# Housing and Savings Behavior across Family Types

Annika Bacher*

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**Abstract**

Couples are more likely to be homeowners than singles but allocate – conditional on owning – less wealth into housing. In contrast, couples save more in financial assets than singles. By developing a life-cycle model of housing and financial portfolio choice that allows for differences in family structure and for exogenous marital transitions, this paper shows that divorce risk encourages (precautionary) savings of couples but makes it less desirable to invest into housing. In contrast, prospective marriage, lower income levels and larger exposure to income fluctuations prevent singles from becoming homeowners whereas those who buy houses, tend to buy relatively large ones. Next, I show that accounting for distinct family types and marital risk is important for evaluating policies that aim at increasing homeownership. The standard bachelor framework overstates the effectiveness of housing policies and biases the comparison across different kind of reforms. In contrast, regulations that facilitate stock market participation help to foster wealth accumulation, especially among singles, as they encourage investment in high return assets that can be more easily liquidated in the event of a (marital or labor income) shock.

*Keywords: Housing, Portfolio Choice, Life-Cycle, Family Structure, Marital Risk*

*JEL Classification: D14, D15, G11, G51, J12*

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# 1 Introduction

The aggregate share of homeowners in the United states is falling, attracting considerable attention from policy makers. For example, President Biden declared June 2021 as "National Homeownership Month" and explicitly called "...to recognize the enduring value of homeownership and recommit ourselves to helping more Americans realize that dream".[1] However, in order to effectively design policies that aim at increasing homeownership and thus "help more Americans realize that dream", it is necessary to understand how household's portfolio evolves over their life-cycle and which factors keep them out of ownership. In particular, there is substantial heterogeneity across family types (single men, single women, couples) with regard to their housing choices and their savings behavior: whereas singles are less likely to be homeowners than couples, they invest – conditional on owning – per capita more wealth into housing. In contrast, couples accumulate per capita more financial wealth than singles, both in terms of safe and of risky assets. Despite these differences, the literature has so far largely abstracted from explicitly considering distinct family types when studying housing and financial wealth accumulation dynamics.[2]

Therefore, this paper develops a joint life-cycle framework of housing, financial portfolio choice and family structure that allows for exogenous marital transitions, and addresses two questions: First, what are the key factors that drive differences in investment behavior across family types? Second, what are the implications of introducing distinct family types and changes thereof (through marriage and divorce) into a life-cycle framework of housing and financial portfolio choice for evaluating policies that are intended to increase homeownership and to foster overall wealth accumulation? My results highlight the importance of marital transition risk and differences in labor income profiles across family types for understanding

[1] A Proclamation on National Homeownership Month, 2021. White House Briefing Room. Available under this link [Accessed August 12, 2021].

[2] Two notable recent exceptions are Peter, Schneider, and Piazzesi (2020) who study homeownership differences between couples and singles across a sample of European countries and Chang (2019) who attributes large parts of the aggregate decline in homeownership rates to increasing divorce and falling marriage rates.

heterogeneity in housing patterns and asset accumulation across couples, single men and single women. Moreover, I find that abstracting from distinct family types overstates the effectiveness of housing policies because marital transitions make it less attractive to invest in (indivisible) housing. In contrast, facilitating stock market participation helps households, especially singles, to increase their net worth as it encourages investment in liquid but high return assets.

In the following, I first document novel empirical patterns on financial portfolio composition dynamics and housing choices across couples, single men and single women combining survey data on US households from the Survey of Consumer Finances (SCF) and from the Panel Study of Income Dynamics (PSID). In particular, I show that the average homeownership rate of singles is 30%pts lower than that of couples, whereas the average house value of single homeowners is around $41,000 larger than that of couples (per-capita). Finally, I find that at the entry towards retirement, couples hold per capita on average around $250,000 in financial assets, single women around $100,000 and single men a little less than $200,000.

I then propose a joint life-cycle framework of housing, financial portfolio choice and family structure that is able to endogenously replicate these empirical patterns. In the model, households decide each period on their consumption, their savings in a safe and in a risky financial asset as well as their housing stock, forming expectations about future income, asset returns and marital transitions. Singles and couples differ in five important ways. First, couples face a chance of getting divorced and having to split their assets whereas singles may meet a partner with whom they can pool their wealth. Importantly, to realistically capture the financial riskiness of marital transitions, I require the model to replicate empirical shifts in homeownership rates and in financial wealth in the years preceding and following marriage and divorce. Second, family types differ in terms of their labor income profiles over the life-cycle. In particular, I flexibly estimate the labor income process separately for single women, single men and couples such that it matches higher order moments of earning dynamics in the data (Guvenen, Karahan, Ozkan, and Song, 2021). Third, households enjoy economies of scale which differ between housing services and non-durable consumption goods. In particular, following previous literature (e.g. Yang, 2009), I assume that housing can more easily be shared within family members than non-durable consumption. Fourth, the model allows for features of the US Tax Code that depend on marital status. Given household income, couples and singles face heterogeneous marginal tax rate. In addition, households can deduct mortgage payments from (progressive) income taxes, in line with the Home Mortgage Interest Deduction in the US. Fifth, I assume that agents face and individual risk of dying during retirement to account for gender differences in life expectancies as well as that couples jointly expect to live longer than singles.

Counterfactual simulations reveal that relatively higher income levels and the presence of marital transitions induce couples to increase their (precautionary) savings, whereas both factors depress the asset accumulation of singles, contributing to the marital gap in financial wealth and in homeownership rates. In particular, I find that in a world without marriage and divorce, the marital gap in homeownership rates would shrink by almost 50% and the marital gap in financial wealth would flip, that is couples would on average accumulate per capita less financial savings than singles. Heterogeneity in income levels account for 41% of the marital gap in homeownership rates and again reverses the direction of the marital gap in financial wealth. Moreover, marital risk and singles' relatively larger exposure to labor income fluctuations decreases their willingness to invest in housing (resulting in lower homeownership rates) and additionally shifts the distribution of single homeowners: those who do buy houses, tend to be relatively rich and hence, buy large ones. For example, in the absence of marriage and divorce, the aggregate conditional housing wealth of singles would decrease, lowering the marital gap in conditional housing wealth by around 20%.

Next, I show that allowing for distinct family types and for marital transitions has important implications for policy evaluation. I consider two types of housing regulations and compare their effectiveness in terms of increasing homeownership rates and fostering wealth accumulation between my framework and a standard set-up with one generic bachelor household. In one exercise, I reduce the sales and purchase costs of housing what makes it easier for households to adjust their housing stock in response to shocks. Moreover, I decrease the annual maintenance costs for homeowners, thereby lowering the flow cost of housing. I derive two set of results. First, the bachelor framework overstates the effectiveness of lowering maintenance costs by 57% and the decrease in adjustment costs by 35%. Introducing distinct family types with marriage and divorce reduces the attractiveness of housing (due to its indivisibility) and consequently, housing policies attract less marginal home buyers. Second, abstracting from distinct family types biases the comparison across the two kind of policies. In the benchmark model with single men, single women and couples, both type of policies increase homeownership rates by almost the same amount. In contrast, in the bachelor set-up, reducing maintenance costs appears to be much more effective as it lowers the flow cost of housing and shields households from large expenditure commitments. However, once I allow for marital transitions, households value relatively more to be able to adjust their housing size (in the event of a marital shock) at little cost. Finally, I evaluate both types of policies in terms of increasing households' net worth and additionally consider a reform that facilitates stock market participation. My findings indicate that the latter is most effective in fostering overall wealth accumulation, especially among singles, since it encourages investment in assets that pay high returns in expectations but can be easily pooled in response to a marital shock.

**Related Literature.** By setting up the described framework, this paper contributes to several strands of the literature. Broadly, it relates to a large literature on housing in macroeconomics and financial portfolio allocation of households in general (see e.g. Piazzesi and Schneider (2016) for a review of the former and Gomes, Haliassos, and Ramadorai (2020) or Campbell (2006) for a review of the latter. For a literature review on life-cycle dynamics of household's portfolio composition, see Poterba and Samwick (2001) or, more recently, Gomes (2020)). More specifically, I complement a literature that studies the interaction of housing dynamics and a financial portfolio choice within structural life-cycle frameworks (Cocco (2005), Yao and Zhang (2005), Flavin and Yamashita (2011), Chetty, Sándor, and

Szeidl (2017), Vestman (2019), Paz-Pardo (2020), Brandsaas (2021)). Expanding on their work, I am the first to introduce distinct family types and am thus able to quantify the importance of marital status (and changes thereof) on both housing decisions as well as their interaction with a financial portfolio choice.

Furthermore, my paper extends previous work that analyzes how marital dynamics affect household investment decisions. For example, Fisher and Gervais (2011), Fischer and Khorunzhina (2018), Chang (2019) or Bartscher (2020) study the effect of marriage and divorce on home-buying decisions and mortgage applications. In contrast, Love (2010) or Hubener, Maurer, and Mitchell (2015) develop a joint framework of household structure and financial portfolio choice that abstracts from housing to study how men and women re-balance their financial portfolio following family shocks such as divorce. More generally, many papers focus on the interaction of marital transition dynamics or marital status and household savings behavior (e.g. Cubeddu and Ríos-Rull (2003), Yamaguchi, Ruiz, and Mazzocco (2014), Voena (2015), Fehr, Kallweit, and Kindermann (2016), Borella, De Nardi, and Yang (2018) and De Nardi, French, Jones, and McGee (2021)). Moreover, some empirical work such as Stevenson (2007), Mundra and Uwaifo Oyelere (2016) or Goodman, Pendall, and Zhu (2019) investigates the determinants of housing choices conditional on marital status. Relative to these papers, I focus on the sources of marital gaps in both housing choices and financial portfolio allocation over the life-cycle to derive implications for policies that aim at increasing homeownership and wealth accumulation in the presence of marital risk.

My paper is closest to Peter et al. (2020) who propose a joint framework of housing choices and marital status to study homeownership rates of singles and couples across Europe. Their findings indicate that higher homeownership rates among couples can be attributed to weak rental markets or strong credit markets, depending on the specific country under consideration. In contrast to their work, my paper is limited to one country (the US), additionally includes a financial portfolio choice between a safe and a risky asset and emphasizes on life-cycle dynamics of portfolio composition depending on the family type.

Finally, my paper is related to a macroeconomic literature on life-cycle dynamics of portfolio composition with durable goods. For example, Fernández-Villaverde and Krueger (2011) emphasize the importance of durables to understand portfolio allocation over the life-cycle: Because housing serves as collateral and hence relaxes borrowing constraints, households accumulate housing early in life while they only start saving in financial assets later in life. Albeit being present in my framework as well, this channel gets somehow weakened through the introduction of single households who are reluctant to invest in housing early in life as they expect to may get married soon. Similarly, Yang (2009) focuses on life-cycle patterns of nondurable and durable consumption and shows that the collateral value of housing is key to replicate the increasing housing stock early in life, while its illiquid nature can account for the slow decumulation of housing among the old. In relation to her, I provide evidence that the illiquidity (and indivisibility) of housing not only helps to understand its slow decumulation during old age but also the marital gap in homeownership across couples and singles.

**Roadmap.** The remainder of this paper is structured as follows. Section 2 presents empirical evidence on life-cycle patterns of portfolio dynamics between single men, single women and couples whereas Section 3 introduces the structural model. Next, Section 4 explains the calibration strategy, Section 5 reports the results and Section 6 discusses implications for policy evaluation. Finally, Section 7 concludes.

# 2 Empirical Evidence

The following section first explains the data and the sample selection criteria. Afterwards, I document empirical patterns of household's portfolio composition by marital status and type of single (never married vs. divorced/widowed) over the life-cycle. Lastly, I conduct an event study of portfolio choices around the timing of marriage and divorce.

## 2.1 The Sample

Throughout the analysis, I work with data from the Panel Study of Income Dynamics (PSID) and from the Survey of Consumer Finances (SCF). In particular, I use the waves 1989 until 2016 from the Survey of Consumer Finances (SCF) to measure housing and financial choices of households. The SCF is a triennial repeated cross-section analysis sponsored by the Federal Reserve Board. It is carried out at the household level but collects individual demographic characteristics and income variables as well as detailed information on joint asset holdings of the household. To account for increased likelihood of survey non-response for asset-rich households, the SCF oversamples that population group. Therefore, to ensure the representativeness of the US population, I weigh each observation by the provided survey weights. For income variables and demographic characteristics I work with data from the Panel Study of Income Dynamics (PSID) spanning from 1989 until 2017. The PSID is a longitudinal panel-survey of private households in the US running from 1968 until today.[3] Besides the core sample, the PSID oversamples low-income families (the 'SEO' sample) and immigrant families (the 'immigrant' sample). To make the sample comparable to that from the SCF, I drop all families belonging to those two sub-samples and work with the provided survey weights. Each wave, household members report biographic information, their individual labor force status and individual income levels. In both datasets, I restrict my sample to individuals between 30 and 65 years old as these are the years when households accumulate most of their wealth and thus, need to allocate their portfolio without being retired but already have finished education. Moreover, I drop the lowest and upper half of a percentile of all financial variables to ensure that my results are not driven by individual outliers.

A single woman is defined to be a family unit with a female head and no spouse present. Single men are defined accordingly. Couples only include legally married individuals because in the model, couples file their taxes jointly which is not possible for cohabiting individuals in the US.[4] I define risky assets as direct stock holdings, corporate and foreign bonds, the fraction of mutual funds that is invested in the former as well as the fraction of retirement accounts which is invested in stocks. In contrast, safe financial assets include cash holdings, savings and checking accounts, government bonds as well as the fraction of mutual funds and

[3] Because the Survey of Consumer Finances starts in 1989, I restrict my data sample taken from the PSID to the waves from 1989 until 2017. Data were collected annually until 1997 and afterwards every two years.

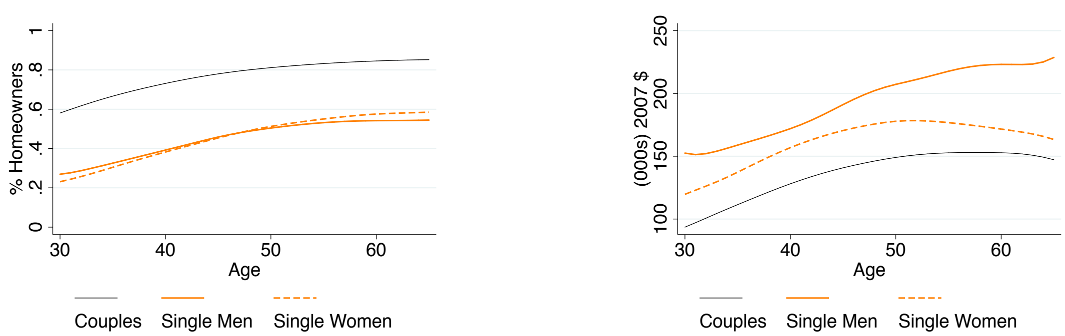
[4] In Appendix D, I show that the reported empirical patterns are robust to including cohabiting individuals either in the "couples" or in the "singles" category.

retirement accounts which is invested in safe assets. In total, my PSID sample consists of 81,788 individual-year observations that correspond to 2,070 individual single women, 1,589 individual single men and 5,550 individuals living in married couples. The average individual is observed for 5 waves and no individual is observed for more than 15 (biannual) waves. The data drawn from the SCF (which is a repeated cross-section) includes 39,357 observations, referring to 25,009 individuals in couples, to 4,696 single men and to 7,512 single women.

## 2.2 Life Cycle Patterns of Investment Choices Across Families

Figure 1a shows that the share of homeowners among couples is higher than among singles at every age. On average, this "marital gap" in homeownership rates is around 30%pts. However, conditional on being a home-owner, singles buy larger houses than couples (per capita), as shown in Figure 1b.[5] Thus, the data suggest that couples invest more in housing along the extensive margin whereas singles tend to invest more along the intensive margin, once they become owners.

Figure 1: Housing Choices Across Family Types (Data)




(a) Homeownership Rates (b) (Conditional) Mean House Value

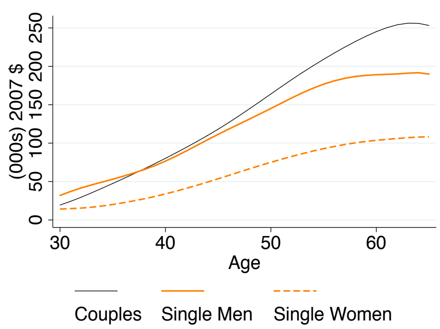
*Notes:* Figure 1 plots the life-cycle profiles of homeownership rates and average house value of owners by family type. House value is defined as the value of a household's primary residence, irrespective of any mortgage debt. Data are from the Survey of Consumer Finances (SCF), waves 1989-2016.

Next, Figure 2 considers financial investment patterns across family types. In contrast to housing wealth, couples accumulate more financial assets (per capita) than both single men

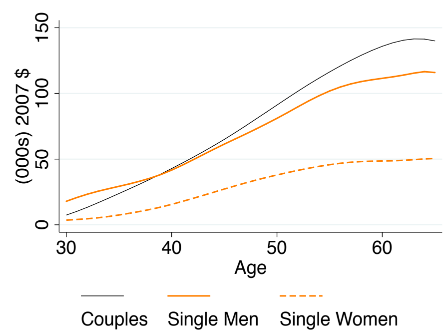
[5] Figure 1b displays the mean conditional house value, irrespectively of any housing debt. In Appendix A.1, I show that this finding is robust to considering the median as well as to considering housing equity.

and single women (Figure 2a).[6] At the entry of retirement, the average financial wealth of single women is little over \$100,000, that of single men almost \$200,000 and couples hold on average per capita \$250,000 in financial assets. This pattern prevails for risky assets as well (Figure 2b). However, Figure 2b combines both extensive (i.e. whether or not the household owns any risky assets) and intensive margin. When considering both margins separately (reported in Appendix A.1), I find that, as for housing wealth, couples are more likely to participate in risky asset markets, but that they, conditional on participation, do not hold more financial wealth in risky assets than singles.

