Illiquid Homeownership and The Bank of Mom and Dad*

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Abstract

This paper studies how altruistic parental transfers to adult children affect their housing decisions when housing is illiquid. I build and estimate a life-cycle overlapping generations model with illiquid housing. In a counterfactual world, without altruism, the homeownership rate would decrease from 50% to 42%. I show that the main friction reducing the homeownership rate among young US households is illiquidity, and not mortgage borrowing constraints. Illiquidity and transfers interact in two distinct ways. First, transfers reduce the likelihood that owners sell and pay sales costs after income losses. Second, kids can tie up wealth in illiquid housing, increasing the marginal utility of non-housing consumption, increasing transfers. This effect is so strong that 23% of 25-year old households prefer housing to be illiquid. One could increase both homeownership and decrease inter-generational inequality in homeownership by increasing housing liquidity, for example, by reducing transaction costs.

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1 Introduction

In this paper, I study how parental wealth and transfers affect households' home purchasing decisions. Supporting homeownership is a high priority among policymakers, and many policies have been enacted to make homeownership easier. Despite this, the homeownership rate among young households is at its lowest levels since the 1960s in the US. The importance of parental background and how it shapes one's economic lot is also at the forefront of economic policy. Many papers measure the role of parental background for human capital and income and the effects on income and wealth inequality. In this paper, I quantify the contribution of parental transfers to the homeownership rate of young households. Second, I study the role of illiquid housing in generating transfers from parents to adult children.

This paper contributes on two fronts. First, it shows that parental transfers are important for the aggregate homeownership rate, which would decline from 50% to 42% without transfers. The decline in homeownership rate has been widely studied, focusing on changing patterns in marriage and divorce (Fisher and Gervais, 2011; Chang, 2020) or borrowing conditions (Paz-Pardo, 2019; Mabille, 2020). My paper contributes to this literature by explicitly modeling the interaction between parents and their adult children. Using survey data, I show that the fraction of first-time buyers who received parental downpayemtn assistance has increased from 15% in 2000 to 30% today (figure **??**). Using a structural model, I show that the relaxation of borrowing conditions would increase homeownership, but mainly among households with wealthier parents.

Secondly, this paper studies the role of parental transfers on the housing decisions of young adults. A large literature studies parental investment in their children's human capital (e.g. Lee and Seshadri (2019); Daruich (2018)) or transfers from adult kids to retired parents (e.g Mommaerts (2016); Barczyk and Kredler (2018)). However, few papers study transfers to adult children. Two notable exceptions are Boar (2018) and Barczyk et al. (2019), where the first omits housing and the second only has homeownership in retirement. This paper contributes to the inter-generational transfer literature on two fronts. First, this paper focuses on the role of transfers on housing decisions.[1] Second, like Boar (2018), I focus on how parental wealth and transfers affect the decisions of young adult households.

To study these questions, I build a life-cycle overlapping generations model with altruistic parents, based on Boar (2018). In the model, parents and their adult children make independent economic decisions and without commitment. The two generations interact through transfers from parents to adult children: inter-vivos and bequests. The key innovation is to include illiquid housing, which interacts with transfers. In models without housing (e.g. Boar (2018); Altonji et al. (1997); Barczyk and Kredler (2014)), the only transfer motive is to increase kid's consumption. Future transfers decrease the kid's incentives to save. Housing introduces multiple new transfer motives. Households enter the economy when they are young, with low wealth and low income, and they must save to buy a house due to loan-to-value constraints. At the life-cycle peak of wealth and income, parent households may choose to transfer money to alleviate the borrowing constraints. As in Boar (2018), future transfer provides insurance against income shocks. Illiquid housing increases the insurance value as kids who own may receive transfers and avoid costly downsizing.

Illiquid housing introduces a partial commitment technology, where housing choices within a period entails expenditure commitments in the next period. To study this effect formally, I extend the two-period model of Altonji et al. (1997) but add illiquid housing as in Chetty and Szeidl (2007), but remove income risk. Buying a large house in period one ties up wealth in housing, increasing the marginal utility of non-consumption housing in period two. However, if housing is liquid, the parent knows that, without transfers, the child will reoptimize and balance his housing and

[1] There exists another empirical literature documenting that transfer receipt increase the probability of transition from renting to owning (e.g. Lee et al. (2018); Blickle and Brown (2019); Guiso and Jappelli (2002); Engelhardt and Mayer (1998). My paper contributes by showing that transfers matter also for the aggregate homeownership rate. This is not obvious: without transfers, households would also save more, which all else equal, increases the homeownership rate.

consumption expenditures. However, when housing is illiquid, the kid can partially commit to keeping the marginal utility of non-housing consumption high, increasing transfers. This mechanism highlights another rationalization for the empirical fact that many households choose to be 'wealthy hand-to-mouth' (Kaplan and Violante, 2014; Aguiar and Bils, 2019), and that adjustment costs have implications beyond risk-taking (Shore and Sinai, 2010).

This paper's main quantitative contribution is to find the importance of parental transfers for homeownership and decompose the frictions that create the transfer channel. To do so, I estimate the model to match household, family, and transfer data from the Panel Study of Income Dynamics. I find that homeownership would decrease from 50% to 42% without altruism by comparing the stationary distributions. Second, I decompose the contribution of two frictions, the minimum downpayment and adjustment costs, in generating a role for transfers. I find that a reduction in down payment increases homeownership rates, but that this effect is concentrated among households with wealthy parents. However, a reduction in adjustment cost has ambiguous effects on the homeownership rate. For households with poorer parents, ownership is now more attractive as it is less risky. Households with wealthier parents overconsume housing when it is illiquid to obtain larger transfers. This effect dominates among households with wealthier parents. In fact, 25% of young households prefer to live in an economy with adjustment costs as they can leverage the illiquidity of housing to receive more transfers.

1.1 Road Map

In section 2, I develop and solve a stylized two-period model of housing and parental transfers that highlights the role of illiquidity and transfers. In section 3, I describe the data sources, discuss summary statistics, and test for the existence of a parental wealth channel on housing outcomes. From the stylized model I also derive two simple tests on the existence of a parental wealth channel on kid's housing outcomes.

Section 4 describes the quantitative model and section 5 discusses the structural estimation. The remainder of the paper is devoted to counterfactual exercises that quantify the role of inter-vivos transfers and parental resources life-cycle outcomes.

2 Two-Period Model of Altruism and Housing

This section develops and solves a stylized two-period model with kids and parents without commitment or cooperation. The model highlights that housing adjustment costs, which make housing illiquid, increases parental transfers. Indeed, poor kids with wealthy parents prefer to face adjustment costs on their housing expenditures. Finally, I introduce a commitment technology and show that adjustment costs have ambiguous effects on total welfare.

2.1 Model Environment

The model simplifies the two-period model in Altonji et al. (1997) by ignoring income uncertainty and extends it by including illiquid housing in a similar vein to Chetty and Szeidl (2007).

Population: There are two households, kids k and parents p. Both are alive at the same time and live for two periods.

Preferences: Kid's preferences are defined over first- and second-period consumption of goods c and housing services h, and are assumed to be time-separable and kids do not discount the future:

$$u(c_k, h_k) + u(c_k', h_k'). \tag{1}$$

The parent derive utility over their own goods consumption in both periods but do not consume housing services. They also value their kid's utility weighted by the altruism parameter $\eta > 0$

$$\mu(c_p) + \mu(c_p) + \eta \left[u(c_k, h_k) + u(c_k', h_k')\right] \tag{2}$$

Finally, I assume that the kid's utility function satisfies the following:[2]

A1: Limits for both goods: The first derivative of u approaches i) infinity at zero, and ii) zero at infinity.

A2: The marginal utility of consumption is non-decreasing in housing consumption.

Endowment: Both households are endowed with an initial level of financial wealth x_k, x_p. Households have no income.

Financial Assets: Households can save in a bond that does not pay interest ('pillow technology'). There is no borrowing.

Consumption and Housing: Both households consume non-negative amounts of goods consumption c in both periods, while kids can consume any non-negative amount of housing services h. Goods and housing both have a unit cost of unity. Housing is illiquid: the kid can adjust his housing choice in the second period h_k', but doing so entails adjustment costs $\kappa \geq 0$ proportional to the quantity of housing chosen in the first period h_k.

Transfers: In both periods the parent can transfer a non-negative amount t_p, t_p' to his child.

No Commitment and non-cooperative: Households cannot commit and act non-cooperatively

Timing: Each period is divided into two stages. In the first stage, the parent chooses his goods consumption and transfers. The kid then receives the transfer and chooses his consumption allocation. Both households die at the end of period two.

[2]These assumptions allow for a wide class of utility function, including constant elasticity of substitution (when the elasticity of substitution is weakly less than 1) and separable power utility with a risk aversion of good consumption higher than 1. Note at assumption A2 precludes cases where goods and housing are perfect substitutes. Chetty and Szeidl (2007) contains a detailed discussion of the role of these assumption.

2.2 Solving the Game

We solve the game by backward induction. The solution shows that when housing is illiquid, kids may receive larger period one transfers that push them into autarky or buy larger houses, causing the parent to give larger period two transfers. Illiquidity is central to the result as it allows kids to commit to future expenses.

The model cannot be solved in closed form, but the solution is unique. I resolve to a numerical solution using Cobb-Douglas Preferences with a risk aversion parameter $\gamma = 1.2$, the housing-expenditure share $\chi = 0.4$, and the altruism parameter $\eta = 0.3$.

2.2.1 Final Period: Kid

I now show how adjustment costs induce kinks in the kid's marginal value of wealth. In the final period his disposable wealth is $x'_k + t'_p$, which he allocates between housing and consumption.[3] The kid's problem can be broken down by whether moves or not. If households do not move, they spend all their disposable wealth net of housing on consumption :

$$V^0_{k'}(x'_k + t'_p, h_k) = u(x'_k + t'_p - h_k, h_k), \tag{3}$$

if households do move, they equate marginal benefits of consumption and housing:

$$V^m_{k'}(x'_k + t'_p, h_k) = \max_{h'_k \geq 0} u(x'_k + t'_p - h'_k - \kappa h_k, h'_k). \tag{4}$$

Both value functions are differentiable in both arguments. Kids are only willing to pay the adjustment cost κ when the non-move allocation is far from the optimal within-period allocation:

$$V'_k(x'_k + t'_p, h_k) = \max \left\{ V^m_{k'}(x'_k + t'_p, h_k), V^0_{k'}(x'_k + t'_p, h_k) \right\}, \tag{5}$$

[3] The solution to the second-period problem of the kid is very similar to the one in Chetty and Szeidl (2007). In this section I discuss pertinent effects of adjustment costs on the strategic transfer game between parents and kids.

Under assumptions A1 and A2 households follow a strategy where they move only when disposable wealth is outside of two thresholds s, S.

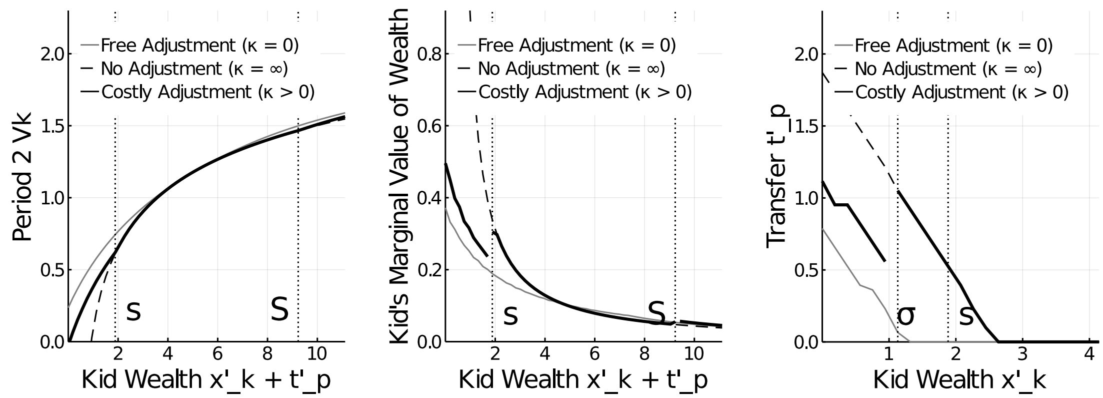
Thus households move if and only if wealth is outside the no-move region (s, S). The intuition for the thresholds is straightforward: If the kid wakes up with a large house, he must reduce food consumption dramatically to remain in the house. The large reduction in utility makes it optimal to pay the adjustment costs and achieve within-period optimality. It becomes better to save the adjustment costs, consume more, and suffer some miss-allocation at $x'_k + t'_p = s$. A similar mechanism creates the upper limit of the no-move region S.[4]

The no-move region (s, S) creates kinks in the kid's value functions. Outside of (s, S) the slope of the value function is given by the envelope theorem applied to $V^m_{k'}(\cdot)$, where households optimally balance housing and consumption. Within (s, S) households remain in the house and the slope is given by the envelope theorem applied to $V^0_{k'}(\cdot)$. At $s + \varepsilon$ households do not equate marginal benefits of housing and consumption, and so the slope is steeper as it moves us closer to within-period optimality. The value function is plotted in figure 1a, which also shows the cases with free adjustment and infinite adjustment costs. The slope (figure 1a) jumps up when wealth crosses either threshold from the left. Inside s, S the slope is initially higher than without costs but becomes lower at the point where not-moving would be optimal without adjustment costs. As we will see in the parent's problem, the optimal transfer is closely related to kid's marginal value of wealth.

[4]While not the main focus of this paper, it is worth noting the link adjustment costs have with the literature on low-liquidity households with large marginal propensities to consume, such as the 'wealthy hand-to-mouth in Kaplan and Violante (2014). Household with a large house h_k can only consume $x'_k + t'_p$. Any change in disposable wealth (for example through transfer or income shocks) maps one-to-one into consumption unless the change is sufficiently large to make the household willing to pay the adjustment cost.

Figure 1: Adjustment Costs and Second Period Outcomes

(a) Period 2 Value Fun. $V_k'()$ (b) Period 2 Slope in Wealth (c) Period 2 transfer t_p'



Note: Vertical lines denoted s, S indicate the thresholds for staying in the current sized house, while σ denotes the level of wealth the kid must bring into the period to stay in the house, taking into accounts the gifts he then receives.

2.2.2 Final Period: Parent

I now show how the adjustment costs affect the parents transfers behavior in the final period. The parent must decide how much to transfer to his kid and consumes the rest. His states are his own wealth, his kid's wealth, and the kid's housing state. The parent's problem is

$$V_{p'}(x_p', x_k', h_k) = \max_{t_p' \geq 0} \left\{ \mu(x_p' - t_p') + \eta V_{k'}(x_k' + t_p', h_k) \right\}, \tag{6}$$

where we have inserted $V_{k'}(x_k' + t_p', h_k)$ for $u\left(c_k'^*(x_k' + t_p', h_k), h_k'^*(x_k' + t_p', h_k)\right)$ From the previous section we have established that V_k' is only differentiable when there are no adjustment costs ($\kappa = 0$) or there is no adjustment at all ($\kappa = \infty$), so the optimization problem is generally not twice differentiable.

When the kid's value function is differentiable we obtain that transfers are pinned down by the slope of the kid's value function

$$u'(x_p' - t_p') = \eta V_{k'}'(x_k' + t_p', h_k) + \lambda, \tag{7}$$

where λ is the multiplier on the non-negativity of transfer constraints (lemma **??** contains a detailed derivation). From (7) we see that transfers are weakly decreasing in kid's wealth when the problem is smooth.

Since the kid's marginal utility jumps at the kinks (figure 1b) the second period transfer policy t'_p also jumps. Figure 1c plots the policy for some (x'_p, h_k). Transfers jump at a level $x'_k = \sigma$ where the transfer changes the kid's extensive choice on moving. Just below σ the parent does not give enough to keep the kid the current house. At σ, the gift jumps to a level that is at least big enough to keep the kid in the house. Note how makes transfers non-decreasing in kid's second period wealth: Moving from $x'_k = \sigma - \epsilon$ to $x'_k = \sigma + \varepsilon$ ensures the kid will obtain a much larger transfer.

