Cyclical Housing Transactions and Wealth Inequality

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These views do not necessarily reflect those of the Federal Reserve Bank of Chicago or the Federal Reserve System

Motivation

Time-varying expected returns

- Business-cycle frequency
- Predicted by price-to-fundamental
- Across asset markets

Wealth inequality

- Wider than income inequality
- Across the wealth distribution

Big picture question: Do cycles exacerbate or reduce wealth inequality?

This paper

Poorer households buy assets when prices are higher and sell when prices are lower

- All asset markets, but start with real estate
- Measure and document an empirical regularity
- Leads to portfolio returns that increase in wealth level

Roadmap of Talk

Introduction

Wealth Inequality from the Timing of Trades

Estimating the Timing of Trades
- Data construction
- Estimating the timing of trades
- Conversion to returns

Additional Results and Implications

Conclusion

Measured-wealth accumulation

$$dW_{it} = (Y_{it} - C_{it})\,dt + \underbrace{\sum_k \theta_{it}^k dR_t^k}_{\equiv \overline{dR}_{it}} W_{it}$$

for $W_{it} \equiv$ measured non-human wealth (financial and real) (Piketty (2015))

- Y_{it} includes labor income, taxes and transfers
- C_{it} is consumption inclusive of rent as well as user cost of housing
- $\overline{dR}_{it}$ is portfolio return
  - Share θ_{it}^k held of asset k
  - Assets k are disaggregated s.t. $dR_{it}^k = dR_t^k \forall i$

Contributions to wealth inequality

$$dW_{it} = (Y_{it} - C_{it})\,dt + \underbrace{\sum_k \theta_{it}^k dR_t^k}_{\equiv \overline{dR}_{it}} W_{it}$$

- Income inequality
- Consumption-savings
  - Do the rich save more?
  - Do the rich leave more inheritance?
- Heterogeneity or wealth gradient on portfolio returns (*)

Return decomposition

$$E\left[\overline{dR}_{it} - \overline{dR}_t\right] = \sum_k \left\{ E\left(\theta_{it}^k\right) - E\left(\theta_t^k\right) \right\} E\left(dR_t^k\right) + \sum_k \left\{ cov\left(\theta_{it}^k, E_t dR_t^k\right) - cov\left(\theta_t^k, E_t dR_t^k\right) \right\}$$

- First term: Average participation

- Second term: “market timing”
  - If price random walk, second term disappears
  - Not exclusive to housing

Covariance approximation

- Expected return on asset k

$$\mu_t^k \equiv E_t\left(R_{t+1}^k\right)$$

- Active change and passive change

$$cov\left(\theta_{it}^k, \mu_t^k\right) \approx E\left(\theta_{it}^k\right) E\left(\mu_t^k\right) \Bigg[\underbrace{cov\left(\log P_t^k + E \log Q_{it}^k - \log W_{it}, \log \mu_t^k\right)}_{\text{passive}} + \underbrace{cov\left(\log Q_{it}^k - E \log Q_{it}^k, \log \mu_t^k\right)}_{\text{active}} \Bigg]$$

Return differential from active trades

- Return predictability (Cochrane (2011))

$$\log \mu_t^k = a^k + b^k \log \frac{D_t^k}{P_t^k}$$

- Portfolio-return differential due to active change

$$acov\left(\theta_{it}^k, \mu_t^k\right) \approx \underbrace{-b^k E\left(\mu_t^k\right) var\left(\log P_t^k\right)}_{\text{asset-market characteristics}} E\left(\theta_{it}^k\right) \underbrace{\frac{cov\left(\log Q_{it}^k, \log P_t^k\right)}{var\left(\log P_t^k\right)}}_{\text{relative elasticity}}$$

Why this paper? Theoretical ambiguity

Goal: Estimate relative elasticity of housing quantity to price $\frac{cov\left(\log Q_{it}^k, \log P_t^k\right)}{var\left(\log P_t^k\right)}$

Standard models give opposite predictions. For example,

- Poorer households buy in boom
  - **Pro-cyclical credit supply (market- or policy-driven)**
  - Distance to financial constraints (e.g. foreclosure)
  - Difference in financial sophistication
  - Targeting of dangerous products
- Richer households buy in boom
  - **Extrapolative expectations in housing market (broad)**
  - Intermediary / expertise (less so for housing)

