House Price Perceptions and the Housing Wealth Effect

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CRETE 2025

July 9, 2025

Revisiting The Housing Wealth Effect

- The Housing Wealth Effect:

$$\Delta \text{ Housing Wealth} \Rightarrow \Delta \text{ Household Consumption}$$

- Defines how:
  - The housing market affects the broader economy
  - Monetary policy is transmitted through the house price channel

- Depends on **House Price Perceptions**:

  Households being informed and fully attentive to house price changes

- **This Paper**: The impact of house price perceptions on the housing wealth effect

More

Δ Actual House Prices $\Rightarrow$ Δ Household Consumption

Owners	Renters

Δ Current Actual House Prices

Owners

$\Rightarrow$ Δ Borrowing Against House Value

$\Rightarrow$ Δ Household Consumption

Δ Current Actual House Prices $\Rightarrow$ Δ Expectations of House Prices

Owners

$\Rightarrow$ Δ Wealth

$\Rightarrow$ Δ Substitution between Housing and Non-housing Consumption

$\Rightarrow$ Δ Household Consumption

Renters

$\Rightarrow$ Δ Homeownership Choice

$\Rightarrow$ Δ Savings for Down Payment

$\Rightarrow$ Δ Household Consumption

Δ Perceived House Prices $\Rightarrow$ Δ Household Consumption

Owners	Renters

Δ Current Perceived House Prices

Owners:

$\Rightarrow$ Δ Borrowing Against House Value

$\Rightarrow$ Δ Household Consumption

Δ Current Perceived House Prices $\Rightarrow$ Δ Expectations of House Prices

Owners:

$\Rightarrow$ Δ Wealth

$\Rightarrow$ Δ Substitution between Housing and Non-housing Consumption

$\Rightarrow$ Δ Household Consumption

Renters:

$\Rightarrow$ Δ Homeownership Choice

$\Rightarrow$ Δ Savings for Down Payment

$\Rightarrow$ Δ Household Consumption

Related Literature

- On the housing wealth effect:
  - Empirical papers rely on national changes in house prices for the time-series variation in home values, along with geographic variation of these national changes at the local level

    Mian & Sufi (2011), Mian *et al.* (2013), Cooper (2013), Attanasio *et al.* (2009), Aladangady (2017), Guren *et al.* (2020), Graham & Makridis (2023)
  - Theoretical models are used to determine the effect by shocking house prices, while holding all other prices and shocks constant

    Campbell & Cocco (2007), Carroll *et al.* (2011), Berger *et al.* (2017), Midrigan & Gorea (2017), Kaplan *et al.* (2020)
- On household expectations of macroeconomic variables and asset prices:
  - Mackowiak & Wiederholt (2012), Abel *et al.* (2013), Coibion & Gorodnichenko (2015), Roth & Wohlfart (2020), Weber *et al.* (2023)
- On house price expectations of owners and renters
  - Kindermann *et al.* (2021), referred to by Kuchler *et al.* (2022)

This Paper

- Stylized facts on household house price perceptions
- Structural model of consumption and housing with endogenous home ownership choice
    - ⋆ **Novel element: House price growth perceptions are incorporated in the model**
- Effect of house price perceptions on:
    1. Marginal propensity to consume out of housing (MPCH)
        - MPCH on average and in the cross-section
    2. Monetary policy transmission
        - Direct and indirect effects

Stylized Facts ⇒ Modelling House Price Perceptions and Expectations

Stylized Fact		Model Assumption
Median owner-perceived house price change less than actual	⇒	• Owners update their perception of actual house price growth occasionally
Renters pay more attention to prices than owners when they want to buy	⇒	• Model focuses on renters who want to buy • Renters update their perception of actual house price growth continuously
The latest perceived house price growth drives expectations	⇒	• House price expectations determined by latest perceived house price growth

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Modelling House Price Perceptions and Expectations

- P_t^H: house price at period t
- ϕ_t^H: house price growth rate at period t

	Observed	Perceived Current House Price	Expected Future House Price
Owner	ϕ_{t-n}^H	$\mathbb{E}_{t-n}[P_t^H \vert \phi_{t-n}^H]$	$\mathbb{E}_t[P_{t+1}^H \vert \phi_{t-n}^H]$
Renter	ϕ_t^H	P_t^H	$\mathbb{E}_t[P_{t+1}^H \vert \phi_t^H]$