Figure 2: Financial Choices Across Family Types (Data)




(a) Mean Financial Assets




(b) Mean Risky Assets

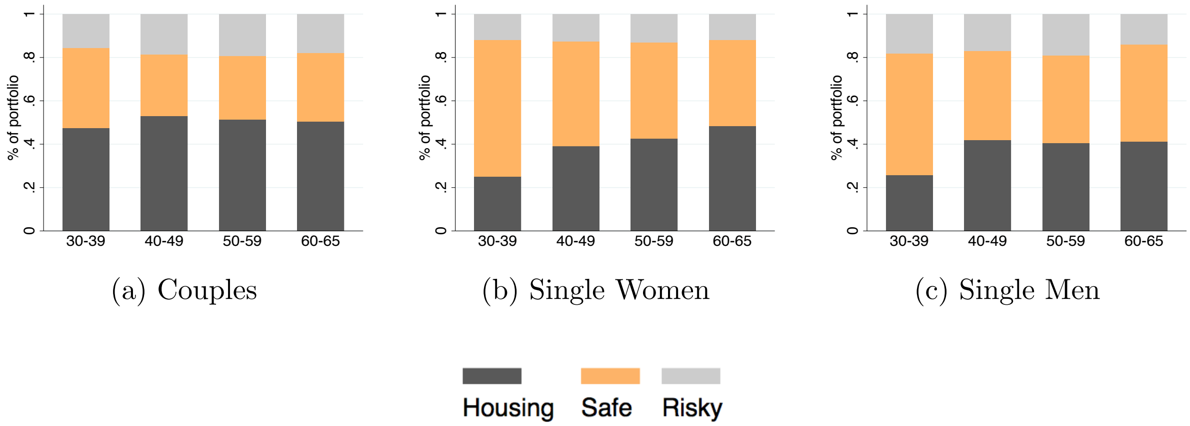
*Notes:* Figure 2 plots average financial assets and the average risky assets by family type. Financial assets are defined as the sum of safe and risky financial assets. Risky assets contain direct stock holdings, corporate and foreign bonds, the fraction of mutual funds that include the former as well as the fraction of retirement accounts which is invested in stocks. Data are from the Survey of Consumer Finances (SCF), waves 1989-2016.

Finally, Figure 3 plots the portfolio shares of housing, risky financial assets and safe financial assets by family type and by age category. The housing share is defined as housing equity over overall wealth.[7] In line with Figure 1, the housing share of couples is higher than that of singles. Additionally, Figure 3 reveals that the housing share of couples is relatively flat over their life-cycle whereas that of both single men and single women is increasing. In contrast, the risky share of couples and of single men is larger than that of single women (see also Bacher, 2021).

[6] Again, this finding is robust to considering the median of financial assets, see Appendix A.1 for details.

[7] Figure 21 in Appendix A.1 illustrates how these patterns differ when splitting the housing share into mortgages and house value (as opposed to considering housing equity).

Figure 3: Portfolio Shares by Age (Data)




(a) Couples (b) Single Women (c) Single Men

*Notes:* Figure 3 plots the average share of overall wealth invested in housing, safe and risky assets by family type and age category. The housing share denotes housing equity as a fraction of overall wealth (the sum of the house value, safe and risky assets net of any mortgage debt). Data are from the Survey of Consumer Finances (SCF), waves 1989-2016.

### 2.2.1 Singles by Type

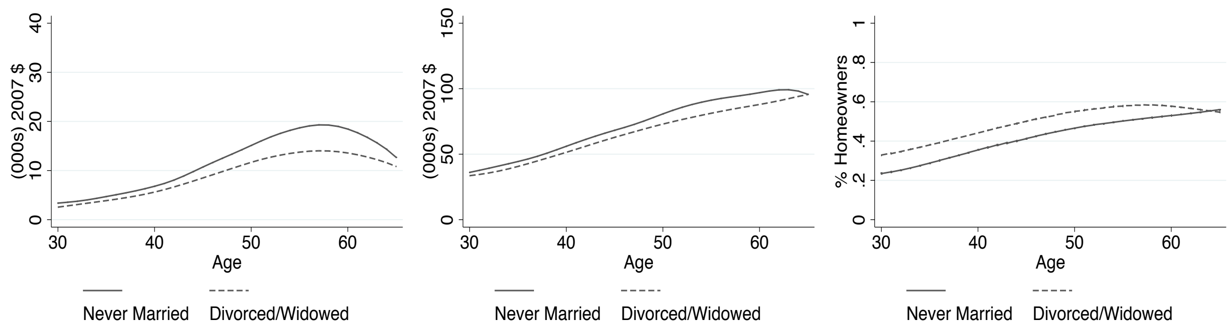
Singles are a very heterogeneous group of the population. For example, a single at age 30 might expect to get married soon whereas a single at age 60 might have been married large parts of her life. Arguably, both marital histories as well as exceptions about future marital states affect portfolio allocation and savings behavior.

Therefore, Figure 5 plots the life-cycle profiles of median financial assets, conditional home equity and homeownership rates separately for never married and divorced (resp. widowed) singles.[8] Both types of singles invest relatively similar. If anything, my findings indicate that divorced singles are more likely to be homeowners and that they – conditional on owning – invest slightly less into housing than never married individuals, suggesting that (some) divorcees keep the house they purchased together with their ex-partner. In contrast, never married singles accumulate more financial assets than divorced individuals which can arise either because the latter invest more in housing and thus have less resources left to save in financial assets. Alternatively, since divorce is costly, individuals may chose to pay their divorce costs out of liquid wealth while keeping their home. Of course, it is also possible that divorced individuals differ with respect to never married singles in terms of their preference

[8] In order to increase the precision of my results, I pool single men and single women for this subsection.

for housing.

Figure 5: Portfolio Allocation of Singles by Type (Data)




(a) Median Financial Assets (b) (Cond.) Housing Equity (c) Homeownership Rates

*Notes:* Figure 5 plots the life-cycle profiles for median financial assets, housing equity of homeowners and homeownership rates for never married singles as well as for divorced or widowed singles. Data are from the Survey of Consumer Finances (SCF), waves 1989-2016.

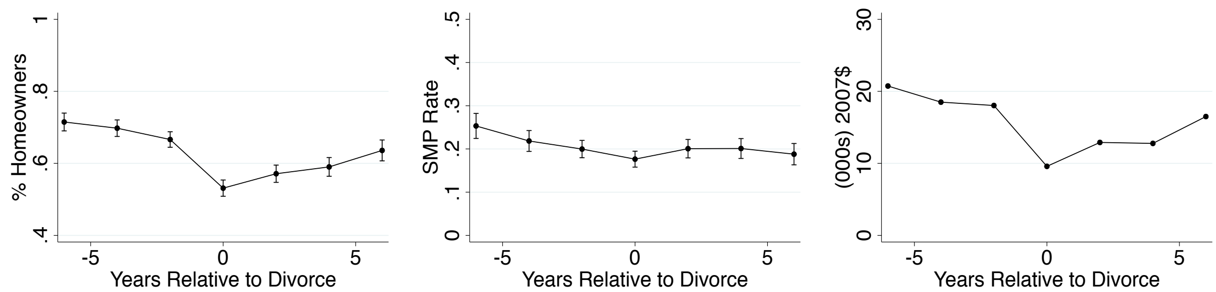
## 2.3 Portfolio Adjustments around Marriage and Divorce

In this section, I conduct an event study of housing- and asset choices in the years preceding and following a marital transition. Thereby, I rely on data from the PSID because of its panel structure. This exercise serves a twofold purpose. First, these moments inform me on how to model asset allocation after marital shocks. Realistically replicating portfolio shifts around marriage and divorce is essential to correctly capture their financial riskiness what in turn affects housing and financial portfolio allocation of households. Second, this exercise allows me to test for anticipation effects, that is whether households adjust their portfolio in the years preceding a marital shift.

### 2.3.1 Divorce

Figure 6 displays how households adjust their portfolio in the years around a marital dissolution. First, I find that the homeownership rate sharply drops following a divorce (Figure 6a). However, it does not drop to zero, indicating that in the model, not all couples should be forced to sell their joint house in the event of a divorce. Moreover, the data does not suggest any significant changes in the stock market participation rate (Figure 6b) whereas median financial assets drop by around 50% (Figure 6c). Importantly, across all margins, no portfolio adjustments occur in the periods preceding the divorce, that is I do not find any anticipation effects in terms of portfolio re-balancing.

Figure 6: Portfolio Allocation around Divorce



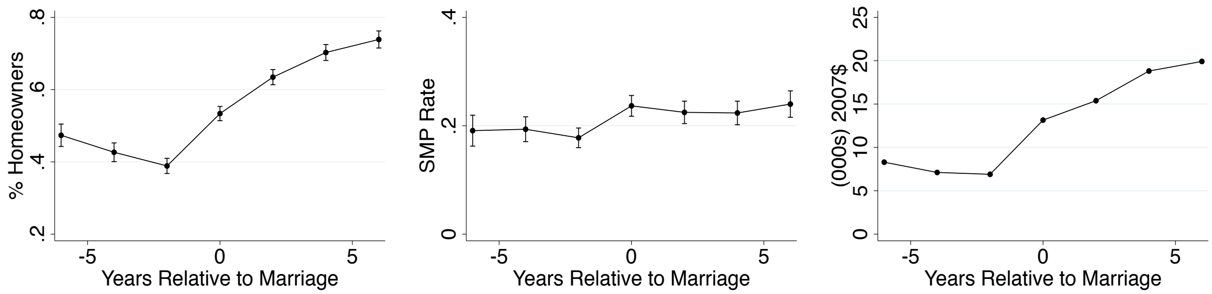

(a) Homeownership Rate (b) Stock Market Participation (c) Median Financial Assets

*Notes:* Figure 6 plots the the evolution of homeownership rates, stock market participation rates and median financial assets in the years preceding and following a divorce, pooled across all households. Data are from the Panel Study of Income Dynamics (PSID), waves 1989-2016.

### 2.3.2 Marriage

Similarly to above, Figure 7 reports portfolio adjustments in the years preceding and following a marriage. After getting married, the average homeownership rate as well as median financial assets rise continuously (Figures 7a and 7c, respectively). In contrast, the stock market participation slightly jumps in the period of marriage and remains flat afterwards (Figure 7b). As before, I do not find any anticipation effects of marriage neither in terms of financial assets nor in the stock market participation rate. If anything, Figure 7a displays a slight decrease in the homeownership rate in the years prior to marriage. Nevertheless, my results show that overall, anticipation effects in terms of portfolio re-balancing in the periods preceding a marital transition are almost non-existent in the data. Therefore, I chose to introduce marital transitions as exogenous shocks in the model, significantly easing its computational complexity.

Figure 7: Portfolio Allocation around Marriage




(a) Homeownership Rate (b) Stock Market Participation (c) Median Financial Assets

*Notes:* Figure 7 plots the evolution of homeownership rates, stock market participation rates and median financial assets in the years preceding and following a marital union, pooled across all households. Data are from the Panel Study of Income Dynamics (PSID), waves 1989-2016.

## 2.4 Robustness Exercises

I conduct several robustness exercises and report the results in Appendix D. First, I show that my empirical results are robust to replicating the analysis with one cohort of individuals (who were born between 1945 and 1960) to ensure that the reported life-cycle patterns are not driven by changes in investment behavior across cohorts. However, to increase precision of the reported estimates, I chose to pool all cohorts in the baseline estimation. Furthermore, I test the robustness of my results to cohabiting individuals. So far, couples include legally married individuals and singles include households without a spouse present. I show that the empirically observed patterns in portfolio choices remain largely unchanged when including cohabiting individuals either in the group of couples or in the group of singles. Finally, I exclude the housing boom period in the early 2000s as well as the years of the Great Recession and show that the observed marital gaps are not sensitive to dropping either of these (unusual) episodes.

# 3 A Life-Cycle Model of Housing and Portfolio Choice

In the following, I develop a stochastic life-cycle model that is capable of replicating the empirical observations highlighted in Section 2. In the model, there are three types of households: single men, single women and couples. For all, their life can be split into working age and retirement. Time is discrete and the model period is two years. Agents enter the model at age 30, retire deterministically at age 64 and live at most for 84 years, that is $j \in \{30, 32, \ldots, 64, \ldots, 84\}$.

Households value non-durable consumption and additionally derive utility from housing. During working age, they are subject to idiosyncratic labor income shocks and can allocate their portfolio between illiquid housing, liquid safe assets and liquid risky assets. Moreover, they face exogenous marital transition shocks that depend on their current labor income, their age and (in case of marriage) on their gender. In order to purchase a home, households have access to collateralized borrowing (mortgages). During retirement, agents' marital status is fixed and they do not supply labor. In contrast, they receive a fixed pension payment and face a positive probability of dying. As before, households can invest in housing, safe and risky assets and can take out loans in the form of mortgages. At age 84, households have to re-pay all their debt. Upon dying, agents value leaving bequests.

## 3.1 Preferences

Households derive utility from nondurable consumption $c$ and from housing services $s$. As common in the literature (e.g. Yang, 2009), I express the per-period utility function in the form of CRRA preferences:

$$\frac{(g(c,s))^{1-\gamma}}{1-\gamma}$$

where $\gamma$ denotes the coefficient of relative risk aversion and $g(c,s)$ is specified as:

$$g(c,s) = \left(\omega\left(\frac{c}{\eta_{ij}^{c}}\right)^{\nu} + (1-\omega)\left(\frac{s}{\eta_{ij}^{s}}\right)^{\nu}\right)^{\frac{1}{\nu}}$$

Here, $\omega$ measures the taste for housing services relative to nondurable consumption goods and $\nu$ specifies the substitutability between these two goods. Moreover, $\eta_{ji}^{c}$ and $\eta_{ji}^{s}$ are demographic shifters which control for changing household sizes over the life-cycle. These shifters vary by age $j$ and household type $i$, i.e. whether the household is a couple, single woman or a single man. $\eta$ smaller than the overall number of household members indicates economies of scales within households. Importantly, these shifters are allowed to differ between nondurable consumption goods and housing services to account for the fact that housing services may be shared more easily among individual household members (Nelson, 1988) than non-durable consumption goods such as food or clothing. Hence, in the current framework, differences in household size alter the optimal allocation of resources *across goods* within one period in addition to affecting the optimal allocation of resources *over time*.

#### 3.1.1 Bequest Motive

In the event of death, individuals derive utility from leaving bequests as in De Nardi (2004):

$$\phi(a', H') = L\frac{(\xi + a' + p_h H')^{1-\gamma}}{1-\gamma}$$

where $a'$ denotes the be-quested financial assets, $p_h H'$ is the value of the be-quested house, $\xi$ captures the luxuriousness of the bequest motive and $L$ governs the bequest intensity. Couples value leaving bequests if they both die within the same period. Whenever only one spouse dies, the surviving spouse keeps the house and continues life as a single with a fraction of the couples' financial assets to account for bequests to non-spousal heirs.

### 3.2 Children

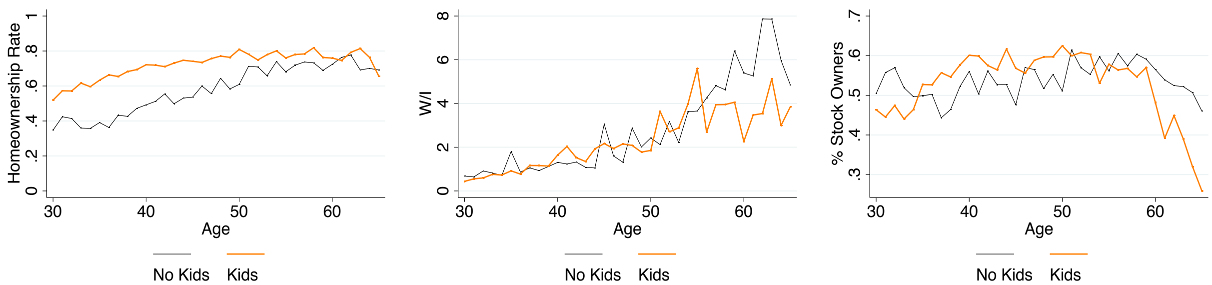
During their 30s and 40s, more than 80% of couples and more than 60% of single women have children living in their household, whereas only around 20% of single men do.[9] In turn, children may directly affect household's savings decisions and portfolio allocation. Figure 8 shows that households with kids are indeed more likely to be homeowners but do not significantly differ from childless households in terms of savings behavior or stock market participation. Moreover, conditional on household type, differences in homeownership rates by kids disappear for single women and become very small for couples and single men (Figure 9). Thus, it seems that marital status per se is a more important predictor for portfolio choices than having children. This finding confirms Peter et al. (2020) who show that once

[9] Own calculations from SCF data.

they control for being couple or single, children do not explain any additional variation in the housing tenure choice across a sample of European countries.