Empirical challenge: No data on quantity trades by household type at cyclical frequency (possibly except tax data)

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Methodology

Core: A panel dataset on real-estate ownership by owner characteristics

- Asset-side data:
  Real-estate assessor records and transaction deed records

- Owner-side data:
  1940 full-count Census

- Linked via owners' surnames

CoreLogic data

Two components

- Assessor records: 2012-2013
- Transaction deed records: coverage increases over time

Two samples, each with consistent set of properties

- More properties: 1998-2013
- Longer time series: 1988-2013

Final product: Property $\times$ year panel, with owners identified for each observation

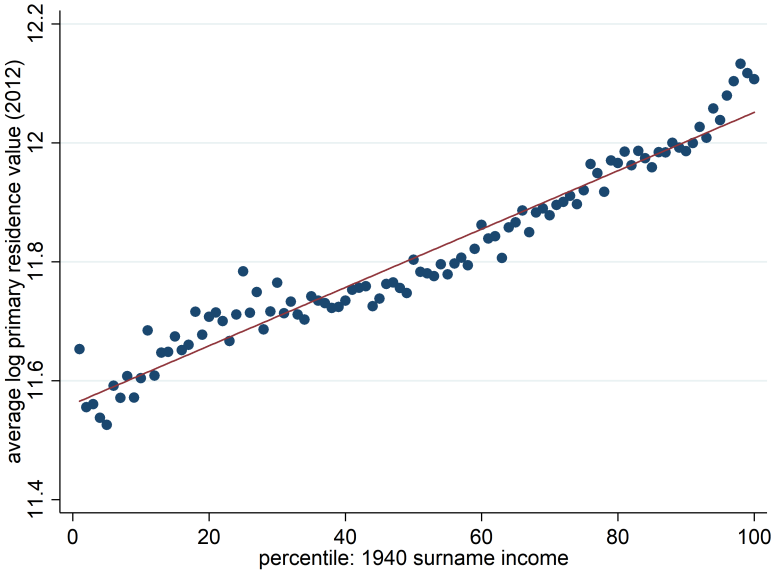
Sample counties | Representativeness

Surnames

Census 1940

- Latest full-count Census publicly available (“72-year rule”)
- Household wage income (first time)
- Housing consumption (value or rent)
- With 100+ individuals in both 2000 and 2010 Census surname files
- 167,409 surnames
- Examples by Census 1940 income
  - Highest: O’Sullivan, Reilly, Keane, Mackenzie
  - Lowest: Fontenot, Guillory, Smalls

First stage: Primary residence value among owners (2012)



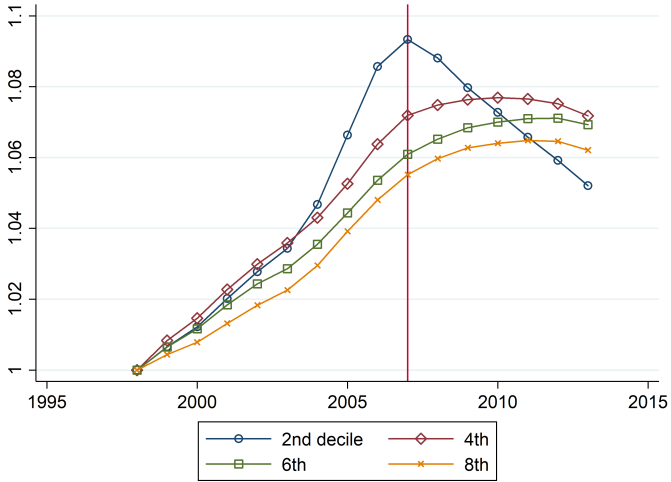
Additional validation

- Against Census
  - Zip-code-level income
  - Residential address vs. property location
- In Henry de Frahan and Sakong (2020)
  - More real-estate ownership per capita
  - More recreational boats
  - More private jets
  - More political contributions

All real estate ownership per capita relative to 1998

Collapse from property × year to surname × year

Real-estate per-capita ownership (count here, also in number of bedrooms and square-footage)

