition along Wealth Distribution (Weighted Average 1999 − 2017)

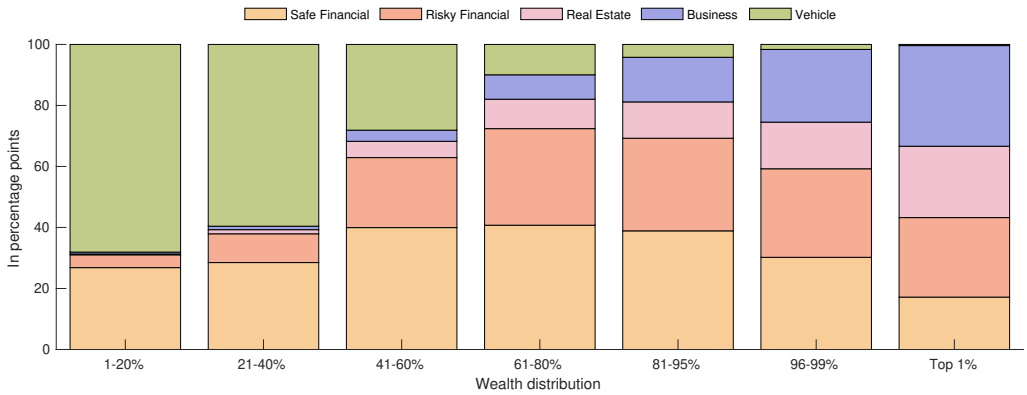
of total wealth grows larger, reaching the highest at 56% for the middle class households, and then goes down for the wealthiest.

4.1.2 Non-housing Asset Allocation

Figure 3 compares homeowner's non-housing asset allocation with the renter's, also along the wealth distribution. Here, we could see some resemblance in the asset allocation between homeowners and renters. For households in the bottom of wealth distribution, non-housing wealth is mainly composed of vehicles and safe financial assets. For wealthier households, non-housing wealth is more dominated by risky financial assets and business, and with a



(a) Homeowner



(b) Renter

Figure 3: Non-housing Asset Allocation (Weighted Average 1999 − 2017)

moderate amount of other real estate investment.

Despite the similarity in asset allocation, there are still some discrepancy in non-housing wealth allocation between homeowner and renter. Figure 4 plots the difference in share of each asset in homeowner's non-housing portfolio and the renter's. Due to investment in housing, homeowners normally invest less in other financial assets and real assets compared to renters within the same wealth distribution group, with a notable exception of stocks investment in the top quintile.

Asset allocation plays an important role in wealth accumulation since different assets have different return rates. By investing more in assets that have higher returns, households will be able to accumulate more wealth. It remains to study total asset return and individual asset return, which will be the focus of next subsection.

(a) Safe financial assets

(b) Risky financial assets

(c) Real estate

(d) Business

Figure 4: Difference in Asset Shares of Non-housing Wealth (owner − renter)

4.2 Rate of Return

4.2.1 Aggregate Non-housing Return

First, we calculate rate of return on non-housing wealth following Cao and Luo (2017). Non-housing wealth is defined as total wealth excluding home equity and vehicles. The returns are composed of capital income from interests, rent, dividends, trust, loyalties, and asset income from business and farming; and capital gains from stocks, real estate, business, private annuity and IRA.

Note that in PSID, they split income from business and farming equally between labor income and asset income, if the household with business income is actively involved in the business and farming. We adjust the asset income share to $\frac{1}{3}$, which is more realistic and is consistent with the finding in Kaymak, Leung, and Poschke (2020). Same as in Cao and

Luo (2017), we calculate returns for households with real non-housing wealth greater than $1,000. And we drop observations with annualized real return lower than −100% or greater than 300%.

Table 2: Annualized Non-housing Wealth Returns

	Mean	Median	25p	75p	Std	Obs
Panel A: with capital gains						
Homeowner	20.92%	1.28%	0	26.60%	0.56	14,568
Renter	14.11%	0	0	6.09%	0.48	3,694
Total	19.54%	0.65%	0	23.05%	0.54	18,262
Panel B: without capital gains						
Homeowner	6.52%	0.43%	0	2.65%	0.23	15,987
Renter	6.51%	0	0	1.47%	0.25	3,898
Total	6.51%	0.32%	0	2.43%	0.24	19,885

Notes: Returns with capital gains: $t(18260) = -6.752, p = 0.000$, one-tailed. Returns without capital gains: $t(19883) = -0.026, p = 0.489$, one-tailed.

Table 2 presents the result. As we can see, the returns on non-housing wealth is highly right-skewed. For the returns with capital gains, homeowners have a statistically significantly higher average return than renters. While for the returns without capital gains, the average returns are not statistically different among two groups.