2.2.3 First Period: Kid

I now show that adjustment costs increase the kid's incentive to undersave by spending more on illiquid housing. The first-period kid states are disposable wealth and the parent's savings decision. He takes into account how his choices will affect the second-period transfer:

$$V_k(x_k + t_p, x'_p) = \max_{x'_k \geq 0, h_k \geq 0} u(x_k + t_p - x'_k - h_k, h_k) + V_{k'}(x'_k + t'^{*}_p(x'_p, x'_k, h_k), h_k).$$

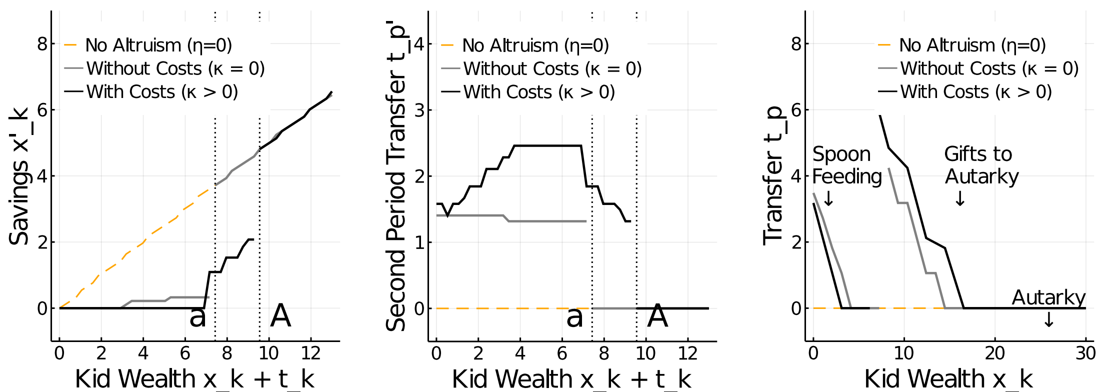
I rely on a numerical solution since the transfers $t'_p(\cdot)$ have jumps and kinks and the value function $V_{k'}(\cdot)$ is non-differentiable.[5]

Figure 2a plots the kids savings $x'_k(x'_p, x_k + t_k)$ for some level of parental wealth. Without altruism the kid smooths perfectly since $\beta = 1/(1+r) = 1$. Without altruism (autarky), households initially save nothing to increase consumption today and receive transfers in the next period. At some point, it is better to smooth over

[5]Namely, there are three problems i) adjustment costs induces kinks in V_k (1a), ii) the transfer policy is non-continuous in x'_k (figure 1c) when $\kappa > 0$ and iii) the transfer policy function has a kink where the non-negativity condition on transfers binds (figure 1c)

Figure 2: The Effect of First-Period Choices

(a) Period 1 Expenses $c_k + h_k$ (b) Period 2 Transfer $t'_p()$ (c) Transfer $t_p(x_p, \bar{x}_k)$



Note: The vertical dashed lines indicate the threshold for where the kid behaves as in autarky, taking into account the first-period gifts without, for the case without adjustment costs(a) and with adjustment costs (A).

periods and savings jump up to the autarky level. With adjustment costs, the jump to autarky is delayed from a to A. The explanation is found in figure 2b which shows the second period transfer $t'_p(x'_p, x'_p, h_k)$ that the kid knows he will receive. With altruism but without costs, the second-period transfer is initially flat in cash-on-hand since the kid starts the second period in the same state $(x'_p, x'_k = 0)$.[6] With adjustment costs, the second-period transfer increases in cash-on-hand as the kid enters the second period with a larger house. While the kid still wakes up with zero wealth $(x'_k = 0)$, he also wakes up with a larger house, so the parent gives yet larger transfers moving the kid towards intra-temporal optimality between housing and goods.[7]

[6] Without adjustment costs the first-period housing choice is irrelevant in the second period.

[7] In fact, the increases in gifts are so large that kids prefer an economy with adjustment costs to an economy without (figure 9a). First, note that poor kids always strictly prefer that their parents are altruistic. Second, somewhat wealthy kids prefer to have adjustment costs, since this increases the second-period transfer. Third, altruism has no impact once the kid jumps to autarky. Appendix B.2 shows that this result is not sensitive to parameters as long as assumptions A1 and A2 hold. Interestingly, this result is true and economically significant in the estimated quantitatively model: 8% of all kids prefer to face adjustment costs and are, on average, willing to pay \$XX for it. Kids who prefer adjustment costs have wealthy parents, and the adjustment costs increase the transfers they receive. Section 7.1 discusses the quantitative details.

2.2.4 First Period: Parent

The second-period adjustment costs also affect the parent's first-period problem by increasing the value of pushing kids to behave as if in autarky. The parent must decide how much to save and allocate spending on consumption and transfers. The parent considers how his transfer t_p increases the kid's cash-on-hand and that the savings decision x'_p inform the kid about the second-period transfers:

$$\begin{aligned} V_p(x_p, x_k) = \max_{x'_p \geq 0, t_p \geq 0} \{ & \nu(x_p - t_p - x'_p) + \eta u(c^*_k(x'_p, x_k + t_p), h_k(x'_p, x_k + t_p)) + \\ & V_{p'}(x'_p, x'^*_k(x'_p, x_k + t_p), h^*_k(x'_p, x_k + t_p)) \} . \end{aligned} \tag{8}$$

The first-period savings choice of the kid $x'_k(x'_p, x_k + t_p)$ provides intuition about the parent's incentives. First, if the kid is close to behaving like in autarky, a large enough gift pushes the kid into autarky and eliminates the kid's strategic motives. Second, if the kid is poor while the parent is wealthy, the kid will consume less than the parent would choose for him without transfers. The parent can then effectively dictate the kid's consumption (spoon-feeding).[8] Figure 2c plots the parent's transfer decision and the effect of adjustment costs on these two transfer motives. When the kid is poor, the parent transfers to increase consumption in the current period, but the kid does not save. Then, there is a region without transfers, before the parent's transfer policy jumps up to push the kid into autarky.[9] As kid wealth increases, transfers go to zero, and kids behave as in autarky.

[8]Spoon-feeding is the main focus in Altonji et al. (1997), while Chu (2020) shows that the correct solution to the model includes a second transfer motive (gifts to autarky). Finally, Barczyk and Kredler (2020) derive the parameters that generate the different transfer motives.

[9]Barczyk and Kredler (2020) derive necessary and sufficient conditions for the different transfer regimes to exist in a model without housing.

2.3 What if Kids and Parents Could Commit?

This paper assumes, in line with the empirical results, that households cannot commit. What happens if one assumes the existence of a commitment technology?

When kids and parents can commit they join forces and solve a family planner problem where each household receives a Pareto weight at formation. The planner pools initial wealth $x_f = x_k + x_p$, and allocates consumption to achieve intra- and inter-temporal optimality. Let θ denote the Pareto weight on the kid's utility function and $V_c(x_f;\theta)$ denote the family planners value function:

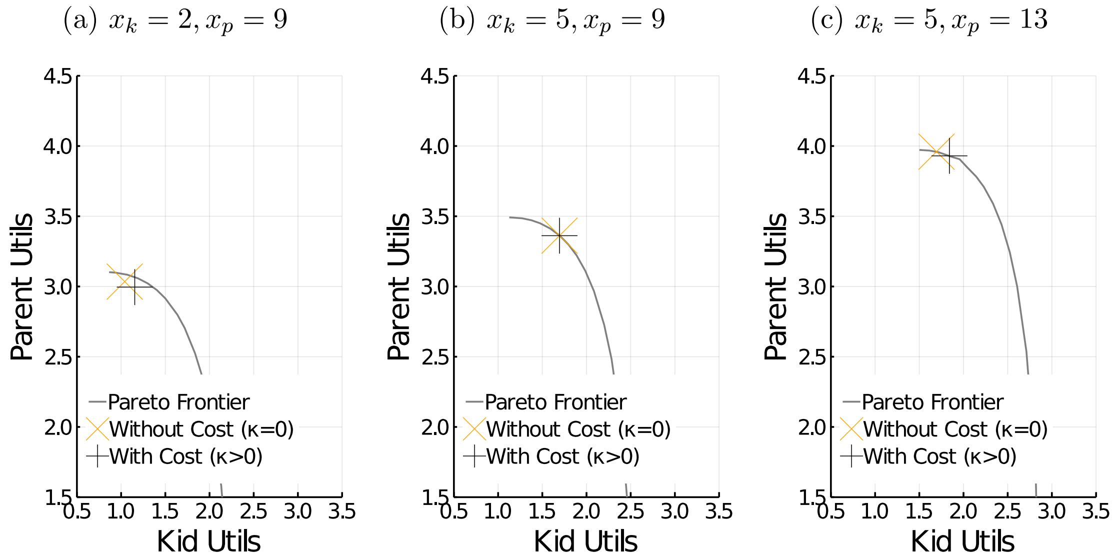
$$\begin{aligned} V_c(x_f;\theta) = \max_{c_k,c_k',c_p,c_p',h_k,h_k'} & \left\{(1-\theta)(\mu(c_p)+\mu(c_p'))+ \right. \\ & \left. [\theta+(1-\theta)\eta](u(c_k,h_k)+u(c_k',h_k'))\right\}, \\ \text{subject to } x_f' &= x_f - c_k - h_k - c_p, \\ 0 &= x_f' - c_k' - h_k' - c_p - \mathbf{1}_{\{h_k' \neq h_k\}}\kappa h_k, \\ x_f' &\geq 0. \end{aligned} \tag{9}$$

The optimal allocations of consumption and housing for initial family wealth x_f depends on the kid's Pareto weight θ. We can define the kid's indirect utility from the commitment problem as

$$V_k^c(x_f,\theta) = u(c_k^c, h_k^c) + u(c_k'^c, h_k'^c), \tag{10}$$

where superscript c denotes the optimal allocation with commitment. The parent's indirect utility is similarly defined. It follows that the kid would only accept to join the family planner problem if his utility increases by doing so, that is if and only if $V_k^c(x_f,\theta) \geq V_k(x_k + t_p(x_k,x_p), x_p)$. There exists at least one $\theta \in [0,1]$ such that both households would be willing to commit for any initial endowment of kid and parent wealth since any feasible allocation without commitment is feasible with commitment.

Figure 3: Solution with Commitment



Note:

Finally, the planner's solution is unaffected by the adjustment costs: The planner will, when $\kappa = 0$ always smooth consumption and housing perfectly since $\beta = \frac{1}{1+r}$ and there is no uncertainty. The same allocation is feasible with costs, and so the adjustment costs have no impact on the planners choice under these assumptions on discount factors, interest rates, and uncertainty.

2.3.1 Is Illiquid Housing Welfare Improving?

I now turn to study whether illiquid housing improves welfare. For an initial allocation x_p, x_k we can trace out the frontier of discounted life-time utility for kids and parents in V_k, V_p space by varying the Pareto weight on the kid. For each initial allocation we can also find the kid and parent discounted utilities in the same space, with and without adjustment costs. Figure 10 plots the Pareto frontier and the no-commitment allocations with and without adjustment costs for a variety of initial allocations.

Figure 3a shows what happens when the kid is poor while the parent is moderately wealthy (gifts-to-autarky). The introduction of costs reduces parent's welfare and increases kid's welfare (by increasing the first-period gift). Next, I increase kid's wealth (figure 3b), and the kid behaves as if in autarky. Thus both no-commitment allocations are identical and on the frontier. Figure 3c plots the results when I also increase parental wealth and households no longer behave as if in autarky. However, both no-commitment allocations are still on the frontier, but the kid prefers adjustment costs since they increase gifts. These results for some initial allocations indicate that adjustment costs make kids weakly better off and parents weakly worse off.[10]

2.3.2 Taking the Commitment Allocations to the Data

By assuming a commitment technology, we lose several objects necessary to bring the model to the data. First, we cannot observe the timing of transfers (but we can back out lifetime net-transfers). Second, wealth allocations within the family are indeterminate. Third, the only objects observable in both models are consumption and housing. Fourth, transfers may flow from kids to parents.

3 Data

Having laid out the theoretical framework for altruism, transfers, and illiquid housing, I now describe the data sets used in the analysis. I present summary statistics on the estimation sample. Finally, I present reduced-form evidence on the existence of parental wealth channel on kid's housing outcomes.

[10]In appendix B.2 I show that these results are not sensitive to parameter values and that the results hold for any initial allocation that implies transfers in period one or period two. Additionally, adjustment costs never improve parents welfare.

3.1 Panel Study of Income Dynamics

The primary data source is the Panel Study of Income Dynamics (PSID), which follows a nationally representative sample of US households and their descendants over time since 1968. The PSID is the only publicly available US dataset that satisfies this paper's three requirements: First, it has detailed wealth, income, and housing data for both parents and kids. Second, it has some information about inter-vivos transfers from parents to kids. Third, it follows households over time so we can observe the transitions from renting to owning.

In 2013 the PSID included additional questions about transfers between generations within a family. I use data from 1999 to 2017. In 1999 the PSID started to collect wealth data every other year instead of every fifth year. Household characteristics such as age, gender, and education refer to the household head. I replace top coded values with missing. All monetary variables are expressed in thousands of 2016 US dollars.

Sample Selection. Throughout this paper, the sample includes all households aged 25-84 in the PSID, except the Survey of Economic Opportunity and the Latino sub-samples to obtain a representative sample.

Matching Parents with Kids. I use the Parent/Child file from the PSID's 2013 transfer supplement. We can observe each household's transfers to and from parents and kids. I only use the parent's reported transfer. First, there may be some stigma about receiving transfers, which may induce receiving kids to under-report. Second, in the model, the parents give transfers to the child. I treat each parent-child pair as separate so that two siblings with the same parent household are counted as two independent households.

Definition of Transfers. The 2013 transfer supplement asks all parent households whether they gave money, gifts, or loans of $100 or more to their kids in 2012. There is no identifying information on whether these transfers are gifts or loans, and I treat all as gifts.[11] Since this paper focuses on transfers that are a) related to housing and b) quantitatively meaningful I set transfers below \$500 to \$0. 31% of transferring parents give transfers below this amount.[12]

3.2 Descriptive Statistics: Who Receives Transfers?

I now discuss descriptive statistics from the PSID sample in 2013 for households aged 25-44 with a non-missing parent household. Tables 11 and 12 contains the sample means and medians, broken down by age, wealth, marriage, house tenure, and whether households received transfers in the last year. In panel a), the first two columns compare the whole sample, broken down by whether they received transfers or not in the last calendar year. The mean transfer is relatively high at \$3,940, and 27% of households received transfers in the last year. Both groups have similar wealth levels, but transferring parents are much wealthier, with a median wealth of \$339,000 relative to non-transferring parents who had \$96,860. Recipients are more likely to be college-educated, white, and a little younger. Receivers are somewhat less likely to be homeowners (39% vs. 43%).

By breaking down the sample by marital status, we see that married or cohabiting households are wealthier, have higher household income, are more likely to be white, slightly older, and have approximately three times the homeownership rate of single households. Married households are somewhat more likely to receive transfers and receive slightly larger transfers. Next, I break the sample down by whether they are renting or owning. Homeowners have ten times the wealth of renters and also significantly wealthier parents. There is no difference between renters and owners in the receipt rates, but transfers to owners are on average \$1000 larger. Homeowners rarely become renters, while 85% of owners rented two years ago. Further, receivers

[11] While transfers may be given as a loan, we know that these parental loans are often not-repaid, interest-free and in effect gifts .

[12] Ignoring small transfers decrease the transfer rate from 32% to 24% and increase the mean transfer from \$2,921 to \$3,944

are more likely to switch from renting to owning: 21% of receiving owners rented two years ago, compared to 15% of non-receiving owners.

Next, I break the sample into five age groups from 25-44. We see that household's wealth, income, and homeownership rates increase with age. The transfer probability decreases with age. Receivers in prime buying age are more likely to be owners: among households aged 29-32, 32% of non-receivers and 40% of receivers were homeowners. Not only are those who received more likely to own, they are also likelier to be new homeowners: Only 13% of owning non-receivers are new homeowners, compared to 21% of owning receivers.

Finally, I break down the sample by wealth quintiles. Within each wealth quintile, receivers and non-receivers have virtually identical wealth, income, and age. Still, receivers are slightly more likely to be white and be college-educated within each quintile. The largest difference is that the receiver's parents are much wealthier. We also see the clear inter-generational correlation of wealth: parents to kids in the bottom wealth quintile have 25% of parents' wealth to kids in the top quintile.

A summary is in order. Receivers have significantly richer parents, have similar wealth and income as non-receivers, and are less likely to own. Receiving transfers increases the probability of transitioning from renting to owning, particularly among households in the prime house-buying age (29-40). Parents' wealth is strongly correlated with the probability of receiving a transfer. In 2013, a 27% of young households received a transfer, and transfers averaged $3,940.

3.3 Parental Transfers for Owners Over Time

From the PSID transfer supplement, we have seen how those who receive transfers differ from their counterparts in 2012. Two additional data sources show that the reliance on parental transfers for housing has increased over the last two decades.