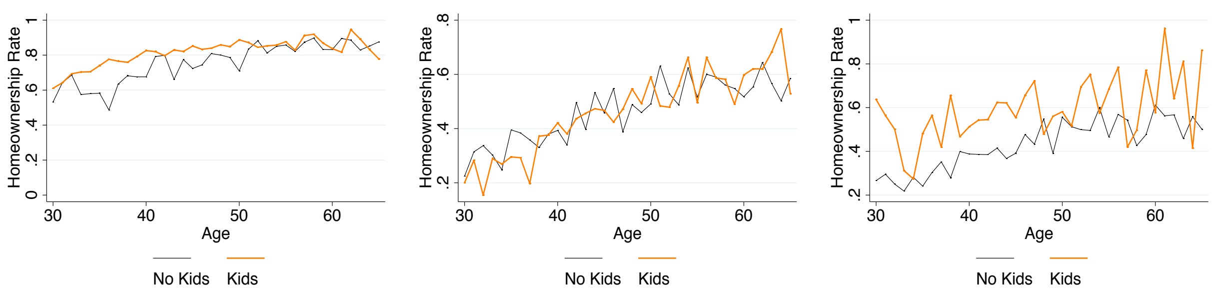
Motivated by these data patterns, I chose to let children enter the model as a deterministic function of age, gender and marital status through changes in the demographic shifter for non-durable consumption goods $\eta^c$ and for shelter services $\eta^s$. In particular, I compute the average number of kids by marital status, gender and age from the SCF and allocate that number of children to all agents in the model who are in the respective age group and have the respective household type.

Figure 8: Children and Portfolio Composition




(a) Homeownership Rate (b) W/I Ratio (c) SMP Rate

Figure 9: Children and Homeownership Rate by Marital Status




(a) Couples (b) Single Women (c) Single Men

## 3.3 Household Earnings

### 3.3.1 Working Age

During working age, households inelastically supply labor and face uninsurable labor income shocks. In particular, I assume that labor income can be split into a deterministic and into a stochastic component and that both of these components vary by household type (couples, single men, single women). Income $y_{ij}$ at age $j$ for household type $i$ can be expressed as:

$$y_{ij} = \bar{x}_i \Xi_{ij} \tilde{y}_{ij}$$

where $\bar{x}_i$ denotes a constant and $\Xi_{ij}$ stands for an age-specific component. $\tilde{y}_{ij}$ represents the stochastic component of labor income.

Recently, a growing literature has emphasized higher-order properties of the labor income process to explain economic decision-making of households (e.g. Guvenen et al., 2021, De Nardi, Fella, Knoef, Paz-Pardo, and Van Ooijen, 2021). In particular, these papers show that households' earning dynamics are characterized by negative skewness and excess kurtosis, both properties that a normally distributed income shock fails to capture.[10] To nevertheless be able to account for these properties in my set-up, I parameterize $\tilde{y}_{ij}$ as an AR(1) process with a Gaussian mixture:

$$\tilde{y'} = \rho \tilde{y} + \nu$$

where $\rho \in (0, 1]$ captures the persistence of shock $\nu$ which is defined as:

$$\nu = \begin{cases} \mathcal{N} \sim (\mu_1, \sigma_1^2) & \text{with probability } p_{\tilde{y}} \\ \mathcal{N} \sim (\mu_2, \sigma_2^2) & \text{with probability } (1 - p_{\tilde{y}}) \end{cases}$$

For small $p_{\tilde{y}}$, negative $\mu_1$, large $\sigma_1^2$ and small $\sigma_2^2$, this parameterization allows for negative

[10] Negative skewness implies that the median of a distribution is lower than it mean, i.e. that low realizations are more likely to occur than high realizations. In turn, excess kurtosis describes heavy tails, meaning that most households experience very small earning changes, however when hit by a shock, these tend to be quite large.

skewness and excess kurtosis as observed in the data. Note that, to keep the process stationary, it has to hold that $\mu_2 = \left(\frac{-p_{\tilde{y}}}{1-p_{\tilde{y}}}\right)\mu_1$.

### 3.3.2 Retirement

During retirement, households are no longer subject to uninsurable income shocks but receive a flat pension payment that is modeled as a fraction of their last realized labor income.

## 3.4 Asset Markets

### 3.4.1 Financial Assets

Households can choose between two types of financial assets: one-period safe assets ($a_s$) and one-period risky assets ($a_r$). Each period, they have a continuous portfolio choice between these two. The safe asset pays a time-invariant return $r_s$. In contrast, the return of the risky asset is drawn from the distribution $r_r \sim N(\mu_r, \sigma_r^2)$ that is assumed to be i.i.d and for which it holds that $\mu_r > r_s$. Following Fagereng, Gottlieb, and Guiso (2017), I allow for the possibility of stock market crashes and augment the return of the risky asset by a "disaster" state. That is, with probability $(1 - p_{tail})$ the return is drawn from the above normal distribution and with probability $p_{tail}$ a tail event $r_{tail} < \underline{\mathrm{r}}_r$ materializes. Whenever households chose to invest part of their financial savings into risky assets, they have to pay a per-period lump-sum participation costs $S^F$ to do so.[11] Moreover, homeowners can borrow in one-period mortgages against their house, which entails a borrowing premium, i.e. $r_m > r_s$. Additionally, mortgages are subject to an LTV requirement, meaning that the maximum amount of debt that a household can hold is a fraction $\zeta_h$ of the price of its home.

[11] In the household finance literature, there is an ongoing debate whether stock market participation costs are best approximated by per-period lump-sum costs as in e.g. Vissing-Jorgensen (2002) or Gálvez (2018), or by one-time entry costs, as e.g. in Alan (2006), Cocco (2005) or Gomes and Michaelides (2005). Whereas taking a stance towards either of them is beyond the scope of this paper, I chose to introduce per-period stock market participation costs in order to avoid having to introduce risky asset holdings as an additional state variable.

### 3.4.2 Housing

As in Kaplan, Mitman, and Violante (2020), households can either be homeowners or renters who have access to houses of discrete sizes which belong to a finite set:

$$\mathcal{H} = \{R_1, \ldots, R_R, H_1, \ldots, H_H\}$$

where $R$ denotes renting. Both renters and homeowners derive utility from housing services $s$ that are modeled as a correspondence between the size of the house $\mathcal{H}$ and the consumption benefits $s$ derived from it. Owner-occupied housing $H$ can be bought at a fixed price $p_H$ which deterministically appreciates over time. Moreover, for homeowners, their house serves as collateral for mortgages. Housing is illiquid, meaning that households have to pay a fraction of the house price whenever they sell or purchase a home. Additionally, they have to pay annual maintenance costs which captures both actual maintenance works but also other housing-related flow expenses such as property taxes. If households are renters, they cannot borrow and also do not accumulate housing wealth. Additionally, they have to pay rent each period which is modeled as a fraction of the lowest house price (rent-to-price ratio).

## 3.5 Marriage and Divorce

### 3.5.1 The Evolution of Marital Transitions

Single individuals get married with an exogenous probability that depends on their gender $i$, age $j$ and current productivity realization $\tilde{y}$. Denote this marriage probability by $\mu(i, j, \tilde{y})$. Conditional on meeting a partner, the probability of meeting a partner such that the couples' productivity realization is $\tilde{y}_c$, depends stochastically on the individual's own productivity realization $\tilde{y}_i$ according to:

$$\Pi(.) = \Pi(\tilde{y}_c | \tilde{y}_i)$$

Both partners always that the same age. Moreover, individuals are matched to a partner who holds the mean empirical amount of assets (conditional on age and gender). Finally, prospective spouses are either renters or own the smallest house. This specification is able to generate assortative mating as we observe it in the data while at the same time allowing for the possibility that, low-income women are less likely to transition into low-income couples than low-income single men. Moreover, couples face an age-and productivity dependent exogenous divorce probability $\lambda(j, \tilde{y})$ each period. In the event of divorce, I again assume that the expected productivity of both spouses depends on the couples' current productivity realization and that these expectations are allowed to differ across husband and wife.

### 3.5.2 Asset allocation after Marital Shocks

Given that marital transitions occur exogenously, it is crucial to carefully model asset allocation rules upon marriage and divorce as these directly affect the financial riskiness of marital shocks and consequently the savings behavior and portfolio composition of households.

If two individuals get married, I assume that they pool all of their financial wealth. If neither spouse owns a house at the time of the marital shock, the couple starts married life as renters (and can subsequently jointly re-optimize). If one of the spouses owns a house, the renting spouse moves in with the owning spouse. Lastly, if both spouses are homeowners at the time of marriage, the couple moves into the larger house and is forced to sell the smaller one.

In contrast, if couples who are homeowners get divorced, they can either liquidate their house or let one of the spouses keep it. In the former case, after having liquidated their house, they split all assets equally with a fraction of them being destroyed (to account for e.g. legal fees). In contrast, if one of the spouses keeps the house, the other spouse receives a larger fraction of the couples' financial assets (again, after an exogenous fraction has been destroyed). I impose that all couples who hold negative financial wealth have to liquidate their house. This assumption is necessary to avoid situations in which one spouse receives the entire wealth following a divorce.[12] Lastly, renting couples split their financial assets equally upon divorce, again with a fraction of them being exogenously destroyed.

[12] Because the LTV requirement in the model has to hold each period, households' net worth is always positive.

## 3.6 Taxes

Households have to pay flat capital taxes $\tau_c$ on capital income both from the safe and the risky asset. Moreover, labor income is subject to a progressive tax. The specification of the tax function follows Benabou (2002), Heathcote, Storesletten, and Violante (2017) and Guner, Kaygusuz, and Ventura (2014) and assumes that pre-tax earnings $y$ map into post-tax earnings $\mathbb{Y}(y)$ according to:

$$\mathbb{Y} = y - t(y)$$

where $t(y)$ specifies the amount of taxes paid and is defined as:

$$t(y) = 1 - \tau_l \hat{y}^{-\tau_p}$$

$\tau_l$ governs the average level of taxation and $\tau_p$ determines its degree of progressiveness. The function input $\hat{y}$ denotes labor income divided by average labor income, that is $\hat{y} = \frac{y}{\bar{y}}$. As in the US tax code, mortgage payments above the standard deduction are deductible from the income tax, hence reducing the taxable amount of income, $y$. The home mortgage interest deduction (HMID) is one of the largest tax expenditure in the United States (Sommer and Sullivan, 2018) and is, given the progessitivey of income taxes, over-proportional beneficial for households with higher marginal tax rates.

## 3.7 Timing

Timing within one period is as follows. In the beginning of period $t$ all shocks materialize. That is, households learn their current productivity state, their stock market return and their marital status. Thus, agents start period $t$ with a given amount of net worth that depends on their decisions in period $t-1$, their marital status and the realization of shocks. Afterwards, they decide on how much to consume, on their housing stock next period, whether they want to take out a mortgage and how much to save in both the risky and the safe asset. If investing part of their endowment in the risky asset (i.e. if $a_{r_{t+1}} > 0$), they have to pay the participation costs $S^F$ in the *current* period, that is in period $t$.

## 3.8 Recursive Formulation

I express the problem recursively by defining six value functions: the value function for singles, the value function for couples and the value function for an individual living in a couple, all during working age as well as during retirement. The latter is the relevant object when computing the present value of marriage for a single whereas the value function for couples determines the optimal allocation of resources within a couple across time (Borella, De Nardi, and Yang, 2019). Moreover, because mortgages are modeled as one-period debt and because the stock market participation cost has to be paid per-period and given the i.i.d nature of the return process for the risky asset, I can combine financial assets and labor income into one "cash-on-hand" state variable: $a = \sum_{k=r,s}(1 + (1 - \tau_c)r_k)a_k - (1 + r_m)m + \mathbb{Y}(y(.), m)$ where $\mathbb{Y}(.)$ denote after-tax earnings as described in section 3.6.[13]

### 3.8.1 Singles – Working Age

The state variables of a single agent are her gender $i$, age $j$, cash-on-hand $a$, her current house $\mathcal{H}$ (which can, in the case that $\mathcal{H} = R$, be rented) and her current stochastic productivity realization $\tilde{y}$.[14] Each period, she decides on consumption, her housing stock next period, how much to invest in mortgages, the safe and the risky asset. The corresponding value function reads as:

$$\begin{aligned} V^S(i, j, a, \mathcal{H}, \tilde{y}_i) = \max_{a_r', a_s', \mathcal{H}', m', c} & \; u(c, s) + \beta(1 - \mu(i, j, \tilde{y}_i))\mathbb{E}V^S(i, j + 1, a', \mathcal{H}', \tilde{y}_i') \\ & + \beta\mu(i, j, \tilde{y}_i)\mathbb{E}\hat{V}^C(j + 1, \tilde{a}', \tilde{\mathcal{H}}', \tilde{y}_c') \end{aligned}$$

$$a_r' + a_s' - m' + c = a + p_h\mathcal{H} - p_h\mathcal{H}' - \underbrace{\mathbb{1}_{\mathcal{H}' \neq \mathcal{H}}\Phi(\mathcal{H}, \mathcal{H}')}_{\text{Adjustment cost}} - \underbrace{\mathbb{1}_{a_r' > 0}S^F}_{\text{SMP cost}} - \underbrace{\mathbb{1}_{\mathcal{H} = R}\alpha p_h H_1}_{\text{Rent}} - \underbrace{\mathbb{1}_{\mathcal{H} \neq R}\pi\mathcal{H}}_{\text{Maintenance cost}}$$

$$\underbrace{m' \leq \zeta_h p_h \mathcal{H}'}_{\text{LTV - Constraint}}$$

[13] Because labor income is not i.i.d, I still keep track of the current productivity realization $\tilde{y}$ when expressing the problem recursively.

[14] Strictly speaking, $i$ denotes family type, i.e. single men, single women or couple. However, when considering only single households, family type and gender can be used interchangeably.

$$c \geq 0 \qquad a = \underbrace{\sum_{k=r,s}(1+(1-\tau_c)r_k)a_k - (1+r_m)m + \mathbb{Y}(y(i,j,\tilde{y}_i),m)}_{\text{"cash-on-hand"}}$$

where $\tilde{a}'$ and $\tilde{\mathcal{H}}'$ stands for expected financial assets and housing stock, respectively, in the next period if the individual gets married with probability $\mu(i,j,\tilde{y}_i)$. $p_h$ denotes the current house price. For the case of renters (i.e. if $\mathcal{H} = R$), $p_h = 0$.

### 3.8.2 Singles – Retirement

During retirement, agents do not supply labor and receive a fixed pension income that depends on their last labor income realization. There is no marriage or divorce. Retired individuals face survival risk $\psi_{ij}$, leaving as state variable gender $i$, age $j$, cash-on-hand $a$, their housing stock $\mathcal{H}$ as well as the last income realization before retirement ($\hat{y}_i$). In the last period of their certain life ($J$), they have to re-pay all their debt.

$$V_R^S(i,j,\mathcal{H},a,\hat{y}_i) = \max_{a'_s,a'_r,\mathcal{H}',m',c} u(c,s) + \\ \beta\psi_{ij}\mathbb{E}V_R^S(i,j+1,\mathcal{H}',a',\hat{y}_i) + \beta(1-\psi_{ij})L\frac{(\xi + a' + \mathcal{H}')^{1-\gamma}}{1-\gamma}$$

$$a'_r + a'_s - m' + c = a + p_h\mathcal{H} - p_h\mathcal{H}' - \mathbb{1}_{\mathcal{H}'\neq\mathcal{H}}\Phi(\mathcal{H},\mathcal{H}') - \mathbb{1}_{a'_r>0}S^F - \mathbb{1}_{\mathcal{H}=R}\alpha p_h H_1 - \mathbb{1}_{\mathcal{H}\neq R}\pi\mathcal{H}$$

$$m' \leq \zeta_h p_h \mathcal{H}' \qquad m_J = 0$$

$$c \geq 0 \qquad a = \sum_{k=r,s}(1+(1-\tau_c)r_k)a_k - (1+r_m)m + \mathbb{Y}(pen(\hat{y}),m)$$

### 3.8.3 Couples – Working Age

The value function for couples during working age is needed to compute optimal allocation for a couple that consists of a women $f$ and a man $m$. The state variables of a couple can be summarized by their age $j$ (which is assumed to be the same across spouses), their joint cash-on-hand $a$, their joint housing state $\mathcal{H}$ as well as their current productivity realization

$\tilde{y}_c$. The corresponding value function reads as:

$$V^C(j, a, \mathcal{H}, \tilde{y}_c) = \max_{a'_r, a'_s, \mathcal{H}', m', c} u(c, s) + \\ \beta(1 - \lambda(j, \tilde{y}_c))\mathbb{E}V^C(j + 1, a', \mathcal{H}', \tilde{y}'_c) + \beta\lambda(j, \tilde{y}_c)\mathbb{E} \sum_{i=f,m} V^S(j + 1, \tilde{a}', \tilde{\mathcal{H}}', \tilde{y}'_i)$$

$$a'_r + a'_s - m' + c = a + p_h\mathcal{H} - p_h\mathcal{H}' - \underbrace{\mathbb{1}_{\mathcal{H}' \neq \mathcal{H}}\Phi(\mathcal{H}, \mathcal{H}')}_{\text{Adjustment cost}} - \underbrace{\mathbb{1}_{a'_r > 0} S^F}_{\text{SMP cost}} - \underbrace{\mathbb{1}_{\mathcal{H}=R}\alpha p_h H_1}_{\text{Rent}} - \underbrace{\mathbb{1}_{\mathcal{H} \neq R}\pi\mathcal{H}}_{\text{Maintenance cost}}$$

$$\underbrace{m' \leq \zeta_h p_h \mathcal{H}'}_{\text{LTV - Constraint}}$$

$$a = \underbrace{\sum_{k=r,s}(1 + (1 - \tau_c)r_k)a_k - (1 + r_m)m + \mathbb{Y}\left[y_c(j, \tilde{y}_c), m\right]}_{\text{“cash-on-hand”}}$$

Again, $\tilde{a}'$ and $\tilde{\mathcal{H}}'$ denote expected financial assets and housing, respectively, in the following period if the couple gets divorced with probability $\lambda(j, \tilde{y}_c)$.