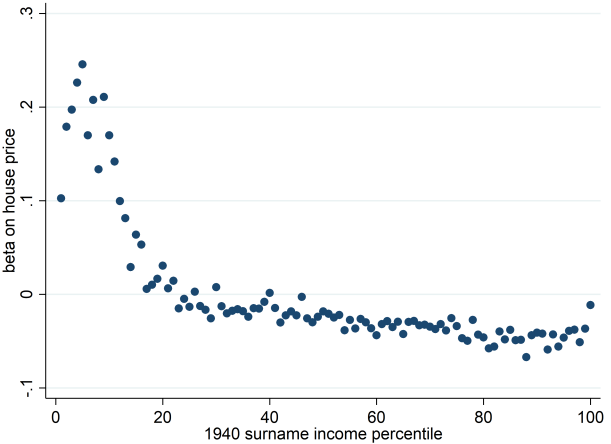


Estimating quantity-to-price elasticity

$$\log(q_{it}) = \beta_i \log(P_t) + \alpha_i + \alpha_t + \gamma_i t + \xi_{it}$$

- α_i: rich households always own more
- α_t: focus on share of total (vs. construction)
- γ_i: rent growth; secular trends in population/homeownership

LHS variation RHS variation



Conversion to returns vs. wealth levels

- What we have: Quantity-to-price elasticity β_i vs. "wealth proxy" using 1940 surname-level income

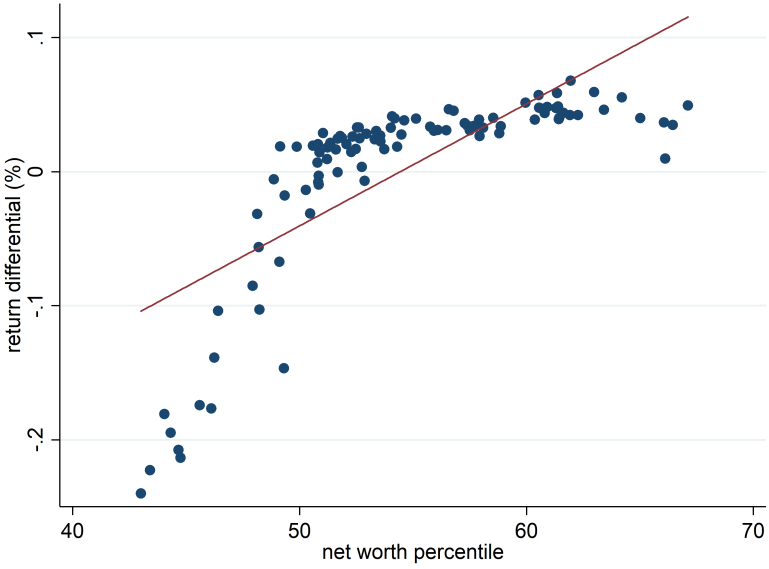
- **X-axis:** 1940 income
  $\longrightarrow$ surname-level home value in 2012-2013
  $\longrightarrow$ corresponding wealth percentile today

- **Y-axis:** Quantity-to-price elasticity
  $\longrightarrow$ implied portfolio returns

$$acov\left(\theta_{it}^k, \mu_t^k\right) \approx \underbrace{-b^k E\left(\mu_t^k\right) var\left(\log P_t^k\right)}_{\text{asset-market characteristics}} E\left(\theta_{it}^k\right) \underbrace{\frac{cov\left(\log Q_{it}^k, \log P_t^k\right)}{var\left(\log P_t^k\right)}}_{\text{relative elasticity}}$$

Step-by-step: X first arrow | X second arrow | Y first arrow

Headline estimate



- ~60 bp / year interquartile range
- cf. 1% in Fagereng et al. (2016)

Back-of-envelope

- Wealth share:

$$\frac{W_i}{W} \approx \left\{ 1 + \underbrace{E\left[\overline{dR}_{it} - \overline{dR}_t\right]}_{\text{return differential}} \underbrace{\frac{W}{Y}\frac{1}{1-c_y}}_{\text{labor income}} \right\} \frac{Y_i}{Y}$$

- Given estimated return differential
  - 8% higher wealth share than income share in IQR
  - Actual wealth-income share gap: 40%
  - $\approx$ fifth of residual wealth gap

Assumptions

Roadmap of Talk

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Additional Results and Implications