SHED: To better understand US households' financial health, the Federal Reserve first conducted the SHED in 2013. It is an annual cross-section survey with a focus on financial well being. In 2015 and 2016, the survey asked homeowners when they bought their home and how they funded the downpayment.[13] The results are plotted in the left panel of figure **??** in the introduction. The main observation is the large increase in the role of inter-vivos transfers for homeowners since 2001. Since 2011 around 30% of first-time buyers received transfers, while only 10-15% did before. Second, the rise coincides with decreased housing affordability and stricter mortgage lending practices.

In 2013, 2014, and 2016 the SHED contained a question asking renters why they rent. The main barrier to homeownership was borrowing constraints: 57% of US households mentioned that they could not afford a down-payment or did not qualify for a mortgage. The second most common answer was that renting was more convenient (26%), followed by planning to move (23%). These answers suggest that the illiquidity of owner-occupied housing is an important friction that keeps households from buying.

American Housing Survey: I use the AHS to obtain time series back to 1991. The AHS follows roughly 60,000 housing units over time and asks households in owner-occupied units how they funded the downpayment. We can see that the reliance on parental transfers is the highest it's been (right panel of **??**). It is important to note that the x-axis denotes the survey year, not the year of purchase. Small changes thus indicate large changes among new owners who are a small subset of all owners. We see a relatively flat trend in the '90s, followed by a quick decline in 2005-2008 as more households were using mortgages with low down payments. Finally, we see a dramatic increase in the years after the housing bubble.

[13] The data was recorded for owners who bought since 2001 in the 2015 wave and those who bought since 2015 in the 2016 wave.

3.4 Hypothesis I: Households With Wealthier Parents Are Less Likely To Downsize

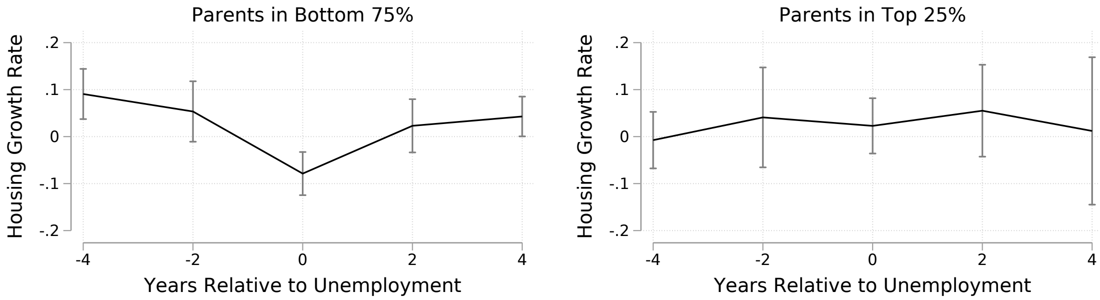
I now test one prediction of the stylized model: Kids with wealthier parents are less likely to downsize in the second period. While the model had no uncertainty, it is straightforward to extend the model to include income risk. The model then predicts that households with poorer parents have to decrease housing consumption more after income losses. I perform an event study on the effect of unemployment at housing consumption to test this hypothesis.

The sample is limited to household heads who are unemployed only once between ages 25 and 45. The consumption value of owner-occupied housing is set to 6% of the market value as in Boar et al. (2020). For renters, I use the rental payment. The log growth rate is defined as the difference in log housing consumption between t and $t-2$. Households who switch between renting and owning are coded as missing.[14] I use parental wealth as a proxy for transfers since transfers were only observed in 2013. I divide the sample by whether the head's parents were in the top 25% of parental wealth at the time of unemployment.

I then compare the housing consumption responses at unemployment by parental wealth to examine whether households with wealthier parents are less likely to downsize. The results are displayed in 4. Households with non-wealthy parents decrease the growth rate of housing consumption from 4% to -6%, a significant change at the 5% level. Households with parents in the top 25% have no statistically significant decrease in housing consumption growth rates. These results are in line with the stylized model's theoretical predictions, which predicts that households with wealthier parents have smaller changes in housing expenditures.

[14]This methodology is inspired by Chetty and Szeidl (2007) who find that housing consumption response less to unemployment than non-durable consumption, as predicted by a model with illiquid housing. I focus on showing that parental wealth supports a household's housing consumption. Further details are in appendix A.1, where I also report results separately for renters and owners.

Figure 4: Event Study: Housing Consumption at Unemployment by Parental Wealth



Note: Solid lines are the means and bars denote the 95% confidence interval. Sample consists of households aged 20-65 with exactly one unemployment spell, and without changes in head and/or spouse in the four years before and after unemployment.

3.5 Hypotheses II: Parental Wealth Affects House Purchases

We have established that housing wealth provides insurance against downsizing after income losses. I now show that households with wealthier parents also buy more expensive houses and are less likely to be behind on mortgage payments, controlling for their own wealth, income, and demographics.

3.5.1 Households With Wealthier Parents Buy Larger Houses

The model implies that households with wealthier parents should choose larger house sizes. I run a simple regression on house values at purchase for first-time buyers and test whether the parent's wealth is positively associated with larger house purchases, controlling for income, education, age, family size, and race.

Column 1 of table 1 reports the results from an OLS regression of house values among first-time buyers. We can see that households with wealthier parents buy larger houses: A 1% increase in parental wealth is associated with a 0.072% increase in the purchase value of the child's house. The effect of parental wealth is similar to that of the kid's own net worth (0.079%).

3.5.2 Households With Wealthier Parents Are Less Likely to Have Mortgage Difficulties

I now show that households with wealthier parents are less likely to be behind on their mortgages, even though they buy more expensive houses. A key insight of the stylized model is that parental transfers not only relax borrowing constraints but also reduce the downsides of illiquid housing. Households who take out large mortgages and cannot follow the payment plan may be behind on mortgage payments, ultimately ending in foreclosure. Being behind mortgages is an indicator of financial stress and is typically expensive due to fees. I now measure whether parental wealth decreases households' probability of being behind on mortgage payments, controlling for demographic variables. Since 2009 the PSID has collected information on whether households are behind on their mortgages. Since 2009 the percentage of households that are behind on mortgage payments has decreased from 3.8% to 1.8%, and 8.6% of the sample have been behind at least once.

I perform OLS regressions of the following form:

$$Behind_i = \beta_1 Wealth_{p(i),t-2} + \beta_2 Income_{i,t-2} + \beta_3 NetWorth_{i,t-2} + \gamma X_{i,t} + \varepsilon_i,$$

where the sample is limited to the first time a household is observed as owners. Households are denoted by i, their parents by $p(i)$, and X_i, t denotes a vector of controls including time, age, education, and race. Column (2) shows that parental wealth in the period before purchase decreases the probability that a household will ever be behind. The coefficient of -0.023 is statistically significant at the 1% level. The regression is a linear probability model, so the coefficient implies that a 1% increase in parental wealth decreases the probability that the child will ever be behind by 0.023 percentage points. The effect of parental wealth is larger than the effect of kids' net worth but smaller than the effect of kid's income. The coefficients and significance levers are virtually unchanged when the outcome variable is whether

Table 1: Housing Choices and Parental Wealth

	(1) House Size	(2) Ever Behind	(3) Behind First	(4) Behind RE	(5) Behind FE
Parent					
Wealth (t-2)	0.072***	-0.023**	-0.022**	-0.008*	-0.007
	(0.020)	(0.008)	(0.007)	(0.004)	(0.009)
Child Household					
Net Worth (t-2)	0.079***	-0.014*	-0.017*	-0.008*	-0.002
	(0.016)	(0.007)	(0.006)	(0.003)	(0.004)
Income (t-2)	0.388***	0.001	0.019	-0.001	0.014
	(0.035)	(0.015)	(0.013)	(0.007)	(0.011)
High School=1	0.240***	-0.005	-0.061*	-0.008	0.002
	(0.072)	(0.031)	(0.031)	(0.021)	(0.095)
College =1	0.482***	-0.029	-0.060+	-0.039+	0.010
	(0.083)	(0.035)	(0.035)	(0.022)	(0.103)
White=1	0.070	-0.058*	0.017	-0.001	0.000
	(0.057)	(0.024)	(0.020)	(0.014)	(.)
Family Size	0.097*	0.023	-0.006	0.005	-0.008
	(0.050)	(0.020)	(0.018)	(0.010)	(0.022)
N	884	709	372	2,057	2,057

Note: Standard errors in parentheses. 'Behind' refers to whether the households is behind on a mortgage. Wealth, income, parental wealth, mortgage, family size, and house values are logged. All regressions include year fixed effects, and control for age and age-squared of both the child and parent.

households are behind the first time they are observed as homeowners (column 3).

I also report the results from two specifications where I follow the same households as in column (2) also after purchase. I report results from a random effect (RE, column 4) and a fixed effect (FE, column 5) regressions. Once we follow households over time, the effect of parental wealth decreases, but it remains large and significant at the 5% level in the RE regression. With household fixed effects the effect is no longer significant. However, the FE regressions must be interpreted with caution since there is little time variation in parental wealth over time within a family. Overall, the results support the hypothesis that parental wealth decreases the probability of being behind on mortgage payments.

4 A Quantitative Model of Family Banking and Housing

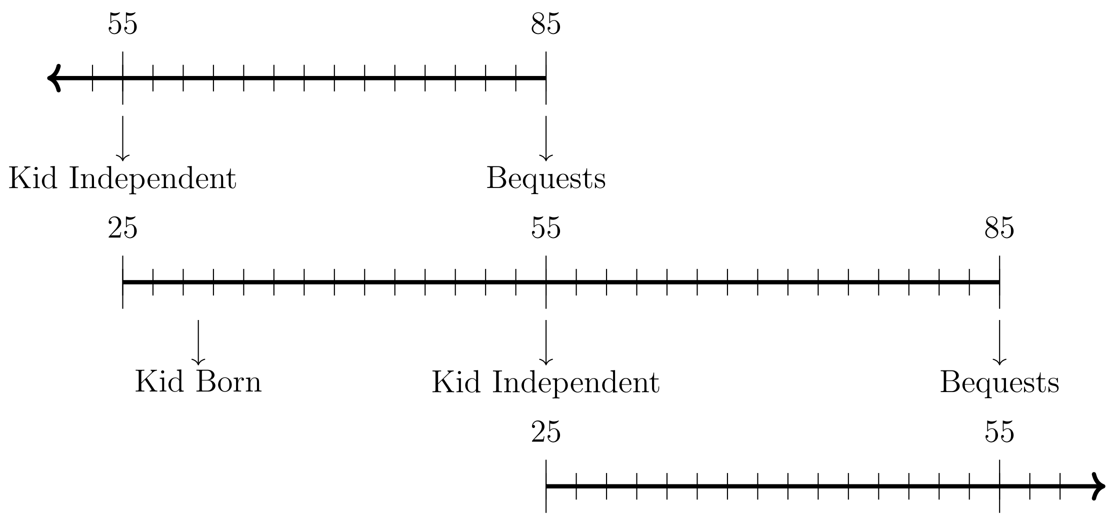
This section describes my life-cycle model of house tenure choices with overlapping generations, idiosyncratic earnings risk, and altruistic inter-vivos transfers from parents to children. The model has two main building blocks. The first is altruism and no commitment. Parents are altruistic towards their children and derive utility from their kid's utility. They can affect their kid's choices by transferring non-negative amounts in any period. Altruism without commitment creates strategic behavior, where both households understand how their choices affect the other's future behavior. The second is the introduction of (illiquid) housing into an altruism model. When housing is liquid, the only interaction with altruism is that parental transfers relax the mortgage borrowing constraints. With illiquid housing, children and parents both get face expenditure commitments. The model also becomes a two-asset model, where both wealth and the portfolio composition matter for transfers. In particular, owning children with low liquid wealth ('house-rich cash-poor') have a high marginal utility of non-housing consumption and may receive transfers. Finally, when housing is illiquid and income is uncertain, a risk of owning is that you may have to sell after receiving adverse income realizations. However, wealthy parents provide partial insurance against both income losses and may even transfer to ensure that their child can stay in the house and not pay the sales cost.

4.1 Demographics, Preferences and Technologies

Time is discrete and finite. Each period consists of two years. At the beginning of each period, a constant mass of new households enter the economy. The only economic agents in the model are households.

Demographics. Households are economically active from age $a \in \mathcal{A} = \{25, 27, \ldots 83\}$. A family consists of one adult kid k household (25-53) and a parent p household (55-

Figure 5: Overview of Household Problems



83). Households die with certainty after age 83. When the parent dies, the kid becomes a parent aged 55, linked with a new adult kid aged 25, and new kids are born when their parents are 30. Each parent-kid pair overlaps for 15 periods with an age gap of 30 years. Only two households are economically active in any dynasty at a time. Figure 5 shows the life cycle of two generations.

Altruism. The parent is altruistic towards his in the sense of Barro (1974). The parent places weight η on the utility of the adult kid. At death any wealth left is bequethed to the kid. Altruism to later generations is not explicitly modelled.

Inter-Generational Transfers. The parent can, in every period, transfer a non-negative transfer t_p that the child receives immediately. If transfers and bequests were not allowed the resulting policy functions would be identical to a model without altruism ('autarky').

Labor earnings. Households supply one unit of labor inelastically in each period. Households face a common and deterministic life-cycle earnings l_a. After retirement households receive constant retirement benefits $l_a = l_r \forall a \geq 67$. Households aged 25-53 face persistent idiosyncratic age-dependent productivity shocks $y_{i,a} \in \mathcal{Y}_a = \{y_1, \ldots, y_{N_y}\}$. The process follows an age-dependent Markov chain, where $\pi_a(y'|y)$

denotes the probability of switching from state y to y' at age a. Parents face no income uncertainty. The earnings of household i receives at age a is thus

$$w_{i,a} = l_a y_{i,a} \; \forall a \in \{25, 27, \ldots, 53\}, \tag{11}$$

$$w_{i,a} = l_a \; \forall a \in \{55, 57, \ldots, 83\}. \tag{12}$$

While this dichotomy in labor income risk is primarily chosen to reduce the state space it is also largely consistent with the empirical fact that labor income risk is decreasing with age (Sanchez and Wellschmied, 2020). Furthermore, this paper focuses on the role of parental transfers for kid's housing choices, and so parental income risk is not a primary concern. However, I perform robustness exercises where I allow for income and health expenditure risk also for parents in D.3

Housing. Households value consumption and housing services. They can obtain housing services from the rental market or the owner-occupied market. In the first market they can rent housing of quantity h_r, and in the latter they can own houses of size h_o. The unit price of housing is p and q is rent-to-price ratio: qph_r. Homeowners pay deprecation δ on their housing. I assume adjustment costs that are proportional to the market value for owner-occupied housing, as in Yang (2009):

$$adj(h_{a+1}, h_a) = \begin{cases} \kappa_b p_t h_{a+1} & \text{if } h_a = h_r \;\&\; h_{a+1} \neq h_r, \\ \kappa_s p_t h_a & \text{if } h_a \neq h_r \;\&\; h_{a+1} = h_r, \\ 0 & \text{if } h_{a+1} = h, \end{cases} \tag{13}$$

where κ_s, κ_b denote the selling and purchasing costs. In this notation h_a is the house a household enters the period with and h_{a+1} the house chosen this period. These adjustment costs make housing illiquid.