### 3.8.4 Couples – Retirement

As for singles, retired couples receive a flat pension income that depends on their last income realization before retirement ($\hat{y}_c$). They do not work and cannot get divorced. However, they individually face the risk of dying. If one spouse dies, the surviving one continues his or her life as single with a fraction $\delta$ of the couple's assets and – if they are homeowners – keeps the house. If both spouses die within the same period, they jointly value leaving bequests. Their value function reads as:

$$V_R^C(j, a, \mathcal{H}, \hat{y}_c) = \max_{a'_s, a'_r, \mathcal{H}', m', c} u(c, s) + \beta\psi_{jf}\psi_{jm}\mathbb{E}V_R^C(j + 1, a', \mathcal{H}', \hat{y}_c) + \\ \beta \sum_{i=f,m} \psi_{ij}(1 - \psi_{-ij})\mathbb{E}V_R^S(i, j + 1, \delta a', \mathcal{H}', \hat{y}_i) + \\ \beta(1 - \psi_{jf})(1 - \psi_{jm})L\frac{(\xi + a' + \mathcal{H}')^{1-\gamma}}{1 - \gamma}$$

$$a'_r + a'_s - m' + c = a + p_h\mathcal{H} - p_h\mathcal{H}' - \mathbb{1}_{\mathcal{H}' \neq \mathcal{H}}\Phi(\mathcal{H}, \mathcal{H}') - \mathbb{1}_{a'_r > 0}S^F - \mathbb{1}_{\mathcal{H}=R}\alpha p_h H_1 - \mathbb{1}_{\mathcal{H} \neq R}\pi\mathcal{H}$$

$$m' \leq \zeta_h p_h \mathcal{H}' \qquad m_J = 0$$

$$c \geq 0 \qquad a = \sum_{k=r,s} (1 + (1-\tau_c) r_k) a_k - (1 + r_m) m + \mathbb{Y}(pen(\hat{y}_c), m)$$

### 3.8.5 Value to an individual of becoming a Couple

The value of an individual in a couple is the relevant object when computing the value of single $i$ for getting married to partner $p$, i.e. the present discounted value of the individual's utility in the event of marriage (Borella et al., 2019). In this context, variables denoted with a $\hat{hat}$ indicate optimal allocations computed with the value function for couples, given the respective state variables. The value of an individual in a retired couple $\hat{V}_R^C$ is defined accordingly.

$$\hat{V}^C(i, j, a, \mathcal{H}, \tilde{y}_c) = u(\hat{c}, \hat{s}) + (1 - \lambda(j, \tilde{y}_c)\beta \mathbb{E} \hat{V}^C(i, j+1, a', \mathcal{H}', \tilde{y}_c') +$$
$$\lambda(j, \tilde{y}_c)\beta \mathbb{E} V^S(i, j+1, a', \tilde{\mathcal{H}}', \tilde{y}_i')$$

# 4 Calibration

I calibrate the model using a two-step strategy as standard in the literature (e.g. Cagetti, 2003, Gourinchas and Parker, 2002). That is, I first calibrate all parameters that can be identified directly from the data and set some other parameters in line with the literature. Second, I internally calibrate the remaining parameters.

## 4.1 Externally chosen Parameters

I calibrate my model to the years from 1989 until 2017. Table 4 summarizes all externally calibrated parameters. One period in the model corresponds to two years in the data, in line with PSID frequency. I assume that the housing grid is defined over five discrete choices: two rentals and three sizes for homeowners, that is $\mathcal{H} = \{R_1, R_2, H_3, H_4, H_5\}$. I set the coefficient of relative risk aversion $\gamma$ to 1.5 and the housing utility share $(1-\omega)$ to 0.1, both values that are common in the housing literature. Next, I borrow the parameter for the bequest intensity $L = 0.128$ and for the luxuriousness of bequests $\xi = 0.73$ from Cooper and Zhu (2016) who estimate both values in the context of a portfolio choice model with CRRA preferences. The average rent-to-price ratio is 0.1, as estimated in Davis, Lehnert, and Martin (2008), and corresponds to the value of the small house. In particular, I assume the rent for the small house to be 5% of the smallest house price and that of the big rental house to be 15% of the smallest house price. I follow Cocco (2005) and set the annual maintenance costs to be 1% of the house price. The LTV constraint is set to 0.8 (i.e. households can borrow up to 80% of their house value) and adjustment costs are assumed to be 10% of the house house price, equally distributed among buyer and seller, both values taken from Paz-Pardo (2020). In the following, I describe in more detail how I estimate the processes for labor income, marital transitions, asset returns as well as tax-related parameters, survival probabilities and initial conditions directly from the data.

### 4.1.1 Labor Income Profiles

Figure 10 shows life-cycle profiles of average household labor income for single men, single women and couples, expressed as annual income out of labor earnings (including labor income from farms and businesses) and social security benefits converted into 2007 dollars using the CPI-U.[15] I drop households who, according to the described measure, report less than \$500 annual income. To estimate the income profiles, I follow Borella et al. (2019) and first split the sample by household type and then separately regress the log of income for household i at age j,

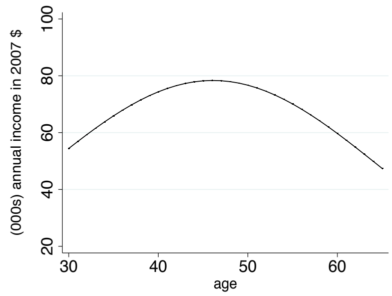
$$log(income_{ij}) = \alpha + \beta_1 age_{ij} + \beta_2 age_{ij}^2 + \beta_3 woman_i * age_{ij} + \beta_4 woman_i * age_{ij}^2 + \delta_i + u_{ij}$$

on a fixed effect $\delta_i$, age, $age^2$ as well as – for singles – their interaction term with a dummy that indicates if the individual is a woman. Furthermore, for singles, to obtain shifters for gender, I regress the sum of the fixed effect and the residual on a gender dummy:

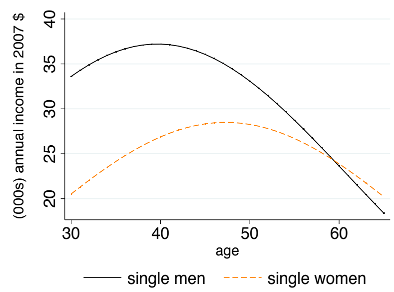
[15] CPI estimates taken from the US Bureau of Labor Statistics, available under this link [Accessed April 19, 2021].

$$\delta_i + u_{ij} \equiv w_{ij} = \gamma_0 + \gamma_1 woman_i + \epsilon_{ij}$$

Figure 10: Life Cycle Profiles of Income (Deterministic Component)




(a) Couples – HH Level




(b) Singles

The coefficients from these income equations (reported in Table 9 in Appendix B.1) inform me about the deterministic component of the income process which can be split into a constant and an age-specific part. Moreover, the gray values in Table 2 report the second, third and fourth empirical moment of residual income levels (i.e. of $\epsilon_{ij}$) in the cross section as well as for income changes within individuals over time. In line with previous literature (Guvenen et al., 2021, De Nardi et al., 2021), I find that the income process across all family types display negative skewness and excess kurtosis. Moreover, both the cross sectional variance and the variance in income changes is lower for couples than for singles, suggesting some form of insurance across spouses. For example, couples have the ability to pool individual income streams or to adjust spousal labor supply in response to income shocks, both margins that are not available to singles. In turn, lower income variance affects household's willingness to bear risk along other dimensions, such as asset markets (Heaton and Lucas, 2000, Fagereng, Guiso, and Pistaferri, 2018). Additionally, singles face a higher kurtosis in income changes. Thus, their income process is characterized by more heavy tails than that of couples, meaning singles face larger jumps in their period-by-period income transitions, adding an additional layer of risk.

I estimate the parameters governing the stochastic part of the income process $\tilde{y}$ with the simulated method of moments, requiring the process to match the empirical moments reported in Table 2. Given the functional form specified in Section 3.3.1, I need to estimate five parameters per family type. Table 1 summarizes the estimation results and Table 2 the corresponding data fit. My point estimates imply almost equal persistence across family types. However, singles face a larger variance $\sigma_1^2$ as well as $\sigma_2^2$ and their innovations are less likely to be drawn from the normal distribution with negative mean. The process matches very well the standard deviation and the kurtosis for both income changes and income levels by family type. In addition, it replicates the less negative skewness in income changes for single women, albeit generally predicting too low values for the skewness of income changes. In contrast, the model generated process implies slightly too large values for the skewness in the cross sectional dispersion of income realizations when compared to the data.

Table 1: Estimation Results – Stochastic Income Process

| | Couples | Singles | |
|---|---|---|---|
| Parameter | | Men | Women |
| $\rho$ | 0.7500 | 0.7502 | 0.7505 |
| $\mu_1$ | -0.0615 | -0.0909 | -0.1263 |
| $\sigma_1^2$ | 0.9508 | 1.4090 | 2.2888 |
| $\sigma_2^2$ | 0.3141 | 0.3288 | 0.4261 |
| $p_{\tilde{y}}$ | 0.2171 | 0.1514 | 0.0425 |

Table 2: Data vs. Model – Stochastic Income Process

| | Income Levels | | | Income Changes | | |
|---|---|---|---|---|---|---|
| | Couples | Singles | | Couples | Singles | |
| Moment | | Men | Women | | Men | Women |
| SD | 0.7934 | 0.9496 | 0.9524 | 0.5614 | 0.6711 | 0.6737 |
| | 0.7834 | 0.9257 | 0.9161 | 0.5665 | 0.7017 | 0.6669 |
| Skewness | -0.0969 | -0.0932 | -0.0412 | -0.1629 | -0.1565 | -0.0611 |
| | -0.1329 | -0.1514 | -0.2111 | -0.1190 | -0.1197 | -0.0301 |
| Kurtosis | 3.9445 | 3.5814 | 3.4568 | 7.5249 | 9.3101 | 10.3191 |
| | 3.9078 | 3.6574 | 3.4522 | 7.5280 | 9.3043 | 10.3260 |

*Notes:* Table 2 compares the second, third and fourth moment for income levels in the cross section as well as for income changes within individuals in the data (gray numbers) with those generated by the simulated income process (black numbers), given the parameter values listed in Table 1. Data are from the PSID, waves 1989-2017.

### 4.1.2 Pension Payments

Pension payments are flat and assumed to be 70% of income during the last year of work. That is, pensions differ by household type and by productivity state at age 65 to mimic in a parsimonious way that in the US, pension payments depend on average earnings throughout working life.

### 4.1.3 Marital Transition Probabilities

Figure 11a plots marriage probabilities by age and gender whereas Figure 11b displays divorce probabilities by age for individuals with a low, medium and high productivity realization, respectively. Both graphs are estimated using PSID data. Marital transitions are defined as the likelihood of getting married (respectively divorced) within the next period conditional on not being married (respectively being married) in the current period. More specifically, I estimate the following logit function, separately for couples and singles:

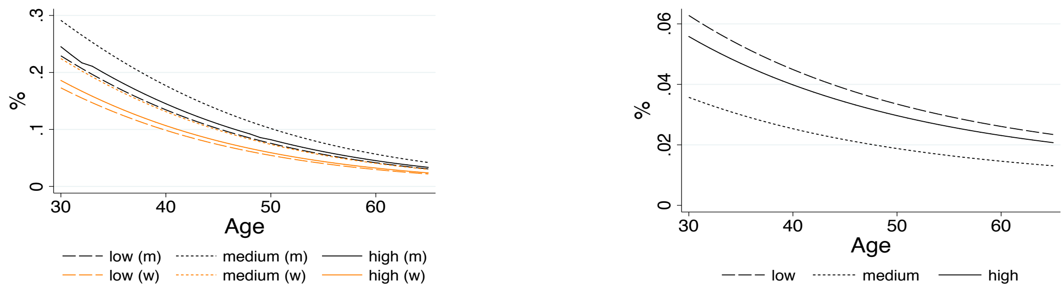
$$\xi_{t+1} = \frac{exp(X_t \beta^s)}{1 + exp(X_t \beta^s)}$$

where $\xi_{t+1}$ denotes the probability of being married (respectively divorced) next period. As explanatory variables, I include a constant, the age, age-squared, the current productivity realization (residuals from the income regression, see Section 4.1.1) and in the case of marriage, the gender of the individual.[16] Table 10 in Appendix B.2 reports the corresponding regression coefficients. Both marriage and divorce probabilities are declining in age and the likelihood of getting married is higher than to get divorced, especially for young individuals. And any given age, single women are less likely than single men to get married within the next year. Moreover, the probability of experiencing a marital transition is non-monotone in income: individuals with medium productivity (conditional on age and family type) face the highest marriage probability and are least likely to get divorced. In turn, individuals at the lowest end of the income distribution (again, conditional on age and family type), are most

[16] For couples, age refers to the average age across spouses.

likely to get divorced and have the smallest probability of getting married.

Figure 11: Marital Transition Probabilities




(a) Marriage Probability

(b) Divorce Probability

*Notes:* Figure 11 plots marriage and divorce probabilities by age for individuals with a "low", "medium" and "high" productivity realization, respectively. In Figure 11a, (m) refers to men and (w) refers to women. Estimates are based on logit regressions whose coefficients are reported in Appendix B.2. Data are from the Panel Study of Income Dynamics, waves 1989-2017.

### 4.1.4 Asset Returns

House prices grow deterministically at an annual rate of 1.6%. In addition, I set the annual return rate of the risk-free asset to 2% and assume a mortgage premium of 2%, i.e. $r_m = 0.04$. All values are taken from Cocco (2005). The risky asset has a normally distributed return plus a tail risk. That is, I first assume a risk premium of 4%, and a variance of $Var(\tilde{R}(s)) = \sigma_r^2 = (0.1758)^2$. The latter reflect the variance of the annual total return index of the S&P 500 from 1989 until 2016. With probability $1 - p_{tail}$, the return of the risky asset is drawn from that normal distribution and with probability $p_{tail}$ a disaster state materializes. $p_{tail}$ is set to 2% and results in a loss of 40% of all risky assets, both values that Barro (2009) empirically estimates form historical US data on stock market crashes. In the model, the risky asset return realization is modeled as a aggregate shock. When simulating the model for a large set of individuals over their life-cycle, I simulate the return of the risky asset to mimic the observed stock market performance in the US over the time-period of my sample (1989 until 2016).

**Correlation of stock returns and labor income**. The optimal portfolio share of households is sensitive to the correlation between stock market returns and labor income shocks

(Gomes, 2020). Therefore, I calibrate this correlation directly from historical FRED data. In particular, I follow Brandsaas (2021) and compute the correlation of year-on-year changes between the seasonally adjusted monthly S&P Index and yearly median real earnings. For the former, I take average values within each year to create yearly indices. Throughout my sample period, the correlation between wages and stocks is $-0.0825$ and not statistically significant different from zero which is why I assume the asset return shock individual labor income shocks to be uncorrelated in the model.

#### 4.1.5 Demographic Shifters

I obtain the demographic shifters $\eta^c$ and $\eta^s$ from Yang (2009). In her paper, she uses equivalence scales for non-housing consumption from Fernández-Villaverde and Krueger (2007) and follows Nelson (1988) who finds that economies of scales for housing are "so large that two can live as cheap as one half". Table 3 summarizes her results. The first two household members refer to adults and all remaining members refer to children. Next, I compute the average household size by age and by family type in my sample from the SCF and assign the corresponding values for both $\eta^c$ and $\eta^s$ to each household in the model.

Table 3: Equivalence Scales (Yang, 2009)

| Family Size | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|---|---|---|---|---|---|---|---|
| $\eta^c$ (non- housing) | 1 | 1.34 | 1.65 | 1.97 | 2.27 | 2.57 | 2.87 |
| $\eta^s$ (housing) | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.6 |

#### 4.1.6 Tax Parameters

I take the values for the tax parameters fo $\tau_l$ and $\tau_p$ from Guner et al. (2014) who estimate them by marital status and the number of children using IRS data. Specifically, I work with their estimates for married couples with one child (the median number of children for couples in my sample), which implies $\tau_l = 0.91$ and $\tau_p = 0.064$, and for singles without children (the median number of children for singles in my sample), resulting in $\tau_l = 0.882$ and $\tau_p = 0.036$.