Model Overview

- **Setup**:
    - Partial Equilibrium, house prices exogenous to model
    - Infinite Horizon
- **Households**:
    - Face discrete-continuous choice:
        1. Decide whether to own or rent
        2. Decide their non-housing consumption and housing consumption
    - Have different house price growth perceptions if they are owners and renters
    - Are subject to idiosyncratic and aggregate income risk
    - Can borrow:
        - Owners: against the value of their house
        - Renters: against their permanent income

More

Paper Headline Result: Average MPCH Accounting for Perceptions

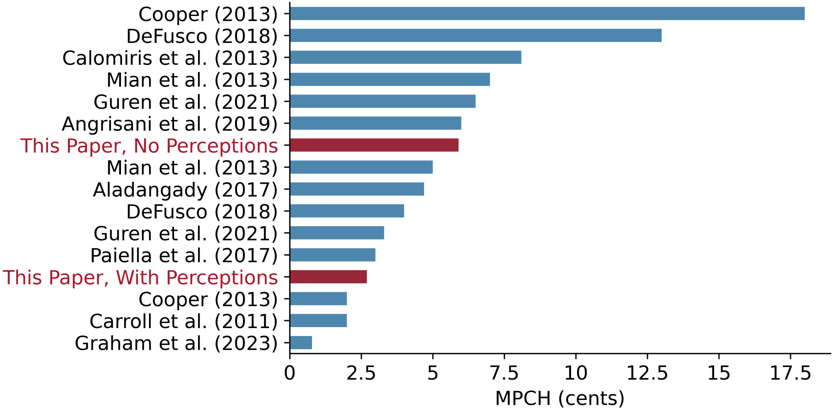

Figure: This Paper's MPCH Estimate vs. the Literature
This Paper, With Perceptions: baseline model result
This Paper, No Perceptions: counterfactual with fully informed and attentive households

Heterogeneity in the MPCH, Owners

- Most responsive to shock and lose the most due to perceptions:

  Households with lowest liquidity and lowest debt capacity

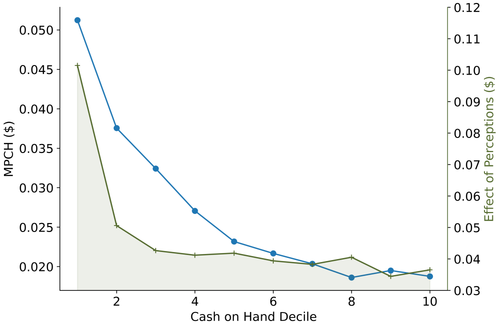

Figure: MPCH along the Cash on Hand Distribution

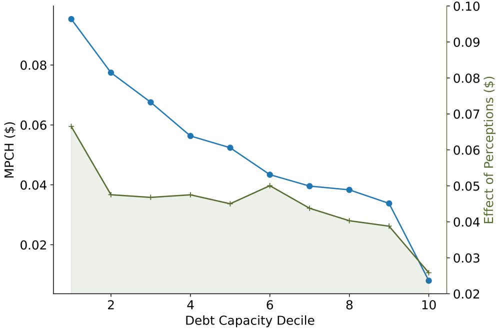

Figure: MPCH along the Debt Capacity Distribution

Heterogeneity in the MPCH, Renters

- Most responsive to shock:

  Households with highest liquid savings and lowest debt capacity

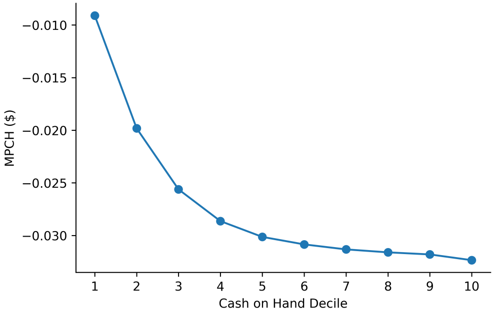

Figure: MPCH along the Cash on Hand Distribution

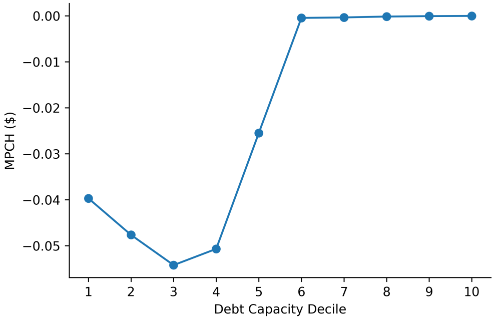

Figure: MPCH along the Debt Capacity Distribution

Monetary Policy Transmission and the Effect of Perceptions

Experiment: Monetary Policy Tightening

- Shock interest rates by $+100$ bps

  $\Rightarrow \Delta$ Policy Rate $\Rightarrow \Delta$ Local House Prices $\Rightarrow \Delta$ Consumption due to **House Price Channel**

- What is the direct impact of house price perceptions on the transmission of monetary policy?

House Price Channel and House Price Perceptions

- Perceptions dampen the consumption response through the house price channel

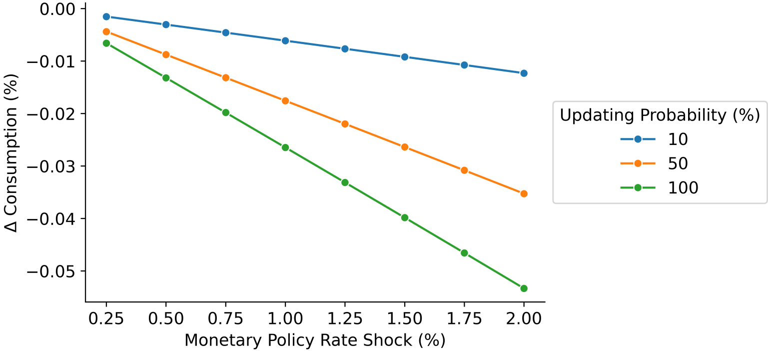

Figure: House Price Channel for Different Levels of Updating Probability and Rate Shock Magnitude
Δ Consumption is the average consumption response across US Metros

House Price Channel, Owners

- The consumption response is not symmetric for positive and negative house price changes resulting from monetary policy tightening

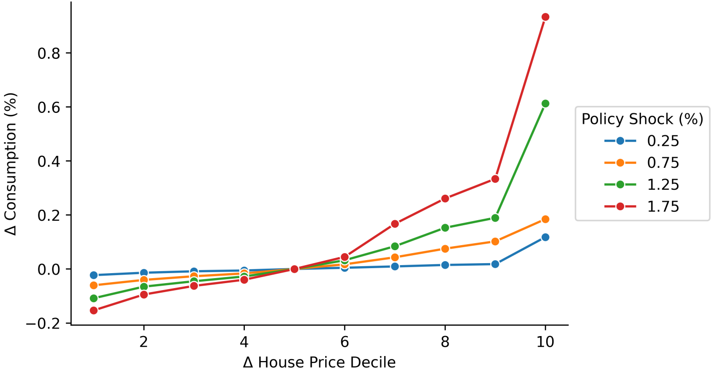

Figure: House Price Channel for Different Magnitudes of Monetary Policy Shocks and House Price Changes, Owners

House Price Channel, Renters

- The consumption response is symmetric for positive and negative house price changes resulting from monetary policy tightening

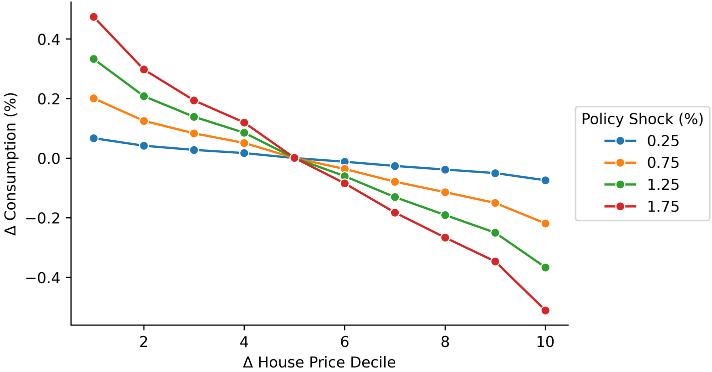

Figure: House Price Channel for Different Magnitudes of Monetary Policy Shocks and House Price Changes, Renters

Monetary Policy Transmission and the Effect of Perceptions

Experiment: Monetary Policy Tightening

- Shock interest rates by $+100$ bps

  $\Rightarrow \Delta$ Policy Rate $\Rightarrow \Delta$ Local House Prices $\Rightarrow \Delta$ Consumption due to **House Price Channel**

  $\Rightarrow \Delta$ Policy Rate $\Rightarrow \Delta$ Deposit Rate $\Rightarrow \Delta$ Consumption due to **Savings Channel**

  $\Rightarrow \Delta$ Policy Rate $\Rightarrow \Delta$ Debt Rate $\Rightarrow \Delta$ Consumption due to **Debt Channel**

- What are the indirect effects of house price perceptions on monetary policy transmission?

Indirect Effects of Perceptions on Monetary Policy Transmission

Higher probability of perceiving house price changes:

1. More households likely to decide to move more often
    - Transaction cost incurred each time housing is traded
        - Cost paid using liquid assets $\Rightarrow \downarrow$ Average savings balance
2. More households likely to increase their debt against their house price
    - Period of overall house price growth
        - $\uparrow$ Average debt balance

Indirect Effects of Perceptions on Monetary Policy Transmission

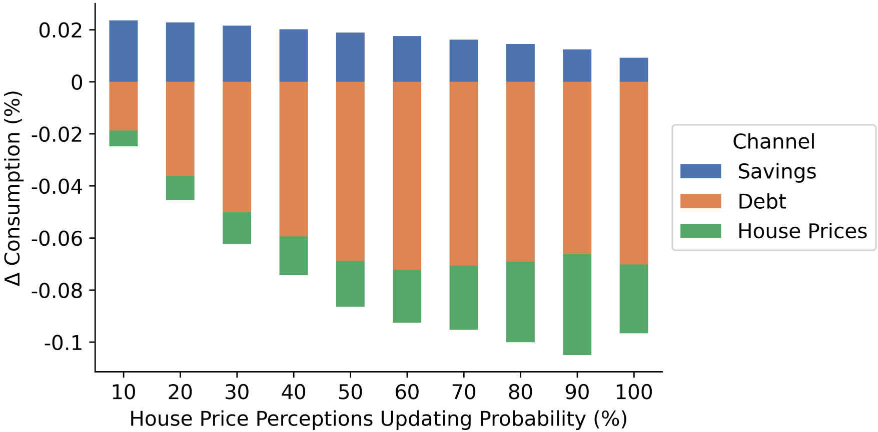

Figure: Effect of Perceptions on Monetary Policy Transmission by Channel, Owners

Conclusion

- **House price perceptions have a significant impact on the housing wealth effect**
  - The average model-estimated MPCH of 2.7 cents is $\sim$ half what it would be if homeowners decided their consumption based on actual instead of perceived house prices
- **House price perceptions impact households' consumption differently**
  - Owners with low liquidity, low borrowing capacity are most negatively impacted
- **House price perceptions affect the transmission of monetary policy**
  - Direct effect: the efficiency of the house price channel is dampened
  - Indirect effect: as the house price perception updating probability increases, the efficiency of the savings channel decreases, whereas the efficiency of the debt channel increases

Disclaimer

Researcher(s)' own analyses calculated (or derived) based in part on data from Nielsen Consumer LLC and marketing databases provided through the NielsenIQ Datasets at the Kilts Center for Marketing Data Center at The University of Chicago Booth School of Business.

The conclusions drawn from the NielsenIQ data are those of the researcher(s) and do not reflect the views of NielsenIQ. NielsenIQ is not responsible for, had no role in, and was not involved in analyzing and preparing the results reported herein.

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Perceived - Actual House Price Growth, US 2013-2019

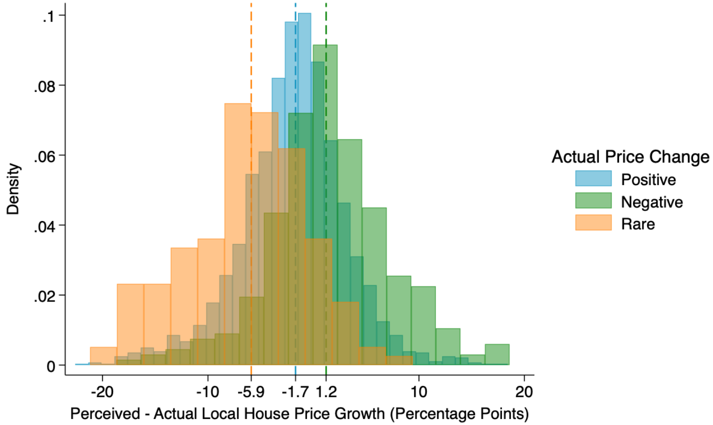
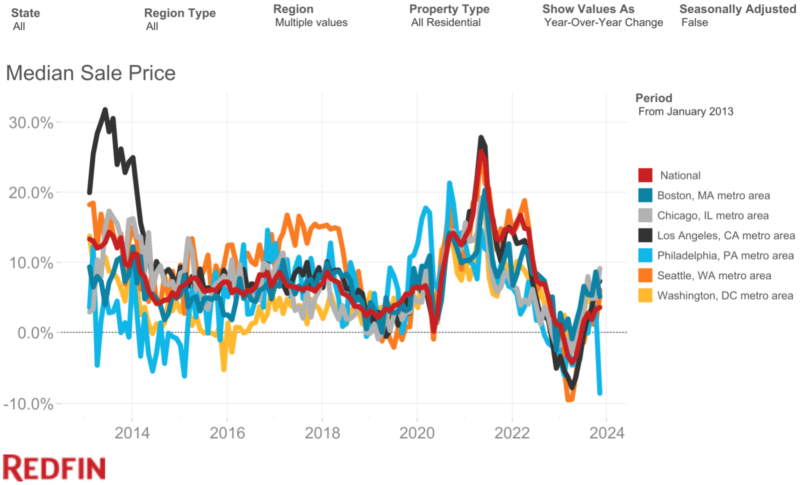


Figure: Histogram of Perceived - Actual Annual Local House Price Growth, Data from ACS and Zillow Back
Positive (Negative) Actual Metro-Level Changes. Rare Actual Metro-Level Changes > 2 s.d. Change in Metro


State
All
Region Type
All
Region
Multiple values
Property Type
All Residential
Show Values As
Year-Over-Year Change
Seasonally Adjusted
False
Median Sale Price
30.0%
20.0%
10.0%
0.0%
-10.0%
2014
2016
2018
2020
2022
2024
Period
From January 2013
National
Boston, MA metro area
Chicago, IL metro area
Los Angeles, CA metro area
Philadelphia, PA metro area
Seattle, WA metro area
Washington, DC metro area
REDFIN

Back

Stylized Facts

Stylized Fact 1: Median owner-perceived house price change < actual

$$\Delta p_{j,t}^{H,perceived} = \beta_0 + \beta_1 \Delta p_{j,t}^{H,actual} + \xi_j + \zeta_t + \epsilon_{j,t}$$

$\Delta p_{j,t}^{H,perceived}$: median house price growth in Metro as perceived by households, ACS data

$\Delta p_{j,t}^{H,actual}$: median house price growth in Metro, Zillow data

ξ_j, ζ_t: Metro and year FE

	(1)	(2)
$\Delta p^{H,acutal}$	0.520***	0.339***
	(0.016)	(0.036)
Metro FE	No	Yes
Year FE	No	Yes
Adj. R^2	0.269	0.288
N	2910	2910

Table: Household Perceptions of House Price Changes, for households with median-valued homes, 2013-2019 Back

Stylized Fact 1: Further evidence

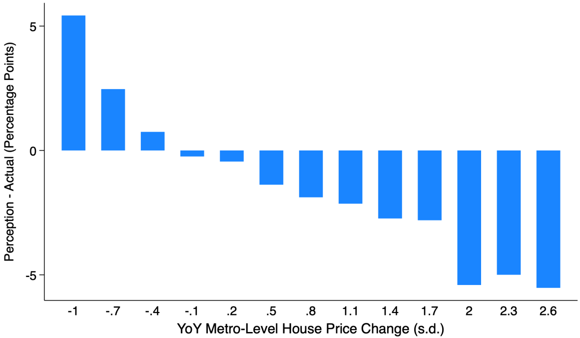


Figure: Difference of Perceived - Actual Annual House Price Growth, by Actual Annual House Price Growth Median Home Values, Metro-Level Changes 2013-2019, Zillow and ACS

Back

Stylized Fact 2: Renters pay more attention to prices than owners when they want to buy a home in the future

- Determine probability of renters vs. owners checking house prices using data from the NYFed Survey of Consumer Expectations and running a logit regression with the following index:

$$y_{i,t} = \gamma_0 + \gamma_1 \text{Renter}_i + \gamma_2 \text{Prob Buy}_i + \gamma_3 \text{Renter}_i \times \text{Prob Buy}_i + \boldsymbol{\gamma_4}' X_j + \xi_j + \zeta_t + \epsilon_{j,t}$$

$y_{i,t}$: index is 1 when household checked house prices at least once in the past year

Renter_i: household is a renter

Prob Buy_i: household-provided probability of buying a house in the next 3 years

X_j: household controls

ξ_j, ζ_t: region and year FE Back

Stylized Fact 2: Renters pay more attention to prices than owners when they want to buy a home in the future

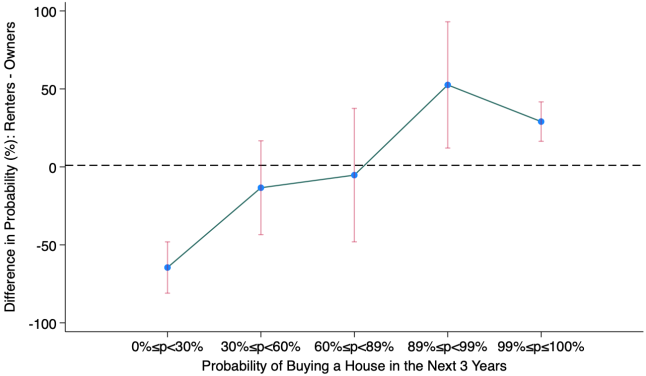


Figure: Difference in Attention to House Prices: Renters - Owners Back

Difference in the logit-predicted probability that renters check house prices vs. owners, 2014-2018

Stylized Fact 3: The latest perceived price growth drives expectations

- Trace expectations for house price growth using NYFed Survey of Consumer Expectations data

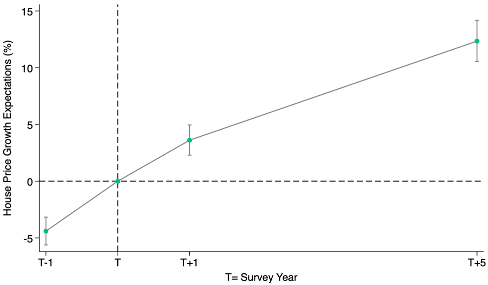


Figure: House Price Growth Expectations by Owners
For typical house price in zip, 2014-2018

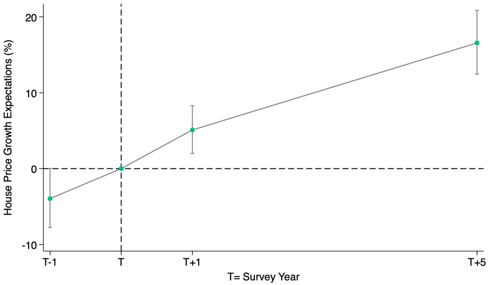


Figure: House Price Growth Expectations by Renters
For typical house price in zip, 2014-2018 Back

	(1)	(2)	(3)
1[Change in Rent = 1]	0.111**		0.132***
	(0.050)		(0.050)
1[Consultation of House Price Source = 1]		0.554***	0.557***
		(0.137)	(0.188)
Household Controls	Yes	Yes	Yes
Region FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
Pseudo R^2	0.0350	0.0463	0.0468
N	1153	1153	1153

Table: Renters' perceptions of house price changes. *Notes*: Estimates of logit regression of renters perceiving house price changes against their experienced rent changes and their tracking of house price changes. Data spans the 2014-2018 period. The specification includes household controls for household income, age, education, type of residence, living location (urban, rural, suburb, etc.), as well as region and year fixed effects. Standard errors are clustered at the regional level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.010$

Back

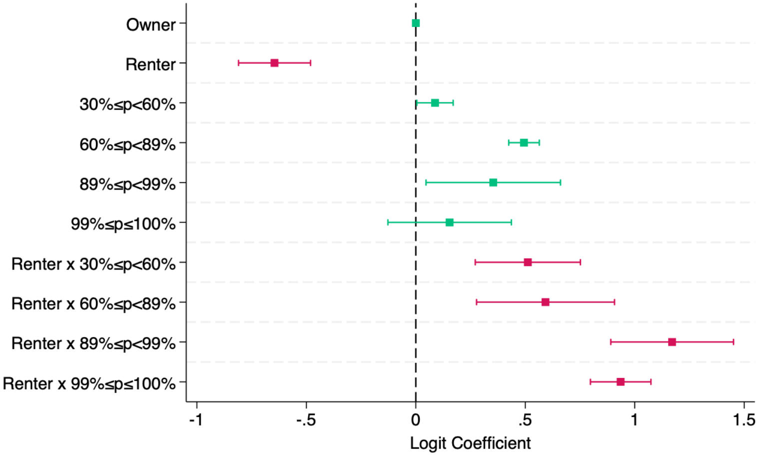


Figure: Coefficients of Interest: Attention to House Prices for Renters vs. Owners, given self-reported probability of buying a home

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Modelling House Price Perceptions and Expectations

- Perceived House Price, $\tilde{P}^H_t$
  - Owners
    - Observe actual house price growth occasionally, every n periods
    - Perceived house price will be the expected price conditional on the last observed house price growth rate ϕ^H_{t-n}
  - Renters
    - Observe actual house price growth continuously
    - Perceived house price will equal the actual house price
- Expected House Price, $\mathbb{E}_t[P^H_{t+1}]$
  - Owners
    - Expected house price will again be the expected price conditional on the last observed house price growth rate n periods ago
  - Renters
    - Expected house price will be the expected price conditional on the most recent growth rate Back

More on Model

Preferences

- Households gain CRRA utility from non-housing consumption and housing services

$$u(c_{i,t}, h_{i,t}) = \frac{1}{1-\rho}(c_{i,t}^{\alpha} h_{i,t}^{1-\alpha})^{1-\rho}$$

  - ρ: coefficient of relative risk aversion
  - α: non-housing share of consumption
- Owners: choose $h_{i,t}$
- Renters: can only gain one unit of utility from housing $\bar{h}$
- Future cash flows are discounted by discount factor β

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House Prices

- National house prices are driven by:

  Γ^H: national house price growth
  Ψ^H_t: national house price shocks, correlated with aggregate permanent productivity shocks

- Local house prices evolve according to:

$$P^H_{j,t+1} = \Gamma^H \phi^H_{j,t+1} P^H_{j,t} \Psi^H_{t+1}$$

  $\phi^H_{j,t}$: house price growth local deviations from national house price dynamics

- The local house price growth rate follows:

$$\Pr[\phi^H_{j,t+1} = \phi^H_{j,k} | \phi^H_{j,t} = \phi^H_{j,n}] = \Xi_{n,k}$$

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Housing Costs

- Owners:
  - Choose their housing service units $h_{i,t}$
  - Cost to buy or sell housing units is proportional to the number of housing units and prices

$$\kappa_{i,t} = \tau h_{i,t} P^H_{j,t}$$

- Renters:
  - Rental housing provides one unit of housing services, $\bar{h}$
  - Pay a flow rental cost proportional to house prices

$$R^H_{j,t+1} = \bar{R}\bar{h}P^H_{j,t+1}$$

$\bar{R}$: rent to house price ratio
$P^H_{j,t}$: house price in area j

Back

Household Income

- Household labor income is:

$$y_{i,t} = w\theta_{i,t}\Theta_t p_{i,t} P_t$$

  w: constant wage rate
  $\theta_{i,t}$, Θ_t: idiosyncratic and aggregate transitory productivity shocks