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Additional results in paper

- Overall relationship driven by between-race variation Racial decomposition
- Possible micro-foundations
- Comparison across US geographies Cross-section
  - More “buy high, sell low” by poorer households (elasticity) in more cyclical areas
  - Long-run implication: Higher wealth inequality (absolute & relative to income inequality) in more cyclical areas

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Conclusion

- **Question**
  - How does timing of trade affect wealth returns and wealth inequality?
- **Methodology**
  - Constructed panel data on real-estate ownership (deeds $\times$ surnames)
- **Result**
  - Poorer households buy high, sell low
  - Over the IQR of wealth distribution, 60-bp higher return per year
  - Driven by between-race
- **Suggestion for Policy**
  - Homeownership policy to build middle-class wealth
  - Timing matters

Roadmap of Talk

Extra slides

Geographical cross-section

References

Extra1

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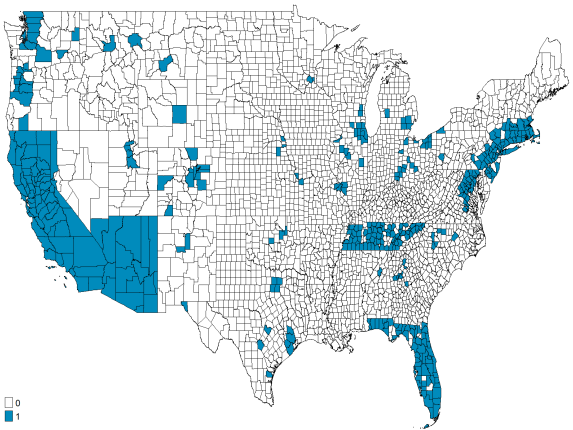
Sample of properties

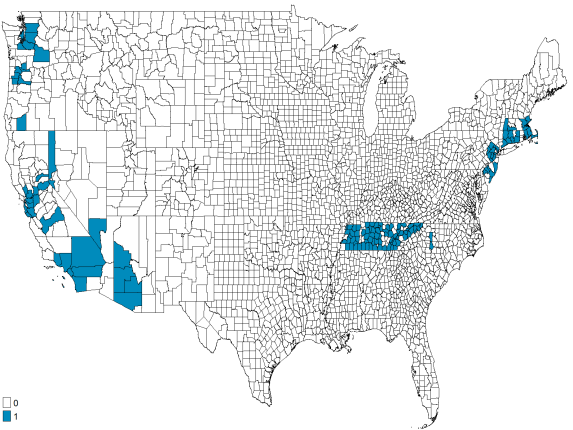
Back

1998-2013 sample



Covers 60% of US population

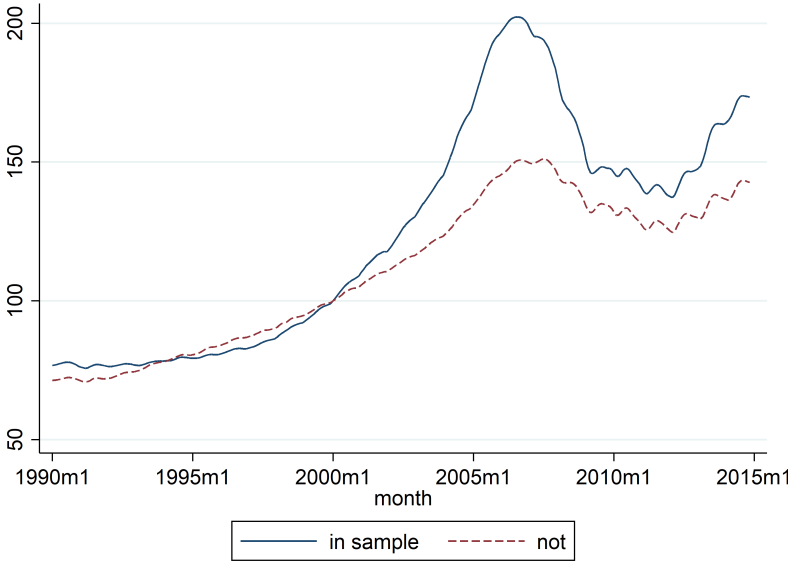
1988-2013 sample



Covers 21% of US population

Sample not representative (1998-2013)

Back



Focus on cyclical variation

Back

- Diff-in-diff, taking out linear trends

$$\log(q_{it}) = \alpha_i + \alpha_t + \gamma_i t + \varepsilon_{it}$$

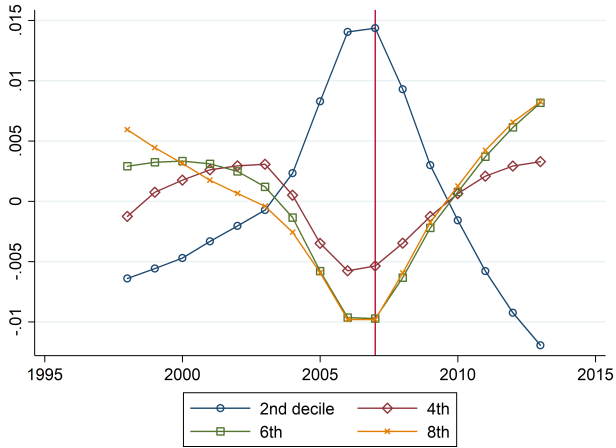
  - α_i: rich households always own more
  - α_t: focus on share of total (vs. construction)
  - γ_i
    - rent growth on price side
    - secular trends in population, inequality and homeownership on quantity side

- cf. Hoopes et al. (2016) Comparison

Log residuals

Back

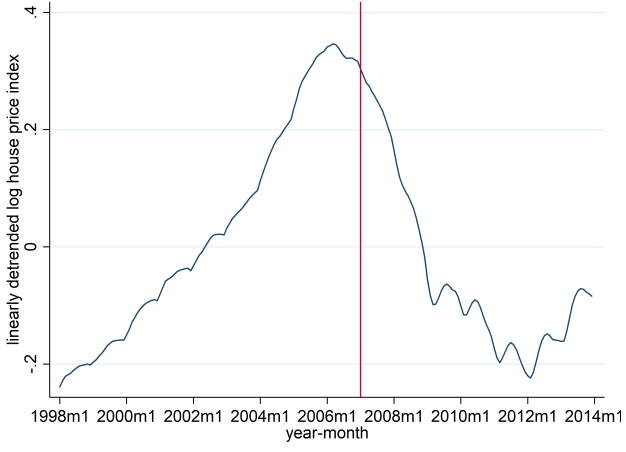
$$\log(q_{it}) = \alpha_i + \alpha_t + \gamma_i t + \varepsilon_{it}$$



House price index: CoreLogic

Back

$$\log(P_t) = \gamma_0 t + \varepsilon_t$$

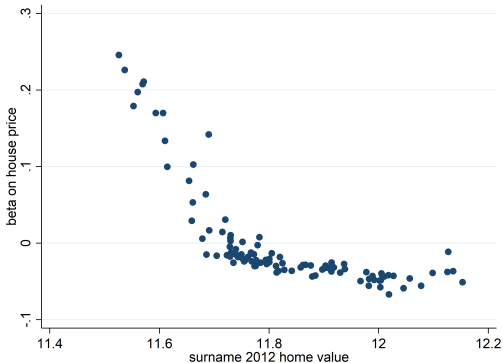


"Second stage" estimate

Back

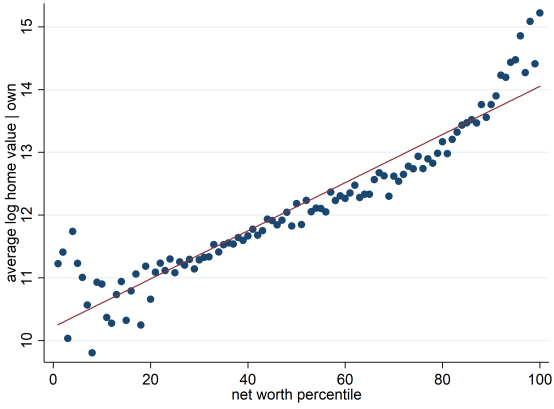
$$\beta_i = \frac{d \log (q_{it})}{d \log (P_t)} = -0.35 x_i + \varepsilon_i$$

$$x_i = Z_i \Gamma + \nu_i$$



From home value to wealth distribution (SCF 2013)

Back



$$E\left[\log \text{ home value} \mid \text{own}\right] = 0.026 \text{ percentile} + 10.408$$
$$= f\left(\text{percentile}\right)$$

"Second stage" against wealth percentile

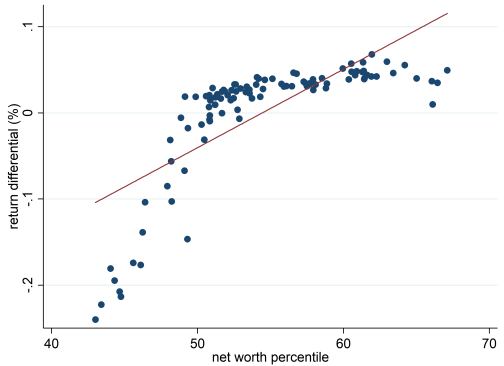
Back

$$\beta_i = -0.01 f^{-1}(x_i) + \varepsilon_i$$
$$x_i = Z_i \Gamma + \nu_i$$

Loading mapped to return

Back

$$g(\beta_i) = 0.012\, f^{-1}(x_i) + \varepsilon_i$$
$$x_i = Z_i\Gamma + \nu_i$$



where

$$g(\beta_i) \approx -b^k E\left(\mu_t^k\right) var\left(\log P_t^k\right) E\left(\theta_{it}^k\right) \beta_i$$

and estimates for national housing stock

$$\tilde{b}^k \approx 0.2$$
$$E\left(\mu_t^k\right) \approx 1.1$$
$$var\left(\log P_t^k\right) \approx (0.16)^2$$
$$\bar{\theta}_t^k \approx 1$$

Contribution to wealth inequality

Back

Additional assumptions

- Shut down consumption-savings margin

$$C_t = c_y Y_t + c_w W_t$$

  with APC $c_y \approx 0.25$ (from CEX)

- Aggregate income and wealth are co-integrated

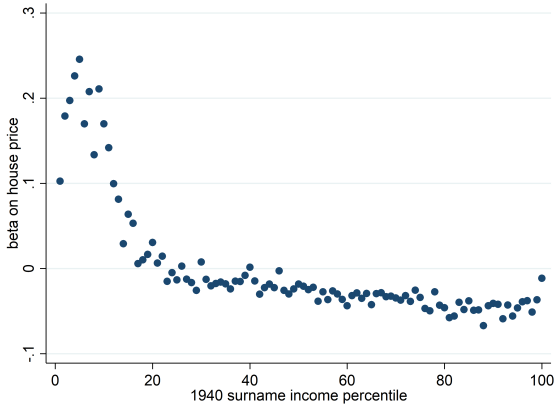
Wealth shares

$$E\left[\frac{Y_{it}}{W_{it}}\right] - E\left[\frac{Y_t}{W_t}\right] = -\frac{E\left[\overline{dR}_{it} - \overline{dR}_t\right]}{1 - c_y}$$

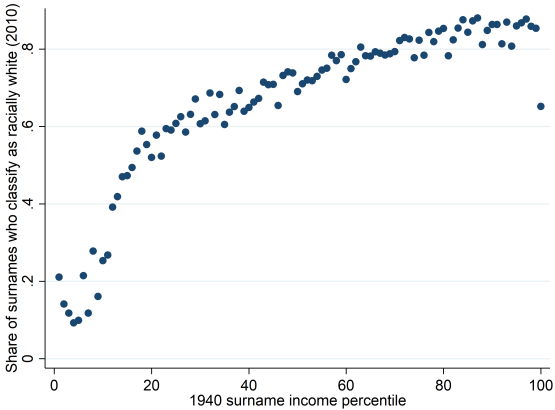
Decomposition by race

Back

Estimated betas



Racial share



Decomposition by race (1998-2013)

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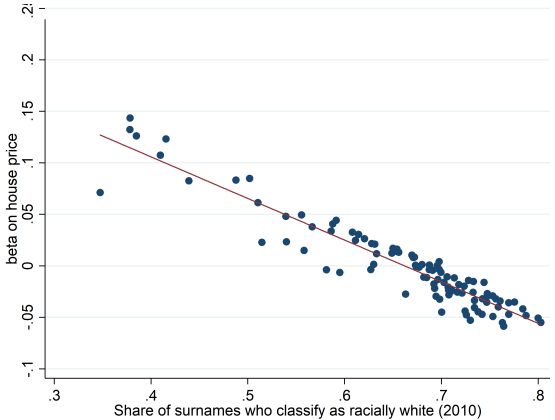
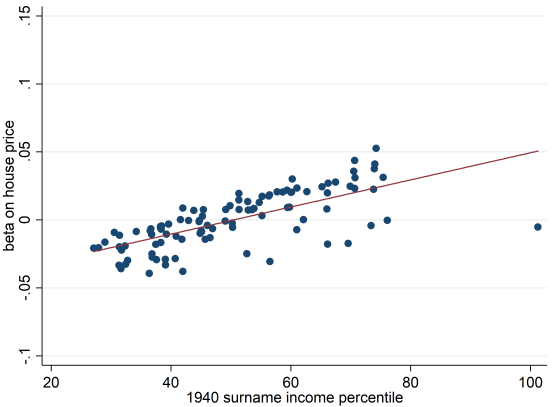
Beta vs. white share (residual)



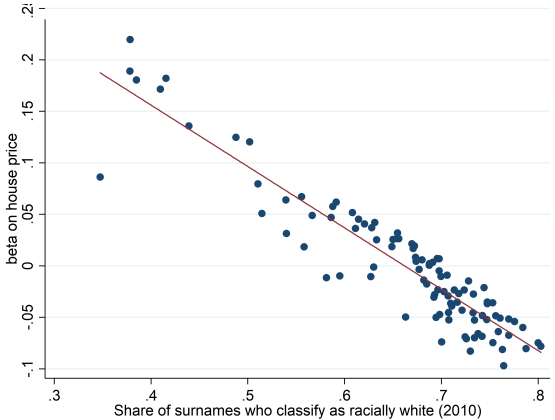
Beta vs. 1940 income (residual)



Decomposition by race (1988-2013)

Back

Beta vs. white share (residual)



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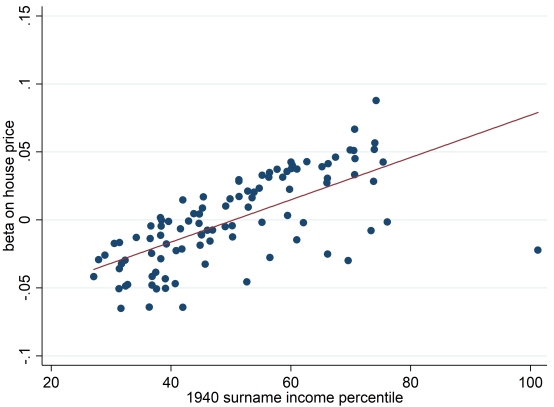
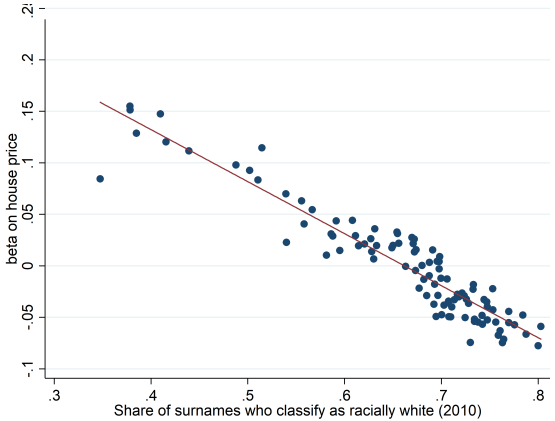


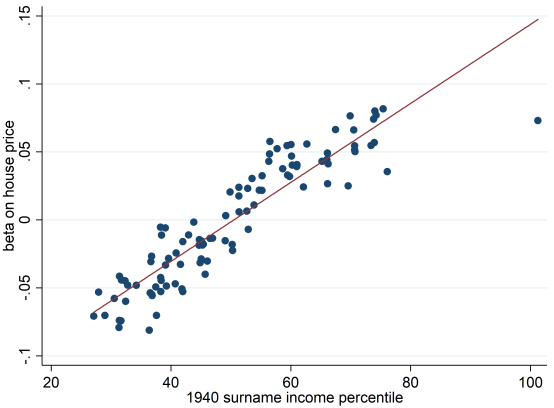
Decomposition by race (1988-2013 sample, subperiod 1988-2002)

Back

Beta vs. white share (residual)



Beta vs. 1940 income (residual)



Decomposition by race: One possibility

Back

- Multiple possibilities
  - Non-linearity
  - Government policy targeting racial minorities
- A new possibility: Counter-cyclical racial prejudice (Sakong (2018))
  - Counter-cyclical discrimination in credit & employment access (**?**)
  - More pro-cyclical asset purchase

Roadmap of Talk

Extra slides

Geographical cross-section

References

Back to broader implication

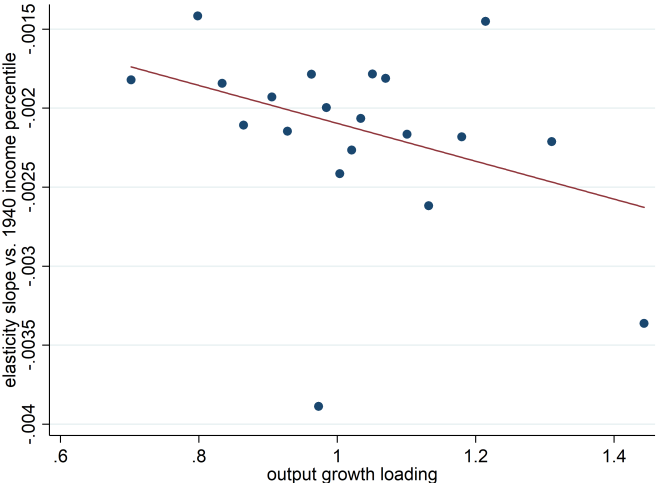
Back

- Expected returns more volatile $\longrightarrow$ trading at “wrong” times leads to larger relative losses
- Cross-sectional implication
  - Housing markets geographically segmented
  - Home bias in portfolio
  - Stickiness in residence
  - Elasticity lower?

Heterogeneity in elasticity

Back

$$\log q_{ict} = \tilde{\delta}_c \left(\log P_{ct} \times \text{1940 income percentile}_i\right) + \alpha_{ic} + \alpha_{ct} + \gamma_{ic} t + \xi_{ict}$$



Testing cross-sectional implication

Back

- Sort metro areas by historical output cyclicality 1969-2015 (predictor of expected-return volatility)

- More wealth inequality relative to income inequality?

- Issue: Measuring wealth inequality at the local level

Zip-code-level balance sheet

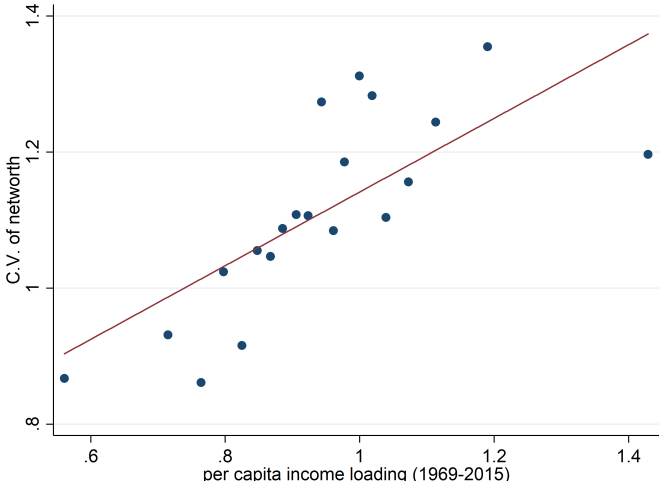
Back

- Construct zip-code-level balance sheet in 2012
  - Following Mian et al. (2013), Saez and Zucman (2016)
  - Financial cash flow (interest, dividend) from IRS SOI + capitalize
  - Real estate from CoreLogic assessor
  - Liability from Equifax
  - Wage income from IRS SOI
- Compute coefficient of variation between-zip-code, within-MSA

Wealth CV vs. cyclicality

Back

$$\text{CV}_m = \phi\pi_c + \gamma \text{wage CV}_m + \Gamma X_c + \varepsilon_c$$



Policy

Back

- Additional cost of business cycles
  - Stabilization policies are redistributive policies
- Homeownership policy to encourage middle-class wealth

Roadmap of Talk

Extra slides

Geographical cross-section

References

References

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