FTHB model slide deck

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(DRAFT)

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Model setup

Defined parameters

Note: The entire model is standardized to median household income in the 1998-2004 SCF (About $67,000 in 2013 dollars)

- $1 - \alpha = 0.859$: Cobb-Douglas parameter, share of expenditure in perishable consumption (i.e. α share in durables)
- $\gamma = 2$: Intertemporal elasticity of substitution
- $r = 2.4\%$: rate of return on the safe asset
- $r_{borrow} = r + 0.8\%$ interest rate on borrowing (if $q \leq (1 - \theta) * h * p$)
- $\delta = 2.2\%$: Depreciation rate of hdurable
- $F = 6\%$: total fixed cost on adjusting durable stock
- $\underline{s} = 0.8$: share of the fixed cost borne by the seller (i.e. she pays $\underline{s}F$)
- $\theta = 20\%$: Required down payment on durable
- $\rho_z = 0.91$: Persistence of AR(1) income process
- $\sigma_z = 0.20$: S.d. of shocks to income process
- $\epsilon = 2.5$: Price elasticity of supply for the representative housing firm

Calibrated parameters

Note: Unlikely that all the parameters below will be calibrated.

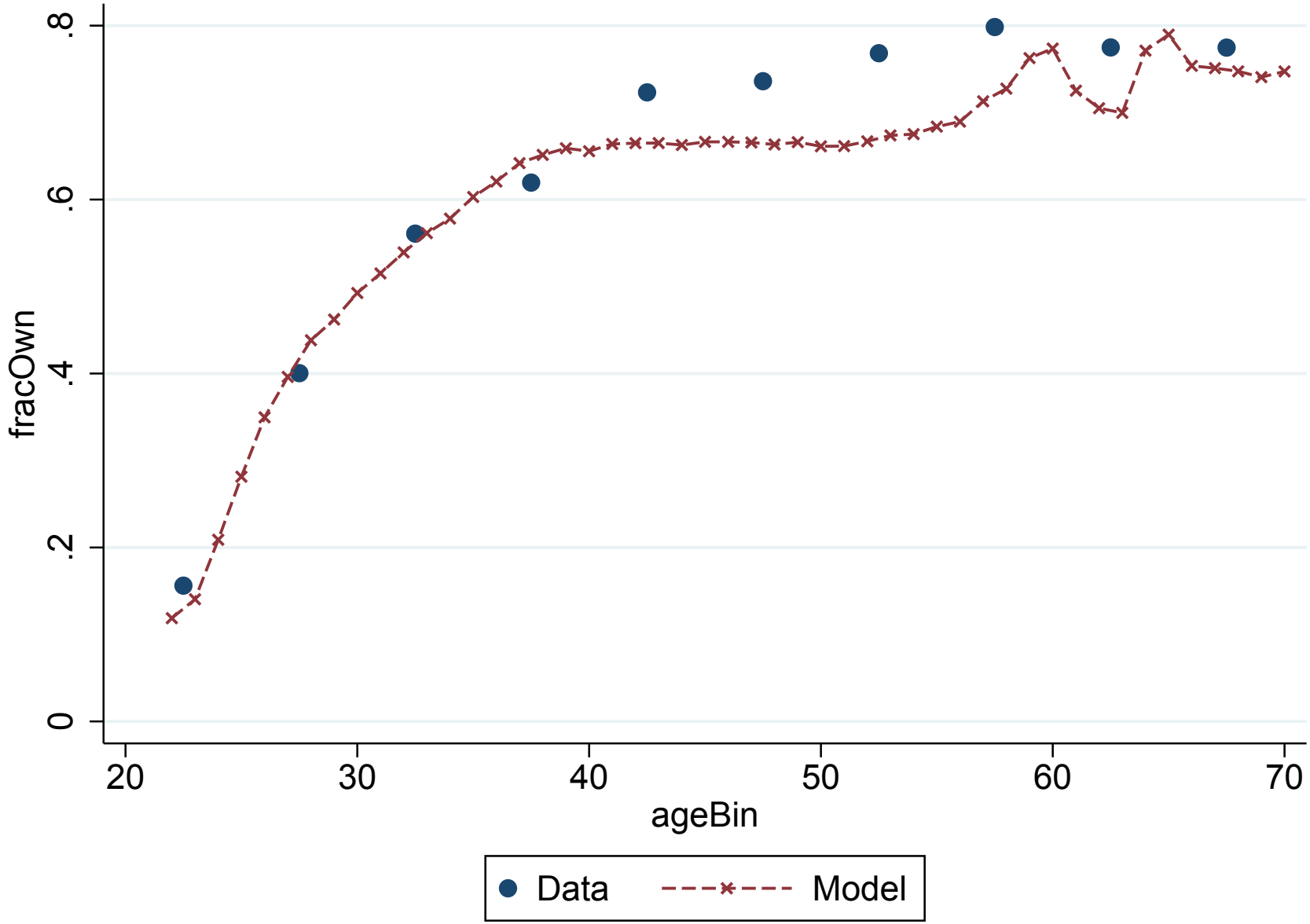
- $\beta = 0.915$: Discount rate.
- $\phi = 0.26\%$: Rental housing markup (added onto user cost of housing yields the rental price as a fraction of housing)
- $\phi_{ret} = 0.065\%$: Rental housing markup in retirement.
- $h_{min} = 0.78$: Minimum size for an owned house (no limits exist on renting)
- $\Xi = 2.00$: A lump sum transfer at retirement equal to a proportion of labour income before retirement
- $\Psi = 3.60$: Multiplicative factor on bequest utility (seems large, but maybe bequests are also defined differently?)
- ω : Disutility of rental housing ($= 1$ for owned housing)
- $\underline{b}$: Reference value for bequests: affects marginal utility of a unit increase in bequests.

Algorithmic details

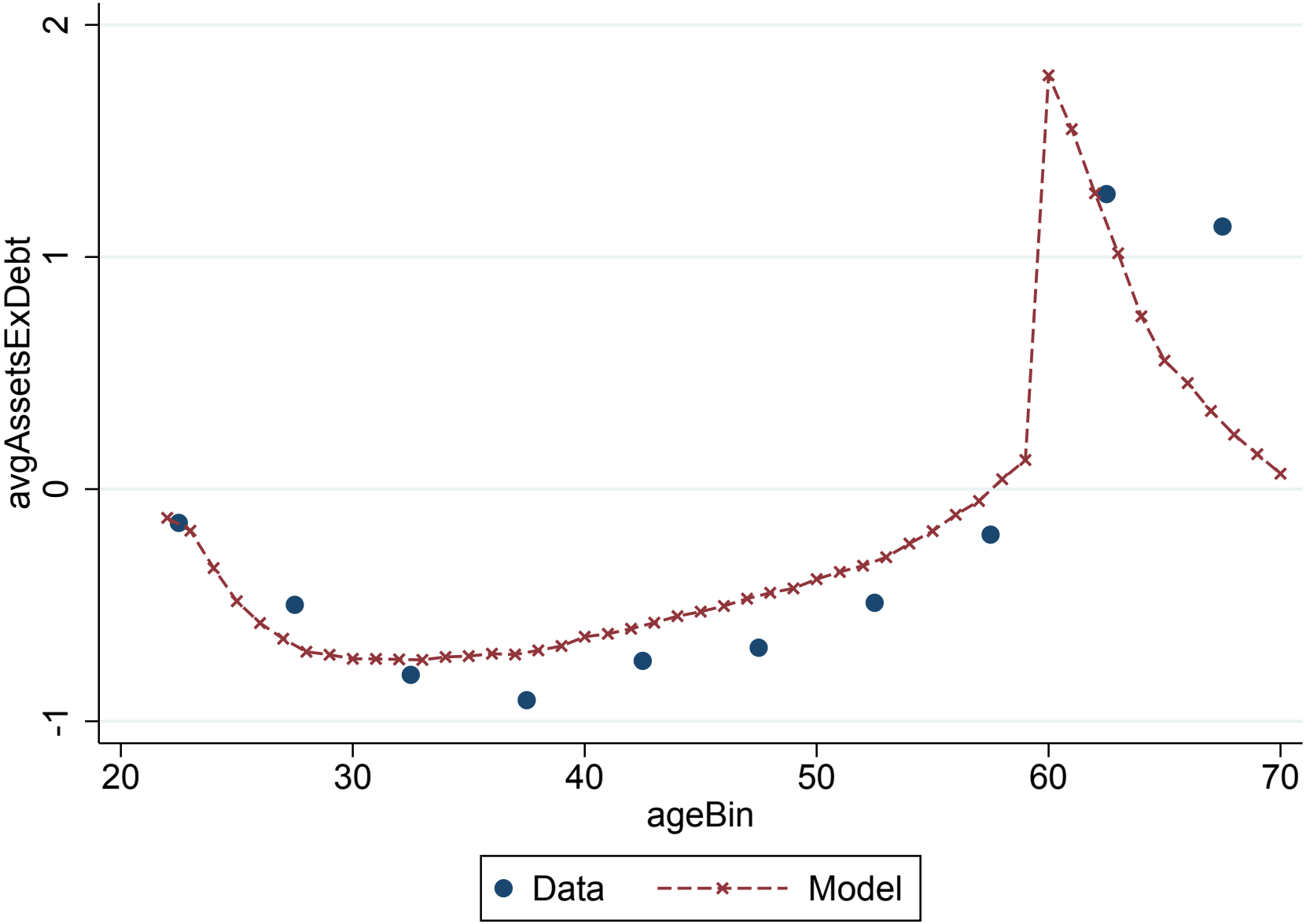
- Search space over 120 uneven grid points for voluntary equity, $q = a + (1 - \theta) * h * p$, 90 grid points for h
- 9 grid points for income process (Tauchen '86 discretization), with a range of ± 2.5 the unconditional s.d of the AR(1)
- 38 working periods, 25 retirement periods. Correspond to ages 22-84 on data
- A steady-state general equilibrium is found by minimizing the deviation between the **average** excess demand for housing (see Kaplan, Mitman, Violante, eq. 6) and the average new construction supply.
  The minimizing price is found using Brent's method, with a liberal convergence threshold. However, the minimum deviation still usually reaches less than 1E-2.

Model in steady-state

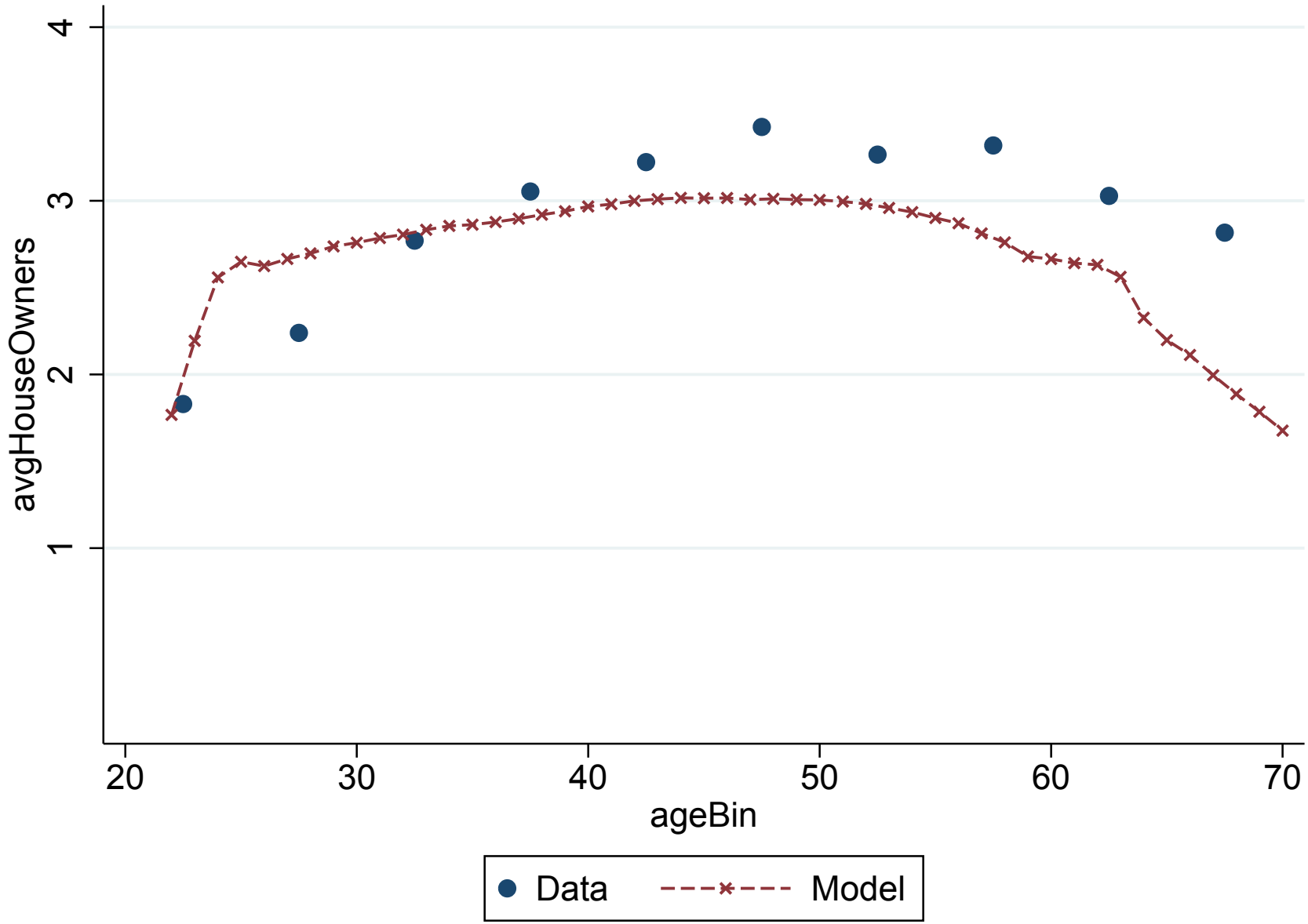
Homeownership over the lifecycle: model v. data



Assets over the lifecycle: model v. data

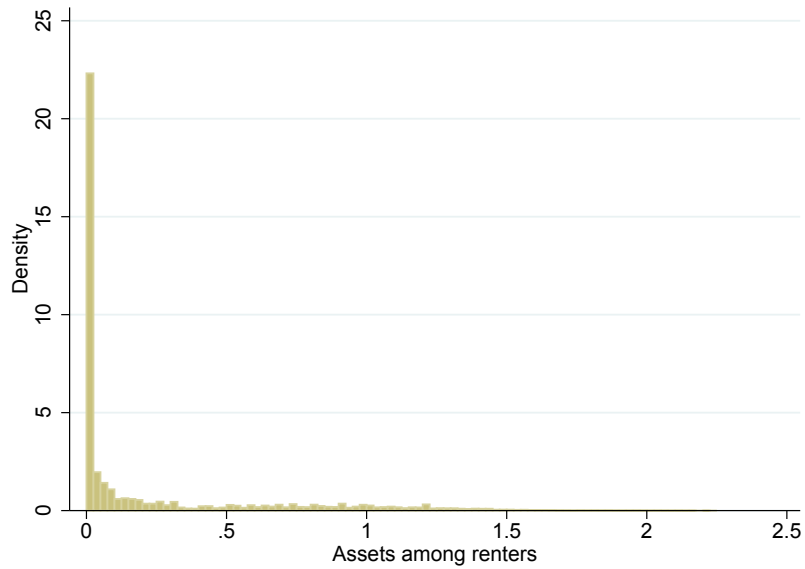


Owned house value over the lifecycle: model v. data

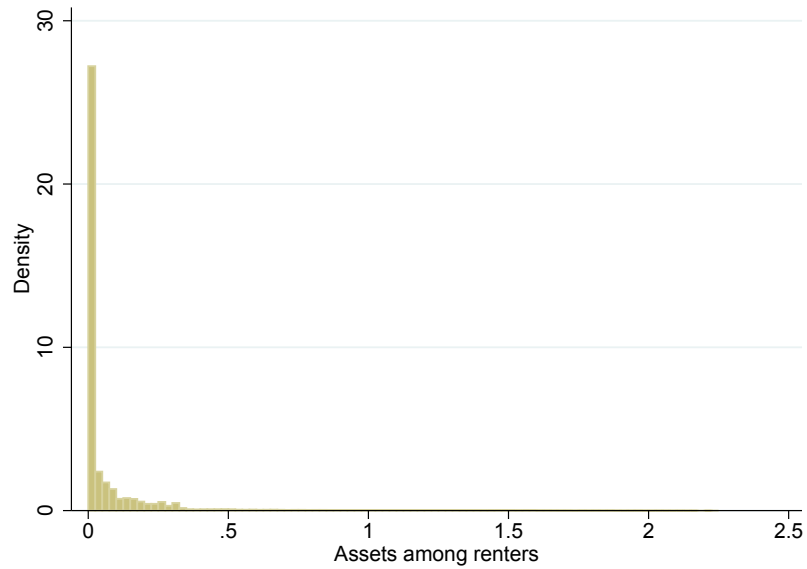


Distribution of assets for renters, model

(a) All living renters

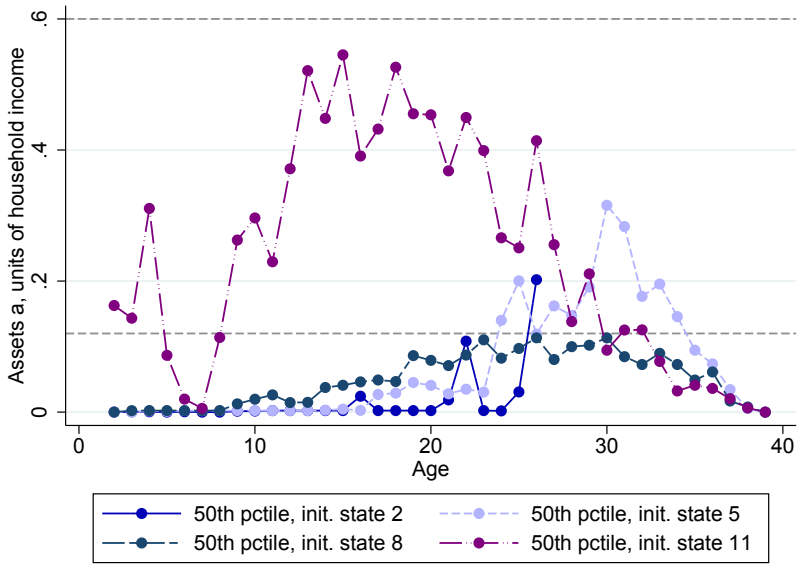


(b) Renters of working age

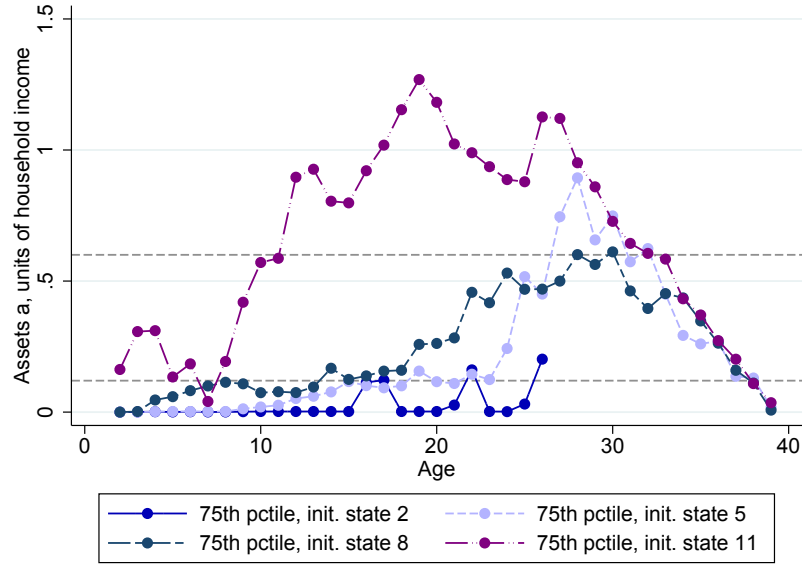


Time series of assets/savings for renters, model

(a) Median within each age



(b) 75th percentile within each age

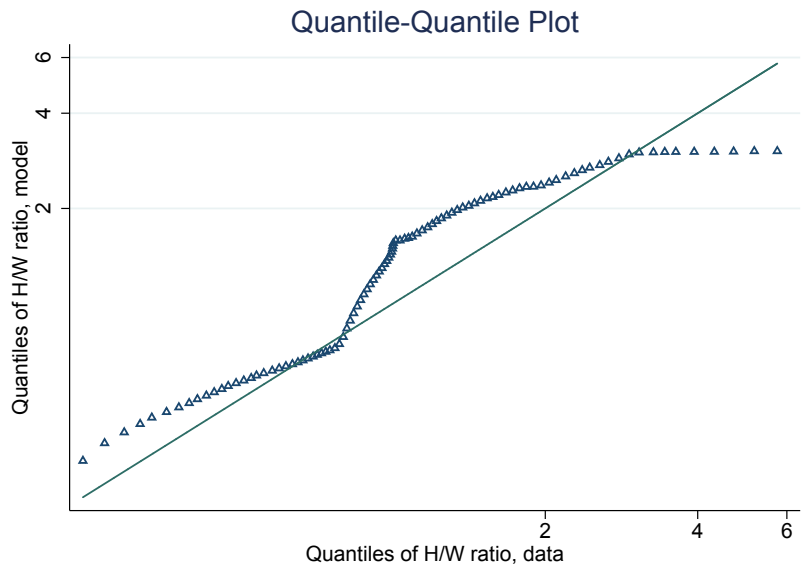


The horizontal lines indicate

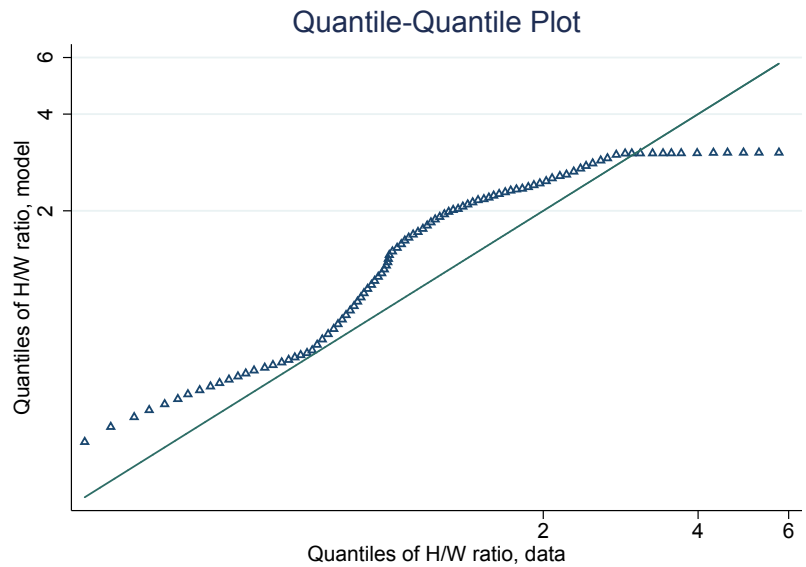
- The equivalent of \$8,000 in the model;
- The average down payment on a house (20% $\times$ 3 household income units)

Distribution of housing/net worth for owners, model

(a) All living owners

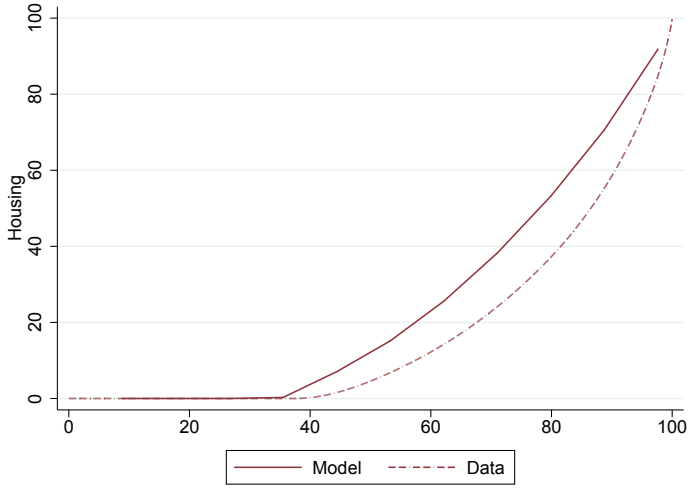


(b) Owners of working age

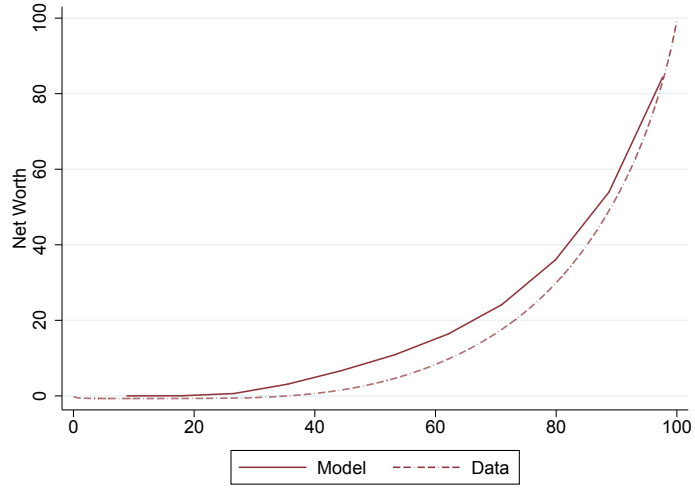


Lorenz curves for variables in the model

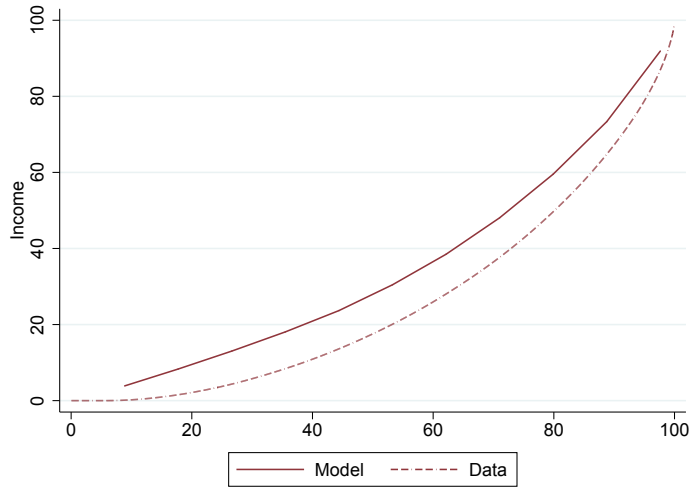
(a) Owned housing



(b) Net wealth

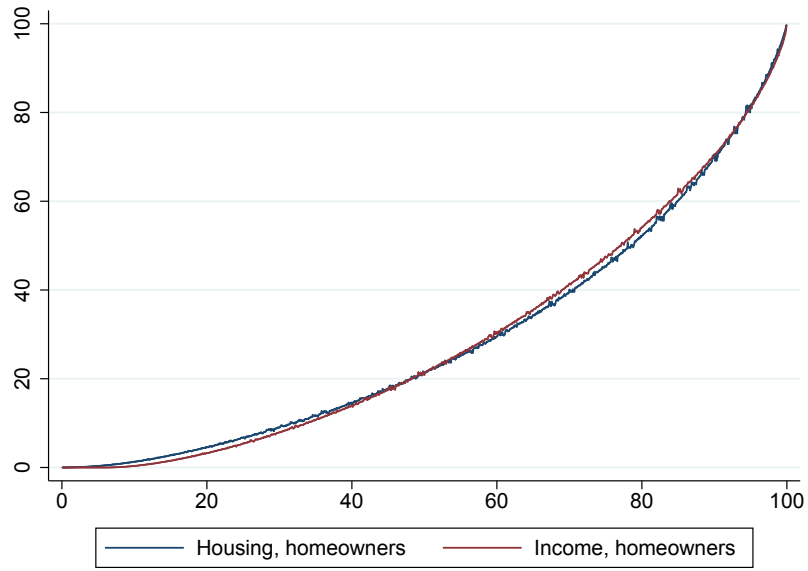


(c) Income in period

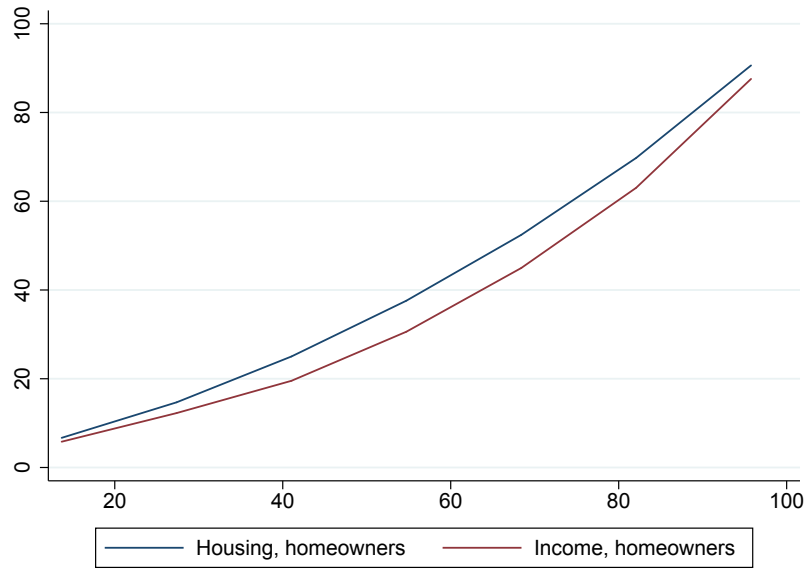


Inequality in housing: model v. data

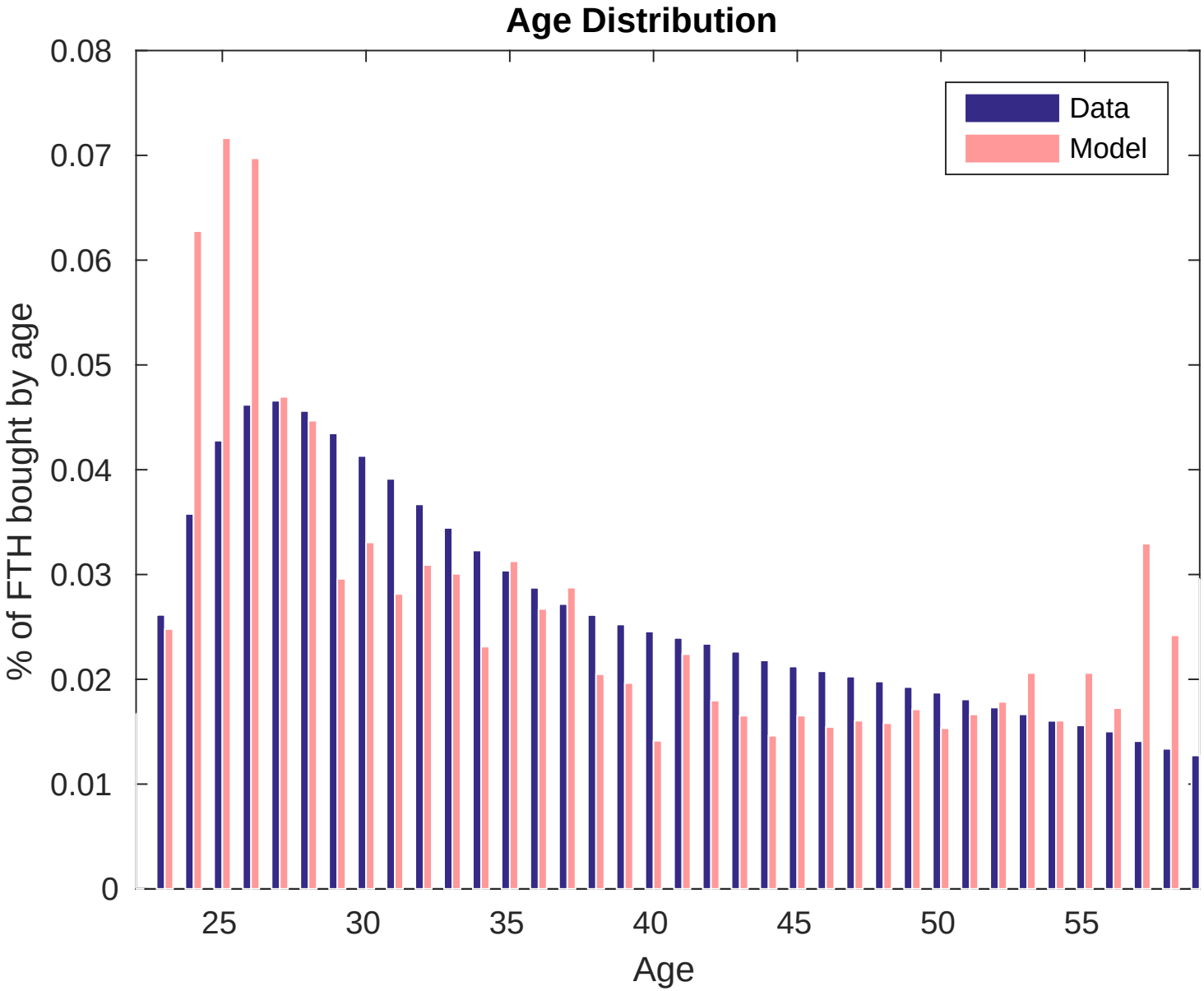
(a) Lorenz curves from SCF data



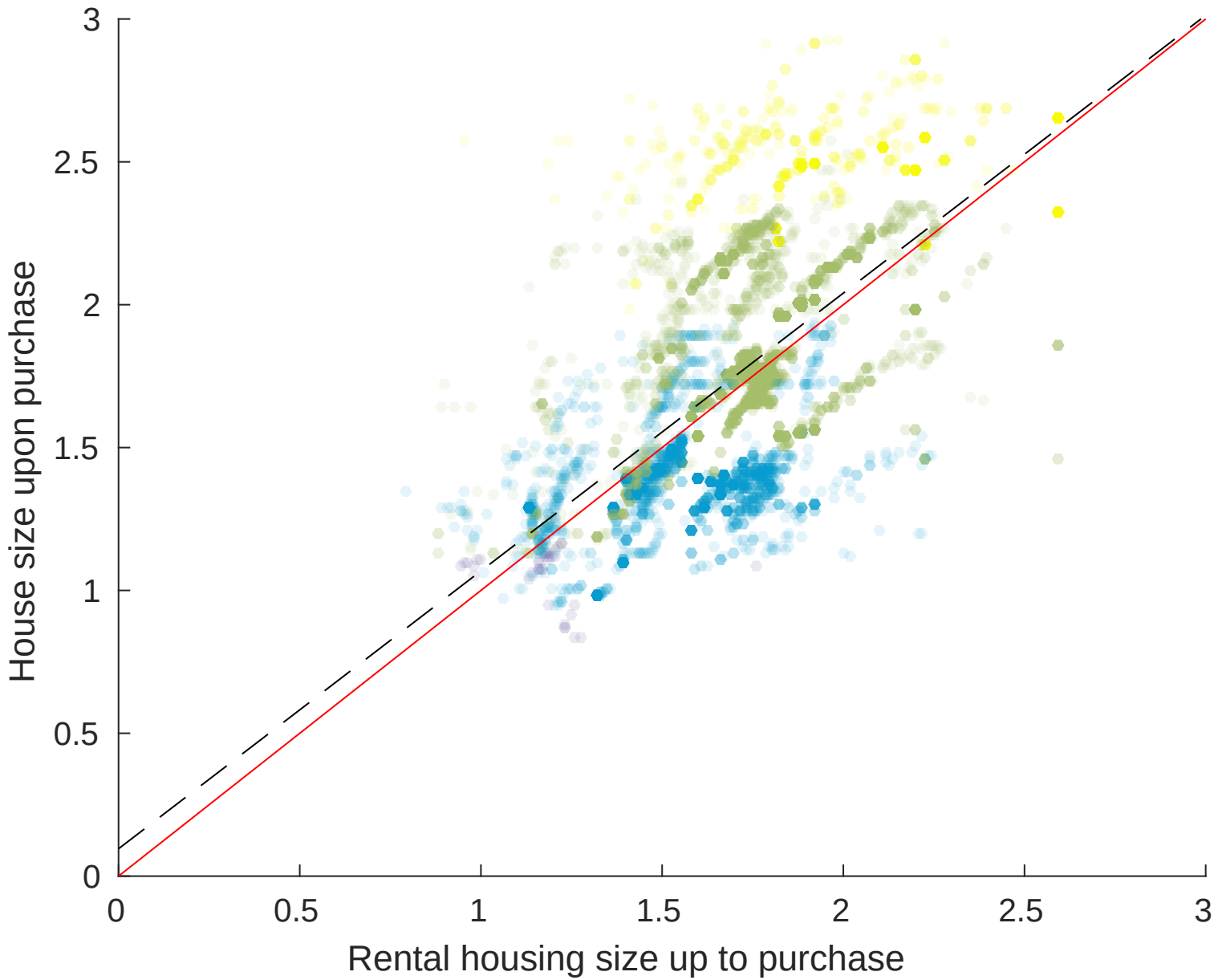
(b) Lorenz curves from model panel



Distribution of First-Time Homebuyers: model v. data



Upscaling of housing for FTHBs, model

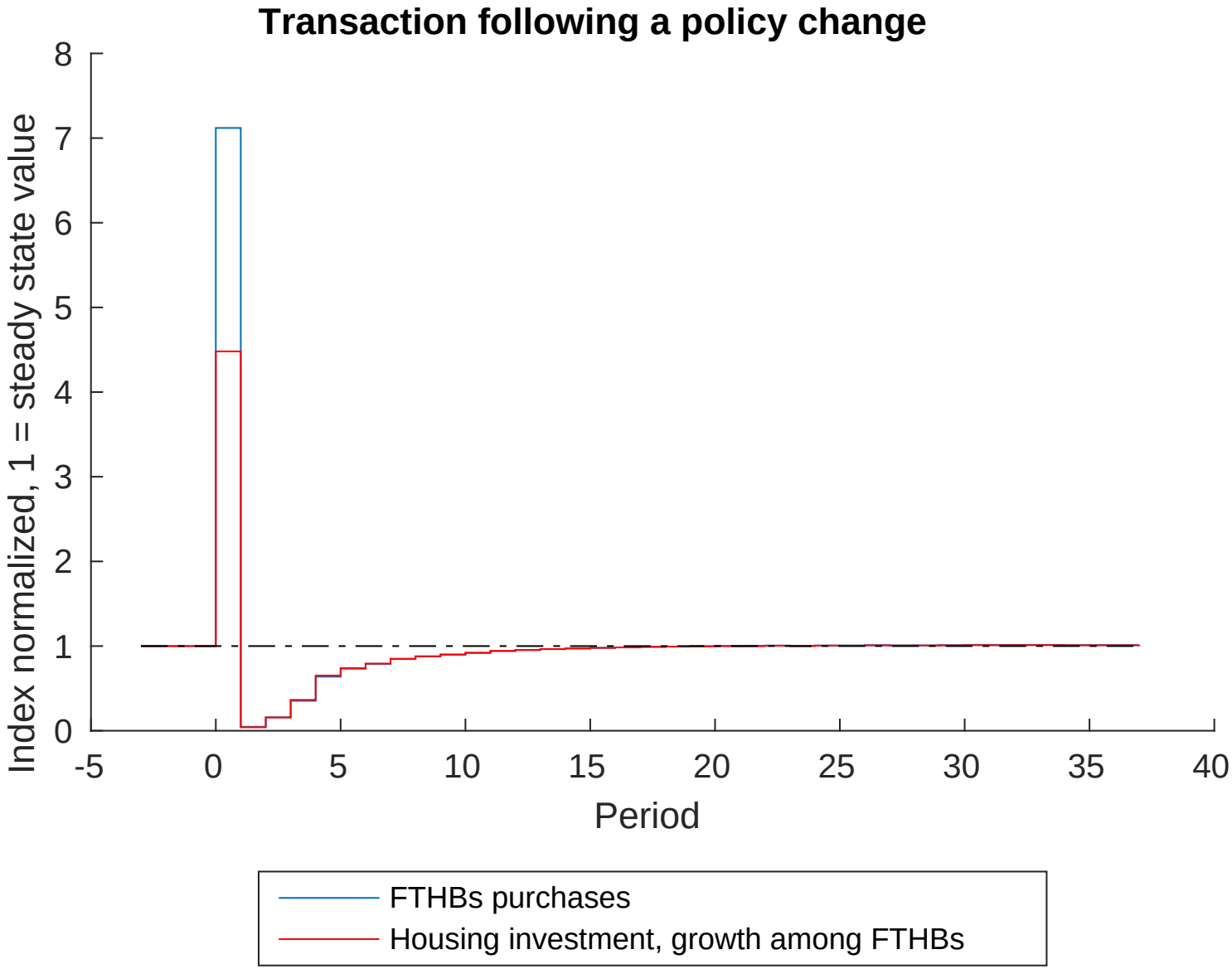


Policy effects, exogenous prices

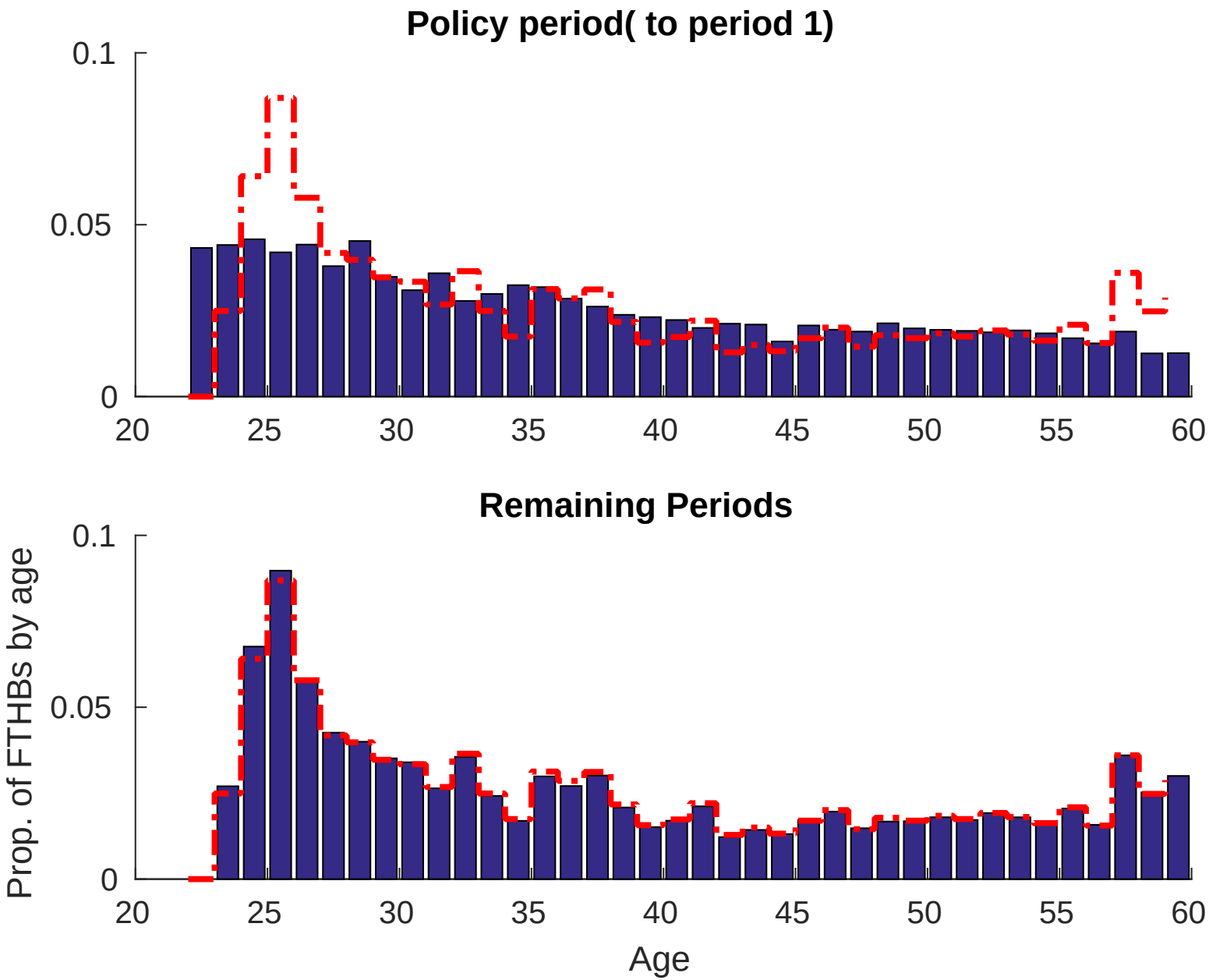
Policy specifications

- Every policy assumes the price is unchanged from the steady-state equilibium price (so effects are exaggerated in magnitude)
- Policy 1 (first five slides) is a policy where, if the credit is claimed, the equivalent of $8,000 is inapplicable toward the down payment, but received the period after the purchase (this is trying to emulate the FTHB credit)
- Policy 2 is a policy where the $8,000 is rebated on the down payment of the house, and nothing else (this is counterfactual)
- Policy 3 is a policy like Policy 1, except the subsidy is much smaller (more like $6.50). It verifies effects aren't large in the first two policies due to bugs.

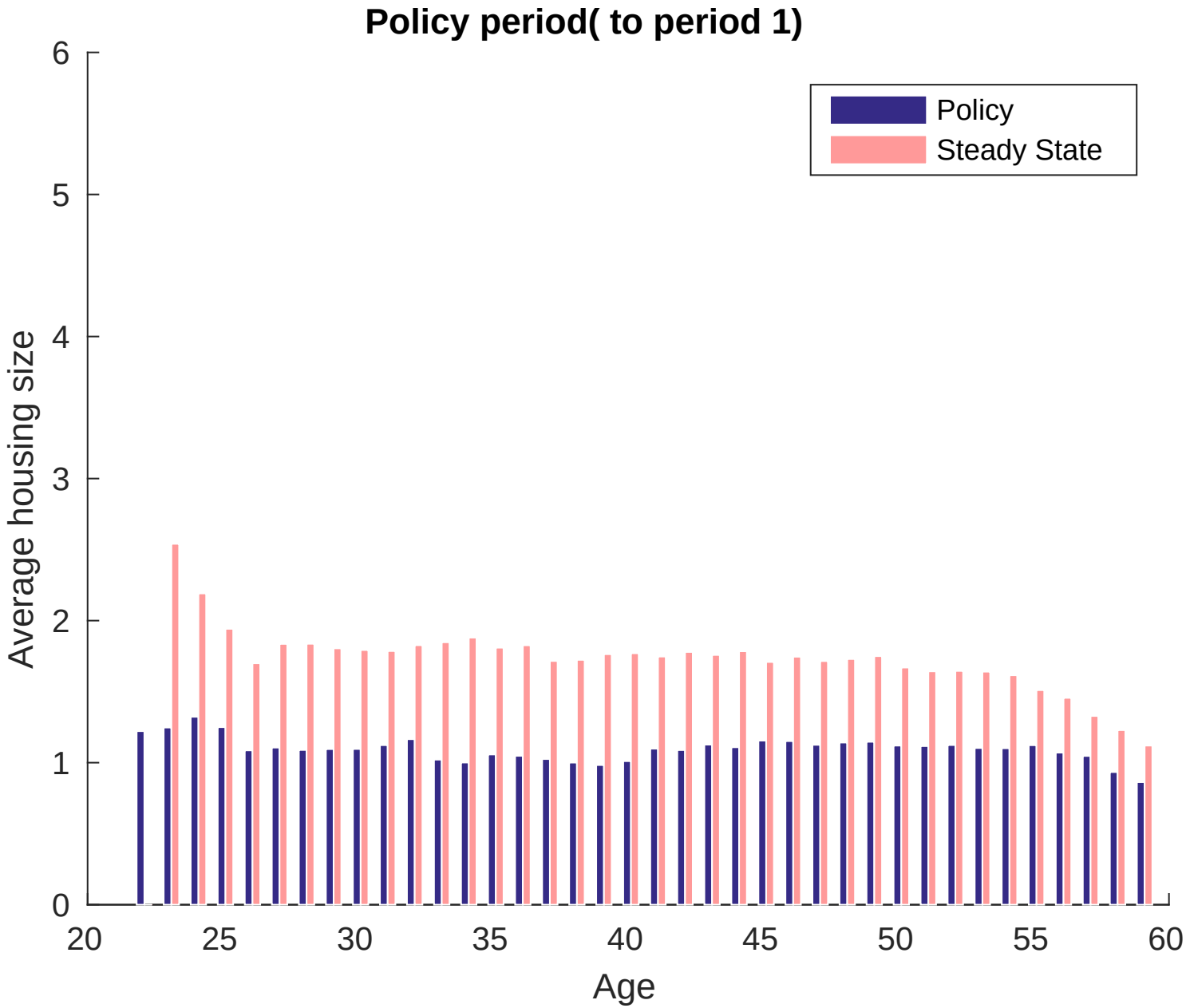
Time series of variables during transition period (1)



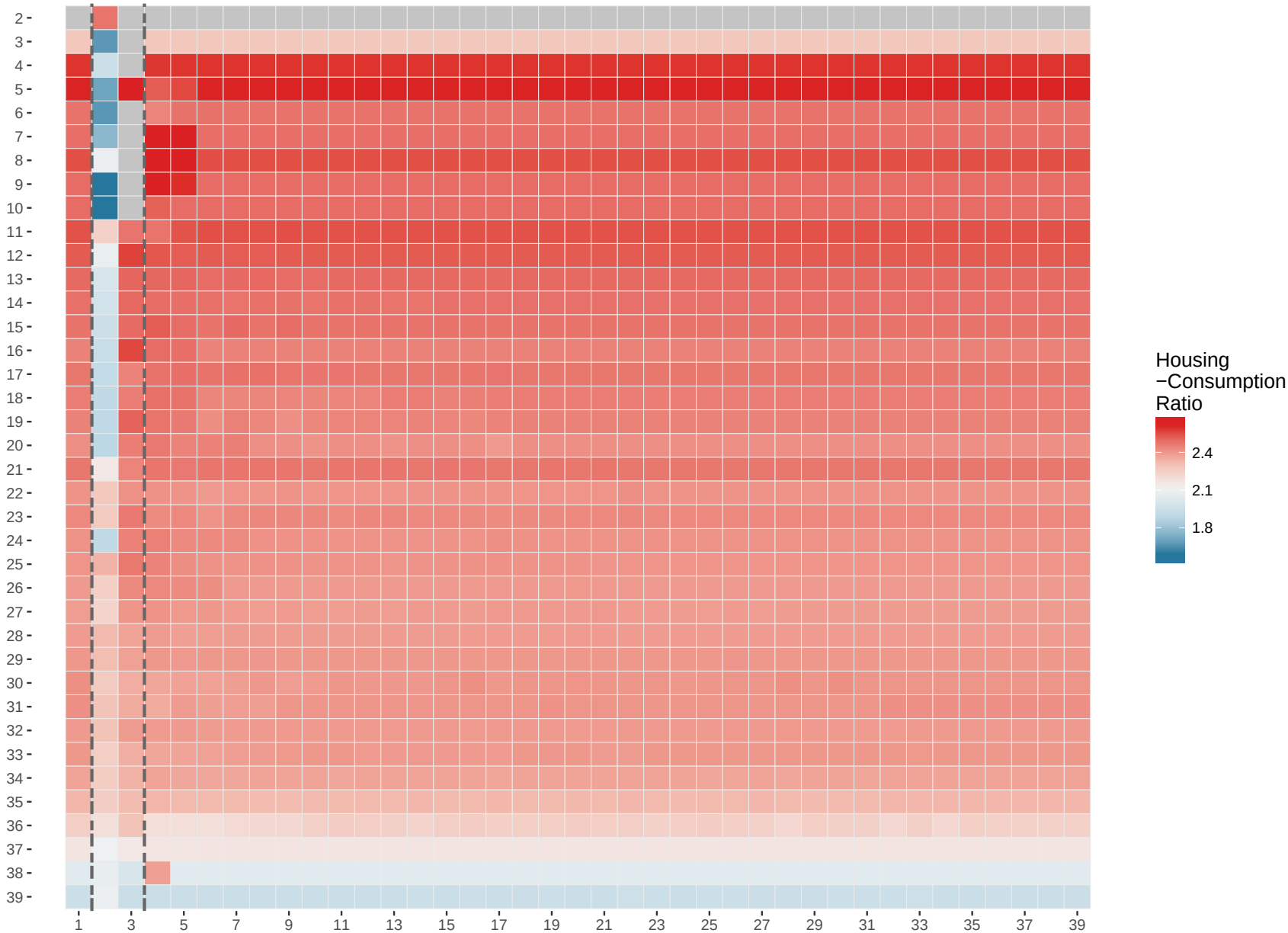
Policy-induced shifts in FTHB age distribution (1)



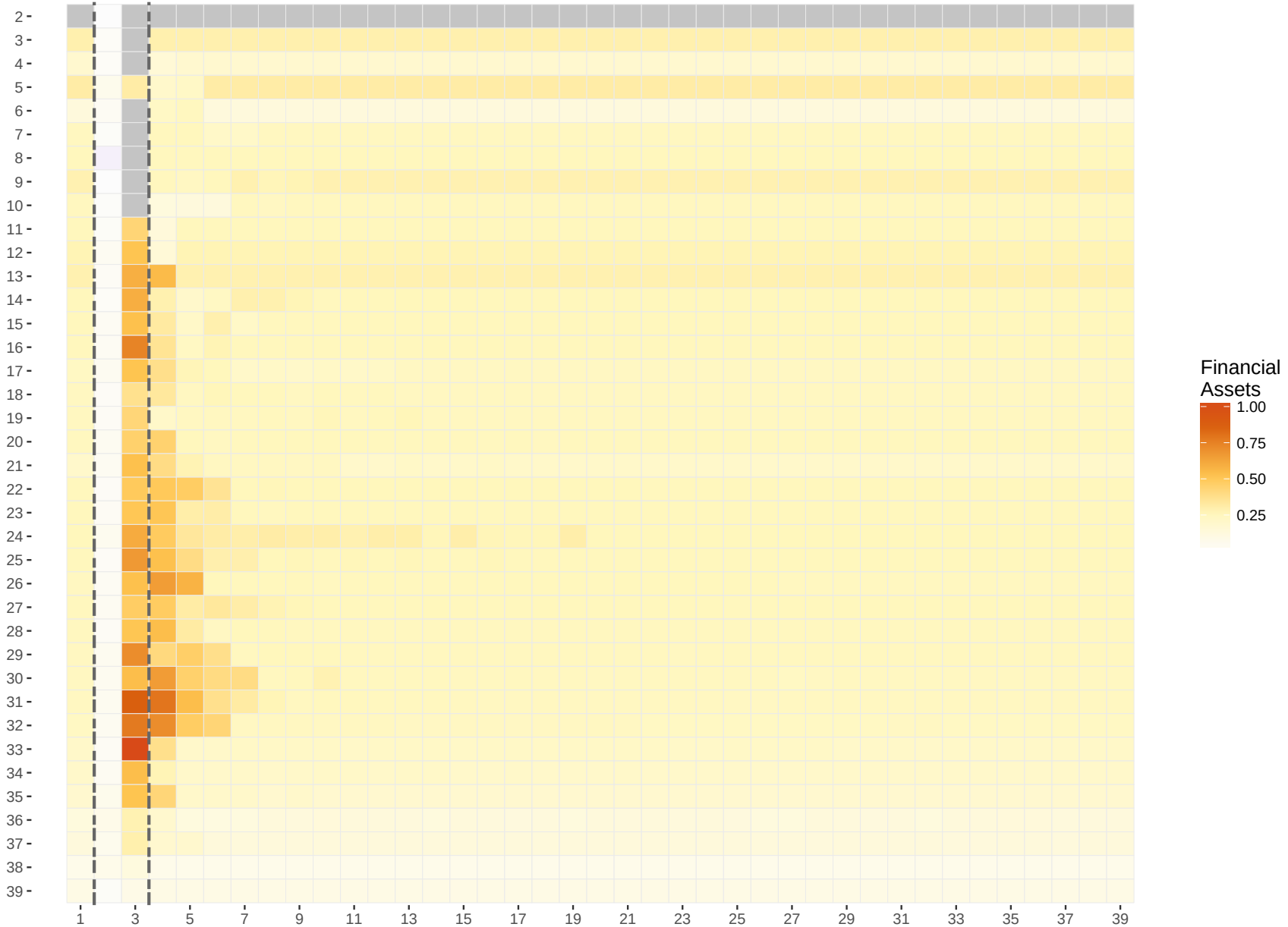
Policy-induced shifts in house size (1)



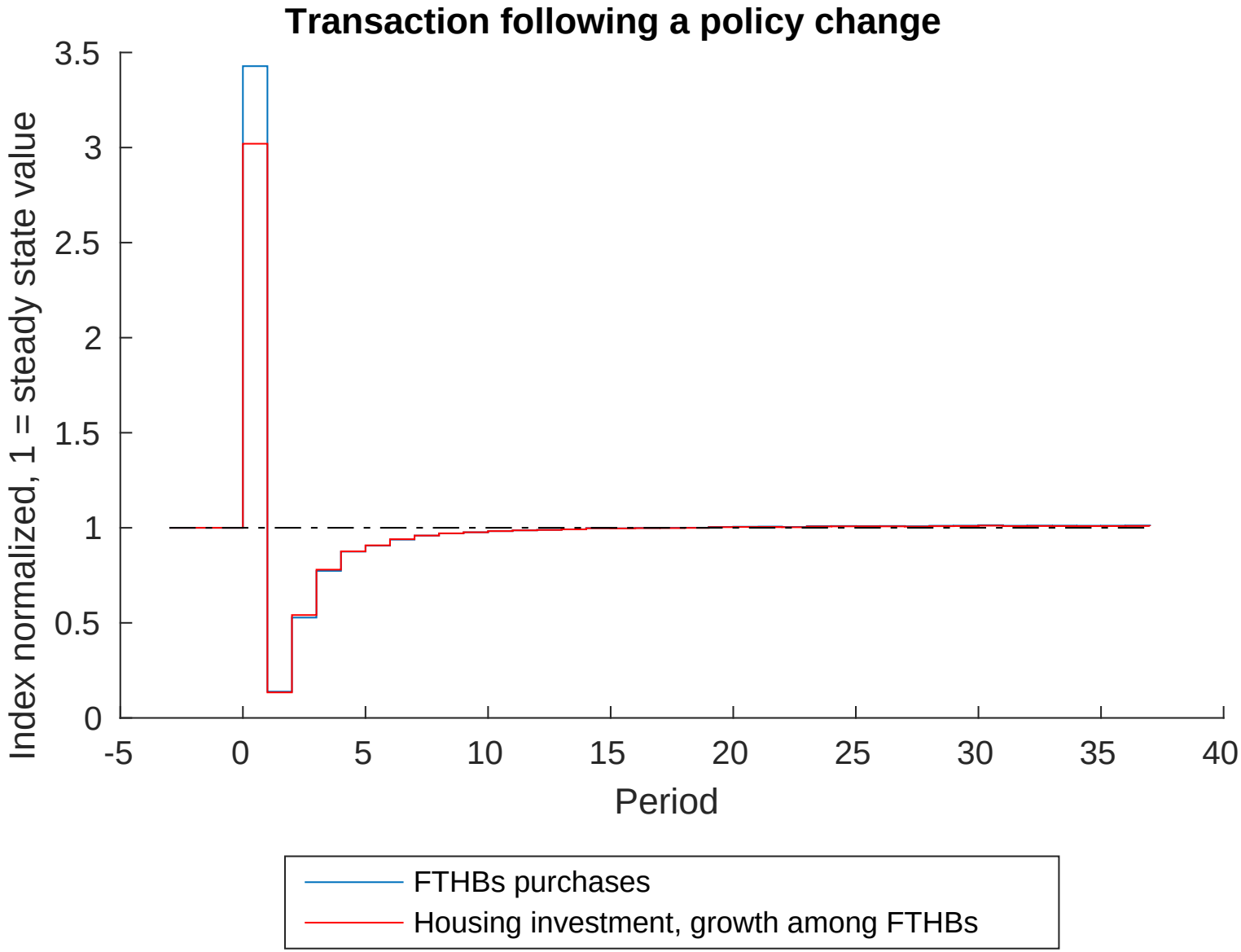
Heatmap of FTHB housing wealth-consumption ratio (1)



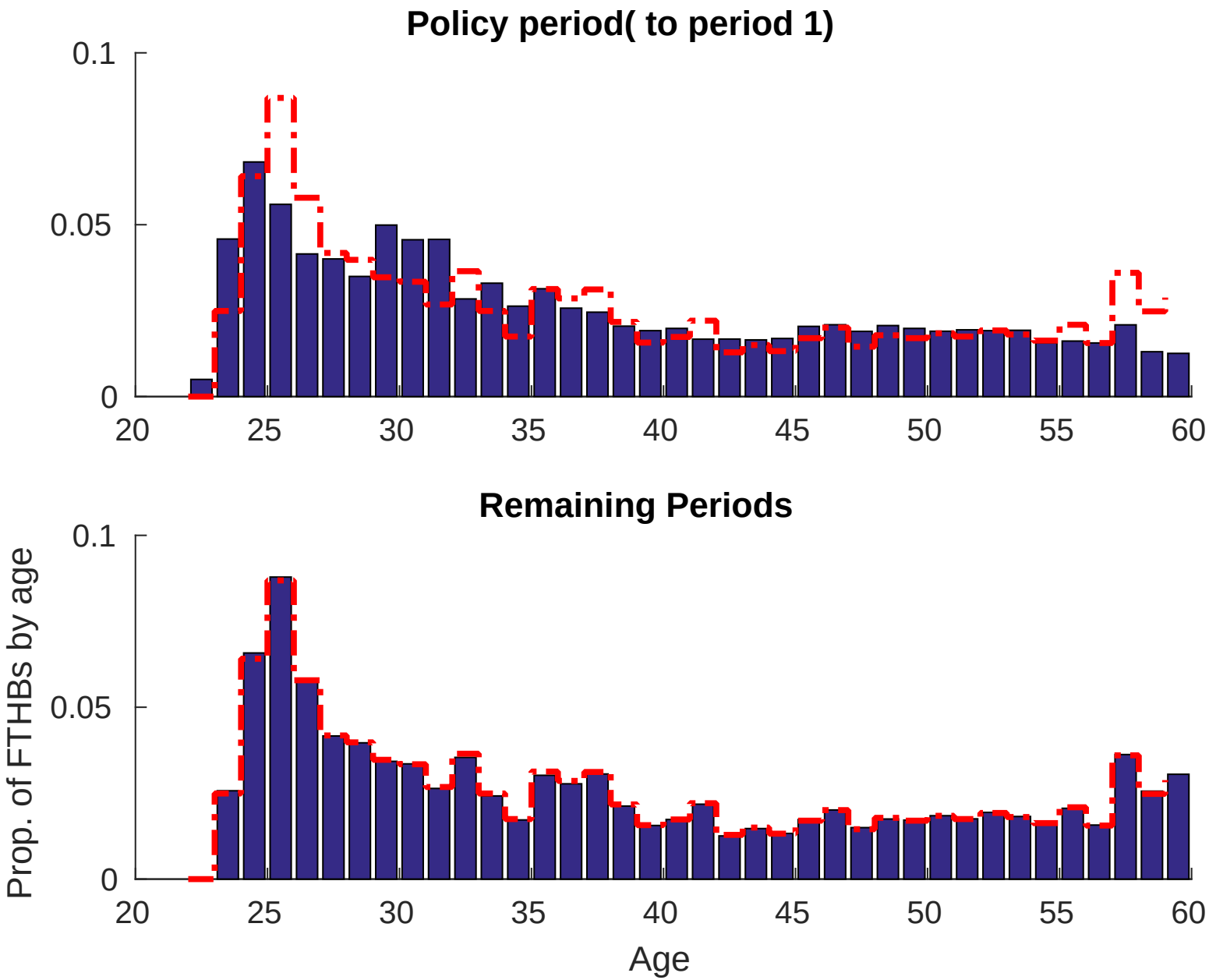
Heatmap of FTHB financial assets before purchase (1)



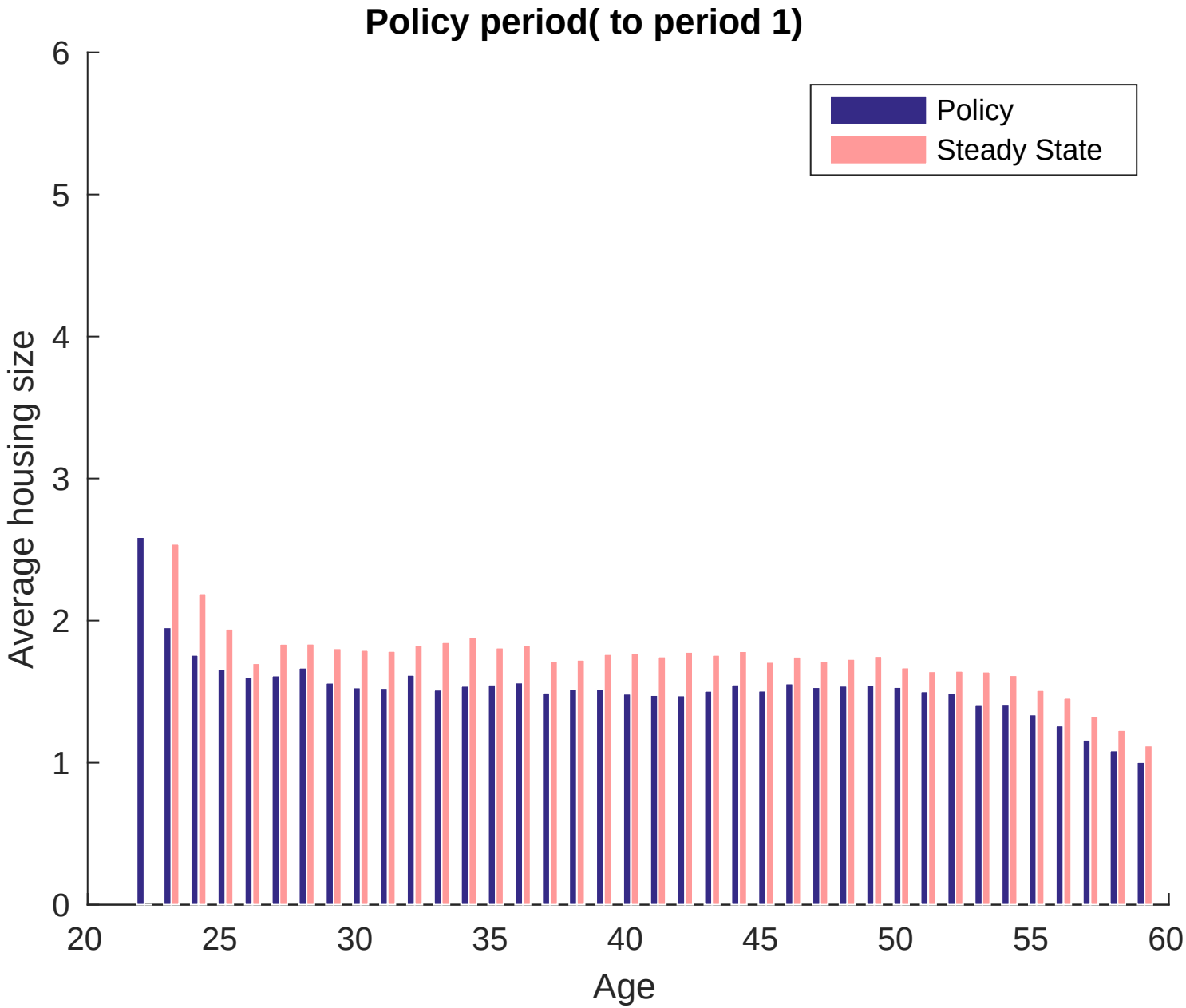
Time series of variables during transition period (2)



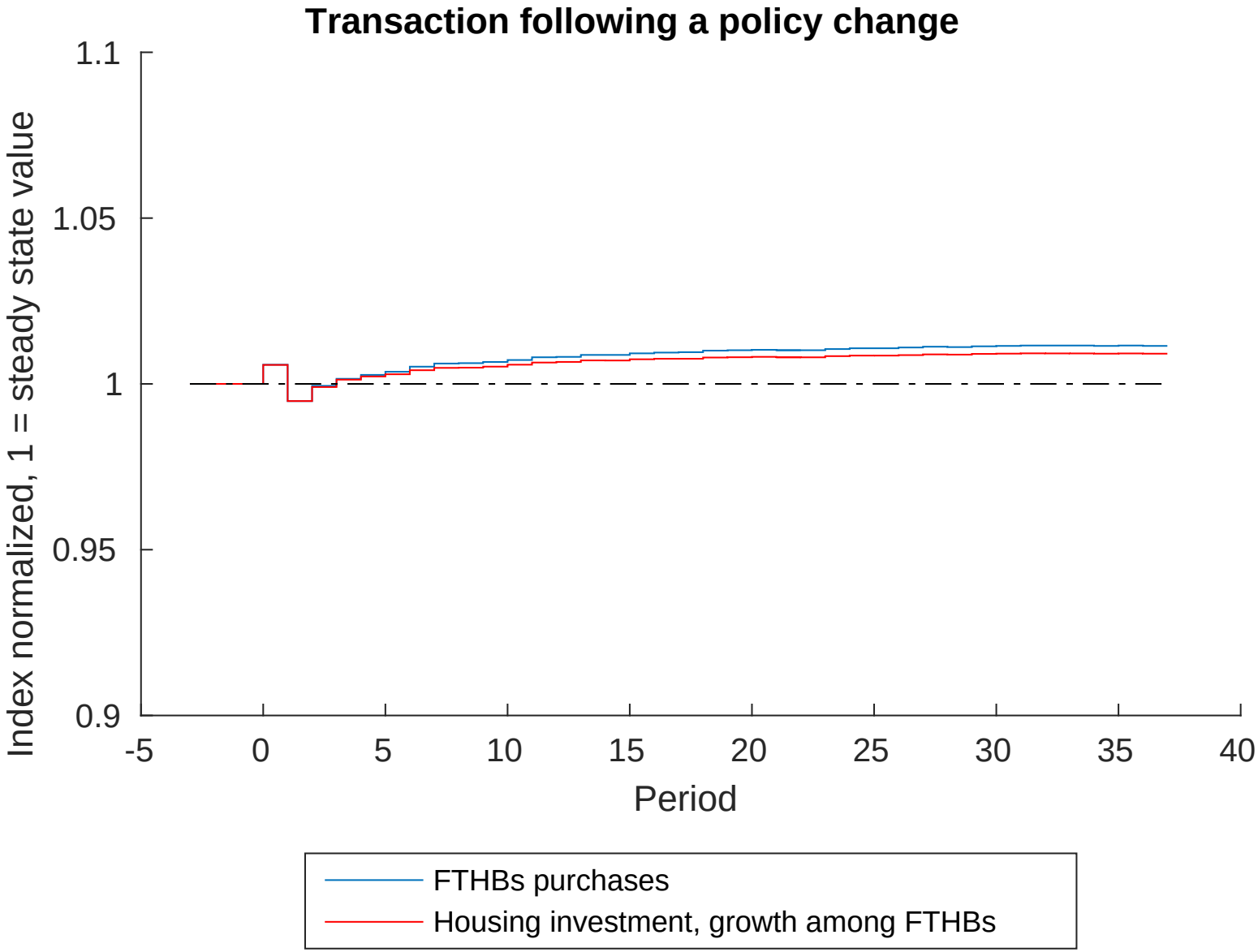
Policy-induced shifts in FTHB age distribution (2)



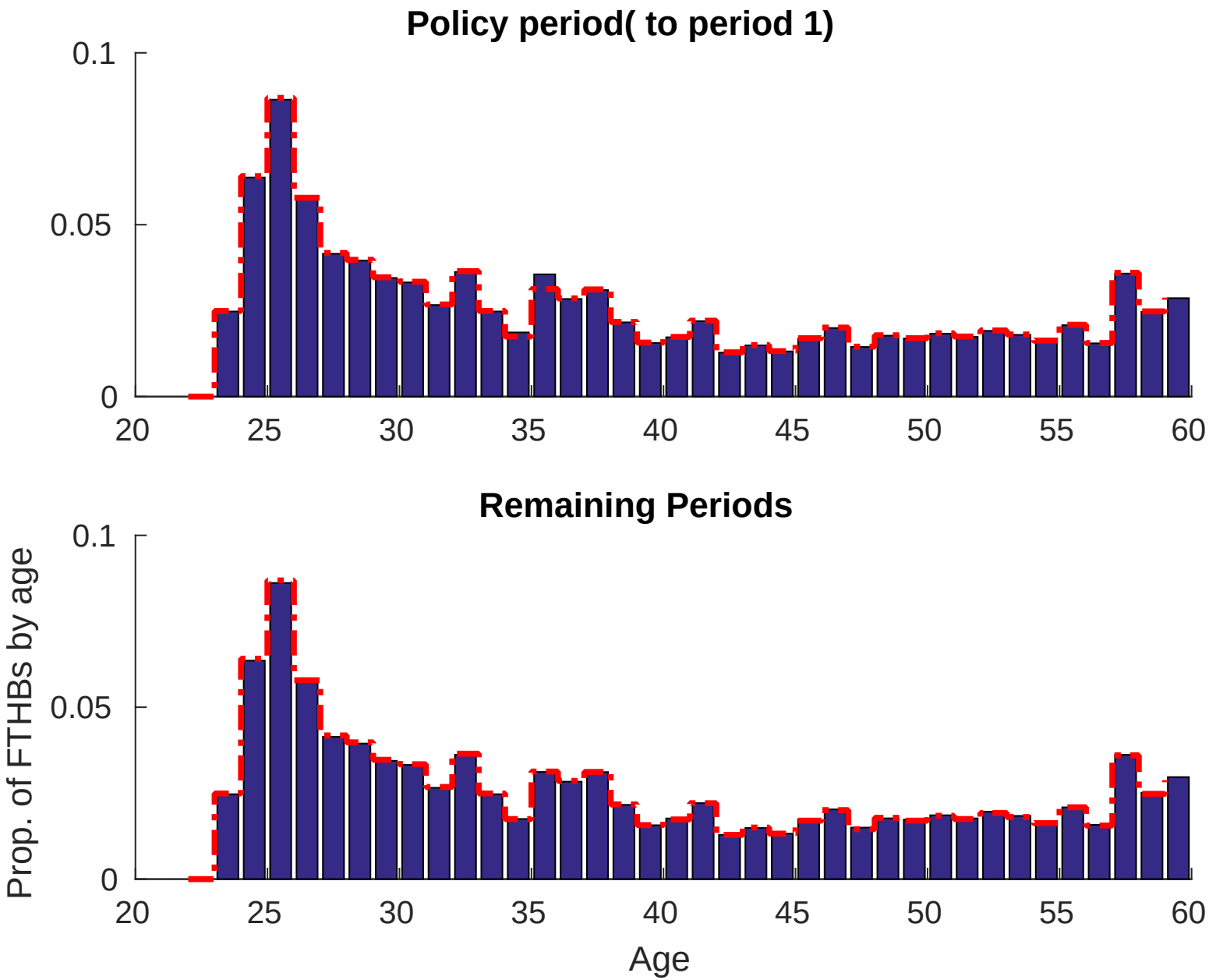
Policy-induced shifts in house size (2)



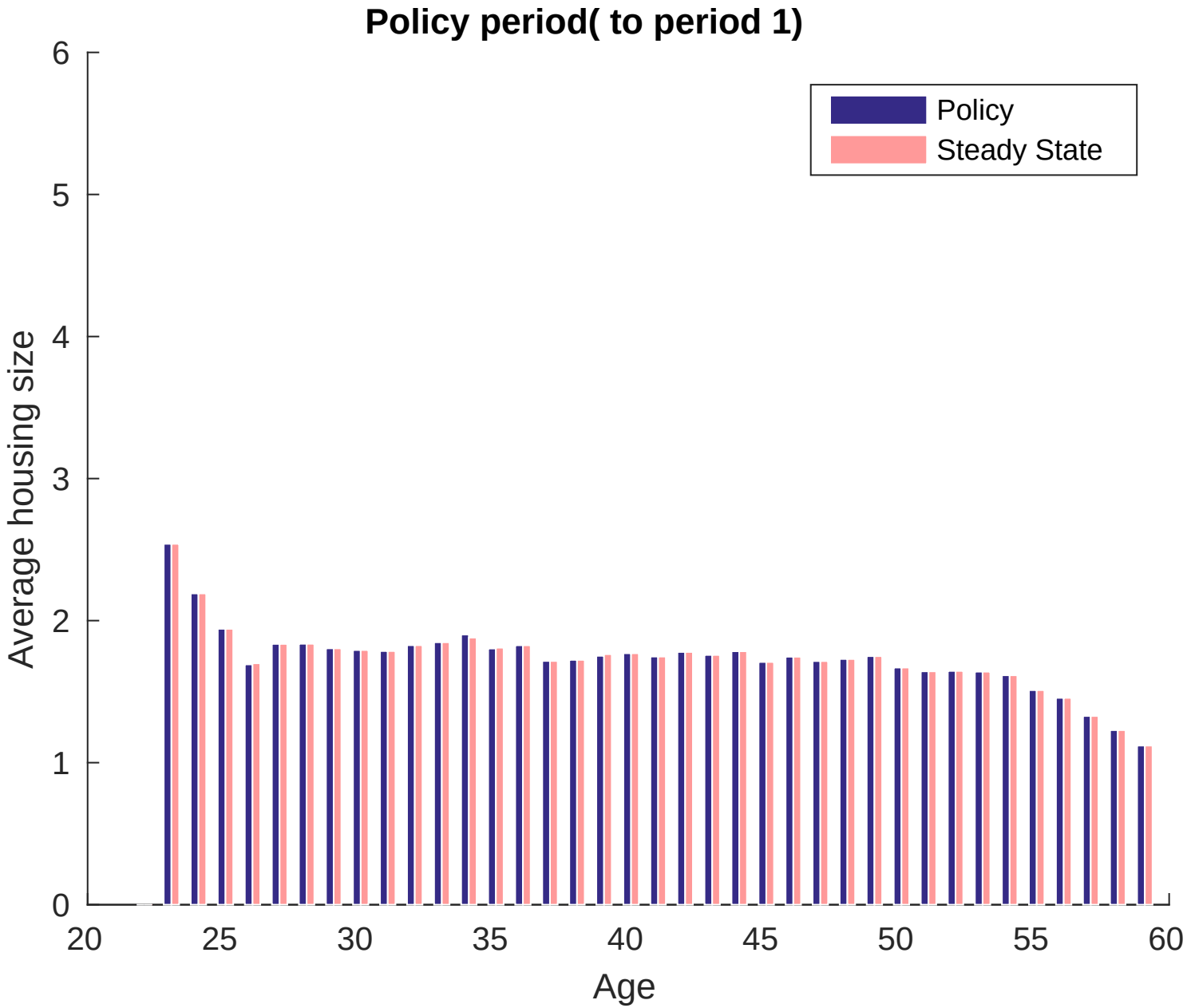
Time series of variables during transition period (3)



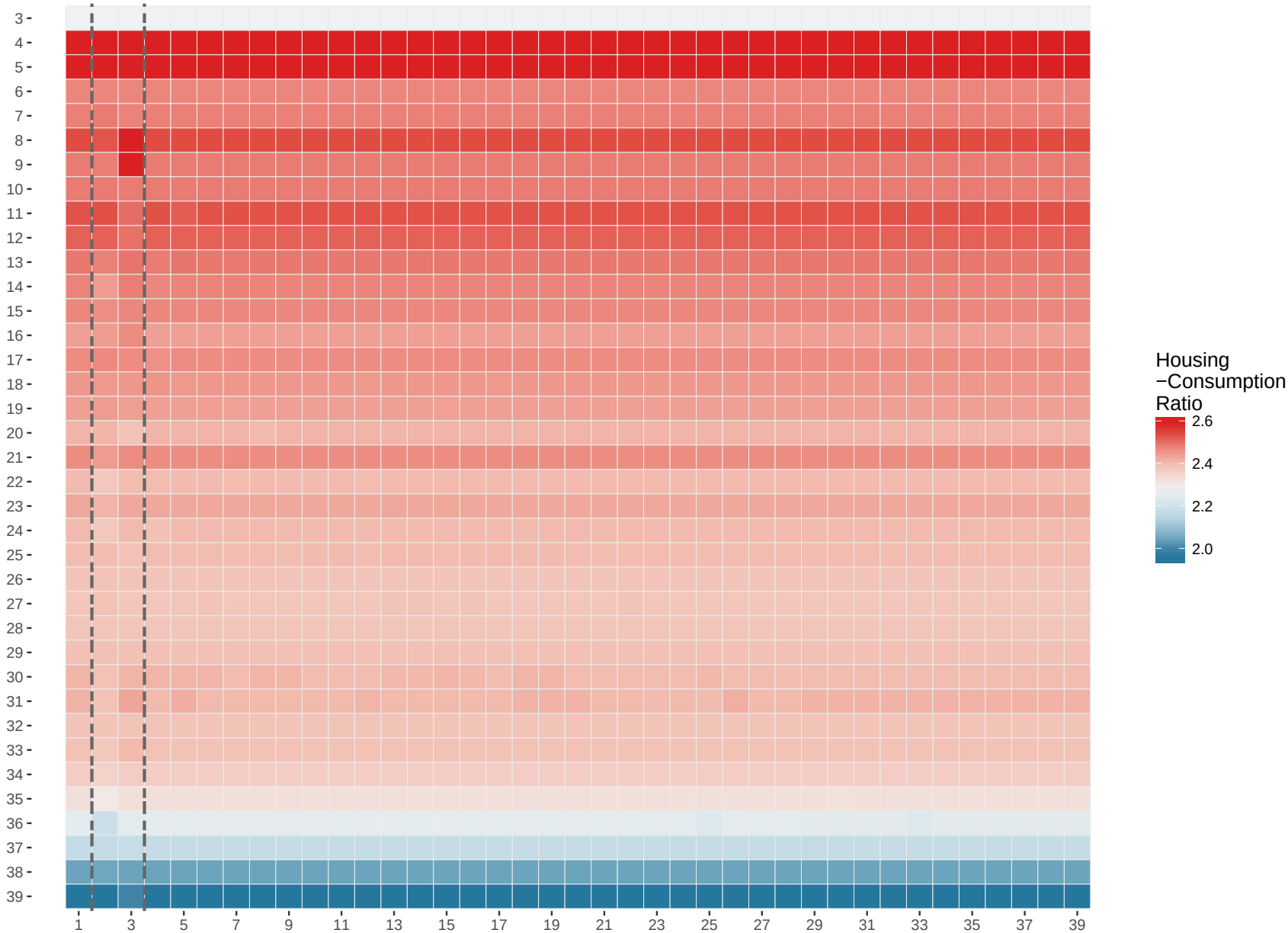
Policy-induced shifts in FTHB age distribution (3)



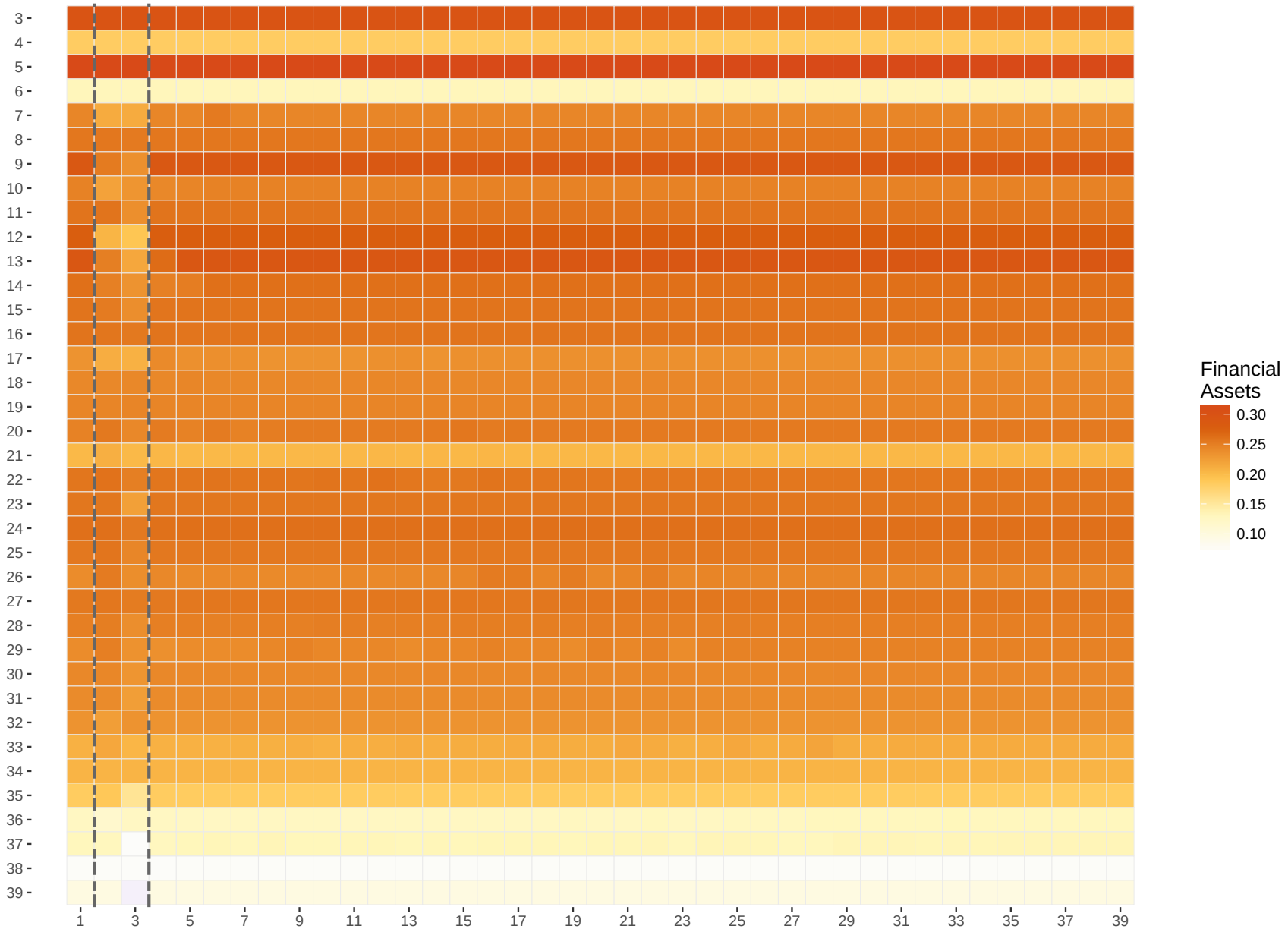
Policy-induced shifts in house size (3)



Heatmap of FTHB housing wealth-consumption ratio (3)



Heatmap of FTHB financial assets before purchase (3)



Counterfactual binscatters for induced FTHBs