- Idiosyncratic and aggregate productivity $p_{i,t}$, P_t evolve according to:

$$P_{t+1} = \Gamma P_t \Psi_{t+1}$$

$$p_{i,t+1} = p_{i,t}\psi_{i,t+1}$$

  Γ: aggregate productivity growth
  $\psi_{i,t+1}, \Psi_{t+1}$: idiosyncratic and aggregate permanent productivity shocks

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Liquid Wealth

- Household liquid wealth $a_{i,t}$ evolves based on tenure
  - Owners:
  $$a_{i,t} = m_{i,t} - c_{i,t}$$
  - Renters:
  $$a_{i,t} = m_{i,t} - c_{i,t} - R^H_{j,t}$$

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Debt

- Owners borrow against the value of their house:

$$-a_{i,t} \leq (1-\theta)P^H_{j,t}h_{i,t}$$

$(1-\theta)$: the fraction of a house's value that can be used as collateral

- Renters borrow up to a fraction of their permanent income:

$$-a_{i,t} \leq \sigma w p_{i,t} P_t$$

σ: renters' borrowing limit with respect to their permanent income

- The interest rate for debt is higher than the interest rate for savings:

$$R^{boro}_t > R^{save}_t$$

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Model Parameter Estimation and Calibration

Model Parameter Estimation and Calibration

- House Price Parameters
  - House price growth perception parameters: Stylized Facts
  - Actual house price dynamics: calibrated using house price data, FHFA HPI at the US and Metropolitan level
- Institutional Characteristics and Other Parameters
  - Values from the literature
- Preference and Transaction Cost Parameters
  - Estimated in the model, using Generalized Method of Moments
  - Using Survey of Consumer Finances and Current Population Survey data from 2013-2019

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House Price Parameters

Parameter	Description	Value	s.e.
House Price Parameters			
π	% Perceptions Updating Probability	34%	0.00
$\phi^{H}_{j,low}$	Low Additional Growth State	-3.53%	
$\phi^{H}_{j,no}$	No Additional Growth State	0.00	
$\phi^{H}_{j,high}$	High Additional Growth State	4.04%	
$\text{prob}^{H}_{j,low}$	Unconditional Low State Probability	24.6%	
$\text{prob}^{H}_{j,no}$	Unconditional No Growth State Probability	57.8%	
$\text{prob}^{H}_{j,high}$	Unconditional High State Probability	17.4%	
Preference and Transaction Cost Parameters			
ρ	CRRA	1.51	0.006
α	Non-Housing Share of Consumption	0.849	0.011
β	Discount Factor	0.92	0.015
τ	Housing Transaction Cost	0.051	0.0002

Table: House Price Parameters
Perception parameters are estimated outside of model,
preference and transaction cost parameters are estimated in model Back

Moments

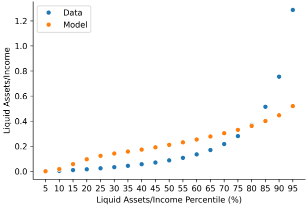

Figure: Liquid Assets/Income, All

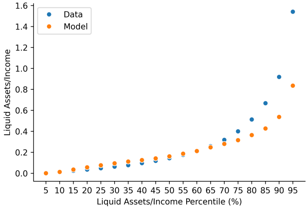

Figure: Liquid Assets/Income, Owners

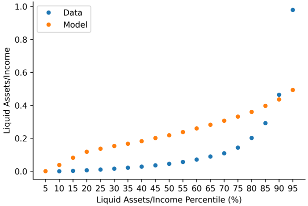

Figure: Liquid Assets/Income, Renters

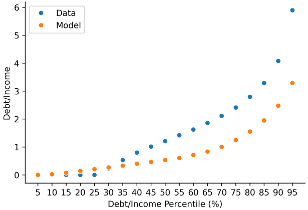

Figure: Debt/Income

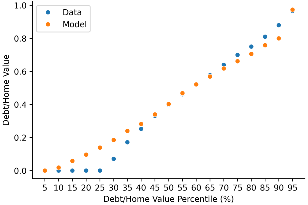

Figure: Debt/Home Value

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