Financial Market. Households can save in a one-period risk free bond with a return r. Borrowing is allowed against collateral (owner-occupied housing), but must satisfy a loan-to-value (LTV) constraint. Borrowing works like a one-period mortgage that is rolled over every period. The mortgage has an interest rate of $r + r^m$, where $r^m \geq 0$ is the mortgage premium. Since the mortgage premium is positive households will never simultaneously hold both a mortgage and save in the risk free bond. Let b denote the net position in bonds. The interest rate households face is

$$r(b) = \begin{cases} r & \text{if } b \geq 0, \\ r + r^m_a & \text{if } b < 0. \end{cases} \tag{14}$$

The borrowing constraints take the following form depending on the house tenure choice:

$$\begin{cases} b \geq -LTV \times ph_{a+1} & \text{if } h_a = h_o \\ b \geq 0 & \text{if } h_{a+1} = h_r \end{cases}$$

Initial Conditions of the New Young. A household's starting wealth and productivity at age 25 is stochastic and allowed to be correlated with the kid's parents wealth and productivity at age 53, $x_{25}, y_{25} \sim F(x_{53}, y_{53})$. All households start as renters but are allowed to purchase housing in the first period. The distribution of F is crucial to generate sufficient inter-generational correlations in initial conditions.[15]

Preferences. The parent and child have time-separable expected utility preferences over consumption and housing services. Households discount the future at rate β. The per-period utility function is allowed to depend on the house tenure and is age independent and takes the following form for the kid:

$$U_k(c_k, h_k, o_k) = u(c_k, h_k, o_k) = \frac{\left(c^\xi s(h, o)^{1-\xi}\right)^{1-\gamma} - 1}{1 - \gamma}, \tag{15}$$

[15]While this paper abstracts away from early-childhood, education and college investment of parents, these choices affect moments such as initial starting wealth and income, which it is important to match to generate inter-generational correlations in the simulated data in line with empirical evidence.

where s denotes housing services, γ measures risk aversion, and ξ the expenditure shares on non-housing consumption. The function $s()$ maps housing qualities and house tenure into values comparable to consumption and takes the following form

$$s(h, o) = \begin{cases} h & \text{if renting } (o = 0), \\ \chi h & \text{if owning } (o = 1). \end{cases} \tag{16}$$

Finally, the parent's per-period utility function is identical, just augmented by the altruistic utility derived from the kid

$$U_p(c_p, h_p, o_p, c_k, h_k, o_k) = u(c_p, h_p, o_p) + \eta u(c_k, h_k, o_k) \tag{17}$$

Timing. The productivity state of children is realized first. Families with new kids also draw the initial wealth level of the kid from Θ. Next, the parent chooses his consumption c_p , non-negative inter-vivos gifts t_p, bond position b_p, and housing choice h_p. The kid decides her consumption c_k, housing h_k, and savings b_k choices after observing his parent. The parent moves first to be consistent with mortgage regulation in the US, which requires that gifts are deposited before mortgages are approved.

State Variables. The state variables of a parent p are the beginning of period wealth for the kid $x_k \in X = [0, \infty)$, the parent's starting wealth $x_p \in X$, the house tenures $h_k \in H = \{h_r, h_o\}, h_p \in H$, the productivity of the child $y_k \in y_a = \{y_1, \ldots, y_{N_y}\}$, and the age of the child $a_k \in A_k \in \{25, 27, \ldots, 53\}$. Let the state variable of the parent be denoted by $\mathbf{s}_p \equiv (x_k, x_p, y_k, h_k, h_p, a_k)$.

Due to the timing assumption in the model, the child makes choices after the parent makes her choices. The parent's choices affects the kid's feasible choice set (transfers t_p increases cash-on-hand x_k) and next period state variables (the parents choices for net-bond position b_p and housing h_k determine next-period transfers). At the beginning of the second stage the state space of the child expands to

$(x_k, x_p, y_k, h_k, h_p, a_k; t_p, b'_p, h'_p)$. The kid is indifferent between a change in own wealth or transfers, but cares about his disposable wealth after transfers $\tilde{x}_k \equiv x_k + t_p$. Further, since he moves after the parent, the parent's starting wealth and housing x_p, h_p is redundant for the kid, so we can rewrite the state space to be $\mathbf{s}_k = \left(b'_p, h'_p, x_k + t_p, y_k, h_k, h'_p, a_k\right)$. Let $V_k(s_k)$ denote the kid's value function in the second stage.

4.2 Household Decision Problems

I now describe the recursive formulation of the household's decision problems. Households take all prices as given. Each household's decision problem is divided into a discrete owning/renting choice. Households find consumption, savings, and transfer policies conditional on a housing choice, before picking the housing choice that maximizes utility.

4.2.1 Problem of the Kid-Parent Pair

I now show the decision problems of both households, conditional on them choosing to own $h'_k = h_o$. Appendix C.2 contains the problems conditional on renting and for the final period of life of the parent.

Kids - Second Stage: The kid chooses consumption, savings, and housing. I let primes denote next period variables, and highlight variables affected by strategic considerations.

$$
\begin{aligned}
V_k(\mathbf{s}_k) = \quad & \max_{c_k, b'_k, h'_k = h_o} u(c_k, h'_k) + \beta \mathbb{E}\left[V_k(\mathbf{s}'_k)\right] \\
& \quad \text{s.t.} \quad b'_k = x_k + t_p + w_k - c_k - ph'_k - adj(h_k, h'_k) \\
& \qquad\qquad x'_k = b'_k(1 + r(b'_k)) + ph_k(1-\delta) \\
& \qquad\qquad b_k \geq LTV ph'_k.
\end{aligned}
\tag{18}
$$

$$\text{Where } \mathbf{s}_k = \left(b'_p, h'_p, x_k + t_p, y_k, h_k, h'_p, a_k\right),$$
$$\mathbf{s}'_k = (b^*_p(\mathbf{s}'_p), h^*_p(\mathbf{s}'_p), x'_k + t^*_p(\mathbf{s}'_p), y'_k, h'_k, a_k + 2).$$

Transfers from parents increases kid's cash-on-hand. In addition to this wealth effect a transfer may relax the borrowing constraint. The transfer does not directly interact with the adjustment cost, but as discussed in section 2 the adjustment costs incentives kids to overconsume housing. The kid takes into account how her choices affect the parent's state and next-period choices. Denote the resulting policy functions by $c^*_k(\mathbf{s}_k), h'^*_k(\mathbf{s}_k), b'^*_k(\mathbf{s}_k)$, where the superscript asterisk denote the optimal solution of the equilibrium stage game. It will be convenient to denote next period wealth by $x'^*_k(\mathbf{s}_k)$.

Parents - First Stage: The parent chooses consumption, savings, housing and the transfer:

$$\begin{aligned}
V_p(\mathbf{s}_p) = \max_{c_p, b_p, h_p, t_p} \; & u(c_p, h_p) + \eta u\left(c^*_k(\mathbf{s}_k), h'^*_k(\mathbf{s}_k)\right) + \beta \mathbb{E}\left[V_p(\mathbf{s}'_p)\right] \\
\text{s.t.} \quad & b_p = x_p + w_p - c_p - t_p - ph'_p - adj(h_p, h'_p) \\
& x'_p = b'_p(1 + r(b'_p) + p'h'_p(1 - \delta) \\
& t_p \geq 0, b'_p \geq -LTV \times ph_p.
\end{aligned} \tag{19}$$

$$\begin{aligned}
\text{Where } \mathbf{s}_k &= \left(b'_p, h'_p, x_k + t_p, y_k, h_k, h'_p, a_k\right), \\
\mathbf{s}_p &= (x_k, x_p, y_k, h_k, h_p, a_k) \\
\mathbf{s}'_p &= \left(x'^*_k(\mathbf{s}_k), x'_p, y'_k, h'^*_k(\mathbf{s}_k), h'_p, a_k + 2\right).
\end{aligned}$$

The parent moves first and takes into account how its choices will affect the choices of the kid in the second stage. We see that there are two distinct strategic considerations. First, the parent affects the kid's consumption in this period. Second, the parent affects the kids housing tenure and savings choices. For example, it may be that the parent observed an owning kid that will sell his house without transfers. However, the parent can avoid this by transferring sufficient funds to keep this house-rich but cash-poor kid in the house.

4.3 Measures of Households

I now define the measures of households and the related laws of motion. The state-space of a parent household is $S_p = X_k \times X_p \times Y_k \times H_k \times H_p \times A_k$, with $\mathbf{s}_p$ denoting generic elements therein and the $\mathcal{S}_p$ the associated Borel-σ algebra. The state space of the kid household is $S_k = B_p \times H_p \times X_k \times Y_k \times H_k \times A_k$, where $B_p = (-\infty, \infty)$. I omit further definitions for the kid for conciseness. Let $\psi_p(\mathbf{s}_p)$ be a probability measure over $(S_p, \mathcal{S}_p)$, so that $\psi(\mathbf{s}_p)$ denote the measure of households with state $\mathbf{s}_p$, and let Ψ_p denote the corresponding cumulative distribution function. The mass of households for each age is normalized to 1/15. Note that $\psi_p(s_p)$ denotes the distribution of households after shocks are realized but before choices are made.

Law of Motion for Dynasties with Kids Aged 25-51: The mass of households with state $\mathbf{s}_p$ is just the mass of families that choose policies for housing and savings such that they can end up in that state, times the probability of that specific income shock:

$$\begin{aligned}\psi(\mathbf{s}'_p) = \int_{\mathbf{s}_p \in \mathcal{S}_p} & \mathbf{1}_{\left\{x'_p = x'^*_p(\mathbf{s}_p)\right\}} \mathbf{1}_{\left\{h'_p = h'^*_p(\mathbf{s}_p)\right\}} \mathbf{1}_{\left\{x'_k = x'^*_k(\mathbf{s}_k(\mathbf{s}_p))\right\}} \mathbf{1}_{\left\{h'_k = h'^*_k(\mathbf{s}_k(\mathbf{s}_p))\right\}} \times \\ & \pi(y'_k | y_k) \, \mathrm{d}\psi(\mathbf{s}_p).\end{aligned} \tag{20}$$

Note that the kid's state $\mathbf{s}_k(\mathbf{s}_p)$ denotes the kid's states after the parent have made their decisions, and is therefor a function of the parent's state and thus also their policies: $h'^*_k(\mathbf{s}_k(\mathbf{s}_p)) = h'^*_k\left(b'^*_p(\mathbf{s}_p), h'^*_p(\mathbf{s}'_p), x'_k + t'^*_p(\mathbf{s}'_p), y'_k, h'_k, a_k + 2\right)$

Law of Motion for Kids 53: In this special case, the distribution will depend on the choices of the new parent (old kid), the now deceased parent and the stochastic initial conditions of the new kid. Note that s_p only denotes the subset of the state-space where $a_k = 53$.

$$\psi(\mathbf{s}'_p; a_k = 25) = \int_{\mathbf{s}_p \in \mathcal{S}_p} \mathbf{1}_{\{x'_p = x^*_p(\mathbf{s}_p) + x^*_k(\mathbf{s}_k(\mathbf{s}_p))\}} \mathbf{1}_{\{h'_p = h^*_p(\mathbf{s}_p)\}} \mathbf{1}_{\{h'_k = h_r\}} \times F(x'_k, y'_k | x_k, y_k)\, \mathrm{d}\psi(\mathbf{s}_p; a_p = 53). \tag{21}$$

Note how the initial wealth and productivity of the child depends on the wealth x_k and productivity y_k of the new parent at age 53. Further, all kids start out as renters and the next-period wealth of the new parent is savings plus bequests.

Finally, we define a function $\mathcal{H}$ that operates one on distribution $\psi(\mathbf{s}_p)$ and policy functions $g^*(\mathbf{s}_p) : \mathbf{S}_p \to (X \times B \times T \times H) \times (X \times B \times H) \subset \mathbb{R}^5 \times \{h_r, h_o\}^2$ and maps it into a new distribution in accordance with equations (20, 21):

$$\psi_{n+1} = \mathcal{H}(\psi_n, g^*), \tag{22}$$

where the subscript denotes the iteration of the distribution. A stationary distribution is then a fixed point of equation (22).

4.4 Equilibrium Definition

A stationary equilibrium, which is also Markov Perfect, is a collection of value functions $V_k(\mathbf{s}_k)$ and $V_p(\mathbf{s}_p)$, policy functions $c'^*_k(\mathbf{s}_k)$, $b'^*_k(\mathbf{s}_k)$, $h'^*_k(\mathbf{s}_k)$ and $c'^*_p(\mathbf{s}_p)$, $b'^*_p(\mathbf{s}_p)$, $h'^*_p(\mathbf{s}_p)$, $t'^*_p(\mathbf{s}_p)$, and a distribution of households $f(\mathbf{s}_p)$ such that:[16]

1. In each repetition of the parent-kid stage-game:

   (a) The parent's policy functions are optimal given the kid's policy functions.

   (b) The kid's policy functions are optimal given the parent's policy functions.

2. The measure of households is invariant

[16] In section 6.3 I additionally include endogenous supply of owner-occupied units, where the supply depends on the price p.

4.5 Model Discussion

Several properties of this setup are worth noting. The model features rich strategic interactions: the Samaritan's Dilemma, where the kid undersaves to receive larger transfers, and the 'gifts-to-autarky', where the parent can push the kids into self-sufficiency. Further, both households internalize fully how their behavior will affect the other in current and future periods. There is limited risk-sharing where parents provide partial insurance toward kids.

The decision to buy a house is a relative one in models with rental and owner-occupied housing. Potential homeowners buy housing if, and only if, the benefits of owning exceed those from renting. Thus, differences in an individual's desire to own will be affected by differences in net benefits. Housing and altruism interact in many ways in the model. Some interactions are generated by the illiquidity of housing, while others are driven by the LTV constraint and housing's indivisible nature.

What is the impact of altruism and illiquid housing on the relative benefits of owning? First, as in the stylized model, altruism increases the incentive to over-invest in illiquid housing, as it increases transfers. Second, altruism decreases the downside risk of illiquid housing when there is income risk: An owning household that receives bad income realizations will sell and pay the sales cost m_s, unless it receives transfers. On the other hand, illiquid housing can also reduce the incentive to undersave: if a household owns and wants to consume its wealth to receive larger transfers it must pay the sales cost. Similarly, the buying cost m_b makes overconsumption in housing less attractive. While not the focus of this paper, the fact that housing is illiquid may also benefit parents, as they can hold more wealth in illiquid housing, and thus increase the costs of transfers.[17]

Altruism and housing interact in two additional ways, regardless of liquidity. First, the introduction of altruism lowers the kid's savings motive, all else equal.

[17] Barczyk and Kredler (2020) study a similar effect, driven by a preference shifter for owning among retired parents. Homeowning parents increase kid's incentives to provide long-term care so that the parent remains in the house, which the kid eventually inherits.

Since households only buy once they cross a wealth threshold, the decreased savings motive lowers homeownership. On the other hand, transfers increase wealth directly and so may shift households above the purchase threshold. Second, the LTV constraint introduces another transfer motive. The value function is the upper envelope of the value functions conditional on the decision to rent or own. The envelope creates another kink, where the marginal value of wealth is high, which increases transfers to the right of the owning threshold. Finally, transfers can reduce the severity of binding borrowing constraints.

The model has implications for the propensity to be liquidity constrained (hand-to-mouth). Households who are liquidity constrained have higher marginal propensities to consume and are important drivers of aggregate consumption responses (Kaplan and Violante, 2014). The downside of being liquidity constrained is lower with altruism since transfers may provide insurance against income shocks. The upside is also larger since 'house-rich, cash-poor' households may receive additional transfers. This matters for policy: A policy rebate targeted to hand-to-mouth households may then disproportionally flow to households who a) would get parental transfers without the policy, b) have wealthier parents, and c) have strategically chosen to have low liquidity. Further, Boar et al. (2020) show that preference heterogeneity in discount factors and risk aversion may be an important element in the propensity to be hand-to-mouth. However, having wealthier parents decreases savings rates and increases consumption, which is observationally similar to higher discount rates or higher intertemporal elasticity.

Finally, this is an infinitely repeated game, and so the equilibrium need not be unique, unlike in the stylized two-period model. However, I experiment with different starting positions and verify that they all yield the same equilibrium.

5 Parameter Selection

To quantify the effects of parental assistance on homeownership and evaluate counterfactual policies, I structurally estimate the model using data from the PSID. I follow a standard two-step estimation procedure. In the first step I estimate parameters that do not require the model structure directly from the data or take them from the literature. In the second step I estimate the remaining parameters using simulated method of moments (SMM).

All parameters and moments estimated in this paper use the 1999-2017 waves of the PSID. Income, wealth and housing values are all winsorized at the 1st and 99th percentiles to limit the role of outliers. All calculations use family weights.

5.1 Parameters Chosen Independently and Externally From the Model

All externally calibrated parameters and values are summarized in table 2.

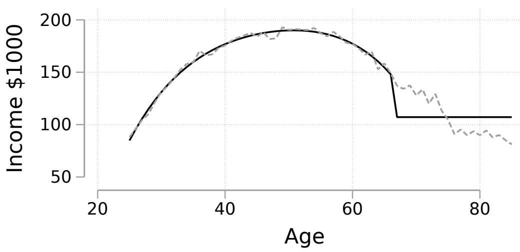
Period Length. Each decision period is calibrated to be two years to overlap with the PSID interview frequency. I report all parameters in their non-annualized forms (e.g., the interest rate is the two-year interest rate).

Income Process. The income processes consists of a deterministic life-cycle component and shocks. To find the deterministic component, I first find the weighted average household income, by age and year. I then weight each year equally to obtain the life-cycle profile. I then regress the average income by age on a fifth-order polynomial. I use the predicted values from this regression as the life-cycle income. To find income after retirement, I find the average predicted income for households aged 65 or more, and divide it by the predicted income at age 63. Income for households aged 65 or more is then set be the income at age 63 multiplied by this ratio. Figure 6a displays the data and the predicted values.