Table 4: Externally Calibrated Parameters

| Parameter | Source | Value |
|---|---|---|
| Model Period Length | PSID frequency | 2 years |
| Housing Grid | – | $\{R_1, R_2, H_3, H_4, H_5\}$ |
| CRRA ($\gamma$) | – | 1.5 |
| Housing utility share ($1-\omega$) | – | 0.1 |
| Bequest Intensity | Cooper and Zhu (2016) | 0.128 |
| Luxuriousness of bequest | Cooper and Zhu (2016) | 0.73 |
| Rent-to-price ratio ($\alpha$) | Davis et al. (2008) | 0.1 |
| LTV | Paz-Pardo (2020) | 0.8 |
| Annual housing maintenance cost | Cocco (2005) | 0.01 |
| Housing adjustment cost | Paz-Pardo (2020) | {0.05;0.05} |
| Survival Probability | Life Tables | see text |
| Demographic Shifter ($\eta^s < \eta^c$) | Yang (2009) | see text |
| Tax Parameter | Guner et al. (2014) | see text |
| Initial Conditions | PSID, SCF | see text |
| Income Processes | PSID | see text |
| Prob. of Marriage ($\mu$) & Divorce ($\lambda$) | PSID | see text |
| Asset Returns | Cocco (2005), Barro (2009) | see text |

#### 4.1.7 Survival Probabilities

I compute the gender specific death probabilities at age $jf$ from the Life Tables of the US Social Security Administration as the likelihood to die within the next two years conditional on having survived up to age j.[17] Next, I take the inverse of those probabilities and work with average values between the years 1990, 2000 and 2010, corresponding to the sample period of my study. In the case of couples, both spouses face individual survival risk and thus, they may die in separate years. If one spouse dies, the surviving one keeps 70% of the household's assets to account for bequests to non-spousal heirs (Jones, De Nardi, French, McGee, and Rodgers, 2020).

#### 4.1.8 Initial Conditions

The initial distribution of housing in the model is chosen such that it mimics the distribution of homeownership rates by gender and marital status at age 30 in the SCF. In particular,

[17] All tables available under this link [Accessed April 19, 2021].

I assume that agents in the model initially either rent (with a 50:50 chance of renting the small or the big rental) or own the smallest house size. Next, I impose the initial distribution of asset holdings by homeownership status, gender and marital status at age 30 in the SCF. Finally, I take the distribution of couples and singles at age 30 from PSID data.

## 4.2 Internally calibrated Parameters

In the following, I explain the calibration of parameters that cannot be identified directly from the data. Table 12 summarizes the results. I focus in particular on the asset allocation upon marital shocks and on the elasticity of substitution between housing services $s$ and non-durable consumption goods $c$, which is pinned down by $\nu$.

### 4.2.1 Asset Allocation upon Marital Shocks

**Marriage.** In the event of marriage, I have to impose a distribution of potential partners that an agent gets matched with. To do so, I first restrict both partners to have the same age. Second, I assume that individuals are always matched to a partner who has the average amount of assets as in the data, conditional on age and gender. In 70% of marital unions, the prospective partner is a renter (with a 50:50 chance of living in the small or big rental), whereas the remaining 30% own a small house, corresponding to the average homeownership rate of singles below 40 (which is the time when most marriages occur). Lastly, I non-parametrically estimate the transition probabilities across productivity states when getting married from PSID data and feed them into the model.

**Divorce.** The model has two free parameters that determine asset splitting rules following a divorce: the fraction of assets that is exogenously destroyed upon a marital dissolution and the splitting rule of financial assets in the event that one spouse keeps the house. Following Cubeddu and Ríos-Rull (2003), I set the former to 20% and assume that in the latter case the spouse without the house is left with 70% of the remaining financial assets after 20% have been exogenously destroyed.[18] As for the case of marriage, I non-parametrically estimate the

[18] If the household holds debt at the time of divorce, it is forced to liquidate the house and to split the remaining financial assets equally, again with 20% being destroyed. See Section 3.5.2 for more details.

transition probabilities across productivity states when getting divorced separately for men and women from the PSID.

### 4.2.2 Elasticity of Substitution between $s$ & $c$

Each period, the optimal relation between non-durable consumption $c$ and housing services $s$ can be expressed as:[19]

$$c = s * \left(\frac{\omega}{1-\omega}\right)^{\frac{1}{1-\nu}} \left(\frac{\eta^s_{ji}}{\eta^c_{ji}}\right)^{\frac{\nu}{1-\nu}} \tag{1}$$

Large parts the housing literature set the elasticity of substitution to one (i.e. $\nu = 0$) which implies that the momentary utility function $g(c, s)$ takes the Cobb-Douglas form (e.g. Cocco, 2005, Yang, 2009). This assumption can be justified by the almost constant housing expenditure share by wealth and age in micro data (e.g. Davis and Ortalo-Magné, 2011). However, in my sample, I find that the housing expenditure share is larger for singles than for couples. Moreover, it is decreasing in the number of kids for couples during young ages.[20] Hence, my empirical findings indicate a negative relation between the housing expenditure share and the number of overall household members which is in line with Peter et al. (2020) who show that singles have a higher housing expenditure share on housing than couples in Europe. Guided by these results, I target the ratio of the housing expenditure share between couples and singles to pin down $\nu$ whereas $\omega$ governs the mean level of housing expenditure shares across household types. Recall that I take the values for $\eta^c$ and $\eta^s$ from Yang (2009) who works with $\eta^s < \eta^c$ (implying that economies of scale are larger for housing services than for other consumption goods) based on previous evidence (Nelson, 1988). In this case, for the housing expenditure share to be decreasing in the number of household members, it has to hold that $\nu < 0$, meaning that the elasticity of substitution between $c$ and $s$ is below one.

[19] Equation 1 refers to the case of continuous housing and thus cannot be directly mapped into the current set-up with a discrete housing choice. Nevertheless, its exposition is useful for understanding the effect of $\nu$ on the relation between $c$ and $s$, depending on household size.

[20] All corresponding Figures can be found in Appendix A.2.

### 4.2.3 Remaining Parameters

The remaining parameters can be summarized by the discount factor ($\beta$), the utility flow from housing services, depending on the specific house size ($s_1, s_2, s_3, s_4, s_5$), their price ($p_1, p_2, p_3, p_4, p_5$) as well as the stock market participation cost ($S^F$). First, I normalize the utility flow of the small rental $R_1$ to one and set the price for rental properties to zero. Hence, including $\nu$, the model has ten free parameters that I jointly calibrate to match ten moments. Table 5 summarizes the results.

I target the wealth-to-income ratio of couples at age 45 to match the discount factor and take its data value of 1.82 from the SCF. Note that I target the *net* wealth-to-income rate, that is net financial wealth (safe and risky assets net of mortgages) over household income, explaining why my data target is lower than values reported in previous papers. However, in the model, financial wealth of households is expressed as safe and risky assets net of mortgages which is why the empirical net wealth-to-income ratio is the moment that maps best into the model set-up. Next, I take the homeownership rate of couples at age 45 from the SCF to target the utility flow of living in the larger rental ($s_2$). In contrast, I calibrate the utility flow from owning to match the average housing share of couples at age 35 (for $s_3$), at age 45 (for $s_4$) and at age 55 (for $s_5$) in the SCF. The housing share is defined as the share of overall household wealth that is invested in housing. To pin down house prices in my model, I target average house prices (conditional on owning) at different ages. Finally, I match the mean stock market participation rate of couples at age 45 in the SCF to calibrate the flow cost of stock market participation.

Table 5 shows that the model matches its associated data targets well. The discount factor ($\beta = 0.888$) is low compared to frameworks with only one financial asset but close to values in the household finance literature (for example, Cooper and Zhu (2016) estimate an annual discount factor of 0.87 in a portfolio framework with CRRA preferences). The estimate for the utility flow of the big rental is $s_2 = 10$ whereas those of houses available for owing are $s_3 = 2$, $s_4 = 7$ and $s_3 = 10$. Hence, the per-period flow utility from owing the smallest house is twice as large as renting the smallest rental unit. Moreover, the utility flow from living in the large rental is calibrated to be equal to the utility flow of the biggest house size. The calibrated annual stock market participation cost of annually \$1,275 lies within the range of estimates from previous papers that include a flow cost of stock market participation, despite relatively low values for $\gamma$.[21] For example, Cocco (2005) reports an estimate of \$1,000 with a coefficient for the relative risk aversion of $\gamma = 5$. Catherine (2020) estimates a stock market participation cost of \$1,010 with a CRRA coefficient of $\gamma = 8.2$. However, the current framework additionally includes marital transition risk, lowering household's propensity to invest in risky assets and hence, requiring lower values of risk aversion to match stock market participation rates. Finally, I find a value for $\nu$ of -0.05, implying a elasticity of substitution between non-durable consumption goods and housing services of 0.95. Its slightly negative value reflects the slightly higher expenditure share of housing for singles in the data.

Table 5: Internally Calibrated Parameters: Targets & Fit

| Parameter | Key Moment | Data | Model | Value |
|---|---|---|---|---|
| Discount factor ($\beta$) | W/I (net) | 1.82 | 1.83 | 0.888 |
| Big rental size ($s_2$) | homeownership rate at 45 | 78% | 81% | 10 |
| Small ownership size ($s_3$) | Housing Share at 35 | 58% | 57% | 2 |
| Medium ownership size ($s_4$) | Housing Share at 45 | 61% | 53% | 7 |
| Big ownership size($s_5$) | Housing Share at 55 | 55% | 42% | 10 |
| Price of small house ($p_3$) | house value of owners at 35 | \$204,214 | \$146,552 | \$120,000 |
| Price of medium house ($p_4$) | —"— at 45 | \$238,085 | \$184,264 | \$180,000 |
| Price of big house ($p_5$) | —"— at 55 | \$239,957 | \$216,708 | \$255,000 |
| Stock market cost ($S^F$) | mean SMP at 45 | 62% | 62% | \$1,275 p.a. |
| Elasticity of subs. ($\nu$) | $\frac{\text{hous. expenditure share singles}}{\text{hous. expenditure share couples}}$ | 1.0860 | 1.0743 | -0.05 |

[21] The larger $\gamma$, the more risk averse are agents and hence, the lower their optimal portfolio share, for a given stock market participation cost.

## 4.3 Model Results

In this section, I validate the performance of my model externally, that is I show the fit of some important untargeted data profiles.

### 4.3.1 Asset Shifts around Marital Transitions

One key set of parameters in my framework governs the asset allocation around marital transitions (as described in Section 4.2.1), which directly affect their financial riskiness. As a first validation exercise, I therefore study how the model endogenously replicates empirical housing choices and changes in financial wealth in the years preceding and following a marital shock. Figure 12 displays the results, with values in the year prior to the marital transition normalized to zero. Because the SCF is a repeated cross-section and the PSID has a panel structure, I compute the empirical moments from the PSID despite matching homeownership rates and financial assets from the SCF.

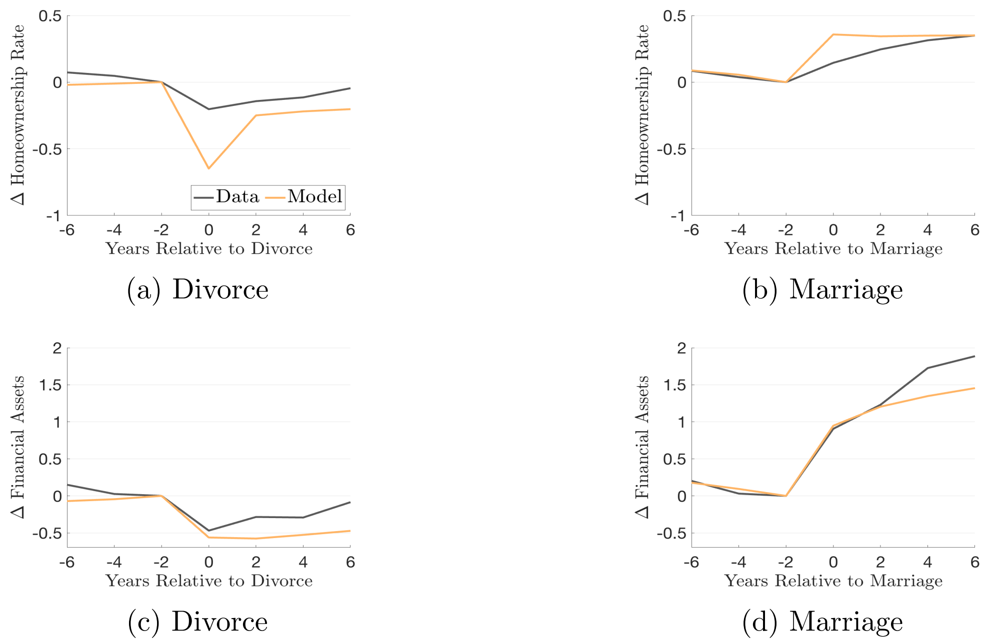
The model captures very well the increase in homeownership rates following a marriage and the evolution of financial wealth in the event of both marriage and divorce. In contrast, it over-predicts the drop in homeownership rates after a divorce which is partly mechanical: As at most one spouse can keep the house following a divorce, the model naturally produces a drop in homeownership of around 50%pts.[22] Nevertheless, given that the model generates an increase in homeownership rates close to empirical levels after only one model period (two years), I regard this validation exercise as successful.

### 4.3.2 Life-Cycle Profiles of Housing and Asset Accumulation

In Section 2, I show that couples are more likely to be homeowners than singles across all ages but that they, conditional on owing, live (per capita) in smaller houses. In contrast, couples accumulate (per capita) more financial wealth than singles. To test the model performance with regard to these observations, Figure 13 shows the model fit for life-cycle profiles of

[22] The drop would be exactly 50%pts if all divorcees decide that one spouse keeps the house and if the homeownership among couples were 100%.

Figure 12: Portfolio Allocation around Marital Shocks – Data vs. Model




(a) Divorce

(b) Marriage

(c) Divorce

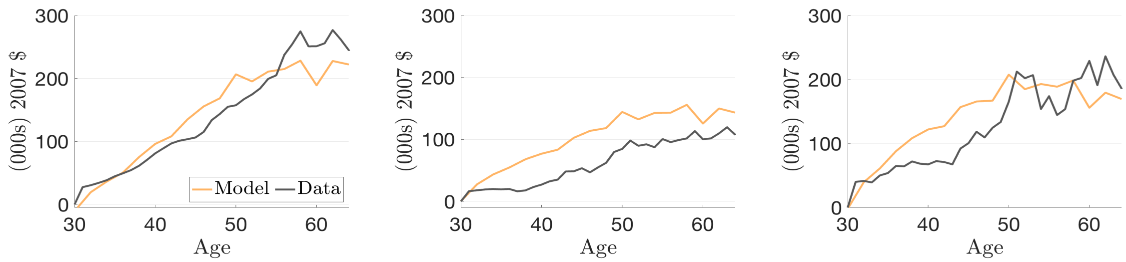
(d) Marriage

financial wealth accumulation across family types and Figure 14 compares homeownership rates for single men, single women and couples in the data with model-implied simulations. Finally, Figure 15 reports the model fit for the average housing wealth of homeowners. The model matches very well the financial wealth accumulation of couples and single men whereas it slightly over-predicts the wealth accumulation of single women. Moreover, the model is able to replicate the life-cycle path of homeownership rates across all family types but that, conditional on being a homeowner, couples live (per capita) in smaller houses. However, it overstates this marital gap compared to the data, in that it predicts too little housing wealth for owning couples. However, most importantly, the model is able to endogenously generate all three empirical pattern from Section 2: the marital gap in homeownership rates and in financial wealth as well as the reversed marital gap in conditional house values.

### 4.3.3 Further Results

Appendix C reports the model fit for the share of overall wealth hat households allocate to housing, safe and risky assets over the life cycle (corresponding to Figure 3 in Section 2). Additionally, in Appendix D, I test the robustness of my model with respect to moving

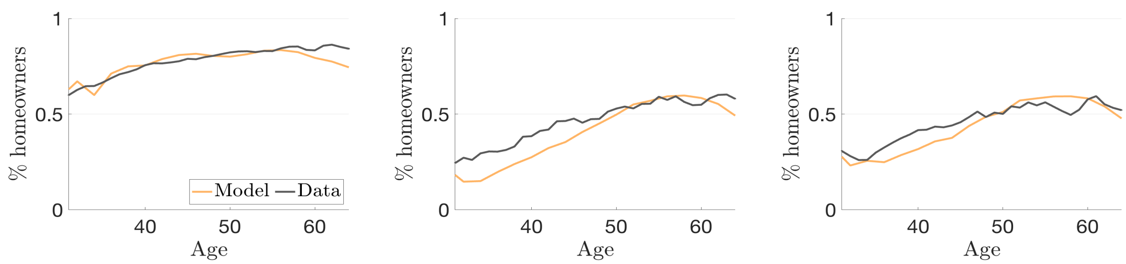
Figure 13: Financial Wealth by Family Type – Data vs. Model




(a) Couples (per capita) (b) Single Women (c) Single Men

*Notes:* Figure 14 plots the model fit for life-cycle profiles of financial wealth by family type. The gray lines refer to the data (waves 1989 to 2016 of the Survey of Consumer Finances (SCF)), whereas the orange lines plot model simulations.