To take a closer look at the whole distribution of non-housing wealth returns, we did a Kolmogorov-Smirnov test (shown in Table 3) and plot the empirical CDF (shown in Figure 5). For the returns with capital gains, homeowners have more dispersed returns than renters. There are more homeowners cluster at the distribution with large loss and significant gains. For the returns without capital gains, the distribution of homeowner's renter is to the right of the renter's, and it is statistically significant. Due to the fact that households usually report very little capital income, this measure of return is much smaller and the difference in distribution functions is not very distinguishable from the graph. Probably because of relatively little capital income, the average return is not statistically different (as shown in

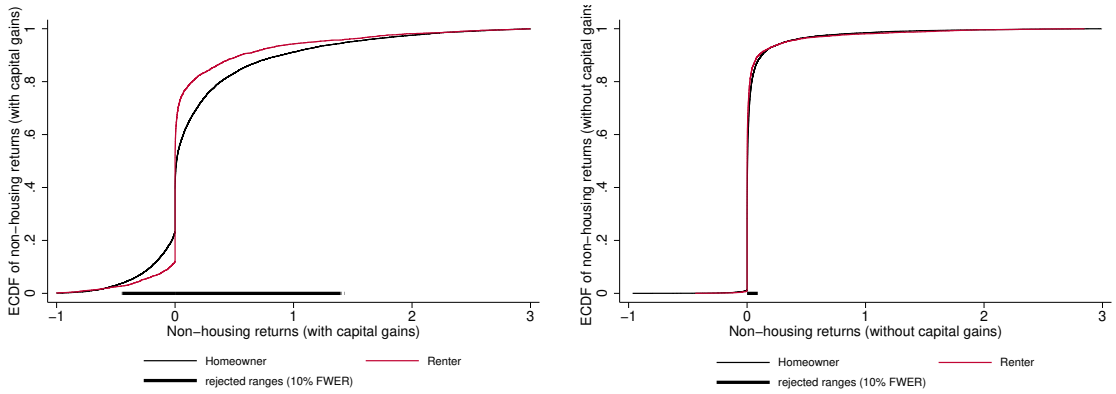
Table 3: Kolmogorov-Smirnov Test on Distribution of Non-housing Wealth Returns

Smaller group	D	P-value
Panel A: with capital gains		
Renter	0.167	0.000
Homeowner	−0.111	0.000
Panel B: without capital gains		
Renter	0.217	0.000
Homeowner	−0.005	0.842

the t-test in Table 2).

The differences in the returns might come from the fact that homeowners and renters have different asset allocations. On average, homeowners invest more in stocks, business, and real estate that are more risky and have large swings in asset price, therefore, the returns with capital gains are more dispersed for homeowners. Also, because homeowners are wealthier and own more assets that bring some capital incomes, the returns in terms of capital income are also (slightly) larger.

Next, we will study whether there is difference in the rate of return in individual asset.



(a) with capital gains (b) without capital gains

Figure 5: Empirical CDF of Annualized Non-housing Returns

4.2.2 Individual Asset Return

Business and Farm. For households with business and farm returns, the majority (92%) are homeowners. Among these households, 51% of homeowners and 59% of renters have positive capital income from business and farm.

Table 4: Annualized Business & Farm Wealth Returns

	Mean	Median	25p	75p	Std	Obs
Panel A: with capital gains						
Homeowner	23.07%	6.38%	−24.35%	51.00%	0.72	1,982
Renter	37.37%	14.93%	−20.88%	77.45%	0.82	162
Total	24.15%	6.87%	−24.35%	53.21%	0.72	2,144
Panel B: without capital gains						
Homeowner	7.66%	0.01%	0	7.73%	0.16	2,174
Renter	13.77%	1.41%	0	18.80%	0.23	185
Total	8.14%	0.04%	0	8.43%	0.17	2,359