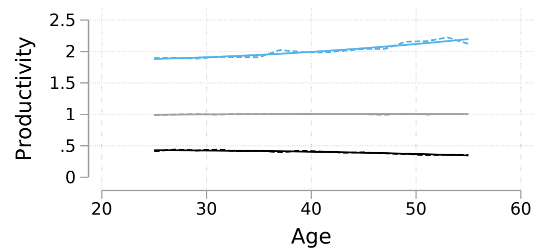
Next, to find the values for the stochastic productivity shifter for kids, I first set

Figure 6: Calibrated Income Process

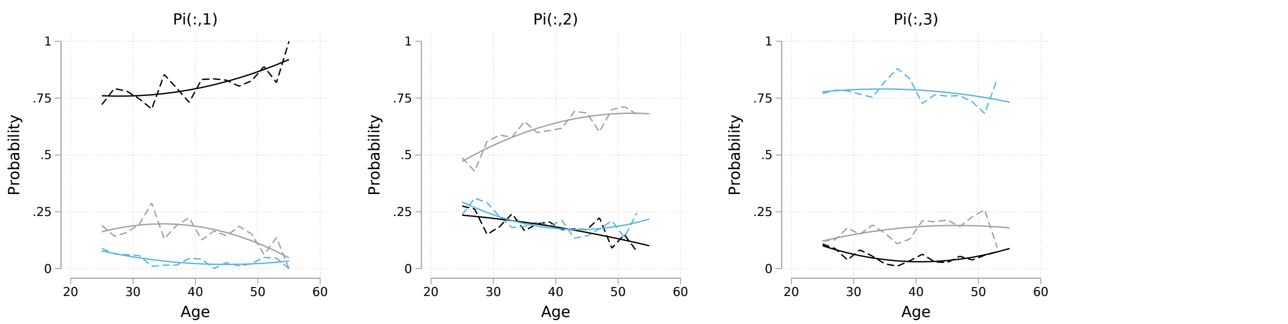
(a) Deterministic Income Profile y_a



(b) Productivity Shifter $y_{i,a}$

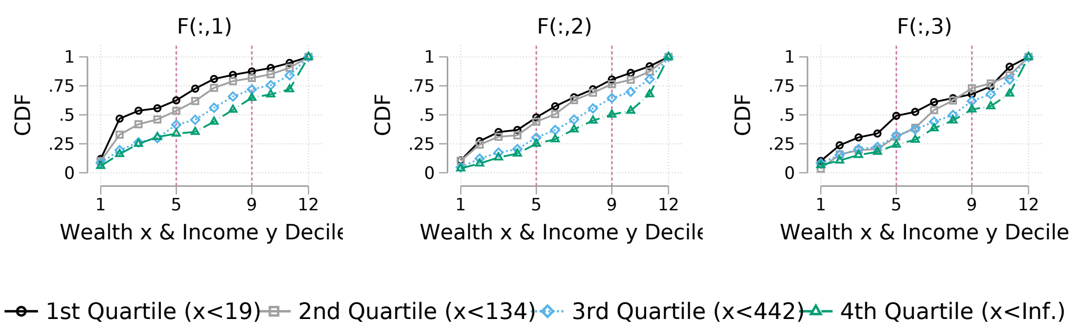


(c) Age-State Dependent Transition Probabilities $\Pi(y_{i,a+2}|y_{i,a})$



Note: Dashed lines are the empirical age-means and solid lines are fitted third order polynomials that are used in the model calibration. The bottom row plots the probability of moving to the bottom tertile (black), middle (gray), and top (blue) income tertiles by the income tertile the kid is currently in, by age.

Figure 7: Initial Distribution $F(x_{53,y_{53}})$ by wealth x_{53} and productivity y_{53}



Note: The vertial lines denote the first, second, and third income shifters for the kids. Within each interval each point denotes a wealth quartile.

$N_v = 3$ to obtain a three-state Markov Chain. The sample is divided into age-specific income tertiles. I then find the probability of moving to all tertiles in the next age group for each age and tertile. This age-dependent transition matrix is plotted figure 6c. To find the values $v_{i,a}$ for each tertile, I first normalize each household's income by the median income within each age group and then find the median income within each tertile. The results are plotted in figure 6b.

Initial Conditions of the Young $y_{k,25}, x_{k,25} \sim F(x_{k,53}, y_{k,53})$. This joint distribution is important to match intergenerational correlations in initial wealth and productivity. To provide a simple and intuitive method, I estimate it nonparametrically. First, I find $N^x_k = 4$ quantiles for wealth and the $N_v = 3$ quantiles of productivity for households aged 25. For the parents, I divide them into $N^x_p = 4$ quantiles for each of the $N_v = 3$ productivity quantiles they are in. I then find the probability of each parent-kid combination in the data and use this as the PDF.

Housing Parameters. I set the rental-rate $q = 0.10$ as is standard in the literature and estimated in Davis et al. (2008). Housing deprecation and maintenance δ is set 0.05 to match depreciation of existing housing capital as estimated in Harding et al. (2007). The values for the transaction costs are taken from Yang (2009) and set to $m_s, m_b = 0.075, 0.02$.

Financial Parameters. I set $LTV = 0.80$, based on the average LTV ratio at loan origination for prime mortgages from Freddie Mac. The risk free rate is set to be $r^f = 0.04$.

5.2 Moments and Internal Calibration

The remaining parameters $\theta = (\beta, \eta, \chi, r^m, p, h_o)$ are chosen to minimize the distance between N simulated moments and empirical moments. All empirical moments are estimated from the PSID using all waves from 1999 to 2017, and are listed in table 4 along with the model simulated moments. I now detail how each moment is estimated in the data, and a heuristic explanation of why the moment aids identification of some

Table 2: Summary of Externally and Independently Estimated Parameter

Parameter		Value	Source
Period Length	n/a	2 years	PSID Frequency
Rental Price	q	0.10	Standard
Deprecation	δ	0.05	Standard
Risk-free Rate	r^f	0.04	Standard
Expenditure Share Housing	ϕ	0.175	Standard
Rental Size	h_r	1.0	Normalization
Max Loan-to-Value	LTV	0.8	Standard
Initial Distribution	$F(x_{53}, v_{53})$	fig. 7	PSID
Deterministic Income	l_a	fig. 6a	PSID
Productivity shocks for Kids	$y, \Pi(y'\|y)$	fig. 6b,6c	PSID
Selling & buying cost	(κ_s, κ_b)	(0.075,0.02)	Yang (2009)

Note: Rental price q, deprecation δ, and the risk free rate r are not annualized (two-year values). All moments estimated from the PSID use waves from 1999-2017. *LTV*

parameters.

For each moment (e.g median wealth), I aggregate over age bins and years. I then aggregate over all years to remove year effects and give each year equal weight. Next, I average the moments over ages and years in the relevant age group, in order to find the moment for the targeted age group.

I target two moments related to wealth accumulation over the life-cycle: median wealth of young (\$23,500) and old (\$206,700) households. I target the median for two reasons. First, this paper is not about the wide dispersion and fat tails in the US wealth distribution, and so targeting the mean will make households too rich. Second, parental transfers for housing are most important for dynasties who are neither very poor or very rich, and so matching the middle of the wealth distribution is pertinent. Section D.5 reports results when parameters are chosen to match mean wealth instead of medians.

I target three moments directly related to housing: the homeownership rate of young households (49.4%), average house value to wealth for young homeowners

(2.32) and rent to income for young renters (0.23).[18] The young homeownership rate is a crucial moment to match for this paper. Matching the average ratio of house values to wealth and the rent-to-income renters ensures that renters and homeowners have similar balance sheets in the model and the data.

Next, I target three moments related to the timing of first purchase: average wealth (33.4), average LTV (0.67), and average age (32.5) when households become first-time homeowners.[19] Wealth at purchase is defined as wealth in the period before households become first-time owners. LTV at purchase is defined as the mortgage over house values in the period households become first-time homeowners. Age at purchase is the age at which households are first observed as owners.[20] It is important to match these moments so that the rent-to-own transition happens while households are young and have low wealth for parental transfers to be quantitatively important.

Finally, I target three moments related to transfers: the average transfer rate to young kids (35.8%), the transfer size over parental wealth (0.034), and transfer rate around young households first-time purchases (39.0%). These moments are all calculated from matched child-parent pairs from the 2013 transfer supplement. I ignore transfers of less than \$500 as these transfers are not quantitatively important but would increase the transfer rate significantly. For transfers around first-time home purchases I include transfers given in the period before, during, and after purchase. The period before purchase is counted as parents may give transfers intended to for later purchases or to help kids save for a downpayment while renting. Further details about the estimation of transfer moments are in appendix C.1. I include transfers after purchase as the two period model highlights the role of future transfers in increasing the relative benefit of owning. These moments are important to ensure that the frequency and magnitude of transfers are correct.

[18] Rent-to-income values outside $(0, 1)$ are coded as missing.

[19] LTV's above 1 are coded as missing.

[20] For households who enter the sample as homeowners we cannot observe time of purchase. To be consistent with the model such households who enter at age 25 or 26 have age-at-purchase be 25, while the others are missing.

Table 3: Estimated Parameters

	Parameter	Value	Std. Err.	Ident. Moment
β	Discount Factor	0.925	0.004	Median Wealth (55-74)
η	Altruism	0.459	0.068	Parent Transfers (55-74)
χ	Ownership Pref.	1.382	0.156	Age First Own (25-44)
r_k^m	Mortg. Prem Kid	0.020	0.006	LTV at purchase (25-44)
$\frac{h_o}{h_r}$	Size Ratio	3.120	0.291	Rent / Income (25-44)
p	House Price	82.075	6.610	Owner (25-44)

Note: Standard errors calculated from estimating the model to 100 bootstrapped samples. The table lists one main identifying moment.

5.3 Model Fit

The estimation of the $N_\theta = 6$ remaining parameters are estimated by simulated method of moments (SMM). I first draw a large set of quasi-random parameter vectors from a Sobol sequence, creating a N_θ-dimensional hypercube where parameters are quasi-random and uniformly distributed over a 'large' support. For each parameter vector the model fit is defined as the squared distance between the $N_m = 11$ simulated moments m^s and the empirical moments m^e:

$$\hat{\theta} = \arg\min \sum_{j=1}^{11} \frac{(m_j^d - m_j^e)^2}{m_j^e}, \tag{23}$$

where the squared distance of each moment is normalized by its empirical mean. The parameter vector that minimizes the objective (23) is the approximate global optimizer. I use this vector as the starting point for a local optimizer that uses a simplex algorithm to the find the local minimum. In appendix G.1 I show how this method allows us to easily verify that each parameter is identified, and how each moment is affected by the different parameters.

The estimated parameters are reported in table 3, and are in line with previous literature and their direct empirical counterparts. The main preference parameters β and η are in line with estimates in related papers (e.g. Boar (2018); Daruich (2018);

Lee and Seshadri (2019). The ownership preference shifter indicates that a house gains 38% more housing services by owning relative to renting, and is somewhat lower than in related papers (e.g. Corbae and Quintin (2015); Chang (2020); Fisher and Gervais (2011). The mortgage premium r_m is estimated to be 0.02, or 0.01 per annum. This is low relative to the true mortgage premium in the US. However, the mortgages in the model are one-period bonds without default, and so would likely command a lower interest rate. Finally, the owner-occupied size is 3.12, relative to a rental size normalized to 1. Among young households in the PSID, the median rental unit has 3 rooms (excl bathrooms) while the median owner-occupied house has 7 rooms (excl bathrooms), which yields a similar size ratio (2.33). Finally, the price is estimated to be \$82,075 in 2015 dollars per housing unit or \$256,074 for the owner-occupied house. In the PSID the average market value of owner-occupied units among households aged 25-44 is \$232,918.

The model fits the data well, table 4. It matches wealth, the homeownership rates, rent-to-income, age of first ownership, and LTV at purchase very precisely. It overpredicts the two-year transfer rate somewhat (36% vs 45%) but underpredicts the transfers around purchase somewhat (39% to 36%). It should be noted that the transfer moments are also the ones who are the least precisely estimated in the data since they only use data from the 2013 PSID.

5.3.1 Identification of Parameters

I now provide a brief argument for why at least one moment is informative for each parameter. The arguments are augmented by identification plots in appendix G.1. We know that wealth accumulation is strongly affected by the discount factor β. The transfer rate identifies the strength of altruism η since higher altruism increase transfers. The age of first purchase decreases when the preference shifter χ for owning increases. With lower mortgage rates, households are willing to take on higher loans, and so the LTV ratio at purchase identifies the mortgage premium r_m^k.

Table 4: Targeted Moments

Moment	Data	Model
Median Wealth (25-44)	23.54	23.65
Median Wealth (55-74)	206.67	206.86
Owner (25-44)	0.49	0.48
Rent / Income (25-44)	0.23	0.21
Age First Own (25-44)	32.53	32.85
LTV at purchase (25-44)	0.67	0.65
Parent Transfers (55-74)	0.36	0.45
Transfers Around Purchase (25-44)	0.39	0.36
Sum Squared Distances		0.03

Note: All moments calculated from the 1999-2017 waves of the PSID, using households aged 25-83, except transfers which is from the 2013 PSID Transfer Supplement.

When minimum owner-occupied house sizes increase, households have higher income and wealth before they buy, so the average rent-to-income ratio decreases. Finally, the house price is pinned down by the homeownership rate, as higher prices delays ownership. The model is highly non-linear, and all parameters influence at least one moment.

5.4 External Validity

As a validation exercise I show that the model matches non-targeted aggregate moments and also moments that relates to the behavior of individual households.

Table 5 shows a list of non-targeted moments calculated from the PSID. First, I find that 37% or 43% of households are 'hand-to-mouth', using the definitions from Boar et al. (2020) and Kaplan et al. (2014), respectively. In the model simulation 41% of households are hand-to-mouth, where hand-to-mouth is defined as having liquid wealth less than 2 weeks of earnings as in Kaplan et al. (2014).[21] The model overshoots the wealth at purchase by $12,000, likely due to the somewhat high min-

[21] I report the number for multiple definitions since neither has a clear model equivalent. In particular, in the model no households hold both a mortgage and liquid wealth.

Table 5: Non-Targeted Moments

Moment	Data	Model
Hand-to-Mouth (25-44)	(0.37,0.43)	0.41%
Wealth at Purchase (25-44)	33.36	45.69
Owner (25-73)	0.65	0.60
Parent Wealth Gradient (25-44, median)	2.52	2.46
$Prob(NewOwner \mid t_p > \$5000, Controls)$ $-Prob(NewOwner \mid t_p \leq \$5000, Controls)$	(0.03-0.08)	0.06

Note:

imum downpayment $LTV = 0.8$ requirement. Next, the homeownership rate among households aged 25-74 is 65% in the data, while it is 60% in the model. Finally, we can see that the model matches the parental wealth gradient (median wealth of parents to owners/median wealth of parents to renters)

The last row reports the effect of receiving larger transfers on the probability of becoming homeowners, controlling for a set of observables. In particular, I replicate the regression from Lee et al. (2018), Tables 7-8. These regressions estimate with a linear probability model the effect of receiving a transfer over \$5000 in the PSID and the HRS, controlling for a set of observerable characteristics.[22] The last row of table 5 reports the results, and we can see that the regressions from the simulated panel in the model is inside the empirical interval.

6 Homeownership Rates Without Transfers?

What would the homeownership rate be without transfers? How does transfers affect the selection of homeowners? In this section I answer these and other questions. To do so I simulate the model under the same parameters, but set $\eta = 0$ in order to eliminate transfers and bequests. The model is then a standard unitary household life-cycle housing model.

[22] Similar regressions are also used in Engelhardt and Mayer (1998); Guiso and Jappelli (2002); Blickle and Brown (2019), who find roughly similar magnitudes.

Importantly, I assume that the supply of housing is perfectly elastic (i.e. that the house price does not change). While this assumption is prima facie incorrect, keeping prices constant allows clean decomposition of the various mechanisms that change the homeownership rates with and without transfers. I wrap up with showing how the results change once the housing supply is endogenous and we allow for partial equilibrium effects, and discuss why endogenous prices are quantitatively unimportant.

6.1 Results with Constant Prices

Table 6 reports how the moments change without altruism and transfer. Homeownership rates go down by 15 pp. from 49, a decrease of 31%. This is a large decrease; from the peak of the housing boom in the 2000s to the low in 2013, the US homeownership rate went down by only 8 percentage points.What drives this large decrease in homeownership rates for young households?