Figure 14: Homeownership Rates by Family Type – Data vs. Model




(a) Couples (b) Single Women (c) Single Men

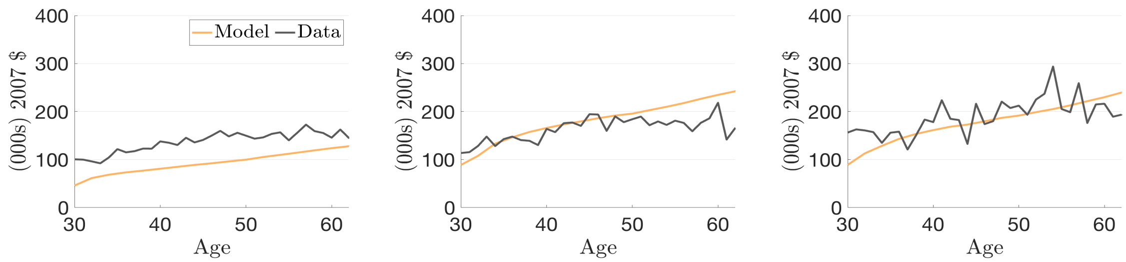
*Notes:* Figure 14 plots the model fit for life-cycle profiles of homeownership rates by family type. The gray lines refer to the data (waves 1989 to 2016 of the Survey of Consumer Finances (SCF)), whereas the orange lines plot model simulations.

frequencies. Previous literature has documented that couples move less often than singles (e.g. Mincer, 1978, Blackburn, 2010, Gemici, 2011, Burke and Miller, 2018). This pattern could shift the incentive of couples to purchase a home relative to that of singles: If I expect to move soon, I may prefer to rent a home and avoid the adjustment costs associated to owning. To address this concern, I validate the model fit with regard to empirical moving frequencies by martial status. In addition, I provide evidence that mortgage characteristics are similar across couples, single men and single women in the data, justifying my choice of introducing one mortgage rate for all households in the economy.

# 5 Explaining Marital Gaps in Investment Choices

By means of counterfactual simulations, I now study the sources of marital gaps in housing choices and in financial wealth. First, to analyze the role of marital risk, I shut down

Figure 15: Average Housing Wealth of Owners by Family Type – Data vs. Model




(a) Couples (per capita) (b) Single Women (c) Single Men

*Notes:* Figure 15 plots the model fit for the average house value of home owners by family type. The gray lines refer to the data (waves 1989 to 2016 of the Survey of Consumer Finances (SCF)), whereas the orange lines plot model simulations.

marriage and divorce, that is I set $\mu = \lambda = 0$. Next, I assign the deterministic part of couples' household income to both single men and single women, making singles effectively richer. Third, I assign singles the stochastic part of the couples' income process, reducing their exposure to income fluctuations. Next, I conduct a counterfactual in which I impose that singles have the same number of average household members than couples, hence I increase their average household size. To understand the importance of heterogeneity in tax rates, I assign single households the couple values for $\tau_c$ and $\tau_l$, changing both their average level of taxation as well as its progressiveness. Finally, I assume away any uncertainty in life-spans (i.e. all agents die at age 84) to isolate the effect of survival risk. In each counterfactual, I change one element, re-solve and re-simulate the model and contrast the resulting life cycle profiles to the benchmark economy.

## 5.1 Results on Counterfactuals

### 5.1.1 Average Values

Table 6 summarizes the relative importance of each channel in explaining the average marital gap in homeownership rates, conditional housing wealth and in financial wealth, respectively. In particular, the column "Bench" displays the results in the benchmark model whereas each further column reports the respective gap from counterfactual simulations. I define the marital gap to be the couples' outcome minus that of singles (explaining its negative value for the conditional house value).

Table 6: Average Marital Gap in Investment Choices – Counterfactuals

| Marital Gap in ... | Bench | $\lambda = \mu = 0$ | Inc. Risk | Inc. Level | HH Size | Taxes | $\psi_i = 1$ |
|---|---|---|---|---|---|---|---|
| Homeownership Rates | 34.61 | 18.12 | 39.71 | 20.30 | 35.60 | 35.95 | 35.86 |
| (Cond.) House Value | -84.97 | -69.68 | -80.60 | -99.79 | -87.67 | -86.00 | -84.43 |
| Financial Wealth | 20.14 | -19.69 | 28.41 | -117.65 | 31.33 | 15.21 | 15.55 |

My results indicate that marital risk as well as income profiles (both in terms of level and in terms of risk) are the most important factors in explaining marital gaps in investment choices. More specifically, shutting down marriage and divorce in the model reduces the marital gap in homeownership rates by 47.65% and the gap in conditional housing wealth by almost 18%. In contrast, after increasing the income level of singles to that of couples, the marital gap in homeownership rates shrinks by around 41% whereas it the marital gap in conditional housing wealth grows by 17.44%. Assigning singles the same income risk as couples lowers the marital gap in conditional housing wealth by 5.14% but widens the marital gap in homeownership rates by 13.18%. Finally, heterogeneity in household sizes, in tax rates and in survival risk contribute relatively less to the observed marital gaps in investment choices, especially with regard to housing.

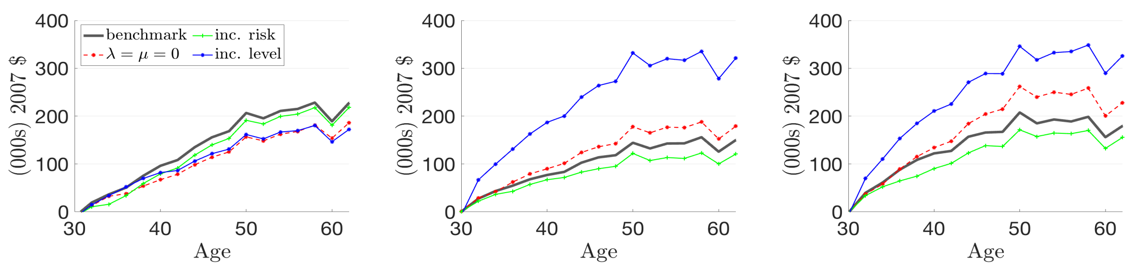
#### 5.1.2 Understanding the Mechanisms

In this section, I analyze in detail how marital risk and heterogeneity in income profiles, the three most important counterfactuals, contribute to the observed marital gap in investment choices. Figures 16 to 18 plot the life-cycle profiles of homeownership rates, financial wealth and conditional house values across family types in the benchmark as well as in the counterfactual simulations.

**Marriage and Divorce.** In the absence of divorce risk, couples accumulate less (precautionary) savings, as indicated by the red line in Figure 16a. In contrast, singles increase their savings in a world without marriage (Figures 16b and 16c). Divorce imposes a substantial financial risk on couples whereas marriage induces a moral hazard motive to not save (as much). In addition, in the absence of marital risk, singles increase their risky asset holdings, earning them higher returns, further contributing to the increase in financial wealth. In response, the marital gap in financial wealth reverses in the counterfactual that assumes away any marital transition risk. Through lower aggregate financial savings, the homeownership of couples falls (red line in Figure 17a), in particular for young households, despite them being more willing to become homeowners, conditional on state variables. In contrast, the homeownership rate of both single men and single women increases (Figures 17b and 17c) because of two factors: First, singles are more willing to invest in housing, conditional on states. Second, singles hold more financial wealth (through a higher savings rate and through more risky investments), enabling more single households to become homeowners.

Lastly, even though singles are on average richer and more likely to own a house, the average house values among single owners decreases (Figures 18b and 18c): because the asset threshold at which singles become homeowners decreases in the absence of marriage, the distribution of owners shifts towards smaller houses. In contrast, for couples, the conditional house value increases (Figure 18a), because many couple owners who lived in the small house become renters (through lower savings).

Figure 16: Counterfactuals – Financial Wealth Accumulation

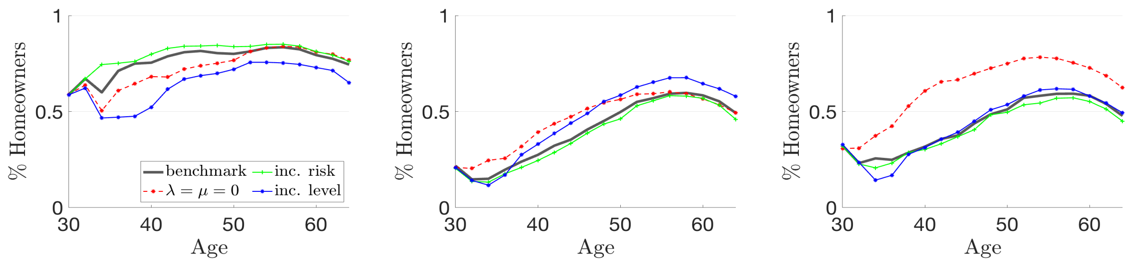



(a) Couples (b) Single Women (c) Single Men

*Notes:* Figure 16 plots the life-cycle profiles of financial asset accumulation by family types across different counterfactual scenarios. The gray lines denote the benchmark framework, the red lines refer to the case without marital transitions, the green lines arise from assigning the stochastic part of the income process of couples to both single men and single women whereas the blue lines result from assigning singles the same income level (deterministic part of the income process) as couples.

**Income Level.** Assigning singles the same income level as couples makes them effectively richer. Consequently, singles' financial wealth increases, as depicted by the blue lines in Figures 16b and 16c. At the same time, couples save less than in the benchmark because divorce is not as financially risky (Figure 16a). Through these aggregate changes in financial

Figure 17: Counterfactuals – Homeownership Rates




(a) Couples (b) Single Women (c) Single Men

*Notes:* Figure 17 plots the life-cycle profiles homeownership rates by family types across different counterfactual scenarios. The gray lines denote the benchmark framework, the red lines refer to the case without marital transitions, the green lines arise from assigning the stochastic part of the income process of couples to both single men and single women whereas the blue lines result from assigning singles the same income level (deterministic part of the income process) as couples.

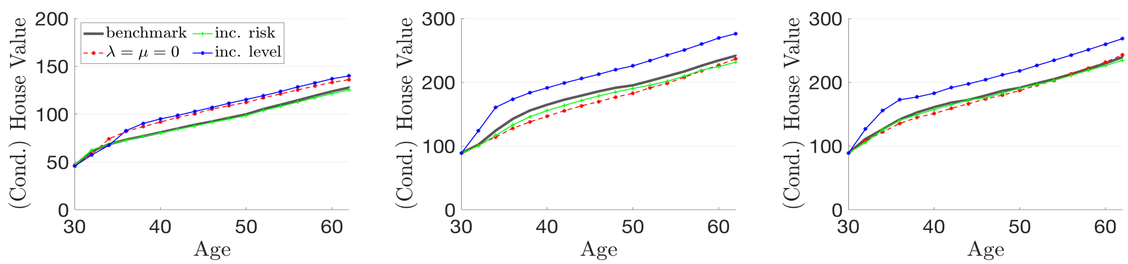
wealth, the share of single homeowners increases whereas that of couple homeowners falls (Figure 17), resulting in a reversion of the marital gap in financial wealth and a lower marital gap in homeownership rates.

Additionally, singles buy on aggregate larger houses, as shown in Figures 18b and 18c. This result arises from two sources: First, conditional on a certain asset level, singles are more willing to invest in larger houses if they expect a higher labor income in future periods. Second, they are less likely to buy the smallest house and rather remain renters in the large rental unit. The conditional house value of couples increases as well (Figure 18a) because as relatively low wealth owners become renters through decreases financial savings, the conditional distribution of couples' housing wealth shifts towards larger homes. Moreover, the asset threshold at which couples increase their house size decreases through reduced (marital) risk exposure. Quantitatively, the increase in conditional house values is larger for singles, explaining why the income level counterfactual results in an increase of the marital gap in housing wealth (Table 6).

**Income risk.** When lowering the income risk of singles to the same level than that of couples, precautionary savings of singles decline and they hold on aggregate fewer assets (green lines in Figures 16b and 16c). However, this effect is somehow damped as singles are also more likely to invest in risky assets than in the benchmark. Again, as the financial riskiness of divorce declines, couples accumulate less financial savings as well (Figure 16a).

Moreover, because of lower risk exposure in the labor market, singles are more willing to invest in housing (conditional on state variables). Nevertheless, through fewer financial savings, homeownership rates of singles slightly decrease on aggregate (Figures 17b and 17c). In contrast, couples' homeownership increases, as their larger willingness to invest in housing dominates the reduced savings motive. When considering conditional house values, I find that couples hardly change their housing wealth (Figure 18a), whereas the distribution of single owners shifts to slightly smaller houses (Figures 18b and 18c) because more relatively low asset single household chose to become homeowners instead of remaining renters.

Figure 18: Counterfactuals – (Conditional) House Value




(a) Couples (b) Single Women (c) Single Men

*Notes:* Figure 18 plots the life-cycle profiles of conditional house values by family types across different counterfactual scenarios. The gray lines denote the benchmark framework, the red lines refer to the case without marital transitions, the green lines arise from assigning the stochastic part of the income process of couples to both single men and single women whereas the blue lines result from assigning singles the same income level (deterministic part of the income process) as couples.

# 6 Implications for Policy Evaluation

In this section, I study the effectiveness of policies that aim at increasing homeownership and wealth accumulation in the current framework and compare the results to a standard bachelor set-up to demonstrate the importance of accounting for distinct family types and marital transitions when evaluating housing policies.

## 6.1 Increasing Homeownership

I consider two policy reforms: First, I lower the transaction costs of housing $\Phi$ from 5% to 2% of the house price. Second, I decrease the annual maintenance cost $\pi$ from annual 1% to annual 0.45% of the house price. In a parsimonious way, lowering housing maintenance costs can be seen as a reduction in property taxes. Hence, the first policy change facilitates housing adjustment in response to shocks whereas the latter aims at lowering the flow cost of housing. To make both policies comparable in magnitude, I require the average per-household gain to be similar across reforms. For example, when lowering housing adjustment costs from 5% to 2% of the house price, I calculate the overall "savings" on all housing transactions that occur in the economy after the policy implementation (i.e. 3% of the respective house price per transaction) and average these savings across all years and households. Table 7 displays the increase in homeownership rates across family types in response to either policy. The row "Annual per-HH Gain" reports the described measure of magnitude. *Panel I* shows the results for the benchmark economy whereas *Panel II* contains the results for a standard bachelor economy with one generic household type. To obtain these numbers, I collapse all three family types in my model and re-calibrate the income process, household sizes, tax parameters and survival risk for the entire population while keeping preference parameters as in the benchmark.[23] Finally, *Panel III* displays the results for an economy with distinct family types but without marriage and divorce, i.e. the benchmark framework with $\mu = \lambda = 0$.

*Panel I* shows that in the benchmark framework, both policies result in a quantitatively similar increase of homeownership rates. Moreover, their effect is rather similar across household types: for couples, both policies lift homeownership rates by around 6%pts, whereas the share of single homeowners increases by 4-5%pts. Next, when turning to *Panel II* that performs the same policy exercise in the bachelor framework, two observations stand out: First, aggregate homeownership rates increase more than in the benchmark, meaning both policies appear to be more effective in terms of helping households to become homeowners. In particular, homeownership rates increase by 8.43%pts when lowering housing adjustment costs and by 13.16%pts when reducing property taxes. Hence, the bachelor set-up overstates the effectiveness of the first policy by 53% and the effectiveness of the second policy by 133%. The intuition behind this result is that in the absence of marriage and divorce, households are more willing to invest their wealth into (indivisible) housing. Consequently, both poli-

[23] The bachelor framework matches well key aggregate data moments of asset accumulation and housing choices when using the same parameters as in the benchmark. See Appendix F for details.

Table 7: Comparing different Policies

| | Δ Homeownership Rate | |
|---|---|---|
| | $\Phi\downarrow$ (5% → 2%) | $\pi\downarrow$ (1% → 0.45%) |
| Annual per-HH Gain: | \$400 | \$390 |
| *Panel I: Benchmark* | | |
| Couples | +6.03%pts | +5.88%pts |
| Single Men | +4.30%pts | +4.73%pts |
| Single Women | +3.89%pts | +5.21%pts |
| Aggregate | +5.52%pts | +5.64%pts |
| *Panel II: Bachelor* | +8.43%pts | +13.16%pts |
| *Panel III:* $\lambda = \mu = 0$ | | |
| Couples | +9.16%pts | +13.02%pts |
| Single Men | +4.50%pts | +4.23%pts |
| Single Women | +4.11%pts | +6.64%pts |
| Aggregate | +8.46%pts | +11.91%pts |

cies attract more marginal home-buyers. Second, in *Panel II*, lowering maintenance costs of housing ($\pi\downarrow$) appears to be more effective than facilitating house size adjustments ($\Phi\downarrow$). Lower maintenance costs decrease the per-period expenditure commitments of homeowners and thus, make them less vulnerable to labor income fluctuations. However, when introducing marital transitions, households face the risk of having to sell their house (either following a divorce or because they move in with their prospective partner), increasing their desire for being able to do so at little cost.

Finally, *Panel III* illustrates the effect of allowing for distinct family types but abstracting from marriage and divorce. As before, both policies have a stronger effect on homeownership rates than in the benchmark, and lowering transaction costs appears to be more effective than reducing sales- and purchase costs of housing. However, in contrast to the bachelor set-up, *Panel III* reveals important heterogeneity across family types in terms of their policy response. For singles, I find hardly any difference in the increase of homeownership rates between *Panel I* and *Panel III*. In contrast, in the absence of marriage and divorce, couple households are substantially more responsive towards both types of housing policies.

## 6.2 Fostering Overall Wealth Accumulation

Enabling more households to become homeowners is often regarded as desirable because housing represents an important determinant of wealth accumulation for middle-class Americans. Therefore, in this section, I evaluate the proposed policy reforms in terms of increasing households' net worth. For comparison, I additionally study the effect of lowering stock market participation costs. The latter encourages households to invest into assets that pay high returns in expectations but can be more easily divided or pooled in the event of a marital shock. Table 8 reports the results.

As reported in *Panel II*, lowering maintenance costs again appears to be more effective than lowering adjustment costs in the bachelor framework. Whereas the former increases average household net worth by a little more than \$7,000, the latter does so by around \$3,000. Facilitating stock market participation ($\downarrow S^F$), in contrast, increases average household net worth by \$5,769. Hence, in the bachelor set-up, one would conclude that encouraging investment in risky financial assets (as opposed to housing investments) is not necessarily more effective in terms of increasing overall wealth accumulation. However, when turning to *Panel I* that introduces distinct family types and marital transitions, I find that lowering stock market participation costs increases average household net worth by \$8,737, whereas both types of housing policies increase average household net worth only by a little over \$5,000, altering the conclusion drawn from the results in *Panel II*. This effect is especially pronounced for singles. In particular, encouraging stock market participation increases the average net worth of single men by 228% more than fostering housing investment, the average net worth of single women by 123% more and that of couples by 31% more. For singles, housing is less attractive as they have lower labor income, are exposed to more labor income fluctuations and expect to may get married in the future. In addition, one can invest very small amounts of wealth into stocks whereas – given a minimum house size – homeownership requires larger amounts of wealth that households need to save to pay for the down payment.

Table 8: Comparing Policies – Net Worth

| | $\Delta$ Net Worth in \$ | | |
|---|---|---|---|
| | $\Phi\downarrow$ ($5\% \to 2\%$) | $\pi\downarrow$ ($1\% \to 0.35\%$) | $S^F\downarrow$ ($\$1,275 \to \$713$) |
| Annual per-HH Gain: | \$400 | \$390 | \$395 |
| *Panel I: Bench* | | | |
| Couples | 8,427 | 6,868 | 10,041 |
| Single Men | -3,701 | -1,571 | 5,996 |
| Single Women | 1,347 | 4,175 | 6,161 |
| Aggregate | 5,316 | 5,097 | 8,737 |
| *Panel II: Bachelor* | 2,945 | 7,015 | 5,769 |

Lastly, Table 12 in Appendix G reports how much of the increase in net worth is driven by changes in average house values and how much by changes in financial savings. Both types of housing policies increase housing investment at the expense of financial savings, while decreasing $S^F$ results in households substituting away from housing towards risky assets, slightly decreasing aggregate housing wealth.

# 7 Conclusion

In this paper, I first provide novel empirical evidence that singles are less likely to be homeowners than couples but that they – conditional on owning – allocate more wealth into housing. In contrast, couples accumulate per capita more financial wealth than singles. By developing a joint life-cycle framework of family types, housing and financial portfolio allocation, I show that low income levels of singles and the presence of marriage and divorce induce couples to accumulate more (precautionary) savings whereas it depresses savings of singles, contributing to the marital gap in financial wealth and in homeownership. In contrast, lower income risk of couples decreases the asset threshold at which they become homeowners, shifting the (conditional) distribution of couple owners towards smaller houses. Building on these results, I find that a bachelor set-up which abstracts from distinct family types and from marital transitions overstates the effectiveness of policies intended to increase homeownership and biases the comparison across different kind of reforms. To foster wealth accumulation, regulations that facilitate stock market participation turn out to be more effective than housing policies, especially for singles, as they encourage participation in high return but liquid asset markets.

Given that the share of single households in the population has been steadily increasing and is expected to further rise, taking household structure explicitly into account when studying macroeconomic outcomes will gain importance in the future. For example, an interesting extension of my framework would be to quantify asset price adjustments in response to changing demand that arises from demographic shifts. So far, most of the literature has focused on the impact of an aging society on the current low-interest environment. However, as singles demand more safe assets, a rising share of single households in the economy is another – potentially quantitatively important – structural factor that may further depress the equilibrium return on safe assets.

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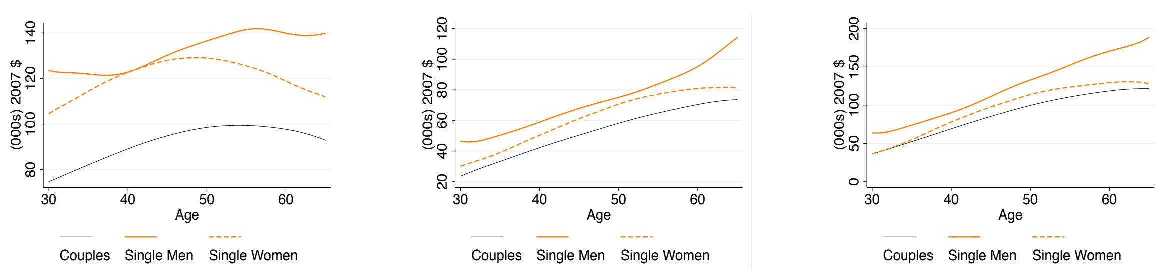
# A Supplementary Figures

In this section, I document additional empirical results to draw a more complete picture on housing and financial portfolio composition dynamics of single men, single women and couples in the United States.

## A.1 Life-Cycle Patterns of Portfolio Composition

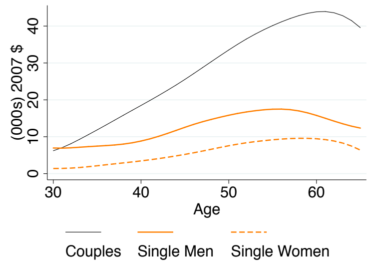
In Section 2, I show that the mean house value of owning singles is larger than that of owning couples (per capita). Figure 19 confirms this (negative) marital gap for the median house value, the mean home equity as well as for the median home equity. Across all specifications, the per-capita wealth of couples is lower than that of both single men and single women. Furthermore, Figure 20a plots median financial assets by family type, confirming that couples accumulate (per capita) more financial assets than singles. When separately considering the extensive and intensive margin of risky asset holdings, I find that couples are more likely to participate in the stock market than singles. However, conditional on participating, single men accumulate more risky assets than couples and single women, both with regard to the mean and the median of risky asset holdings. Finally, Figure 21 replicates Figure 3 but breaks housing equity into mortgages (red bars) and house value (dark gray bars).

Figure 19: Housing Choices Across Family Types – Further Specifications

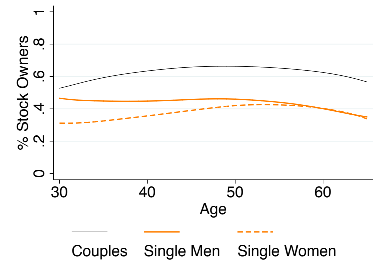



(a) Median House Value (b) Median Home Equity (c) Mean Home Equity

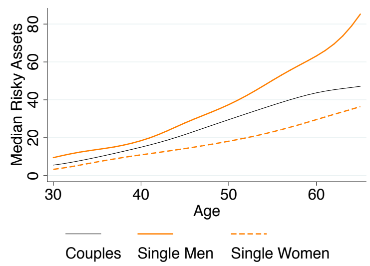
Figure 20: Financial Choices Across Family Types – Further Specifications



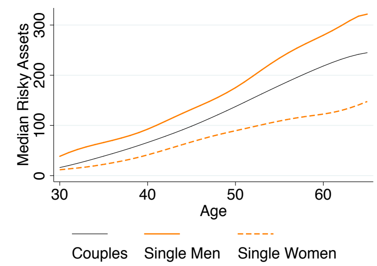

(a) Median Financial Assets




(b) Stock Market Participation




(c) (Cond.) Median Risky Assets

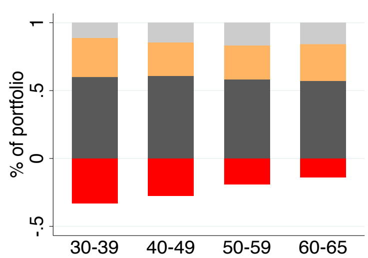



(d) (Cond.) Mean Risky Assets

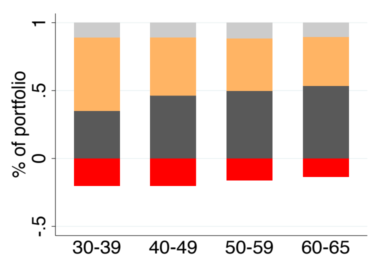
## A.2 Housing Expenditure Share by Marital Status & Kids

Whereas it has been frequently documented that the expenditure share of housing in micro data is independent of age and wealth Davis and Ortalo-Magné (2011), Peter et al. (2020) show that the expenditure share on rent is larger for singles than for couples in Europe. Figures 22 and 23 report the expenditures shares for singles and couples across the wealth distribution and over the life-cycle for my sample. All figures are computed using PSID

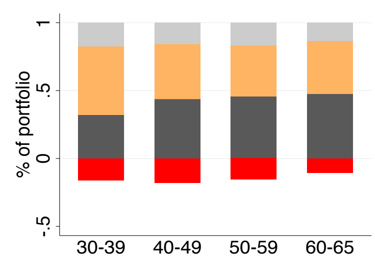
Figure 21: Portfolio Shares by Age – Including Mortgages



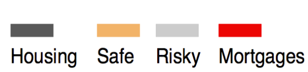

(a) Couples




(b) Single Women

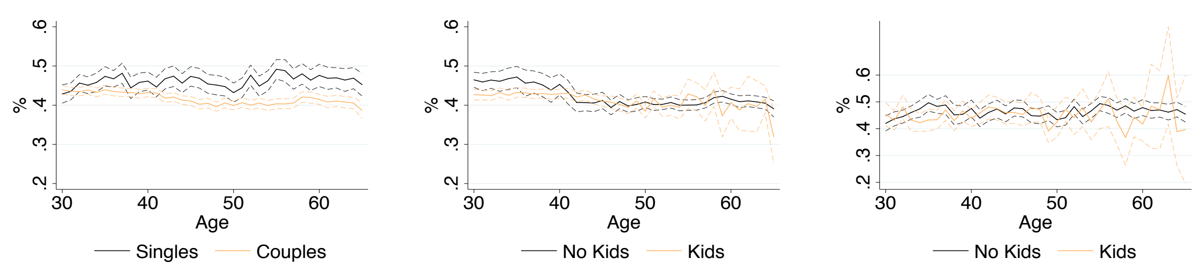



(c) Single Men



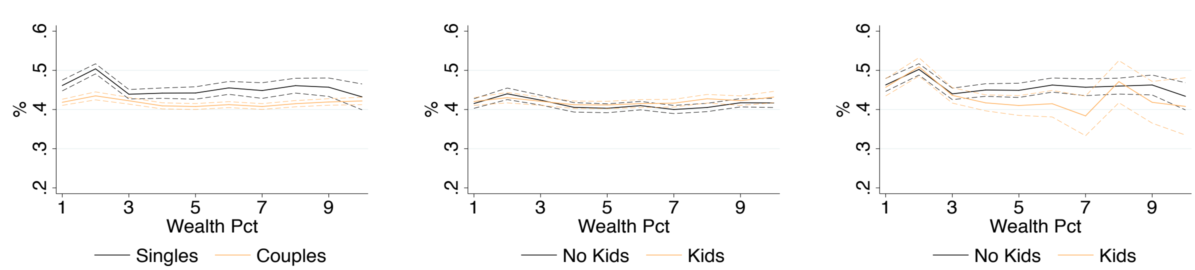
data. In particular, from wave 1999 onwards, households report their expenditures on food, transportation, education, health care, children and housing. The latter includes mortgage and loan payments, rent, property taxes, insurance payments, utilities, cable TV, telephone, internet charges, home repairs and home furnishings. I define the housing expenditure share to be the share in overall reported expenditures that a household allocates to the housing category. My findings confirm the higher expenditure share on housing for singles than for couples whereas I neither find any heterogeneity by wealth nor by age, conditional on marital status. Moreover, for singles, the expenditure share on housing is independent on whether or not they live with children in their household. For couples, Figure 22b displays a higher expenditure share for married households without kids during young ages. Thus, my results indicate that an increase in the number of household members is associated with a decline in the housing expenditure share and that this effect is stronger between singles and coupes (that is, more adult household members) than across couples with and without children.

Figure 22: Expenditure Shares on Housing across Age




(a) By Marital Status (b) By Children – Couples (c) By Children – Singles

Figure 23: Expenditure Shares on Housing across the Wealth Distribution




(a) By Marital Status (b) By Children – Couples (c) By Children – Singles

# B Model Calibration: First Stage

## B.1 Income Process – Deterministic Component

Table 9: Regression Coefficients for Income Estimation (Deterministic Component)

| | Couples | Singles | |
|---|---|---|---|
| | | First Stage | Second Stage |
| Woman | | | -1.153*** |
| | | | (0.0178) |
| age | 0.132*** | 0.0938*** | |
| | (0.00560) | (0.0116) | |
| $age^2 * 100$ | -0.141*** | -0.119*** | |
| | (0.00625) | (0.0123) | |
| age*woman | | 0.0198*** | |
| | | (0.00539) | |
| Constant | 8.883*** | 8.616*** | 0.703*** |
| | (0.122) | (0.272) | (0.0139) |
| Observations | 32,811 | 13,193 | 13,193 |
| Number of unique indiv. | 5,745 | 3,467 | |
| $R^2$ | 0.045 | 0.026 | 0.241 |

*Notes:* Estimations are based on (fixed-effect) OLS regressions from PSID Data, waves 1989-2017. Corresponding Figure is Figure 10 in the main text. Dependent variable of first stage: Log of annual income (labor income and social security benefits). Dependent variable of second stage: fixed effects plus residual from first stage. *Woman* is a dummy indicating if the individual is woman; Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

## B.2 Marriage and Divorce Probabilities: Regression Coefficients

Table 10: Regression Coefficients for Marriage and Divorce Hazards

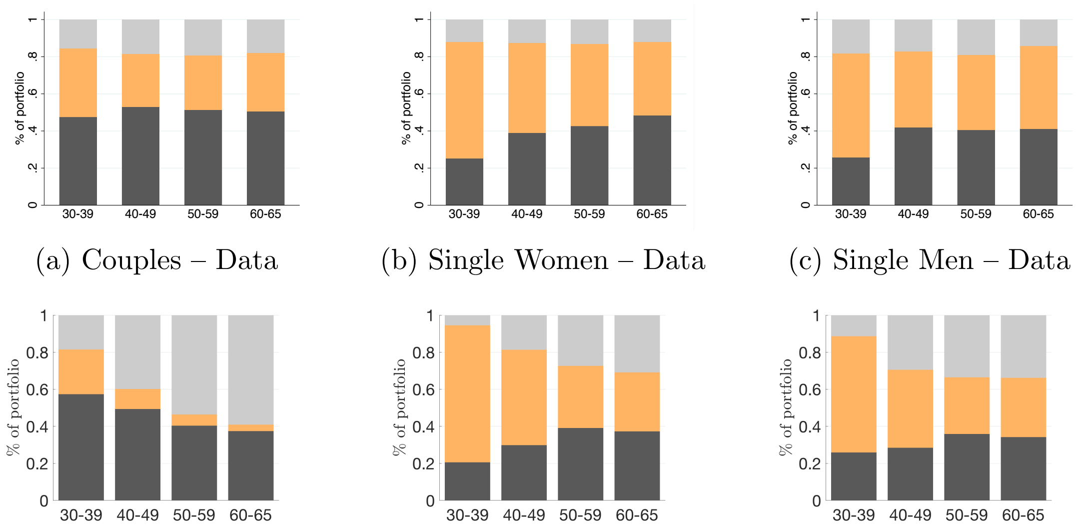
| | (1) Marriage Prob. | (2) Divorce Prob. |
|---|---|---|
| Woman | -0.352*** | |
| | (0.0624) | |
| Age | -0.0677** | -0.0524* |
| | (0.0328) | (0.0276) |
| $age^2 * 100$ | 0.0039 | 0.0243 |
| | (0.0376) | (0.0310) |
| $\tilde{y}_2$ | -0.174 | 0.0590 |
| | (0.221) | (0.201) |
| $\tilde{y}_3$ | 0.0437 | -0.105 |
| | (0.181) | (0.177) |
| $\tilde{y}_4$ | 0.158 | -0.478*** |
| | (0.165) | (0.168) |
| $\tilde{y}_5$ | 0.324** | -0.593*** |
| | (0.160) | (0.168) |
| $\tilde{y}_6$ | 0.346** | -0.927*** |
| | (0.167) | (0.190) |
| $\tilde{y}_7$ | 0.843*** | -1.045*** |
| | (0.201) | (0.262) |
| $\tilde{y}_8$ | 0.683* | -0.924** |
| | (0.392) | (0.445) |
| $\tilde{y}_9$ | 0.0887 | -0.125 |
| | (0.177) | (0.154) |
| Constant | 0.782 | -1.349** |
| | (0.705) | (0.614) |
| Observations | 12,265 | 55,800 |

*Notes:* Estimations are based on Logit regressions from PSID Data, waves 1989-2017. Corresponding Figure is Figure 11 in the main text. Dependent variable: Likelihood of getting married (resp. divorced) within the next two years, conditional on not being married (resp. being married) today. The age of a couple is the average age across both spouses. *Woman* is a dummy indicating if the individual is woman. $\tilde{y}_x$ is a dummy indicating whether the individual has that productivity realization, with $\tilde{y}_1$ being the base. Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

# C Further Model Results

Figure 24 plots the average housing share (that is, the average share of housing equity in overall wealth), the average share of safe assets and average share of risky assets from model simulations and compares it to the data. All shares are untargeted in the calibration exercise.

Figure 24: Portfolio Shares by Age – Data vs. Model (untargeted)




(a) Couples – Data (b) Single Women – Data (c) Single Men – Data

(d) Couples – Model (e) Single Women – Model (f) Single Men – Model

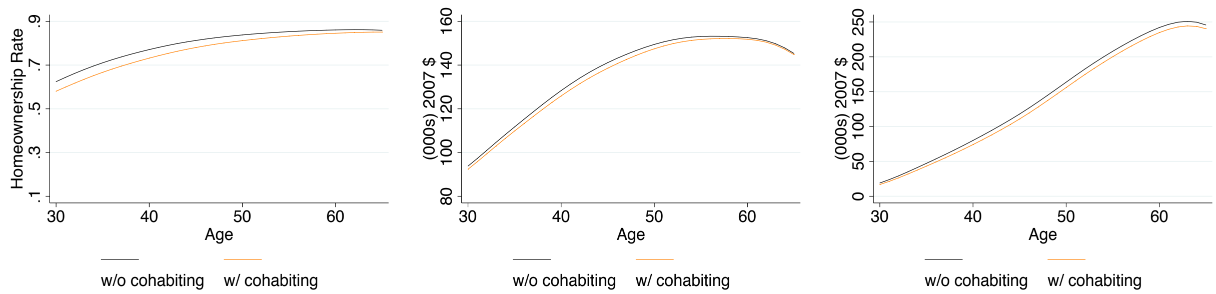
*Notes:* Figure 24 compares portfolio shares by family type from the data (upper panel) with those generated by the model (lower panel). Data are from the Survey of Consumer Finances (SCF), waves 1989-2016.

# D Robustness Checks – Empirics

## D.1 Cohabiting Couples

Throughout the benchmark analysis, I drop all couples who cohabit but are not legally married. However, as documented in for example in Adamoupoulou, Hannusch, Kopecky, and Obermeier (2021), the share of cohabiting individuals has more than doubled throughout my sample period. Therefore, Figure 25 and Figure 26 show the main empirical results from Section 2 when either including cohabiting households in the couples category or in the singles category, respectively (for singles, I allocate cohabiting households to single men if the household head is a man and to single women if the household head is a woman). Overall, I do not find any significant differences neither for couples nor for singles. If anything, the homeownership rate of only legally married couples is higher than if I jointly consider married and cohabiting couples. However, and most importantly, it is still substantially higher than that of singles, hence the marital gap in homeownership rate prevails.

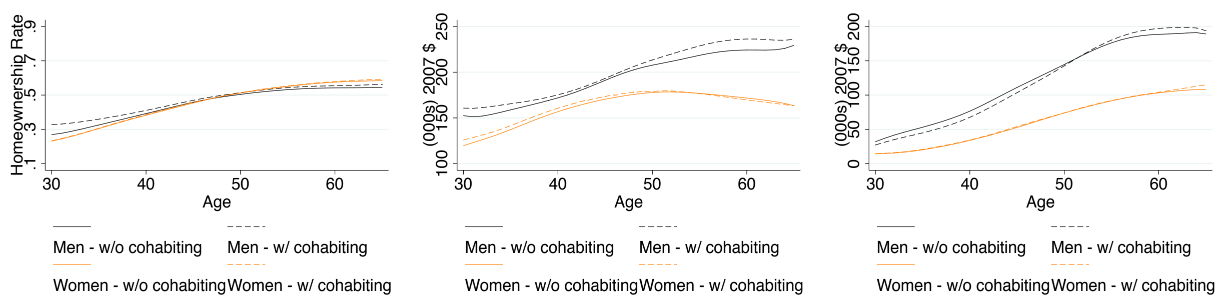
Figure 25: Robustness to Cohabiting Individuals – Couples




(a) Homeownership Rates (b) (Cond.) House Value (c) Financial Assets

*Notes:* Figure 25 plots homeownership rates, the average house value of owners as well as financial asset accumulation of couples, with and without including cohabiting couples in the couples category (orange and black lines, respectively). Data are from the Survey of Consumer Finances (SCF), waves 1989-2016.

Figure 26: Robustness to Cohabiting Individuals – Singles



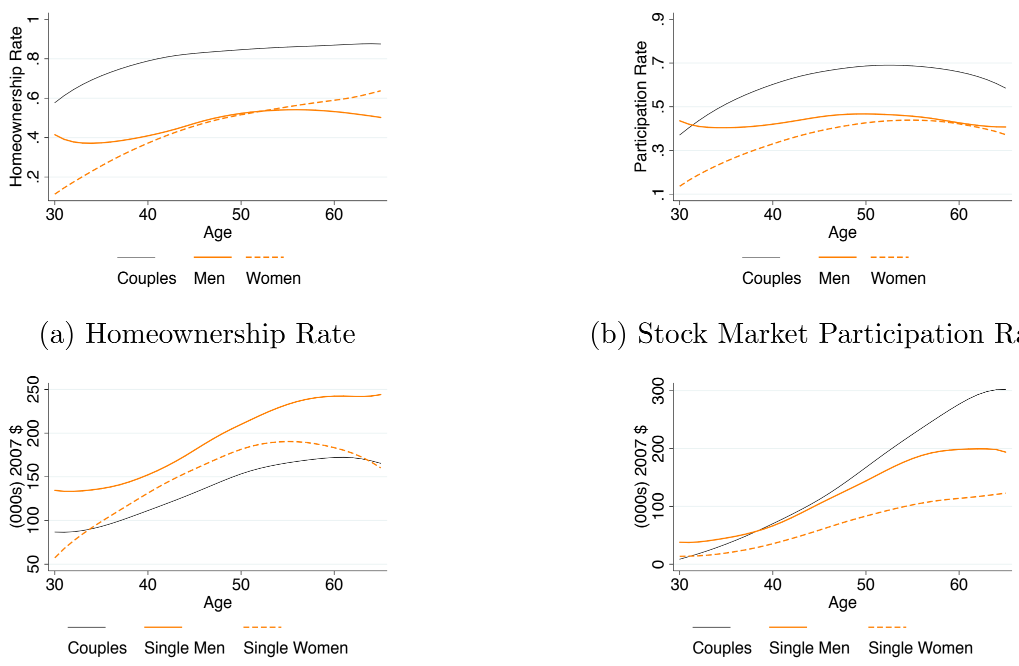

(a) Homeownership Rates (b) (Cond.) House Value (c) Financial Assets

*Notes:* Figure 26 plots homeownership rates, the average house value of owners as well as financial asset accumulation of single men (black lines) and single women (orange lines), with and without including cohabiting couples in the singles category (dashed and solid lines, respectively). Cohabiting couples belong to "single men" if the household reference person is a man and to "single women" if the household reference person is a woman. Data are from the Survey of Consumer Finances (SCF), waves 1989-2016.

## D.2 Cohort Effects

One cannot simultaneously identify age, year and cohort effects because of perfect multicollinearity. However, Ameriks and Zeldes (2004) show that life-cycle profiles of equity shares look very different depending on whether one imposes either cohorts or year effects to be zero. Throughout my analysis I pool all cohorts who participated in the SCF (resp. PSID) throughout my sample period. To test the sensitivity of my results to this implicit assumption that cohort effects are zero, Figure 27 reports the life-cycle profiles of stock market participation rates, homeownership rates, conditional house values and financial assets for individuals who were born between 1945 and 1960. As for the entire sample, I confirm the marital gap in homeownership rates, stock market participants as well as (financial) asset accumulation. Additionally, the conditional house value of singles is higher than that of couples, in line with the benchmark results. Hence, it appears that the reported life-cycle patterns in Section 2 are not driven by differences in investment behavior across cohorts. Therefore, to increase the precision of my estimates, I chose to pool all cohorts in the baseline analysis.

Figure 27: Portfolio - Robustness to Cohort Effects




(a) Homeownership Rate

(b) Stock Market Participation Rate

(c) (Cond.) House Value

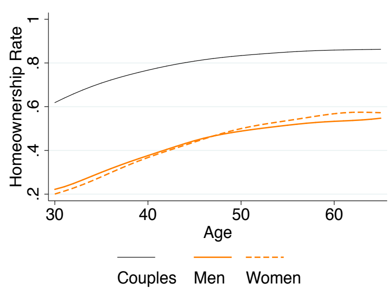
(d) Financial Assets

*Notes:* Figure 27 plots homeownership rates, stock market participation rates, the average house value of owners as well as financial asset accumulation by family type on the cohort of individuals born between 1945 and 1960 (in the case of couples, the average birth year across spouses has to be between 1945 and 1960). Data are from the Survey of Consumer Finances (SCF), waves 1989-2016.

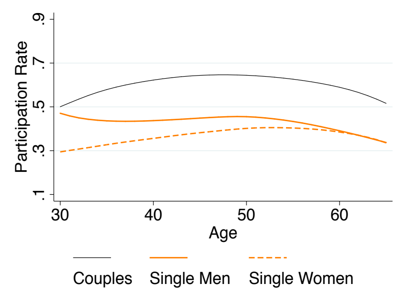
## D.3 Excluding Housing Boom and Bust Years

My sample period covers both the housing boom period in the early 2000s as well as the subsequent house price collapse after the financial crisis in 2008. Arguably, both episodes were rather unusual but strongly affected investment patterns. One potential concern is that these episode had heterogeneous effects across family types and hence drive the document marital gaps in housing choices or in financial portfolio allocation. For example, if singles were more affected by housing foreclosures during the Great Recession than couples (because they were less insured against job losses), marital differences in homeownership rates may be primarily driven by this particular episode. Therefore, Figure 28 reports the life-cycle profiles of homeownership rates, stock market participation rates, conditional house values and financial assets by family type after dropping the years of the housing boom and of the Great Recession (waves 2001, 2004, 2007 and 2010) from the sample. I do not find any significant differences in the documented patterns when compared to the benchmark results in Section 2.

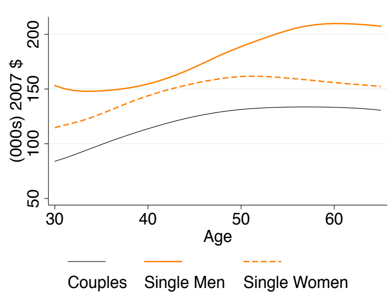
Figure 28: Portfolio - Robustness to Boom & Bust Periods



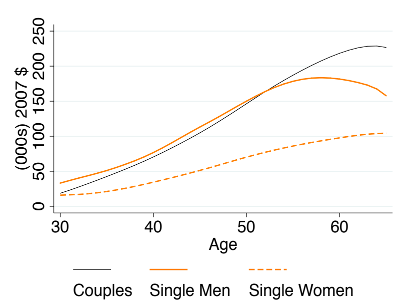

(a) Homeownership Rate




(b) Stock Market Participation Rate




(c) (Cond.) House Value




(d) Financial Assets

*Notes:* Figure 28 plots homeownership rates, stock market participation rates, the average house value of owners as well as financial asset accumulation by family type when dropping the waves 2001, 2004, 2007 and 2010 from the sample. Data are from the Survey of Consumer Finances (SCF), waves 1989, 1992, 1995, 1998, 2013 and 2016.

# E Robustness Checks – Model

## E.1 Moving Frequency

Empirical evidence suggests that singles move more often than couples which shifts their incentives to invest in illiquid housing relative to liquid financial assets (e.g. Mincer, 1978, Blackburn, 2010, Gemici, 2011, Burke and Miller, 2018). Hence, it is possible that higher homeownership rates of couples can be (partially) explained by their lower moving frequency. To test for this channel, Figure 29 compares moving frequencies by marital status in the data to those generated by the model (without being targeted). The model endogenously replicates moving frequencies for both couples and singles very well.

Figure 29: Moving Frequencies – Data vs. Baseline Model (untargeted)


(a) Couples (b) Singles

*Notes:* Figure 29 plots the moving probabilities by marital status from the data (gray lines) and compares them with model simulations (orange lines). The left graph shows couple households whereas the right graph pools single men and single women, both graphs including owners and renters. Data are from the Panel Study of Income Dynamics (PSID) waves 1997-2017, and refer to the survey question "Did you move since the last interview"?

## E.2 Mortgage Characteristics by Family Type

One potential concern in the current analysis is that singles face a different borrowing environment than couples, e.g. that singles have to pay larger borrowing premia which would render the model assumption of homogeneous mortgage premia across all family types unrealistic. Therefore, Table 11 lists the share of mortgage holders with adjustable loan rates as well as the average mortgage rate across couples, single men and single women in the data. I find that both types of mortgage characteristics do not significantly vary by family type. Additionally, when linearly regressing the mortgage rate on family type while controlling for observable households characteristics (income, mortgage value, age and interview wave), the coefficients for family type turn out to not be statistically significant different from zero. Hence, I chose to introducing one type of mortgage (rate) across all households in the model.

Table 11: Mortgage Characteristics by Family Type

| | Couples | Singles | |
|---|---|---|---|
| | | Men | Women |
| % with adjustable loan | 12.90 | 12.63 | 12.24 |
| | (11.73;13.53) | (11.58;12.90) | (12.58;13.22) |
| Mean mortgage rate in % | 6.67 | 6.58 | 6.67 |
| | (6.66;6.70) | (6.55;6.66) | (6.66;6.75) |

*Notes:* Table 11 reports the average mortgage rates and share of households with adjustable rate mortgages by family type. All values are expressed in % and refer to the mortgage that the respective household lists as primary, or "first", mortgage. 95% confidence intervals in parentheses. Data are from the Survey of Consumer Finances (SCF), waves 1989-2016.

# F The Bachelor Economy

The bachelor economy (which serves as a comparison to the baseline framework for the policy exercise) is identical to the benchmark except that it only contains one generic household type. In particular, it can be described by two value functions, one for working age $V_W^B$ and one for retirement $V_R^B$, respectively:

$$V_W^B(j,a,H,z) = \max_{a'_r,a'_s,H',m',c} u(c,s) + \beta \mathbb{E} V_W^B(j+1,a',H',z')$$

$$a'_r + a'_s - m' + c = a + p_h H - p_h H' - \mathbb{1}_{H'\neq H}\Phi(H,H') - \mathbb{1}_{a'_r>0} S_s^F - \mathbb{1}_{H=R}\alpha p_H H_1 - \mathbb{1}_{H\neq R}\pi H$$

$$m' \leq \zeta_h p_h H' \qquad a = \sum_{i=r,s}(1+(1-\tau)r_i)a_i - (1+r_m)m + \mathbb{Y}\left[y(j,z),m\right]$$

$$V_R^B(j,a,H,\hat{z}) = \max_{a'_s,a'_r,H',m',c} u(c,s) + \beta\psi_j \mathbb{E} V_R^B(j+1,a',H',\hat{z}) + \beta(1-\psi_j)L\frac{(\xi+a'+H')^{1-\gamma}}{1-\gamma}$$

$$a_r' + a_s' - m' + c = a + p_h H - p_h H' - \mathbb{1}_{H' \neq H} \Phi(H, H') - \mathbb{1}_{a_r' > 0} S_s^F - \mathbb{1}_{H=R} \alpha p_H H_1 - \mathbb{1}_{H \neq R} \pi H$$

$$m' \leq \zeta_h p_h H' \qquad m_J = 0 \qquad a = \sum_{i=r,s} (1 + (1-\tau) r_i) a_i - (1 + r_m) m + \mathbb{Y}(pen(\hat{z}), m)$$

To calibrate the bachelor economy, I re-estimate all model elements which are allowed to vary by family type in the benchmark framework. In particular, I re-estimate the income profiles (both in terms of level and risk), average household sizes and survival probabilities from the data in the same manner as in the baseline, except that I pool all household types. Moreover, I use the tax parameters for the entire population as provided in Guner et al. (2014). All remaining parameters (including preference values) are held constant to the benchmark. More results are available upon request.

# G Policy Exercises – Wealth Accumulation

Table 12 splits the increase in average household net worth in response to the policies discussed in Section 6 into changes in housing wealth and changes in financial wealth, corresponding to Table 8 in the main text.

Table 12: Comparing Policies – Housing and Financial Wealth

| | $\Phi\downarrow$ $(5\% \rightarrow 2\%)$ | $\pi\downarrow$ $(1\% \rightarrow 0.35\%)$ | $S^F\downarrow$ $(\$1,275 \rightarrow \$713)$ |
|---|---|---|---|
| | | $\Delta$ Housing Wealth in \$ | |
| *Panel I: Bench* | | | |
| Couples | 20,999 | 14,803 | 306 |
| Single Men | 7,092 | 5,444 | -4,344 |
| Single Women | 10,066 | 10,655 | -505 |
| Aggregate | 16,935 | 12,634 | -552 |
| *Panel II: Bachelor* | 18,242 | 20,645 | -1,383 |
| | | $\Delta$ Financial Wealth in \$ | |
| *Panel I: Bench* | | | |
| Couples | -12,572 | -7,935 | 9,736 |
| Single Men | -10,793 | -7,015 | 10,340 |
| Single Women | -8.720 | -6,480 | 6,673 |
| Aggregate | -11,619 | -7,537 | 9,288 |
| *Panel II: Bachelor* | -15,298 | -13,630 | 7,152 |