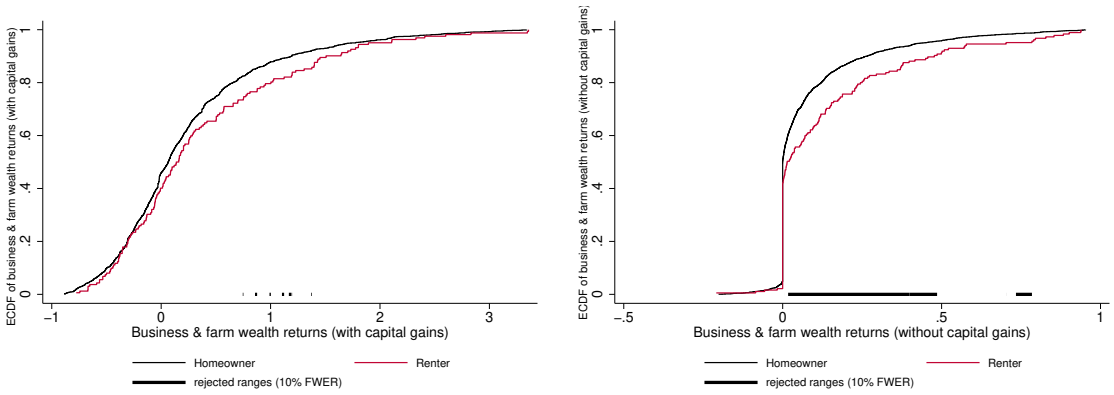
Notes: Returns with capital gains: $t(2142) = 2.386, p = 0.009$, one-tailed. Returns without capital gains: $t(2357) = 4.741, p = 0.000$, one-tailed.

Table 4 presents the calculation of annualized return on business and farm. Average return on business and farm wealth is quite large, and with large dispersion. An interesting finding is that on average, renters have significantly higher returns on business and farm, in terms of both measures of returns. The Kolmogorov-Smirnov test (Table 5) and the empirical CDF (Figure 6) also show that renters enjoy higher returns on business and farm wealth.

There are two possible explanations. First, homeowners are easier to apply for a loan to start a business, because they could use their home equity as a collateral. Since it is harder for renters to get a loan to start a business, they only do it when they are more confident it will be a success. Second, homeowner's mobility is more constrained by their main residence, while renters are easier to relocate. Therefore, renters are more likely to relocate to places where doing business is more profitable. These might help to explain why despite there are

Table 5: Kolmogorov-Smirnov Test on Distribution of Business & Farm Wealth Returns

Smaller group	D	P-value
Panel A: with capital gains		
Renter	0.009	0.976
Homeowner	−0.093	0.073
Panel B: without capital gains		
Renter	0.005	0.990
Homeowner	−0.153	0.000



(a) with capital gains (b) without capital gains

Figure 6: Empirical CDF of Returns on Business & Farm Wealth

fewer renters having business and farm, their returns from business are significantly higher, both on average and in total distribution.

Stocks. Here, we are comparing returns on stocks held directly by households, and not including stocks held indirectly in private annuity, IRAs, or employer-sponsored pension plans. 92.5% of households with stocks returns are homeowners. 77% of homeowners and 71% of renters have positive dividend income.

Table 6 presents the annualized stocks return. In terms of mean, the returns with capital gains are not statistically different between two groups; and renters have higher returns without capital gains. The Kolmogorov-Smirnov test (Table 12) and empirical CDF (Figure

Table 6: Annualized Stocks Returns

	Mean	Median	25p	75p	Std	Obs
Panel A: with capital gains						
Homeowner	13.70%	2.43%	−23.00%	33.75%	0.60	3,725
Renter	15.74%	6.89%	−23.25%	35.32%	0.60	301
Total	13.86%	2.86%	−23.03%	34.03%	0.60	4,026
Panel B: without capital gains						
Homeowner	1.99%	0.76%	0	2.46%	0.03	4,153
Renter	2.44%	0.73%	0	2.97%	0.03	331
Total	2.03%	0.76%	0	2.48%	0.03	4,484

Notes: Returns with capital gains: $t(4024) = 0.562, p = 0.287$, one-tailed. Returns without capital gains: $t(4482) = 2.380, p = 0.009$, one-tailed.

10) in Appendix B.1 show that distribution of stocks returns are not statistically different.

Other Real Estate. Among households with real estate returns, 95% are homeowners. For households with real estate returns, 47% homeowners and 37% renters reported positive rental income. In PSID, households report total rental income received in a given year. Therefore, it is hard to distinguish whether the rental income comes from (part of) main residence or from other real estate for homeowners. We attribute all rental income to other real estate in this case, therefore, homeowner's capital income from other real estate might be exaggerated.

Table 7 presents the returns from investing in other real estate. Average returns are not statistically different between homeowners and renters, in both measures. For the tests on the distribution of real estate returns, they are presented in the Appendix B.2. And the distributions of real estate returns are not statistically different.

Table 7: Annualized Real Estate Returns

	Mean	Median	25p	75p	Std	Obs
Panel A: with capital gains						
Owner	7.86%	1.85%	−16.77%	26.11%	0.42	2,931
Renter	7.11%	1.08%	−21.20%	28.00%	0.44	174
Total	7.82%	1.81%	−16.91%	26.40%	0.42	3,105
Panel B: without capital gains						
Owner	3.19%	0	0	4.17%	0.05	3,207
Renter	2.89%	0	0	2.20%	0.06	183
Total	3.17%	0	0	4.07%	0.05	3,390

Notes: Returns with capital gains: $t(3103) = -0.227, p = 0.410$, one-tailed. Returns without capital gains: $t(3388) = -0.676, p = 0.250$, one-tailed.

Home Equity. We follow Flavin and Yamashita (2002) to calculate returns on owner-occupied housing. The returns on housing depends on imputed capital income and capital gains of the house value.

The imputed rental income is set up based on the no-arbitrage condition: the fair price a homeowner would charge if he rented the house to some renters. The imputed rental income is:

$$(r_t + \delta_{i,t})V_{i,t}^h + \text{property tax}, \tag{10}$$

where r_t is the real interest rate at time t, $\delta_{i,t}$ is the depreciation rate of housing, $V_{i,t}^h$ is the market value of the house. We assume that landlord would charge renters the opportunity cost of investing in housing and also pass the property tax.

The imputed cost of homeownership includes bearing the depreciation of home equity and paying the property tax:

$$\delta_{i,t}V_{i,t}^h + (1 - \tau_{i,t}) * \text{property tax} \tag{11}$$

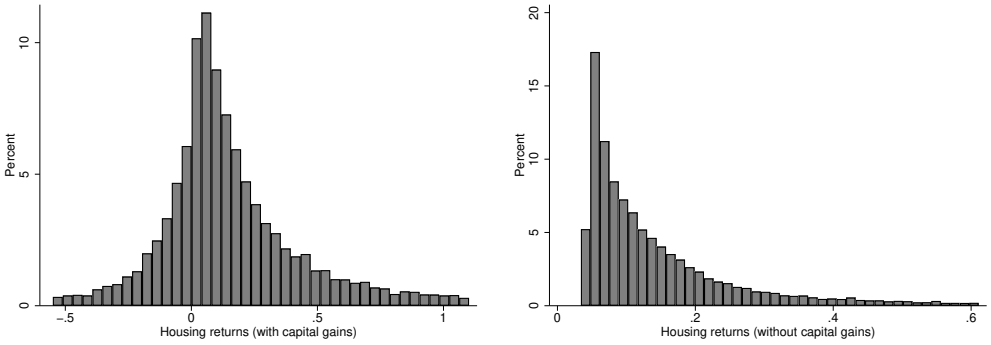
where $\tau_{i,t}$ is the marginal income tax rate, and the property tax payment could be deducted from the federal income tax.

Thus, the imputed capital income from housing is the imputed rental income minus the imputed cost:

$$r_t V_{i,t}^h + \tau_{i,t} * \text{property tax} \tag{12}$$

We follow Flavin and Yamashita (2002) in choosing r_t to be 5%, $\tau_{i,t}$ to be 33%, and the property tax is available in PSID. Note that in Jordà et al. (2019), they used the rent-price approach to calculate the housing return. Their Figure A.27 shows that the rent-price ratio in the US is around 4% to 6% from 2000 to 2015, and it states explicitly that the rent-price ratio for U.S. residential real estate is 4.9% in 2014. Therefore, our choice of 5% for r_t is reasonable.

The annualized return on home equity is presented in Figure 7 and Table 8. Note that we measure returns on housing wealth instead of housing value, when households purchase houses with mortgages (which is usually the case), the returns are leveraged. In general, housing provides considerable returns for homeowners.



(a) With capital gains (b) Without capital gains

Figure 7: Distribution of Returns on Home Equity

Table 8: Annualized Returns on Home Equity

	Mean	Median	25p	75p	Obs
With capital gains	14.78%	9.59%	0.27%	25.74%	19,218
Without capital gains	14.28%	10.37%	6.40%	17.85%	19,720

4.2.3 Rate of Return Heterogeneity

Besides heterogeneity in returns within each individual asset, returns are also different across different assets. Table 9 compares the average and median returns for different assets using data in PSID from 1999 to 2017. Business and farm have the highest average returns, followed by stocks and then other real estate. Since we imputed capital income for owner-occupied housing,it also has sizable returns.

Table 9: Comparison of Individual Asset Returns (1999−2017)

	With capital gains		Without capital gains	
	Mean	Median	Mean	Median
Business & Farm	24.15%	6.87%	8.14%	0.04%
Stocks	13.86%	2.86%	2.03%	0.76%
Real Estate	7.82%	1.81%	3.17%	0
Housing	14.78%	9.59%	14.28%	10.37%

Meanwhile, based on data from the Center for Research in Security Prices (CRSP), the average return on treasury bills, notes, and bonds with different maturities in the same period is shown in Table 10. As we can see, safe assets generally carry lower returns compared to risky financial assets and real assets.

Table 10: Average Returns on Treasury Bills, Notes, and Bonds

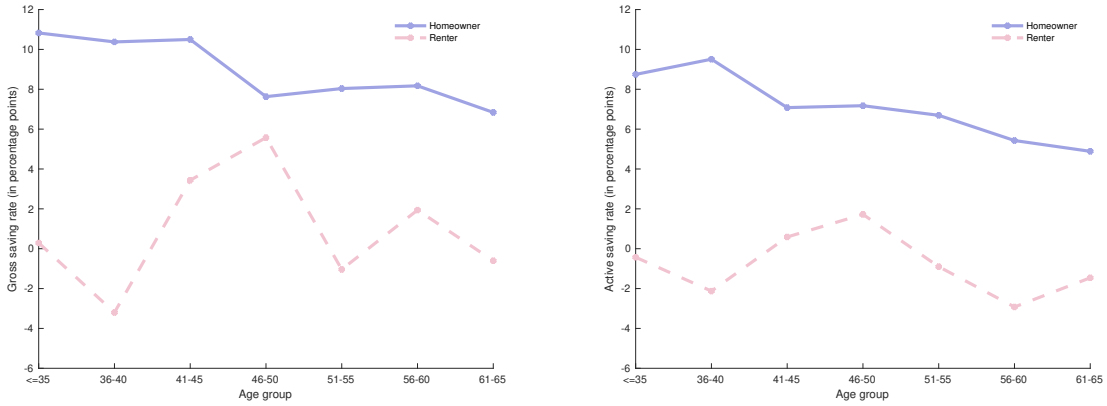
30 Day	90 Day	1 Yr	5 Yr	10 Yr	30 Yr
1.74%	1.94%	2.37%	4.48%	4.92%	7.15%

Returns are heterogeneous among assets, together with different asset allocation, home-owners and renters thus have different returns on their wealth, leading to different wealth accumulation patterns.

4.3 Saving Rate

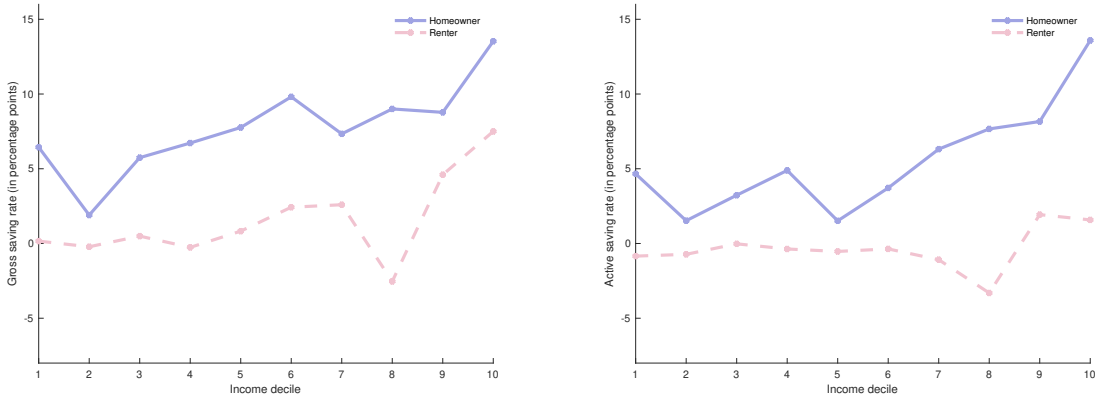
In this subsection, we explore whether there is discrepancy in saving rate between homeowners and renters. We compare two measures of saving rate, gross saving rate and active saving rate, which are defined in Section 2.1 following Dynan, Skinner, and Zeldes (2004).

Life-cycle consideration suggests that saving rate might be correlated with age. Figure 8 shows that homeowners have higher average saving rate than renters in all age group, in both measures of saving rate.



(a) Gross saving rate (b) Active saving rate

Figure 8: Average Saving Rate in Different Age Groups



(a) Gross saving rate (b) Active saving rate

Figure 9: Average Saving Rate along Income Decile

When we compare saving rate after controlling for income, Figure 9 shows that homeowners have higher saving rate than renters. The overall pattern is that when households have higher income, the saving rate goes up, which is consistent with the finding in Dynan, Skinner, and Zeldes (2004).

To analyze saving rate systematically and control for other variables that might influence the saving rate, we run the following quantile regression:

$$s_{i,t} = \alpha + \beta H_{i,t} + f(x_{i,t}) + \tau_t + \epsilon_{i,t}, \tag{13}$$

where $s_{i,t}$ is two measures of saving rate; $H_{i,t}$ is a dummy variable for homeownership; $f(x_{it})$ are control variables, which include age of head, log income, log of lagged wealth, years of education, marital status, family size, number of children; and τ_t is time-fixed effect. The parameter of interest is β, which measures the difference of saving rate between homeowners and renters.

Columns (1) and (4) in Table 11 show the results of quantile regression under the specification (13). As we can, the coefficients for homeownership are significantly positive. The median homeowner's gross saving rate is 5.89% larger than the median gross saving rate of the renters; and homeowner's median active saving rate is 5.50% larger than that of the renters, after controlling for other demographic and economic differences. The coefficients for other variables also have expected signs.

Mortgage: Forced-Saving Mechanism. One possible explanation for homeowners have higher saving rate is that the majority of homeowners purchases home with mortgages. Therefore, homeowners are obliged to make monthly mortgage payments. Each month, part of the mortgage payments is paid towards interests for outstanding balance, and the other part is applied towards paying down the principal outstanding. The part that pays towards the principal will reduce outstanding debt, increase household wealth, therefore, provides a forced-saving mechanism.

Table 11: Quantile Regression for Saving Rate

	Gross saving rate			Active saving rate		
	(1)	(2)	(3)	(4)	(5)	(6)
homeownership	0.0589***	0.0487***		0.0550***	0.0292***	
	(0.007)	(0.005)		(0.005)	(0.003)	
principal ratio		0.4837***	0.4964***		0.7473***	0.7551***
		(0.037)	(0.035)		(0.022)	(0.018)
income	0.0102*	0.0081*	0.0127**	0.0103***	0.0092***	0.0123***
	(0.006)	(0.004)	(0.005)	(0.003)	(0.002)	(0.002)
lagged wealth	0.0009	0.0012	0.0054***	-0.0005	-0.0001	0.0027***
	(0.001)	(0.002)	(0.001)	(0.001)	(0.001)	(0.001)
education	0.0042***	0.0049***	0.0055***	0.0020**	0.0021***	0.0022***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
married	0.0140**	0.0203***	0.0309***	0.0117**	0.0167***	0.0184***
	(0.006)	(0.008)	(0.006)	(0.005)	(0.004)	(0.003)
family size	-0.0114***	-0.0117***	-0.0123***	-0.0118***	-0.0104***	-0.0091***
	(0.004)	(0.003)	(0.002)	(0.004)	(0.002)	(0.002)
# child	0.0079*	0.0087***	0.0094***	0.0119***	0.0088***	0.0079***
	(0.004)	(0.003)	(0.003)	(0.004)	(0.003)	(0.002)
age ≤ 35	0.0103*	0.0163***	0.0123***	0.0065*	0.0100***	0.0077
	(0.006)	(0.005)	(0.005)	(0.004)	(0.004)	(0.005)
age $46-55$	0.0012	0.0073	0.0051	-0.0042	-0.0025	-0.0031
	(0.007)	(0.006)	(0.006)	(0.004)	(0.005)	(0.005)
age $56-65$	0.0032	0.0015	0.0059	-0.0028	-0.0056	-0.0060
	(0.006)	(0.009)	(0.012)	(0.006)	(0.006)	(0.005)
Obs	22,208	21,221	21,221	22,222	21,231	21,231
Pseudo R^2	0.0089	0.0214	0.0205	0.0078	0.0585	0.0577

Notes: *** significant at 1% level, ** significant at 5% level, * significant at 10% level. Bootstrapped standard errors in parentheses. All specifications include dummies for the year. Sample uses the saving rate data from 2001 to 2017.

To examine whether mortgage provides a forced saving mechanism, we add another variable, which is the mortgage payment towards principal scaled by family income. Columns (2) and (5) in Table 11 show that this variable is significantly positive. For households that pay a higher share towards mortgage principal out of their income, their saving rates are significantly higher. Thus, mortgage does provide a forced-saving mechanism.

4.4 Discussion

In this section, we studied the differences in wealth accumulation channels in terms of asset allocation, rate of return, and saving rate. Homeowners and renters differ in all three channels, leading to different wealth accumulation patterns.

In terms of the overall effect due to differences in wealth accumulation channels, 10-year wealth mobility matrices presented in Appendix C show that homeowners are more likely to move up or stay in the same wealth quintile. However, the relative importance of each channel on contributing wealth accumulation remains unclear right now. And it is also worth exploring whether and how these three channels are jointly related. Moreover, it will be interesting to investigate how would homeownership influence wealth inequality.

5 Conclusion

In this paper, we study wealth accumulation by homeowners and renters using PSID data from 1999 to 2017. Our findings reveal notable disparities in the channels through which homeowners and renters amass wealth.

To begin with, there is a discernible distinction in asset allocation between homeowners and renters. Home equity constitutes the predominant share of a homeowner's wealth, with homeowners allocating less to stocks and real assets compared to renters with similar wealth. Nevertheless, despite this discrepancy, homeowners exhibit, on average, greater wealth and a more diversified portfolio.

Moving on to the second point, homeowners enjoy higher average returns on non-housing wealth. In terms of individual asset returns, renters also have competitive returns as homeowners; and renters reap higher on business and farm.

The third aspect highlights the disparity in saving rates, with homeowners exhibiting a higher propensity to save. This discrepancy is attributed to the mortgage serving as a compelled saving mechanism for homeowners.

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A Active Saving

If a household doesn't move between time a to time b, then the active saving in the period is calculated as:

$$
\begin{aligned}
&\text{Active Saving}_{\in(a,b)} \\
&= \text{total wealth at time } b - \text{total wealth at time } a \\
&- (\text{house value at time } b - \text{house value at time } a) \\
&- (\text{real estate value at time } b - \text{real estate value at time } a) \\
&- (\text{business/farm value at time } b - \text{business/farm value at time } a) \\
&- (\text{stocks value at time } b - \text{stocks value at time } a) \\
&+ \text{cost of real estate additions/repairs}_{\in(a,b)} \\
&+ \text{value of real estate purchased}_{\in(a,b)} - \text{value of real estate sold}_{\in(a,b)} \\
&+ \text{value of business/farm invested}_{\in(a,b)} - \text{value of business/farm sold}_{\in(a,b)} \\
&+ \text{value of stocks purchased}_{\in(a,b)} - \text{value of stocks sold}_{\in(a,b)} \\
&+ \text{value of pensions/annuities invested}_{\in(a,b)} - \text{value of pensions/annuities cashed}_{\in(a,b)} \\
&- \text{assets added by movers in}_{\in(a,b)} + \text{debts added by movers in}_{\in(a,b)} \\
&+ \text{assets removed by movers out}_{\in(a,b)} - \text{debts removed by movers out}_{\in(a,b)} \\
&- \text{value of inheritances}_{\in(a,b)},
\end{aligned}
$$

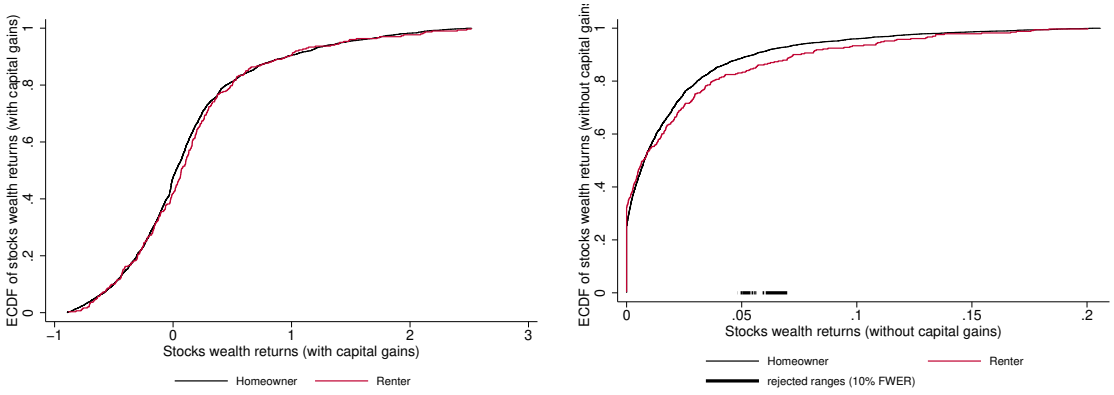
where all the values are inflation-adjusted to the 2019 dollar. If a household moves between time a to time b, then the change in house value is set to 0.