It is not because households young households are poorer: the median wealth doubles without altruism among the young and is unchanged among parents. The average age at first purchase increases, from 33 to 37. The change is driven by changes in the threshold where owning becomes more attractive than renting: i) the LTV at purchase decreases from 0.65 to 0.46, and iii) wealth at purchase increase from 45 to 74. Indeed, the fraction of households who are hand-to-mouth also decreases from 0.42 to 0.23. The decline in the overall homeownership rate of 5 pp. of is smaller, but still sizeable. Finally, note that without altruism the parental wealth gradient falls from 2.46 to 1.26, and the remaining effect is driven by persistent productivity through initial conditions $F()$.

Table 6: Homeownership Decreases while Wealth Increases Without Altruism

Moment	Data	Altruism $\eta > 0$	No Altruism $\eta = 0$
Targeted Moments			
Median Wealth (25-44)	23.54	23.65	42.10
Median Wealth (55-74)	206.67	206.86	208.64
Owner (25-44)	0.49	0.48	0.33
Rent / Income (25-44)	0.23	0.21	0.20
Age First Own (25-44)	32.53	32.85	37.52
LTV at purchase (25-44)	0.67	0.65	0.46
Parent Transfers (55-74)	0.36	0.45	0.00
Transfers Around Purchase (25-44)	0.39	0.36	0.00
Non-Targeted Moments			
Hand to Mouth (25-44)	0.4±3	0.42	0.23
Wealth at Purchase (25-44)	33.36	45.69	74.29
Owner (25-83)	0.65	0.60	0.55
Parent Wealth Gradient (med)	2.53	2.53	1.26

Note:

6.2 More Wealth, Lower Homeownership Without Altruism?

In order to understand why households without altruism require higher wealth to prefer owning, I solve the model under different thee different regimes: i) increases the LTV requirement from 0.8 to 0.9, ii) making housing liquid by removing adjustment costs from housing ($m_s = m_b = 0$), and iii) removing income risk. The results are reported in table 7, and we see that with altruism adjustment costs do not matter for aggregate homeownership rates.

Increase in LTV: Allowing smaller down payments. When the LTV increases the homeownership goes up 23 percentage points with altruism. This increase is driven by higher LTV at purchase and lower wealth at purchase. However, this large increase in homeownership rates is driven by an increased role for parental wealth: The parental wealth gradient more than doubles. Secondly, with higher LTVs, the transfer rate around ownership also increases from 36 to 72%. Without altruism, the LTV increases the homeownership rate by 12 pp., a smaller effect. From table 4 this is not surprising: without altruism households are far away from the borrowing constraint and so relaxing cannot increase homeownership by a significant amount.

Removing adjustment costs: Making housing liquid. Making housing liquid increases the homeownership rate only by 3 pp., driven by small changes in the LTV and wealth at purchase. However, there is a large decline in the parental wealth gradient, from 2.53 to 1.67. This highlights the two mechanisms of liquid housing. Housing is safer and so parental wealth plays a smaller role, and kids cannot use housing as a commitment device. The net change in ownership is small, but there is a large decrease (increase) in ownership among households with wealthy (poor) parents. Without altruism we see that the removal of adjustment cousts increase the homeownership rate by almost 50%. Since households with poor altruistic parents behave as if there was no altruism, this confirms that increasing liquidity will decrease the role of parental transfers in housing outcomes. The removal of adjustment costs, without altruism, lowers the threshold to buy as it removes the largest risk of ownership for households: the risk of having to sell the house and pay adjustment costs as a response to bad income realizations.

Removing Income Uncertainty: In life cycle models with uninsurable income risk it is well known that this substantial friction has large welfare implications. I now quantify how much income risk plays suppresses homeownership rates and whether altruism alleviates this effect. Indeed, the removal of income risk increases homeownership rates significantly. With altruism, we observe an 8pp increase, and without altruism a 17 percentage points. The effect of income risk is larger without altruism as parental transfers provide partial insurance against negative income shocks.

Table 7: Effects of Risk and Borrowing Constraints on Homeownership

Moment	Bench	LTV 0.9	No Cost	Inc Cer.	Bench	LTV 0.9	No Cost	Inc Cer.
Targeted Moments								
Median Wealth (25-44)	23.65	10.73	17.96	29.01	42.10	42.16	39.14	29.01
Median Wealth (55-74)	206.86	198.18	194.27	192.35	208.64	212.31	193.77	179.41
Owner (25-44)	0.48	0.71	0.51	0.62	0.33	0.33	0.45	0.61
Rent / Income (25-44)	0.21	0.24	0.23	0.13	0.20	0.20	0.22	0.13
Age First Own (25-44)	32.85	29.69	30.92	32.56	37.52	37.52	33.28	32.74
LTV at purchase (25-44)	0.65	0.76	0.69	0.74	0.46	0.46	0.63	0.74
Parent Transfers (55-74)	0.45	0.50	0.42	0.34	0.00	0.00	0.00	0.00
Transfers Around Purchase (25-44)	0.36	0.72	0.40	0.22	0.00	0.00	0.00	0.00
Non-Targeted Moments								
Hand to Mouth (25-44)	0.42	0.66	0.45	0.62	0.23	0.23	0.36	0.64
Wealth at Purchase (25-44)	45.69	39.55	40.39	42.83	74.29	74.30	48.30	40.86
Owner (25-83)	0.60	0.74	0.65	0.85	0.55	0.60	0.67	0.85
Parent Wealth Gradient (med)	2.53	5.72	1.67	1.04	1.26	1.24	1.44	1.03

Note: Results using the *bench*mark model (4), with a higher *LTV* of 0.9 instead of 0.8, without adjustment *costs* $m_s = m_b = 0$, and with *inc*ome *cer*tainty. All other parameters and prices are constant.

6.3 Endogenous House Prices

In this section I close the house market by introducing an exogenous reduced-form housing supply equation

$$\ln H^S = \alpha_0 + \alpha_1 \ln p, \tag{24}$$

where α_1 is the aggregate elasticity of supply to prices, and H^S denote the supplied level of supplied housing. As shown in Greenwald and Guren (2020) the way one closes the housing market has large impacts on how changes in demand and credit conditions affect aggregate homeownership rates. How rental rates κ are determined are also important, especially for determining whether households can be stuck with so high rent prices that it is hard to save enough for a downpayment ('rental traps').[23] However, from table 6 we see that the aggregate homeownership rates are similar with and without altruism, so allowing prices to adjust can have at most a limited role.

I calibrate the housing supply elasticity (24) as follows. First, I define α_0 to be such that housing supply would equal housing demand in the benchmark model with altruism for any elasticity α_1, that is: $\alpha_0(\alpha_1) = \ln(H^d) - \alpha_1 \ln p$, where p is estimated price from 3. We can then solve the model without altruism for any supply elasticity α_1 and find the outcomes when house prices are allowed to adjust. Note that $\alpha_1 \to \infty$ yields a perfectly elastic supply function which keeps the prices constant which is the same experiment as in the main quantitative exercise 6. When $\alpha_1 = 0$ housing supply is inelastic and price must be such that the aggregate homeownership without altruism equals the one with altruism, that is 75%. This begs the question: what is the right elasticity to use? Aastveit et al. (2020) estimate long-run elasticities

[23] The degree of segmentation between the rental market and housing market is usually modeled in either extreme. Either there is full segmentation (e.g. Favilukis and Van Nieuwerburgh (2017); Justiniano et al. (2019)), where there is a constant supply of owner-occupied housing. Any change that makes homeownership more likely must then increase the house price (relative to rents). The other extreme is to have perfectly elastic supply (e.g Kaplan et al. (2020)), typically through deep-pocketed landlords who convert rental units to owner-occupied units if the market price exceeds the present value of rents. I follow the latter approach.

Table 8: Housing Supply Elasticities Not Important

Moment	Altruism Benchmark	Without Altruism Inelastic	Middle	Elastic
Aggregate Moments				
Supply Elasticity		∞	5.00	0.00
House Price	82.08	83.41	83.97	78.88
Owner (25-83)	0.59	0.54	0.54	0.59
Targeted Moments				
Median Wealth (25-44)	23.65	41.73	41.89	42.70
Median Wealth (55-74)	206.86	211.18	209.64	211.65
Owner (25-44)	0.48	0.32	0.31	0.36
Rent / Income (25-44)	0.21	0.20	0.20	0.19
Age First Own (25-44)	32.85	37.46	37.54	36.93
LTV at purchase (25-44)	0.65	0.47	0.47	0.48
Parent Transfers (55-74)	0.45	0.00	0.00	0.00
Transfers Around Purchase (25-44)	0.36	0.00	0.00	0.00

Note:

ranging between 1.5-2.5. I report results for when the elasticity is somewhat larger in order to allow for more adjustment as I ignore other equilibrium adjustments. Table 8 reports the results.

The main takeaway from these results is that allowing house prices to adjust does not matter a great deal for the aggregate outcomes in steady state, as expected given the small difference in the overall homeownership rate with and without altruism. The house price only falls by 2.8% in the extreme case with perfectly elastic supply. None of the moments are sensitive to supply elasticity.

7 Housing and Commitment

7.1 Which Households Prefer Adjustment Costs?

In the two-period model we found that the existence of adjustment costs can be welfare improving for poor kids with wealthy parents. I now turn to this result in

Table 9: Household Observables and Support for Keeping Adjustment Cost

	Kid		Parent		Both	
	No	Yes	No	Yes	No	Yes
Age	35.48	29.77	35.08	27.83	35	28.12
Kid Wealth	26.72	23.37	25.96	3.87	25.81	4.17
Parent Wealth	170.37	435.57	187.17	607.46	190.19	759.58
Kid Ownership Rate	0.53	0.62	0.54	0.20	0.54	0.47
Kid Productivity	1.98	1.85	1.98	1.22	1.97	1.94
Transfer Rate	0.34	0.62	0.36	0.93	0.37	0.84
Transfer Size	4.14	11.21	4.47	28.08	4.72	30.51
Share of Households	0.92	0.08	0.99	0.01	1	0

Note:

the quantitative model. First, I take the benchmark stationary distribution. I then see how many dynasties that prefer that their own dynasty does not face adjustment costs in the future.

Table 9 breaks down the characteristics by whether the kid/parent/both households in a family supports the elimination of adjustment costs. First, we can see that kids that do not support removal of adjustment costs are marginally poorer but that their parents have more than twice the median wealth and they are more likely to be homeowners . These kid households are poor and young, with low liquid wealth and high propensities to consume. These kids are also more likely to receive transfers and they get large transfers. In total 8% of kids desire to keep adjustment costs. Almost no parents prefer their kids to face adjustment costs. The 1% who do, are very wealthy and have poor kids with low income. In effect: Kids who prefer to face adjustment costs use the adjustment costs to receive larger transfers from their parents.

8 Conclusion

In this paper, I investigate the role of inter-vivos transfers from parents to their kids on young adults' housing decisions. I focus mainly on two frictions that are affected by policy: i) the minimum downpayment and ii) adjustment costs (sale and purchase costs).

This paper's first contribution is to document that young US households are increasingly dependent on parental transfers, and the fraction of first-time homebuyers who received down payment assistance from their parents has increased from 10% to 30% in the last two decades. I confirm the literature finding that these transfers are strongly associated with increases in the probability of becoming homeowners. The increase in the reliance on parental transfers for first-time homebuyers and decreasing housing affordability creates the backdrop for my study.

The second contribution is to build a quantitative model of altruism and housing choices that can replicate observed life-cycle wealth accumulation and housing decisions and aggregate and reduced-form empirical transfer patterns. The model is rich and can be used to answer a broad set of important questions relating to the intergenerational transmission of wealth, the role of altruism in life-cycle savings, and housing outcomes.

After estimating the model and verifying that the model matches targeted and non-targeted moments, I turn to counterfactual exercises. I first show that the homeownership rate in the US would be 8 percentage points lower without transfers. This decrease is larger than the difference between peak and bottom homeownership rates among the young since the 1990s to today.

The illiquidity of housing is a significant factor in keeping households with poor parents from owning without transfers. Households worry about buying a house with a large mortgage, then receiving poor income shocks such that they are unable to repay the mortgage and most liquidate the house. There is room for policy to affect this channel: In the US, the typical total broker fee is 6%, while it is 2.0% in Canada and around 1-2.5% in most Western European countries.

In a second experiment, I study how the impact of mortgage lending standards varies by both and own parental wealth. I find that tighter regulation decreases the inter-generational correlation of economic outcomes. This is points to an important consequence of macroprudential policies and possible inequity concerns. I also study how purchase and selling costs affect inter-generational transmission. I find that higher costs increase inequality both within and across generations. Interestingly, I find that 8% of young households prefer to face adjustment costs, as they can use them to credibly overconsume, and in return receive higher transfers.

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Table 10: Variable Definitions in the PSID

Variable	PSID code	Description	Note
Transfer Related			
Wheter Rcved Transfer	ER67962	2/5years, gift/inherit $10,000+	Changing definitions
Transfer given	RT13V125	Money/loans/gifts to chld/par	2013 prnt/chld file
Other			
Behind on Mortgage	ER66062	Behind on mortgage/loan payments (first)	
Income	ER65349	Total Household Income	
Employment Status	ER66164	Working, Unemployed etc	
House Value	ER60031	Reported Market Value	
Dollars Rent	ER66090		
Food Delivered Expend.	ER71488		
Food at Home Expend.	ER71490		
Cost of Food Eaten Out	ER66804		

A Data Appendix

A.1 Event Study Details

In the end, the sample consists of 2,200 non-missing log growth rates of housing consumption with 974 unique households. Means and standard errors are constructed using family weights.

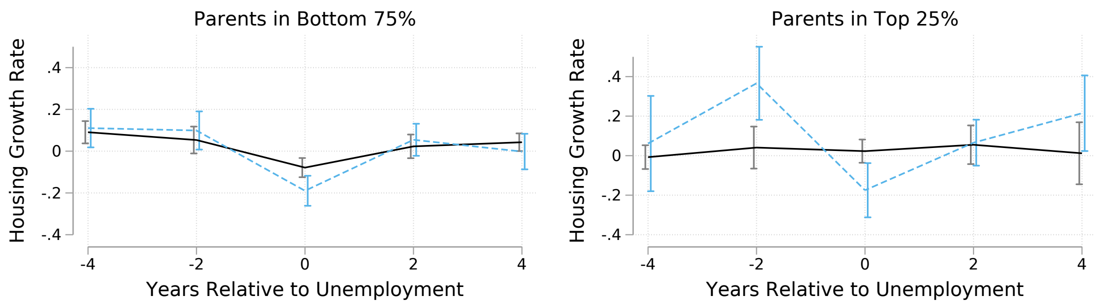
In figure 8, I also report the results where I do the exercise separately for renters and owners. We see the same pattern as in the main exercise, but the results are insignificant at the 5% level for owners.

A.2 Variable Definitions (PSID)

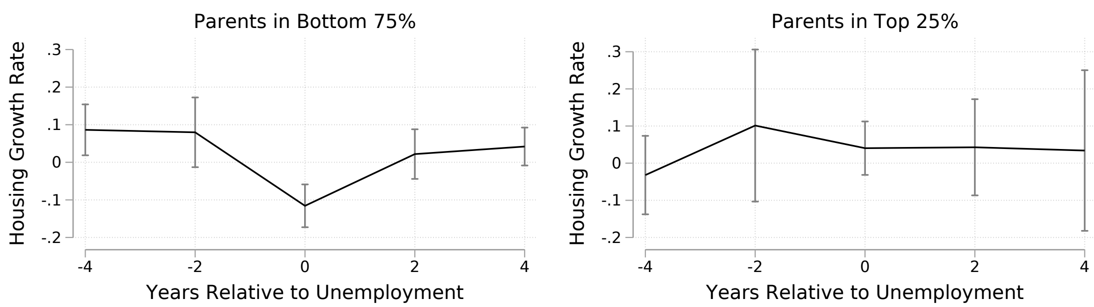
Table 10 lists the most important variable definitions from the 2015 PSID wave.

Figure 8: Event Study: Housing Consumption at Unemployment by Parental Wealth

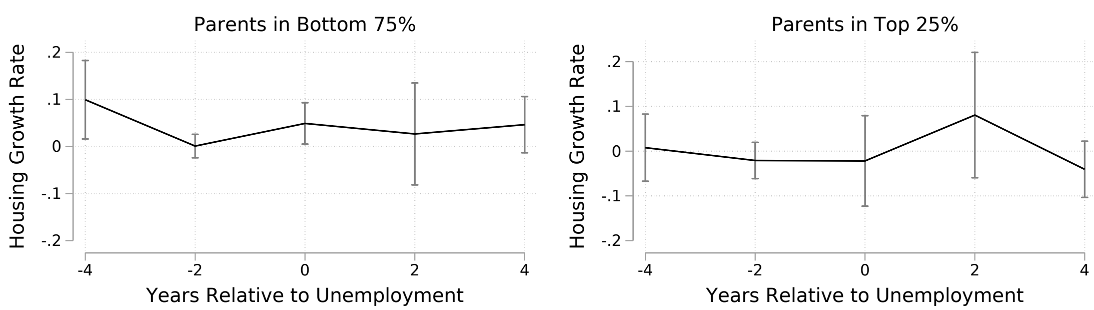
(a) Renters and Owners: Housing and Food Consumption



(b) Renters



(c) Owners



Note: Solid lines are the means and bars denote the 95% confidence interval. Sample consists of households aged 20-65 with exactly one unemployment spell, and without changes in head and/or spouse in the four years before and after unemployment.

B Details for the Two-Period Model

B.1 Full Set of Policy Rules without Commitment

In the first-period problem we saw that the gifts the kid expects to receive can be increasing in cash-on-hand. Figure 9a shows the effect of this pattern on the value functions for the kid in the first period. We can see that poor kids with wealthy parents strictly prefer altruism, but as they jump to autarky they are indifferent. However, we see that adjustment costs increase kid's welfare in the second-stage of the first-period.

Figure 2c showed how adjustment costs decrease spoon-feeding but increase gifts to autarky. The same pattern holds when a kid's wealth is held constant while varying parental wealth, figure 9b. With adjustment costs, spoon-feeding transfers are generally smaller since the kid buys larger houses to receive a larger transfer in the second period. At the same time, the gifts-to-autarky are generally larger, as the benefits of pushing the kid into self-sufficiency is larger. Finally, figure 9c plots the savings policy, and we see that adjustment costs also have a non-monotone effect on parent's savings.

B.2 Further Details on Welfare Improves of Adjustment Costs

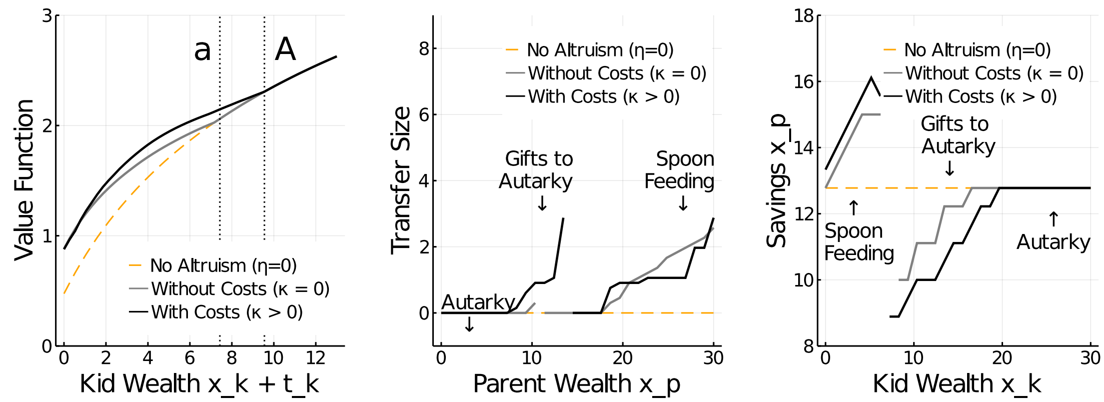
B.2.1 When do Kids Prefer Adjustment Costs?

It turns out that at any initial allocation, lifetime transfers are weakly larger with adjustment costs, as shown in figure 11b. Interestingly, this is true also for regions that generate spoon-feeding transfers (figure 2c) where transfers are smaller in period 1. While spoon-feeding transfers are smaller with costs, the second-period transfers are larger, leading to increased lifetime transfers. However, we see that the kids who benefit the most from adjustment costs receive larger gifts-to-autarky.

Which kids strictly prefer adjustment costs? First, in initial allocations where

Figure 9: First Period Parent Choices

(a) Period 1 Value Fun. $V_k()$ (b) Transfer $t_p(\bar{x}_p, x_k)$ (c) Savings $x_p(\bar{x}_p, x_k)$



Note: These figures show how the three different regimes are induced by changes in parental and kid wealth. During spoon-feeding the parent transfers to the kid, but the kid receives a transfer also in the second period. During gifts to autarky, the parent gives enough to make the kid behave as if there was no altruism. During autarky, both households behave as if there was no altruism.

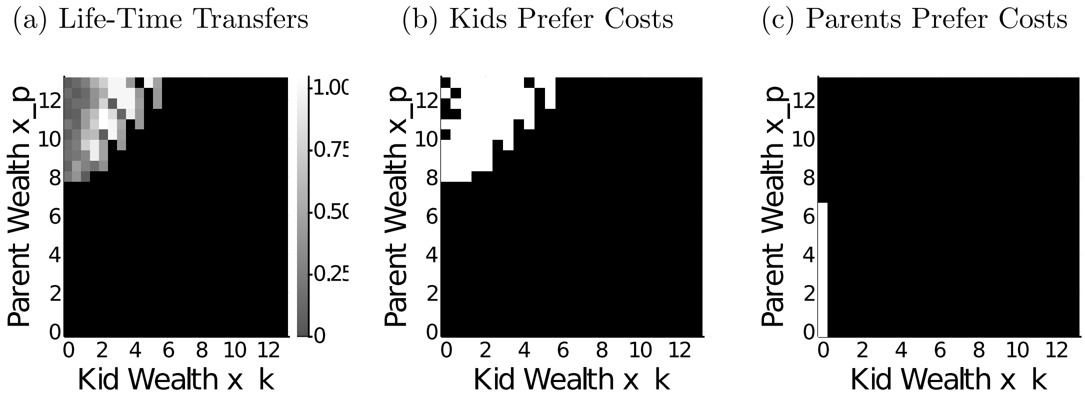
there are no transfers (black areas of figure 11b), kids behave as if in autarky. Since there is no uncertainty and $\beta = \frac{1}{1+r} = 1$ households smooth perfectly across time, and the choices are identical for all $\kappa \geq 0$. The only area where kids may strictly prefer costs is when transfers happen with or without adjustment costs. Figure 11c shows that almost all kids that do receive transfers prefer the world with costs.

Which parents prefer adjustment costs? No parents strictly prefer adjustment costs: In the region where there are no transfers, they are indifferent. When transfers flow in at least one period, transfers are weakly higher with costs, and so parents are worse off with adjustment costs as plotted in figure 11d.

B.2.2 Are the Results Robust to Parameter Values?

Figure 11 repeats the exercise from the previous section under different parameter values of risk aversion γ, altruism η, and expenditure share on housing ξ. The patterns remain qualitatively similar. The fact that the plots are not entirely smooth is unsurprising. Households' policies have numerous kinks, jumps, and non-convexities.

Figure 10: Effect of Adjustment Costs on Life-Time Transfers and Utility



Note: The intensity of the life-time transfer 11b denotes how much larger the transfer is with adjustment costs. Solid black denotes areas where the transfers are identical. In figures 11c,11d black denotes where the household is indifferent and white where it strictly prefers adjustment costs.

Additionally, the solution is a numerical approximation.

The first panel 11a plots the results under the benchmark parameterization. The second panel plots the results with higher risk aversion γ 11e. An increase in risk aversion also increases the desire to smooth, and so parents transfer more to their kids (eq. 7), which increases the region where kids prefer adjustment costs. Next, panel 11f plots the result with higher altruism η. As transfers increase, the region where kids prefer costs grows. Finally, I increase the expenditure share on housing ξ. As households spend more on housing, a larger fraction of expenditures entails adjustment costs, and so the area where kids prefer adjustment costs increase. No parameter combinations make the parent prefer adjustment costs.

C Quantitative Model Details

C.1 Calculation of Transfer Moments

The 2013 wave of the PSID includes a more detailed transfer module that I use to calculate transfer moments.[24] However, this question only includes information regarding transfers in 2012. Among matched child-parent pairs in the 2013 PSID, where children are aged 25-44, 24% report a transfer from parents from kids with an average value (conditional on transfers) of $3,900 in 2012. I biennialize by increasing the annual transfer rate by 1.5 and the transfer size by 1.33.[25] Section D.1 performs a robustness exercise to various biennialization schemes.

C.2 Complete set of Decision Problems

C.2.1 Decision Problem Conditional on Choosing to Rent

]

C.2.2 Decision Problems at Age 53 and 83

C.3 Decision Problems at Age 53 and 83 With Commitment

The family planners discounts the expected future (namely initial conditions of the kid and the resulting new pareto weights), and places weight $\theta + (1-\theta)\eta$ on the

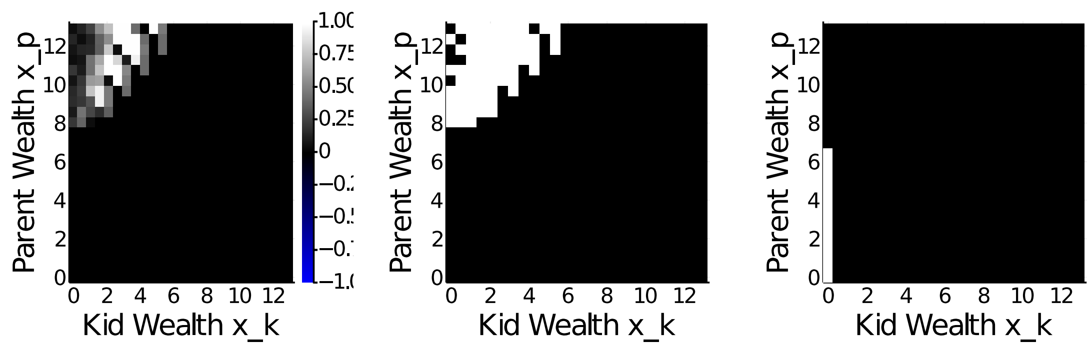
[24] Another alternative would be use a question related to transfers and inheritances over $10,000. While this question is available every year it is limited to transfers over $10,000 and includes inheritance.

[25] This assumption is valid when half of transferring households (12% of the sample) would not transfer in 2013, that half of transferring households (12% of the sample) would transfer the same amount in 2013, and that 12% of the total sample would transfer $3,900 only in 2013. This yields a two-year transfer rate of 36% and a two-year transfer size of $5,200.

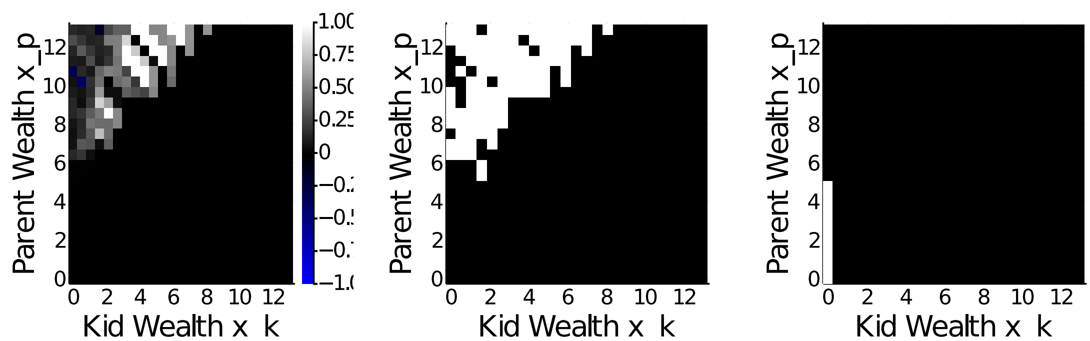
Figure 11: Stylized Model: Sensitivity Parameter Values

(a) Benchmark: $\gamma = 1.2, \eta = 0.5, \xi = 0.4$

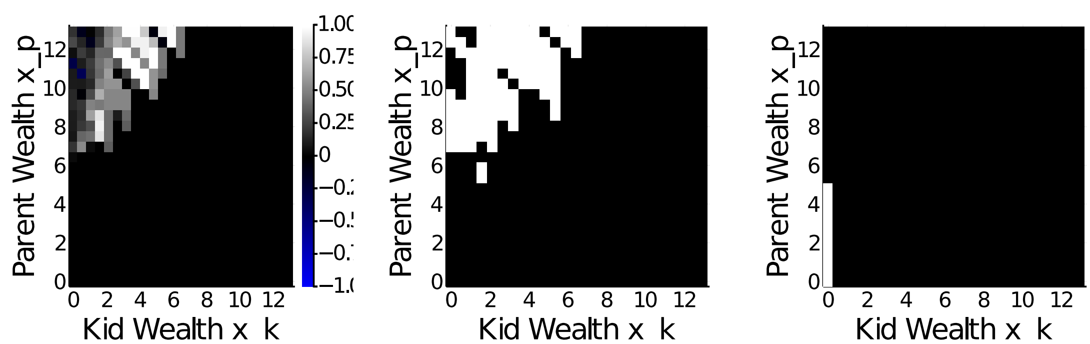
(b) Life-Time Transfers (c) Kids Prefer Costs (d) Parents Prefer Costs



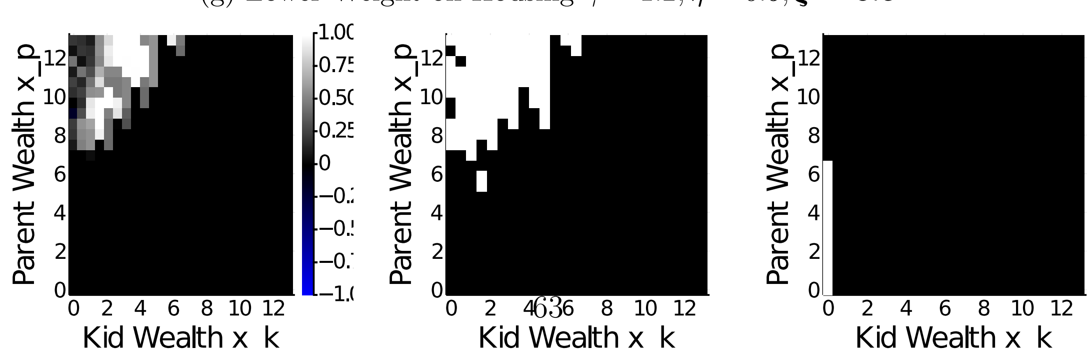
(e) Higer Risk Aversion $\boldsymbol{\gamma = 1.5}, \eta = 0.5, \xi = 0.4$



(f) Lower Altruism $\gamma = 1.2, \boldsymbol{\eta = 0.6}, \xi = 0.4$



(g) Lower Weight on Housing $\gamma = 1.2, \eta = 0.5, \boldsymbol{\xi = 0.5}$



Note: All of these should be redone be smoother future,

$$
\begin{aligned}
V_f(\mathbf{s}_f; a_k = 53) = \max_{c_k, c_p, h'_k = h_r, h_k = h_r, x'_f; \theta} & (1-\theta)\left[u(c_p, h_k) + \eta u(c_k, h_k)\right] + \theta u(c_k, h_k) + \\
& (\theta + (1-\theta)\eta)\beta \mathbb{E} V_f(\mathbf{s}'_f; a_k = 25), \\
\text{subject to } & x'_f = (1 + r^f)(x_f + w_k + w_p - c_k - c_p - \kappa h_k - \kappa h_p), \\
& x'_f \geq 0, c_k \geq 0, c_p \geq 0.
\end{aligned}
$$

D Robustness Exercises

D.1 Transfer Moments

D.2 Housing Sizes

D.3 Parental Income Risk

D.4 Aggregate and/or Idiosyncratic Price Risk

D.5 Targeting Mean Wealth Instead of Median

E Numerical Solution Algorithm

E.1 Numerical Details

I now briefly discuss some details in the numerical solution of the model. Due to the non-convex nature of the decision problems, occasionally binding constraints and discrete nature of housing I use grid search as a slow, but robust approximate solution algorithm.

E.2 Computational Packages

The program solution is written in Julia v1.5.0 In additional to a relative standard set of packages the numerical solution relies on the `interpolations.jl` package for numerical interpolation routines.

E.3 Interpolation, Gifts, Discrete Choices and Borrowing Constraints

The policy function for consumption and savings are non-continuous in wealth which makes interpolation unattractive. However, the policy functions, conditional on choosing a specific house quality are much smoother, and do not display large jumps. When I interpolate the policy functions of the parent when solving the kid's problem, and vice versa, I therefore do the following. I first find the interpolated policies for each housing choice, and then find the probability that the parent's makes this choice. The probability is the interpolated policy discrete choice function, which is discrete $\{0, 1\}$, while the interpolated policy (with flat extrapolation) is continuous between $[0, 1]$.