B Rate of Return

B.1 Stocks

Table 12: Kolmogorov-Smirnov Test on Distribution of Stocks Returns

Smaller group	D	P-value
Panel A: with capital gains		
Renter	0.017	0.860
Homeowner	−0.063	0.108
Panel B: without capital gains		
Renter	0.071	0.047
Homeowner	−0.059	0.122



(a) with capital gains

(b) without capital gains

Figure 10: Empirical CDF of Returns on Stocks

B.2 Other Real Estate

Table 13: Kolmogorov-Smirnov Test on Distribution of Other Real Estate Returns

Smaller group	D	P-value
Panel A: with capital gains		
Renter	0.059	0.325
Homeowner	−0.043	0.546
Panel B: without capital gains		
Renter	0.124	0.005
Homeowner	−0.026	0.796

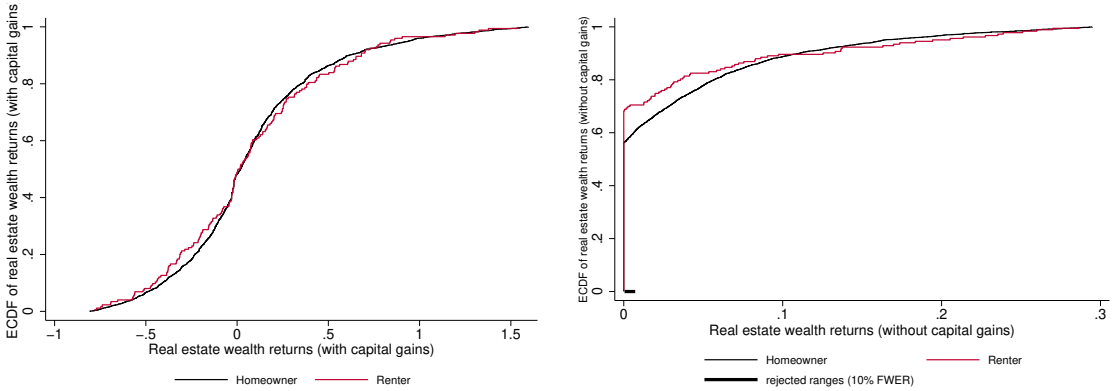


Figure 11: Empirical CDF of Returns on Other Real Estate Wealth

C Wealth Mobility Matrix

Table 14: Wealth Mobility Matrix: Homeowner 1984-1994

		Quintile in 1994				
		1	2	3	4	5
Quintile in 1984	1	0.0625	0.2500	0.4375	0.1250	0.1250
	2	0.0317	0.2540	0.4286	0.2063	0.0794
	3	0.0365	0.0598	0.4319	0.3555	0.1163
	4	0.0120	0.0155	0.1618	0.4578	0.3528
	5	0.0099	0.0011	0.0231	0.1614	0.8046

Table 15: Wealth Mobility Matrix: Renter 1984-1994

		Quintile in 1994				
		1	2	3	4	5
Quintile in 1984	1	0.6231	0.2731	0.0692	0.0192	0.0154
	2	0.3816	0.4058	0.1643	0.0386	0.0097
	3	0.1852	0.2716	0.3580	0.1358	0.0494
	4	0.1034	0.3793	0.2414	0.1034	0.1724
	5	0	0.0769	0.0769	0.4615	0.3846

Table 16: Wealth Mobility Matrix: Homeowner 1994-2005

		Quintile in 2005				
		1	2	3	4	5
Quintile in 1994	1	0.0238	0.0952	0.3571	0.2619	0.2619
	2	0.1026	0.1282	0.3590	0.3333	0.0769
	3	0.0219	0.0601	0.3607	0.4126	0.1448
	4	0.0054	0.0179	0.1342	0.4275	0.4150
	5	0.0011	0	0.0221	0.1604	0.8164

Table 17: Wealth Mobility Matrix: Renter 1994-2005

		Quintile in 2005				
		1	2	3	4	5
Quintile in 1994	1	0.5478	0.3312	0.0764	0.0446	0
	2	0.3228	0.4567	0.1732	0.0394	0.0079
	3	0.3500	0.2667	0.2667	0.0500	0.0667
	4	0.3043	0.2609	0.1739	0.1739	0.0870
	5	0.4000	0	0	0.2000	0.4000

Table 18: Wealth Mobility Matrix: Homeowner 2005-2015

		Quintile in 2015				
		1	2	3	4	5
Quintile in 2005	1	0.2727	0.0303	0.3333	0.2879	0.0758
	2	0.1485	0.0792	0.3366	0.3564	0.0792
	3	0.0774	0.0418	0.2531	0.4916	0.1360
	4	0.0301	0.0096	0.0985	0.4432	0.4186
	5	0.0122	0.0010	0.0112	0.0959	0.8796

Table 19: Wealth Mobility Matrix: Renter 2005-2015

		Quintile in 2015				
		1	2	3	4	5
Quintile in 2005	1	0.5582	0.2836	0.1194	0.0269	0.0119
	2	0.3147	0.4126	0.2238	0.0315	0.0175
	3	0.2785	0.3418	0.2405	0.1013	0.0380
	4	0.2143	0.2143	0.2143	0.2500	0.1071
	5	0.0714	0	0.2857	0.1429	0.5000