Next, one must be careful with the interpolated policy functions around the borrowing constraints. If the interpolated consumption choice of the kid c_k leads to a net bond position b_k that violates the borrowing constraint I set b_k equal to the constraint and reduce c_k to make it hold.

Table 11: Descriptive Statistics (Means), Households Aged 20-44

Demographics	Population		Single		Married		Renter		Owner	
Receiver	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Transfer	0.00	3.94	0.00	3.49	0.00	4.49	0.00	3.91	0.00	4.00
Wealth	78.41	108.33	30.71	56.93	126.76	171.11	13.42	42.02	163.53	210.84
Wealth Parent	404.94	1028.86	325.54	1038.78	485.26	1016.56	241.36	1016.47	619.05	1048.00
Income	72.70	74.24	46.08	47.16	99.69	107.32	46.79	52.84	106.65	107.32
College	0.35	0.51	0.35	0.49	0.35	0.53	0.28	0.47	0.45	0.58
White	0.73	0.85	0.64	0.82	0.83	0.90	0.65	0.81	0.84	0.92
Owner	0.43	0.39	0.22	0.19	0.64	0.64	0.00	0.00	1.00	1.00
Owner t-2	0.41	0.37	0.21	0.17	0.62	0.63	0.06	0.06	0.85	0.79
Age	33.98	32.90	32.79	31.45	35.19	34.66	32.22	31.33	36.29	35.32
Observations	2404	656	1094	304	1310	352	1453	400	951	256

Age	25-28		29-32		33-36		37-40		41-44	
Receiver	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Transfer	0.00	4.09	0.00	4.12	0.00	3.28	0.00	5.28	0.00	2.97
Wealth	33.65	46.23	37.63	78.53	54.21	125.35	118.43	154.32	173.42	212.88
Wealth Parent	320.86	1221.09	379.41	1193.31	361.26	835.07	339.04	643.02	649.47	975.38
Income	43.43	47.88	63.03	69.73	71.47	86.00	93.38	91.86	102.47	102.73
College	0.34	0.55	0.35	0.58	0.32	0.52	0.34	0.43	0.41	0.39
White	0.68	0.83	0.69	0.83	0.73	0.87	0.79	0.88	0.80	0.89
Owner	0.19	0.16	0.32	0.38	0.47	0.47	0.60	0.61	0.66	0.59
Owner t-2	0.14	0.14	0.28	0.30	0.43	0.43	0.60	0.60	0.65	0.53
Age	26.49	26.49	30.48	30.45	34.50	34.33	38.49	38.46	42.62	42.40
Observations	572	195	566	163	562	127	384	99	320	72

Wealth Quintile	Quintile 1		Quintile 2		Quintile 3		Quintile 4		Quintile 5	
Receiver	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Transfer	0.00	2.88	0.00	2.46	0.00	3.04	0.00	5.29	0.00	4.95
Wealth	-53.90	-53.15	-1.08	-1.64	8.15	8.25	39.97	42.02	339.67	403.71
Wealth Parent	231.92	464.99	108.63	270.87	218.55	559.62	391.03	1111.01	938.08	2046.24
Income	59.21	53.99	32.94	33.66	45.83	46.19	77.58	78.29	131.73	123.11
College	0.47	0.58	0.14	0.15	0.21	0.40	0.37	0.52	0.52	0.68
White	0.73	0.85	0.56	0.68	0.71	0.81	0.78	0.95	0.84	0.88
Owner	0.27	0.17	0.08	0.13	0.18	0.16	0.63	0.49	0.87	0.76
Owner t-2	0.28	0.14	0.10	0.11	0.19	0.22	0.56	0.44	0.80	0.67
Age	33.04	31.57	32.43	33.03	32.56	31.29	34.17	33.14	36.95	34.77
Observations	459	148	478	91	518	121	471	137	478	159

Note: Data from the PSID Transfer, Individual, and Family modules. Weighted using family weights. Dollar values in 1000s 2016 USD.

Table 12: Descriptive Statistics (Median), Households Aged 20-44

Demographics	Population		Single		Married		Renter		Owner	
Receiver	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Transfer	0.00	1.53	0.00	1.02	0.00	2.03	0.00	1.53	0.00	1.22
Wealth	10.17	15.26	3.05	6.10	34.59	47.82	1.63	4.07	65.25	81.39
Wealth Parent	96.86	339.31	64.10	289.97	140.41	404.94	37.64	265.55	222.82	503.63
Income	56.51	56.64	35.06	35.82	84.55	81.90	36.51	40.70	91.60	81.50
College	0.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	1.00
White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Owner	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Owner t-2	0.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Age	33.00	32.00	32.00	29.00	36.00	35.00	31.00	30.00	37.00	36.00
Observations	2404	656	1094	304	1310	352	1453	400	951	256
Age	**20-24**		**25-29**		**30-34**		**35-39**		**40-44**	
Receiver	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Transfer	0.00	1.22	0.00	1.53	0.00	2.03	0.00	1.53	0.00	1.02
Wealth	4.60	6.00	5.09	19.33	12.31	31.24	22.38	23.91	44.16	53.92
Wealth Parent	43.79	279.79	81.39	351.01	100.73	396.80	127.18	336.77	145.70	404.94
Income	37.64	39.79	49.14	55.96	61.59	71.98	78.85	70.30	87.60	69.59
College	0.00	1.00	0.00	1.00	0.00	1.00	0.00	0.00	0.00	0.00
White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Owner	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
Owner t-2	0.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00	1.00
Age	26.00	26.00	30.00	30.00	34.00	34.00	38.00	39.00	43.00	43.00
Observations	572	195	566	163	562	127	384	99	320	72
Wealth Quintile	**Quintile 1**		**Quintile 2**		**Quintile 3**		**Quintile 4**		**Quintile 5**	
Receiver	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes
Transfer	0.00	1.02	0.00	1.22	0.00	1.02	0.00	1.53	0.00	1.53
Wealth	-31.95	-30.52	0.00	-0.51	7.62	7.83	36.76	37.64	186.19	185.17
Wealth Parent	67.66	234.01	18.62	138.88	46.75	234.11	155.67	422.23	345.93	719.32
Income	49.55	38.95	26.17	30.52	39.68	38.15	69.72	65.22	114.47	100.73
College	0.00	1.00	0.00	0.00	0.00	0.00	0.00	1.00	1.00	1.00
White	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Owner	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00
Owner t-2	0.00	0.00	0.00	0.00	0.00	0.00	1.00	0.00	1.00	1.00
Age	32.00	30.00	32.00	32.00	32.00	29.00	33.00	32.00	38.00	34.00
Observations	459	148	478	91	518	121	471	137	478	159

Note: Data from the PSID Transfer, Individual, and Family modules. Weighted using family weights. Dollar values in 1000s 2016 USD.

F Supplementary Figures and Tables

G Estimation

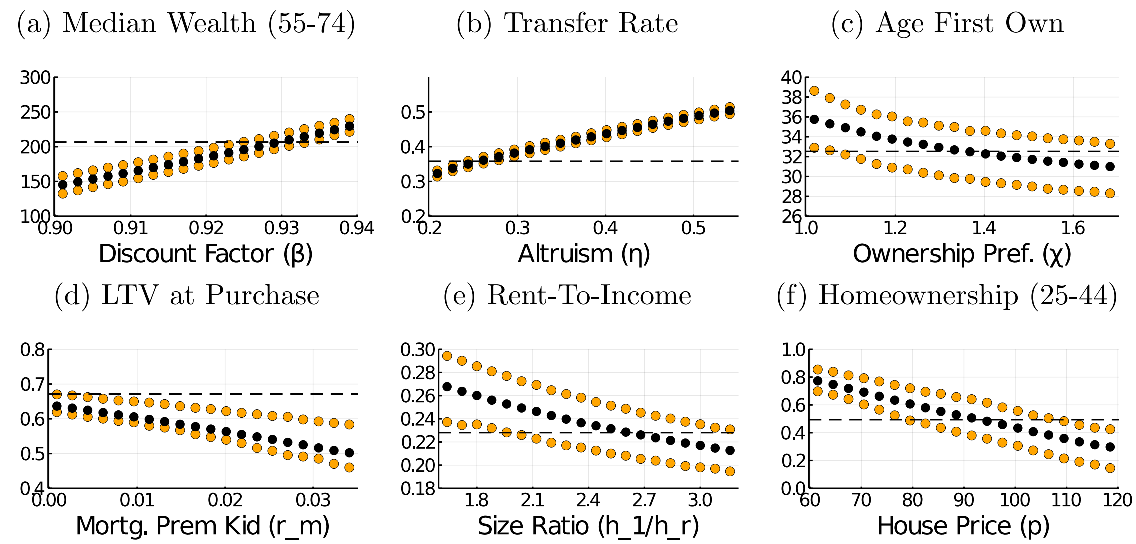
G.1 Global Estimation and Identification

We have $P = 7$ parameters that are to be estimated. Define a seven-dimensional hypercube of uniform distributions. Then I draw $N_s = 20,000$ quasi-random (Sobol) candidate parameter vectors from this hypercube. I solve the model and find stationary distribution for each N_s vector, and find the $M = 11$ moments for each candidate parameter vector. We divide each parameter into 20 quantiles and compute the 25th, 50th, and 75th percentiles for all moments. The remaining $P - 1$ parameters have the original uniform distributions within each quantile. We can then show how these moment percentiles move along the parameter quantiles.

A moment is informative for a parameter if, as we move across quantiles keeping the distribution of other parameters constant, the moment percentiles move. The steeper the slope, the more informative the moment is for the parameter. A parameter is relatively more important when the distance between the 25th- and 75th-moment percentiles is smaller.

Figure 12 shows that each parameter affects at least one moment. For example, we can see that median wealth at age 55-74 is strongly affected by the discount factor β in figure 12a. In figure 12b, we see that the transfer rate is very informative about altruism. At low levels of altruism, other parameters are informative about the transfer rate. For example, there will still be transfers with high discount factors even when the altruism parameter is low. We can see that ownership preference shifter χ is pinned down by the age of first-time homeowners. However, other moments also have a significant impact on this moment. For example, house prices are also important: everybody would own if housing were free, or few would own when prices are high. The remaining figures are interpreted in a similar way.

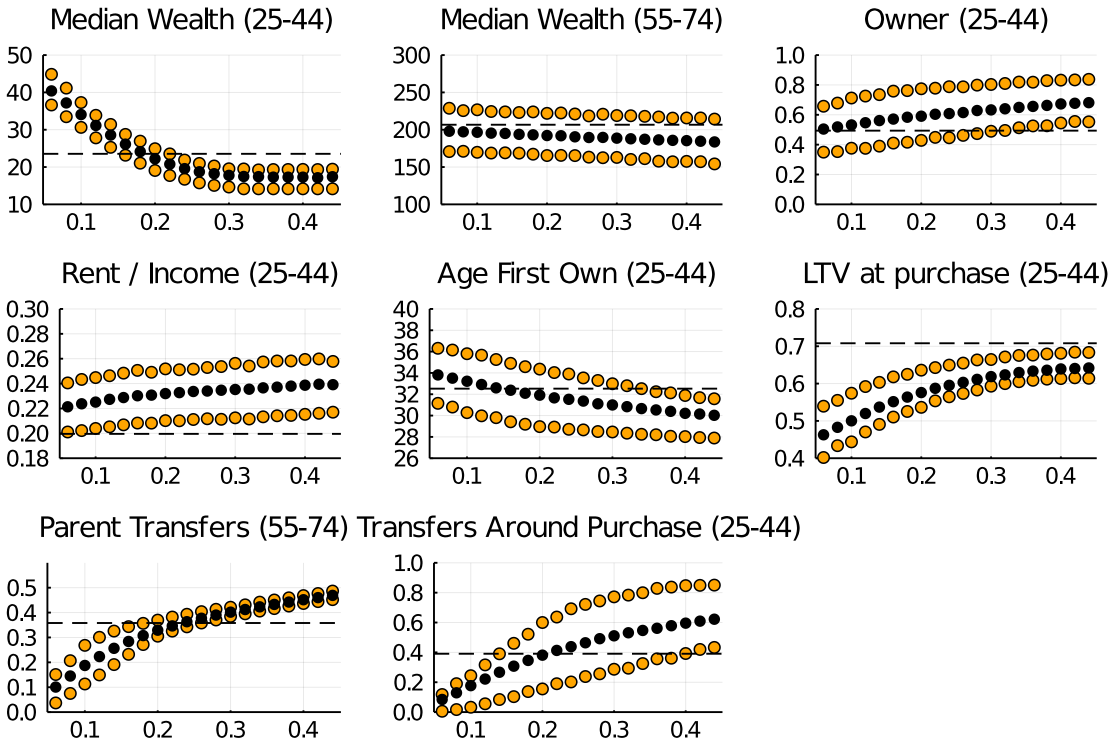
Figure 12: Identification of parameters



Note: Dashed line is the moment's empirical value. Yellow and black dots denote the 25th, 50th, and 75th percentile of the empirical moment for each quantile of the parameter, keeping the distribution of other parameters constant.

Finally, the key objective of this paper is to study the role of altruism on housing demand. I now show how each moment is affected by the altruism parameter in figure 13, and it turns out that the altruism parameter affects every single targeted moment. First, median wealth is strongly decreasing in altruism as households decrease savings to receive more transfers. Altruism also slightly decreases the wealth of older households: households save less when young, parents give more resources to the kid, and reducing savings decreases kids' incentives to overconsume. Homeownership rates are also increasing in altruism: altruism decreases the downsides and increases the upsides of homeownership. Altruism slightly increases the rent-to-income ratio, but this is driven by selection into homeownership. With higher altruism, the age at which households first own is strongly decreasing: households are willing to buy housing sooner, and they receive larger transfers that push them into owning. We also see that the LTV at purchase is strongly increasing in altruism: Households are willing to take on more leverage. Finally, both the overall transfer rate and the transfers around home purchases are also increasing in trans-

Figure 13: Identification of Altruism (η)

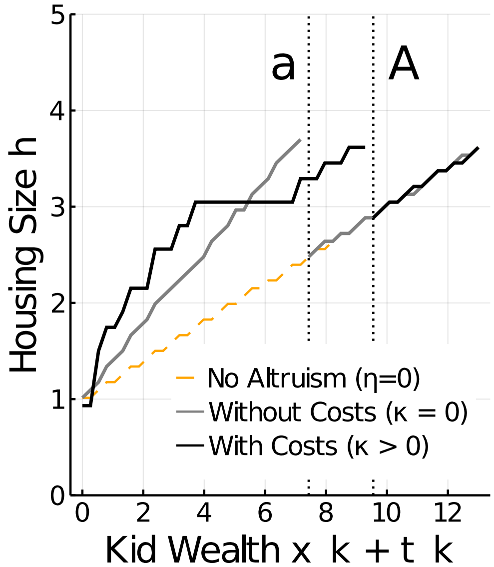


Note: Note: Dashed line is the moment's empirical value. Yellow and black dots denote the 25th, 50th, and 75th percentile of the empirical moment for each quantile of the parameter, keeping the distribution of other parameters constant.

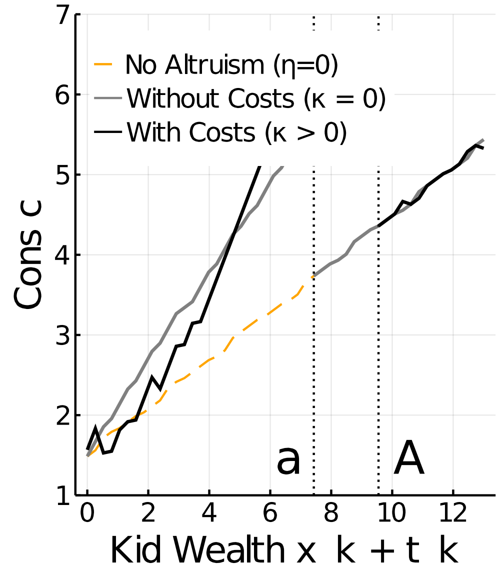
fers. However, altruism does not uniquely pin down transfers around purchase since this moment is also affected by other parameters that affect the timing of purchase. In the online appendix I include identification plots for all estimated parameters.

Figure 14: First Period Kid Choices

(a) Period 1 Housing h_k



(b) Period 1 Consumption c_k



Note: