Flipping Houses in a Decentralized Market

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EEA Congress 2025

August 25, 2025

Motivation and question

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  - Concern about negative effects of flipping on affordability of housing
  - Flippers are intermediaries in a housing market

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Answer: Mean of price distribution $\downarrow$, trade $\uparrow$, welfare $\downarrow$

Policy: Should we regulate fast trade of houses? What are effects of taxing short term holding of 🏠 ? Countries Examples

Answer: Sales tax on flippers has negative effects on current non-homeowners

Literature:

- **Over-the-Counter** Intermediation via bilateral trade (with search) : Duffie, Gârleanu, and Pedersen 2005, Hugonnier, Lester, and Weill 2020 I take HH vs HH from this, Weill 2020, Lagos and Rocheteau 2009, Üslü 2019, Krainer and LeRoy 2002, Allen, Clark, and Houde 2019
- **This paper**: A model with two sided heterogeneity in valuation and inventory, and non trivial intermediation.
- **Housing**
  - **House flipping** : Bayer et al. 2020, Depken, Hollans, and Swidler 2009 , Lee and Choi 2011, Gavazza 2016 but rarely as intermediation in housing market
  - **Homeownership**: Acolin et al. 2016, Sodini et al. 2023, Anenberg and Ringo 2022
  - **Price distribution** : Piazzesi, Schneider, and Stroebel 2020, Rekkas, Wright, and Zhu 2020, R. Diamond and W. Diamond 2024, Head, Lloyd-Ellis, and Sun 2014, Üslü 2019
  - **Taxation of housing**: İmrohoroğlu, Matoba, and Tüzel 2018, Sommer and Sullivan 2018, Kopczuk and Munroe 2015
- **Contribution** : Quantifying effects, use universe of transaction data,

  New Comparative Statics: intermediation $\uparrow \iff$ the mass of intermediary $\uparrow$.

Details

Model

Description of the Game

- Measure 1 of households and a mass f of flippers. Measure s of houses

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- Measure 1 of households and a mass f of flippers. Measure s of houses
- Time is continuous, ∞ horizon, discount rate r.
- Households trade with other households and flippers quantity q of 🏠 (indivisible asset) for general good c .
- **Meeting opportunities**:
  - F vs HH (one-to-one) arrive at rate λ
  - HH vs HH (one-to-one) arrive at rate ρ
- **Terms of trade**
  - **Flipper** (acting as buyer or seller) proposes a price. TOLO.
  - **Inter-Households** trade: split the surplus $50:50$

DESCRIPTION OF THE GAME

- **Preferences**
  - Household **with** a 🏠 receives δ flow.
  - At rate γ, new δ is redrawn from uniform $G(\cdot)$.
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Detour: Frictionless Economy

Instantaneous trade occurs only due to γ shocks. Top s households own a 🏠. $\delta^* = 1 - s$ is the highest non owner.

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Stationary Equilibrium: Timing Strategies Equilibrium

- distributions: of households $dH(q, \delta), q \in \{0, 1\}, \delta \in [0, 1]$, flippers $F(0), F(1)$
- prices P_q and cutoffs $\delta_{1-q}^*(P_q)$ $q \in \{0, 1\}$
- Value functions: households $V(q, \delta)$, flippers $W(q)$

Flipper's problem

Buyer

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- Flipper takes cutoff δ_1^* as given when proposes P_0 Details
- Household sells 🏠 if $\delta \leq \delta_1^*(P_0)$. Mass is a endogenous meeting rate.
- Meetings have a.s. 0 chances to repeat $\Rightarrow$ **F** extracts all surplus of $\delta_1^*(P_0)$ HH.

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Seller

$$rW(1) = \max_{P_1} \lambda \int_{\delta_0^*(P_1)}^{1} dH(0,\delta)[P_1 + W(0) - W(1)]$$

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$$+ \underbrace{\rho\int_0^1 \max\{P(\delta',\delta) - \Delta V(\delta), 0\}dH(0,\delta')}_{\text{HH vs HH trade}}$$

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$$+ \underbrace{\rho\int_0^1 \max\{-P(\delta,\delta') + \Delta V(\delta), 0\}dH(1,\delta')}_{\textbf{HH vs HH trade}}$$ Details

Stationary distribution

$$\int_0^\delta dH(0,\delta) + \int_0^\delta dH(1,\delta) = G(\delta) = \delta \quad \forall \delta \in [0,1] \tag{1}$$

$$F(0) + F(1) = f \tag{2}$$

(3)

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Data

Data on Ireland 2010-2024

Flipped house in a data: bought and next sold within 2 years

1. Residential Property Registry - **full** tax data on transfer of residential property. Info about Details :
   - exact Date
   - Price
   - exact Address
     - used for: share of flipped transactions, average price, returns of flipping Returns
   - Work with **Average House Price**: hedonic regression on Location (City), Quarter Year Regression
2. Household Finance and Consumption Survey (HFCS) similar to Survey of Consumer Finances (SCF)
     - tenure type
     - when moved in
     - consumption
     - mortgage rates
   - used for calibration of : s, r and for average price, turnover Details

Summary Plots

Quantitative Results

ROADMAP

Estimate: f mass of flippers, ρ HH vs HH meeting rate, λ F vs HH meeting rate and γ preference shock.
Method: Minimum Distance Estimator
Moments:

- Share of flipped transactions Details
- Average price
- Return on flipping
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Roadmap

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Counterfactual exercises:

1. **2012 (baseline) vs 2021 (counterfactual):** Adjust f to match share of flipped.

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Counterfactual exercises:

1. **2012 (baseline) vs 2021 (counterfactual):** Adjust f to match share of flipped.
2. **Comparative analysis:** Adjust λ to induce equal flipper meeting rates and compare. **Difference with literature** they take $\lambda \to \infty$ Results
3. **Tax impact:** Examine the effect of a 9% sales tax on flipping. Results
4. **Increase in prices** Explained by change in r Results

Focus on insights from 1

Estimation to 2012 data

Parameter	Description	Value			
		Externally	**Source**		
r	Mortgage rate	3.62%	HFCS		
s	Homeownership rate	68.84%	HFCS		
		MDE	**Target**	**Model**	**Data**
f	mass of Flippers	2.1%	Fraction of flipped	4.81%	4.56%
ρ	Search HH vs HH	0.3	Average price	11.62	11.42
λ	Search F vs HH	3	Return on flipping	1.27	1.29
γ	Taste shock	7%	Tenure time	2.54%	5.59%

Untargeted

Household's Problem - Reservation values Details

$$\Delta V(\delta)\sigma(\delta) = \delta + \gamma \int_0^1 \Delta V(\delta')dG(\delta') + \lambda F(0)\Delta V(\delta_1)\mathbb{1}[\delta < \delta_1] + \lambda F(1)\Delta V(\delta_0)\mathbb{1}[\delta > \delta_0] +$$

$$+\frac{\rho}{2}\int_\delta^1 \Delta V(\delta')dH(0,\delta') + \frac{\rho}{2}\int_0^\delta \Delta V(\delta')dH(1,\delta')$$

where **endogenous discount rate**

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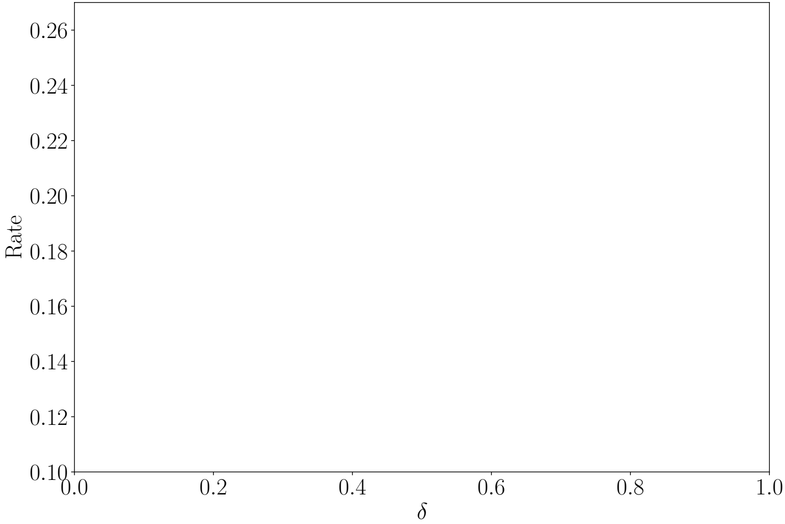
with envelope condition:

$$\sigma(\delta) = \frac{1}{\Delta V'(\delta)}$$

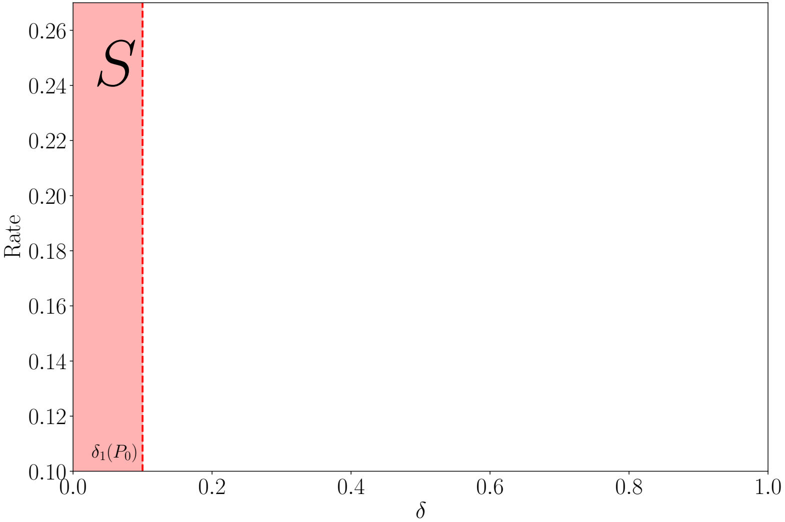
$\sigma(\delta)$ **captures main mechanism!**

illustration later

EXOGENOUS TYPES SPACE

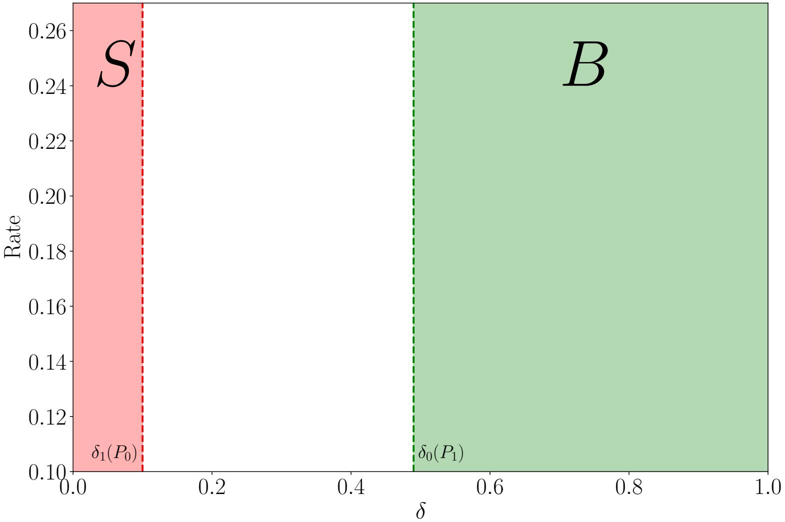


Trade with Flipper - Sellers



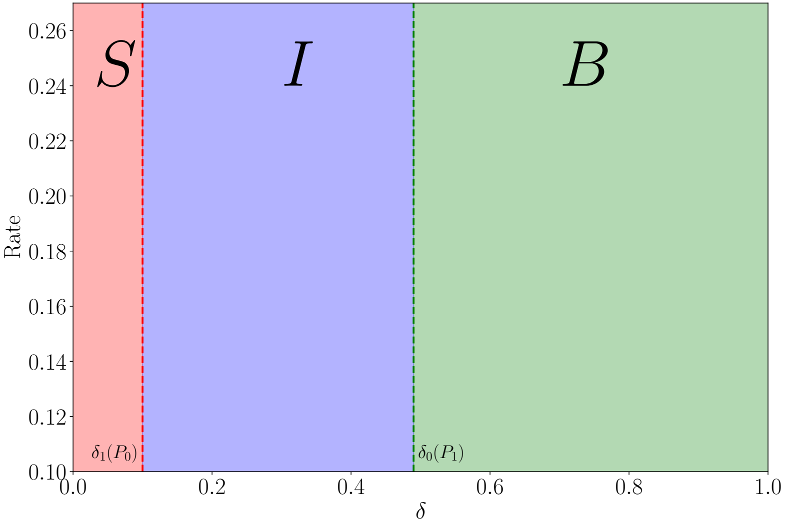
Homeowner with δ sells to flipper only when $\delta < \delta_1 \Rightarrow dH(1, \delta)$ low

Trade with Flipper - Buyers



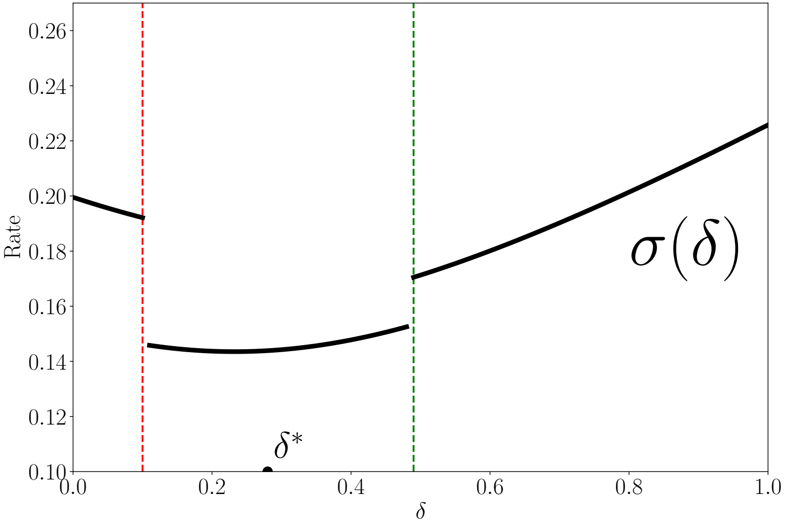
Non-Homeowner with δ buys from flipper only when $\delta > \delta_0 \Rightarrow dH(0,\delta)$ low

Trade with Flipper



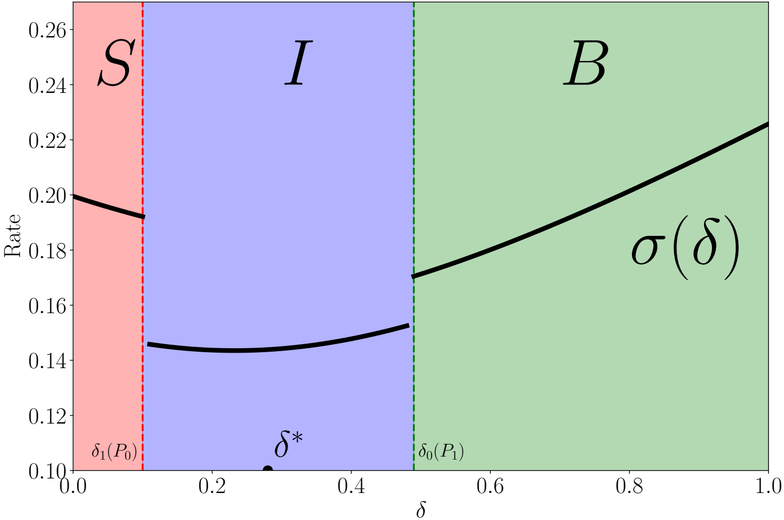
All trade with flippers from extreme types

Household vs Household Trade



Households around δ^* trade the most but trade at low speed $\Rightarrow$ mean price $\approx \Delta V(\delta^*)$

Together



Extreme types ⇒ trade with flipper

Moderate types ⇒ concentration of HH vs HH trade

Main Counterfactual: Intermediation

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Key Insight:

1. Negative **price spillovers** more competition

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1. Negative **price spillovers** more competition
2. **Trade Volume** $\uparrow$, but F crowd out HH vs HH trade
3. **Welfare of Households** $\downarrow$ main effect: homeowners distr FOSC $\downarrow$ + 🏠 is a valuable asset

Prices and Quantities

Variable	% Change
Mean Price	-1.51
Var Price	-0.31
HH Trade	-7.95
Total Trade	5.16
Return	0.99
Turnover	5.16

As **flipping** activity $\uparrow \Rightarrow$ Mean **price** $\downarrow$

Decomposition

Welfare changes

Variable	% Change
Welfare pc	
Households	-0.20
Homeowners	0.34
Non-Homeowners	3.02
Flipper	-23.43

As **flipping** activity $\uparrow \Rightarrow$ **Household Consumption** $\downarrow$

Additional moments

Robustness

- Alternative definitions of flipping: $1, 2, 4$ years between trades Time series Plot pdf Results
- Role of distribution of types : vary distribution of types $G(\cdot)$ Prices
- Information structure: type δ is public Prices Welfare
- Validation Comparison

Conclusion

I develop a model of decentralized trade with an intermediary. The search is random, the types are heterogeneous, and the information is asymmetric.

- I bring housing asset to OTC-search theoretic literature and quantified trade-off.
- I endogenized middleman's asset holding and allowed for asymmetry of information.
- I developed algorithm for cutoff equilibrium with continuous time methods.
- To study intermediation $\uparrow \iff$ the mass of intermediary $\uparrow$.

I use the universe of house transaction data in Ireland and document empirical moments.
house price $\uparrow$ 46%, trade volume $\uparrow$ 135%, between 2012 and 2021
I identify flippers $\approx$ double between 2012 and 2021
I quantify the effects of intermediation. negative price spillover, trade $\uparrow$, welfare $\downarrow$.
I assess effects of tax on flipping current non-owners welfare $\downarrow$.
Robustness : vary holding time of asset results are consistent., distribution of types, information structure

Literature

My results suggests that there are non trivial costs of *intermediation*

Thank you

Appendix

Taxing flipping around the globe

- Germany : 10 years, 14-45%
- Canada : 1 year, 15-33%
- Singapour : 3 years, 12%
- Hong Kong : 3 years 20%

Back

What I do and what I find

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- I bring housing asset.
- I endogenize middleman's asset holding.
- **New CS:** intermediation $\uparrow \iff$ the mass of intermediary $\uparrow$.

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- Unique nationwide coverage.
- $\approx$ double between 2012 and 2021.

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I quantify the effects of intermediation. Negative price spillover, trade $\uparrow$, welfare $\downarrow$.
I assess effects of tax on flipping current non-owners welfare $\downarrow$.

Robustness. Vary: holding time of asset - consistent results., distribution of types, information structure.

Literature

Flippers offers in Polish mailboxes

Back

TIMING

Morning t**:** Household (q, δ) with asset position $q \in \{0, 1\}$ and type $\delta \in [0, 1]$. Then:

1. At rate λ trade opportunity with *a* flipper arrives (γ, λ, ρ IID, exponential).
2. Flipper with $1 - q$ 🏠 offers a price P_{1-q}
3. Household A/R price offers.
4. Given price P_{1-q} indifferent type : $\delta_q^*(P_{1-q})$
5. At rate ρ household meets another household. When trade happens they split surplus $50 : 50$ with price $P(\cdot, \cdot)$
6. γ shock to type arrives
7. Payoffs are realized: prices are paid, flow is paid $q\delta\Delta$,
8. **evening:** discount with $e^{-r\Delta}$
9. Move to $t + \Delta$

◂ Back

PRICES AND CUTOFFS ◂ BACK

Define **reservation value**:

$$\Delta V(\delta) := V(1, \delta) - V(0, \delta)$$

Prices and Cutoffs ◂ Back

Define **reservation value**:

$$\Delta V(\delta) := V(1,\delta) - V(0,\delta)$$

- Household (q,δ) meets flipper with $1-q$ houses $\Rightarrow$ price offer P_{1-q} $\Rightarrow$ A or R
- Cutoff $\delta_q^*(P_{1-q})$ **marginal** indifferent household type

Prices with flippers : extract all surplus of marginal agent:

$$P_0 = \Delta V(\delta_1^*(P_0))$$

$$P_1 = \Delta V(\delta_0^*(P_1))$$

Prices between buyer δ and seller δ' , s.t. $\delta > \delta'$

$$P(\delta,\delta') = \frac{1}{2}\Delta V(\delta) + \frac{1}{2}\Delta V(\delta')$$

Symmetric, Stationary Markov Perfect Equilibrium with cutoffs consists of:

Proof of existence $\rho = 0$

Definition

1. distributions : $H : (q, \delta) \to \mathbb{R}$, $F : (q) \to \mathbb{R}$
2. value functions $V : (q, \delta; P_{1-q}) \to \mathbb{R}$, $W : (q; \delta^*_{1-q}) \to \mathbb{R}$
3. decision rules: cuttoffs $\delta^*_q : (P_{1-q}) \to \mathbb{R}, q \in \{0, 1\}$, prices $P_q \in \mathbb{R}_+, q \in \{0, 1\}$ and $P(\delta, \delta') \in \mathbb{R}_+$

- Given prices $P.$: value functions V, cutoffs $\delta^*_.$ solve household problem (given by HJB equation)
- Given cutoffs $\delta^*_.$: value functions W and prices $P.$ solve flipper problem (given by HJB equations)
- Low of motions hold
- Accounting hold

Back

Proof of existence. $\rho = 0$ case.

1. define operator $\mathbb{H}(D)$ mapping from cutoffs to stationary distributions,
2. define $\mathbb{V}(H, D)$ mapping from distributions and cutoffs to value functions,
3. defines $\mathbb{D}(V, H, D)$ mapping from value functions, distributions, and cutoffs to set of cutoffs.

Equilibrium is a fixed point D of operator $\mathbb{T} : [0,1]^2 \to [0,1]^2$

$$D = \mathbb{T}(D) = \mathbb{D}(\mathbb{V}(\mathbb{H}(D), D), \mathbb{H}(D), D)$$

◂ Back

$\rho = 0$ CASE. PROPERTIES.

- **Distributions**. Assume $f < s$ for given δ_q^* explicit formula for $dH(q, \delta)$, implicit for $F(q)$. $dH(q, \delta), F(q)$ are monotone in $\delta_1(P_0), \delta_0(P_1)$

- **Value functions**. Show that $\Delta V(\delta)$ is strictly increasing and bounded. Use Blackwell conditions - linear in δ and *nice* continuation values. Use Blackwell to find $V(q, \delta)$. *nice* expressions for $W(q)$. Prices from $\Delta V(\delta)$. $V(q, \cdot), W(q)$ are monotone in $\delta_1(P_0), \delta_0(P_1), F(q), dH(q, \cdot)$

- **Cutoffs**. Use HH problem to derive recursion on δ_q^*. Linearity kicks in. Use Lebesgue theorem to bound . Second order polynomial in δ_q^*. $\delta_1(P_0) < \delta_0(P_1)$, $P_1 - P_0 = \frac{\delta_0(P_1) - \delta_1(P_0)}{r+\gamma} = \frac{\bar{\delta}}{2(r+\gamma)}$

◂ Back

Flipper's problem - price setting

$$\underbrace{\int_0^{\delta_1^*(P_0)} dH(1,\delta)}_{\text{MB to } F(0) \text{from paying more}} = \underbrace{[-P_0 + W(1) - W(0)] \cdot \delta_1'^*(P_0) \cdot dH(1, \delta_1^*(P_0))}_{\text{MC of } F(0) \text{from higher price offer}}$$

- Perturbate price: $P_0 + \varepsilon$, $\varepsilon \to 0$
- Attracts more sellers, trade is more frequent **but** affects cutoff and pays more

◂ Back

Flippper's pb

Flippers value functions can be written as:

$$W(1) = \frac{\lambda}{r} \frac{[H(0,1) - H(0,\delta_0)]^2}{\sigma(\delta_0) dH(0,\delta_0)}$$

$$W(0) = \frac{\lambda}{r} \frac{H(1,\delta_1)^2}{\sigma(\delta_1) dH(1,\delta_1)}$$

$$\sigma(\delta_0)^{-1} = r + \gamma + \frac{\rho}{2}[H(0,1) - H(0,\delta_0)] + \frac{\rho}{2} dH(1,\delta_0)$$

$$\sigma(\delta_1)^{-1} = r + \gamma + \frac{\rho}{2}[H(0,1) - H(0,\delta_1)] + \frac{\rho}{2} H(1,\delta_1)$$

Back

Household's problem becomes

Seller:

$$rV(1,\delta) = \delta + \gamma \int_0^1 [V(1,\delta') - V(1,\delta)]dG(\delta') + \underbrace{\lambda F(0) \cdot \mathbb{1}[\delta < \delta_1(P_0)][P_0 - \Delta V(\delta)]}_{\textbf{HH vs F trade}}$$

$$+ \underbrace{\rho \int_\delta^1 \frac{1}{2}[\Delta V(\delta') - \Delta V(\delta)]dH(0,\delta')}_{\textbf{HH vs HH trade}}$$

Buyer:

$$rV(0,\delta) = \gamma \int_0^1 [V(0,\delta') - V(0,\delta)]dG(\delta') + \underbrace{\lambda F(1) \cdot \mathbb{1}[\delta > \delta_0(P_1)][-P_1 + \Delta V(\delta)]}_{\textbf{HH vs F trade}}$$

$$+ \underbrace{\rho \int_0^\delta \frac{1}{2}[\Delta V(\delta) - \Delta V(\delta')]dH(1,\delta')}_{\textbf{HH vs HH trade}}$$

Back

Data

- Residential Property Registry administrative data from Ireland on all transactions of residential property between 2010 and 2023
- 640k transactions for 5 mln country, +500k unique homes
  - 81% 🏠 traded only once
  - 5.9% 🏠 flipped
  - 13.1% 🏠 traded multiple times but not flipped
- info about
  - exact Date
  - Price (in EUR)
  - exact Address
- no information on buyer or seller, nor on quality ...
- In order to obtain **Average house price** distribution run log prices on location (city) and quarter$\times$ year fixed effects.

◂ Back

Table: Regression Results with Different Fixed Effects

	(1)	(2)	(3)	(4)	(5)
Location FE	**County**	**City**	**District**	**City**	**District**
Quarter-Year FE	$\times$	$\times$	$\times$	✓	✓
Constant	12.16***	12.16***	12.19***	12.16***	12.18***
	(0.0008)	(0.0008)	(0.0007)	(0.0008)	(0.0007)
Observations	638,751	638,751	561,010	629,920	532,097
R-squared	0.273	0.378	0.550	0.426	0.566

Standard errors in parentheses. *** $p<0.01$, ** $p<0.05$, * $p<0.1$

I use City $\times$ Quarter-Year Fixed Effects

Table: Variation Explained by Observables

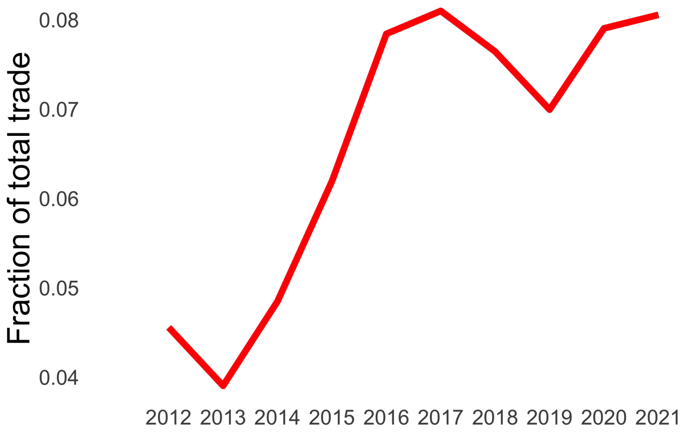
Fixed Effects	R^2
County	0.27
City	0.36
District	0.50
City, Quarter-Year	0.42
District, Quarter-Year	0.57

Note: The table presents the R^2 values from hedonic regressions of log prices on various spatial and time-fixed effects. The city and quarter-year fixed effects specification captures 42% of the price variation, highlighting significant unobserved heterogeneity in household valuations beyond geographic and time-specific factors.

I use City $\times$ Quarter-Year Fixed Effects

◂ Back

Fraction of flipped Ireland



Back Back Intro

HISTOGRAMS

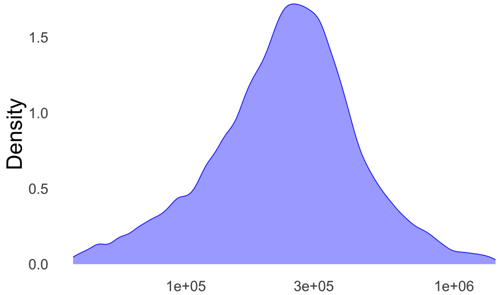


Figure: Raw data

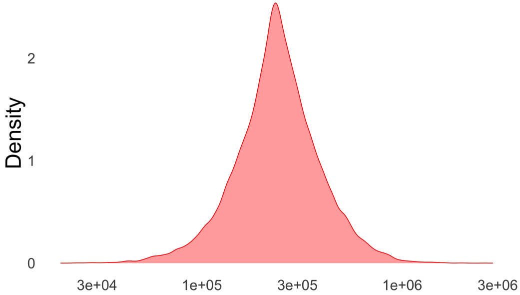
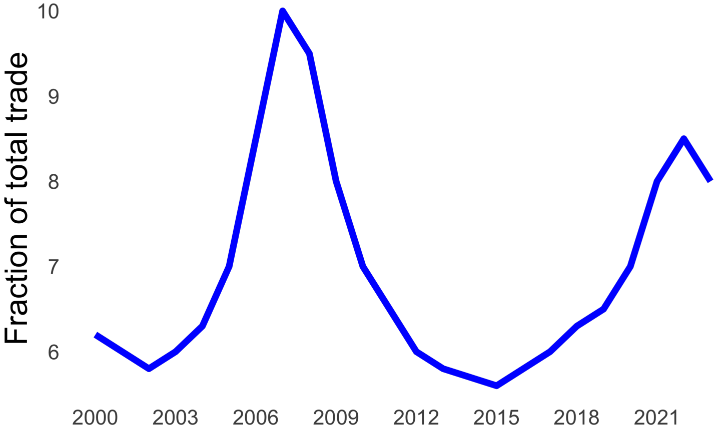


Figure: Average House - City, Quarter×Year FE

Back

Fraction of flipped USA



◂ Back Intro

Mean Returns ◂ Back

Table: Gross returns

Year	Retraded < 2y	Retraded ≥ 2y	Overall
2012	1.29	0.93	1.22
2013	1.28	0.97	1.18
2014	1.47	1.00	1.29
2015	1.55	1.11	1.42
2016	1.45	1.16	1.36
2017	1.45	1.14	1.30
2018	1.38	1.15	1.25
2019	1.33	1.12	1.19
2020	1.27	1.10	1.15
2021	1.32	1.10	1.15

Note: Annualized gross returns for multiply traded houses in Ireland, categorized by flips (re-traded within 2 years), trades that took over 2 years, and the overall sample. The returns are averaged based on the year of the second trade. Flipped properties consistently show higher annualized returns compared to houses

HFCS HOUSEHOLD SURVEY DATA

Variable	Moment	2012 Value	2021 Value
Homeownership	Fraction	68.84	69.05
Mortgage Rate	Net Rate	3.62	2.47
Consumption	Mean	17,000	19,000
Live in House	Mean years	17.88	17.28
Home Value	Mean	190,000	316,000
Other Property	Mean	391,000	448,000
Wealth	Mean	216,000	370,000
Size of House	Mean sqm	111	129
Home Price at Acquisition	Mean	157,000	176,000
Current Home Value	Mean	192,000	316,000
Nr of Mortgages on hmr	Mean	1.52	1.56
Nr of Properties	Mean	1.77	1.80
Income	Mean	55,000	71,000

Back

SUMMARY

Flipped house bought and next sold within 2 years

1. Number of flipped transactions out total volume of transactions was 4.55% in 2012 and 8.05% in 2021
2. Real house prices grew by 76%, average house price grew by 68% and by 47% in annual consumption expenditure units
3. Observables explain 40% of variation of house prices
4. Mortgage rates decreased from 3.62% in 2012 to 2.47% in 2021
5. Total trade volume of trade increased by 135%
6. There is negative correlation between prices and level of intermediation
7. Average gross return on flipped houses increased from 1.29 to 1.32. And are higher than on other multiply traded houses in sample

◂ Back

HOUSE QUALITY DATA ON ENERGY CERTIFICATION

- Source: Sustainable Energy Authority of Ireland (equivalent of EPA)
- County (equivalent of US state) level data on house energy efficiency certification
- Costly certification (120 EUR, 1.5h) mandatory for selling a house
- 1.117 mln issued for whole Ireland 2010-2024
- detailed physical characteristics of a house
- Data contains:
  - daily Date of inspection
  - Date of construction
  - square footage (whole and each room and roof)
  - number of doors, windows
  - emission of energy and CO2 per sq m
- **Problems**: no matching with transaction data
- However can used for estimation of λ in quantifying toy model using flow equations

Findings Reminder - (log non residual real prices)

- Flipped 🏠 constitutes a quarter of all houses traded multiple times
- Fraction of flipped 🏠 and house prices both doubled in Ireland between 2012 and 2021
- Evidence from time series
  1. **Prices** mean and variance $\uparrow$
  2. **Returns of sellers** mean and variance $\downarrow$
- Evidence from cross section (wrt fraction of flippers)
  1. **Prices** mean and variance $\downarrow$
  2. **Returns of sellers** mean and variance $\uparrow$
- Flipped houses are cheaper and have lower standard deviation
- Some evidence on linear relationship between transactions and potential sellers across locations and time

◂ Back

Evidence from time series

1. **Price** mean and standard deviation is increasing in time
2. Flipped houses have lower mean and standard deviation than non retraded or traded after 2 years houses
3. **Returns of sellers** mean and standard deviation are decreasing with time
4. Flipped houses have higher mean and standard deviation of return

Back

(Year, County) observations

1. **Price** Means and standard deviations are decreasing in fraction of flipped houses
2. **Returns of a seller** Means and standard deviations are increasing in fraction of flipped houses
3. **Important moment**:Variance of prices decreasing in fraction of flippers

◂ Back

Share of flipped

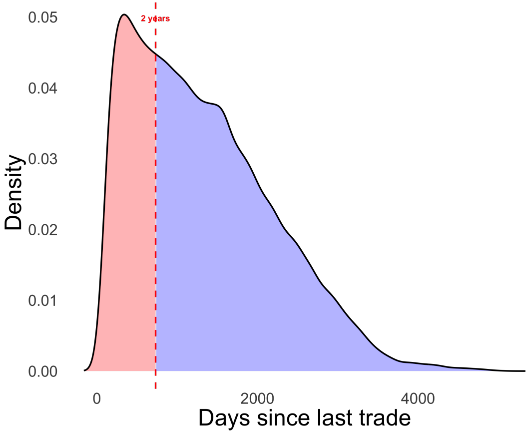


Figure: Data

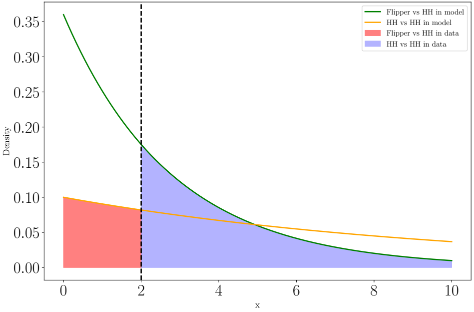


Figure: Model

Back

Experiment: Vary meeting rate instead of f

Comparative statics exerecise in OTC literature:

To study intermediation vary meeting rate λ

Experiment:

Consider change in λ equivalent to keep overall endogenous meeting rates with flipper $\lambda F(0), \lambda F(1)$ at the same level as in previous exercise.

Key Insight:

Increase in flippers welfare is unlikely big

Results ◂ Back

Variable	% Change	
	Change in f	Change in λ
Mean Price	-1.51	-1.47
Var Price	-0.31	-3.54
Flipper Share	67.42	279.04
HH Trade	-7.95	-13.56
Total Trade	5.16	6.67
Return	0.99	1.39
Turnover	5.16	6.67
Welfare pc		
Total	-2.44	1.34
Households	-0.20	0.17
Homeowners	0.34	0.43
Non-Homeowners	3.02	2.49
Flipper	-23.43	147.15

Policy Experiment: 9% Sales Tax on Flipping

Pre-2011 Policy in Ireland:

9% tax on non-household main residence sales.

Experiment:

Compare no tax (baseline) to $\tau = 0.09$ (counterfactual).

Key Insight:

Most of flipping activity evaporates, leaving non-owners with substantial losses.

Results ◂ Back

Table: Effects of Sales Tax on Flipping $\tau = 0.09$

Variable	**% Change**
Mean Price	8.89
Var Price	4.16
Flipper Share	-65.37
HH Trade	4.57
Total Trade	-4.20
Return	2.40
Turnover	-4.20
Welfare pc	
Total	-0.49
Households	0.03
Homeowners	-0.27
Non-Homeowners	-2.17
Flipper	-64.76

Can model explain growth of prices between 2012 and 2022? ◂ Back

	s, γ, λ, ρ **at 2012**					
	r, f **2012**		f **2012,** r **2021**		r, f **2021**	
	Data 2012	**Model**	**Data 2021**	**Model**	**Data 2021**	**Model**
Fraction of Flipped	4.56%	4.81%	8.05%	4.97%	8.05%	8.28%
Average Price	11.42	11.62	16.78	16.83	16.78	16.66
Return on Flipping	1.29	1.27	1.32	1.19	1.32	1.20
Turnover	5.59%	2.54%	5.79%	2.54%	5.79%	2.69%

Note: Externally calibrate r to 2012 from data, estimate f to 2012, 2021 (keeping r at 2012), use r from 2021 data without reestimating the model.

Model fit - trade-update

	Data	Model
	2012	
Total trade	1.274	1.298
Flipper trade	0.058	0.062
	2021	
Total trade	2.410	1.243
Flipper trade	0.183	0.103

Note: In second part of table f comes from counterfactual (with r at 2012 level) and r was adjusted to 2021 level, no reestimation of model otherwise

◂ Back

Model fit - regression

Simulate model and use price data for 2012 and run regression of prices on dummy flipper variable for transactions in which trade happened with flipper:

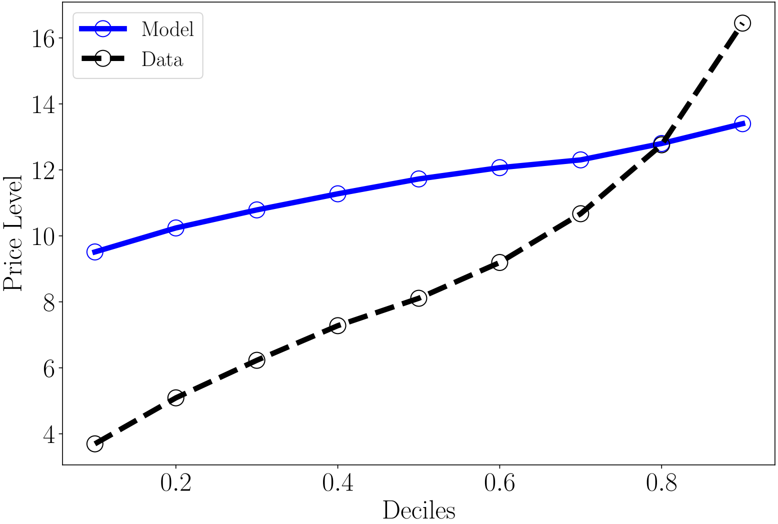
$$P_i = \alpha + \beta F_i$$

	Data	**Model**
β	-0.21	-0.29
Fixed effects	✓	
Consumption adjusted	✓	

Note: β was calculated in simulation for $T = 100$ $dt = 0.1$ and $N = 10,000$ agents. Sample in empirical regression $25,000$

◂ Back

Model vs Data: Price distribution



Key Observations

1. Non-monotonicity in Discount Factor

- Endogenous discount rate creates a non-monotonic relationship with non differentiability at cutoffs.

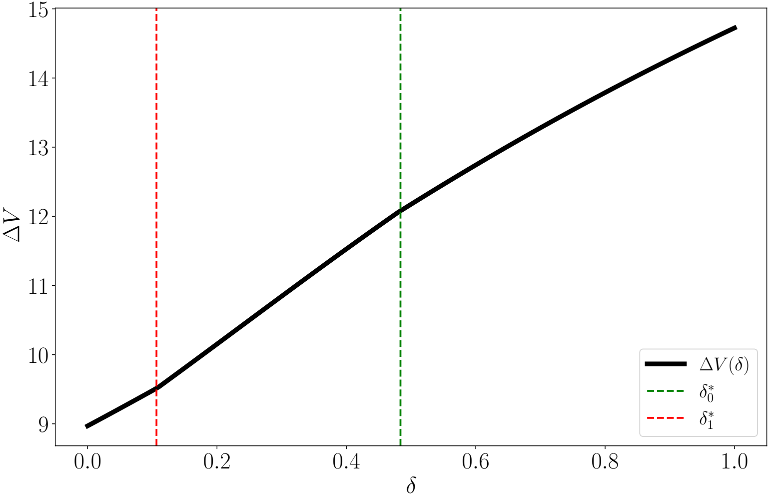
2. Reservation Value

- Initially convex, then concave as δ changes.

3. Frictionless Marginal Type δ^*

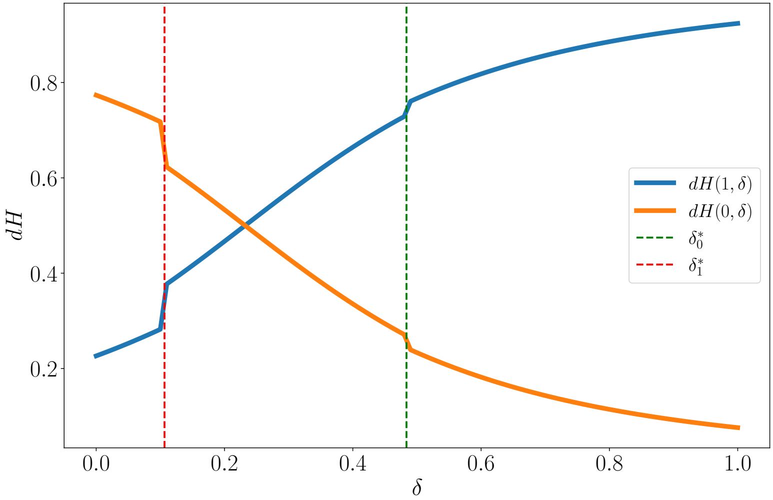
- δ^* type drives the majority of trade volume.

Reservation Value $\Delta V(\delta)$



ΔV strictly increasing, convex-concave, non differentiable at cutoffs Back

PROBABILITY DISTRIBUTIONS OF HOUSEHOLDS



Owners have high types more likely Back

Endogenous meeting rates

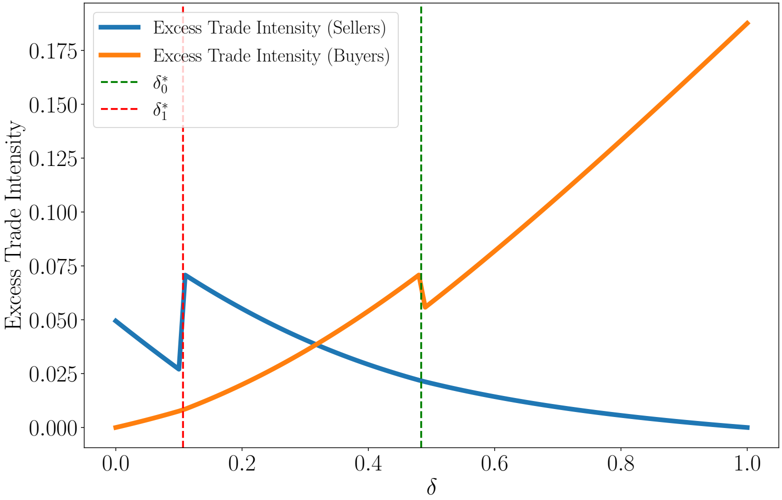
Keep in mind that meeting rates λ and ρ are parameters for 1-1 meetings

For each δ household there is endogenous meeting rate

What are endogenous contact rates for each (δ, q) household?

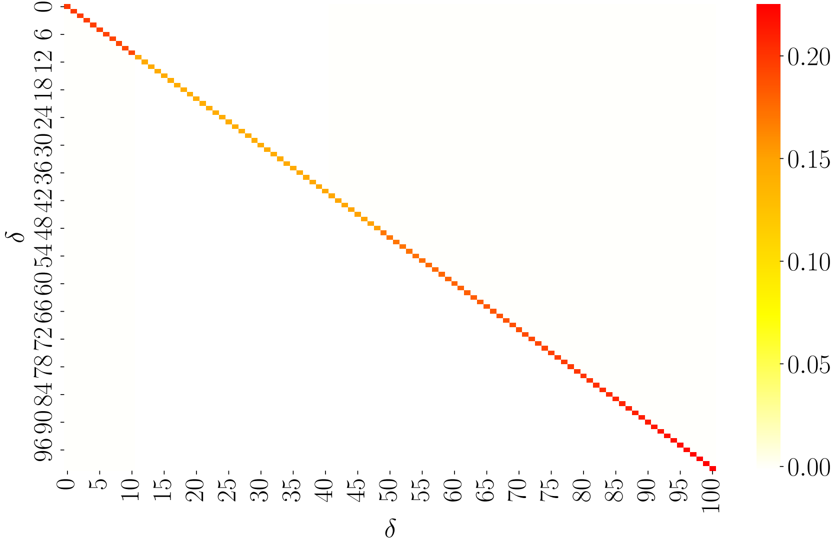
What is the excess rate at which they meet households vs flippers Back

Excess Rate of Meeting: Household vs Flipper



Flipper's contact rates: 0.48 (buyer), 0.11 (seller) Back

Σ Matrix



Back

A Detour: Frictionless Economy

Instantaneous Trade:

Trade occurs only due to γ shocks. Top s households hold a 🏠, while the rest and all flippers remain non-owners.

Frictionless Equilibrium:

In equilibrium, there exists a single price P^*:

$$P^* = \frac{\delta^*}{r} = \frac{1-s}{r}$$

Trade volume:

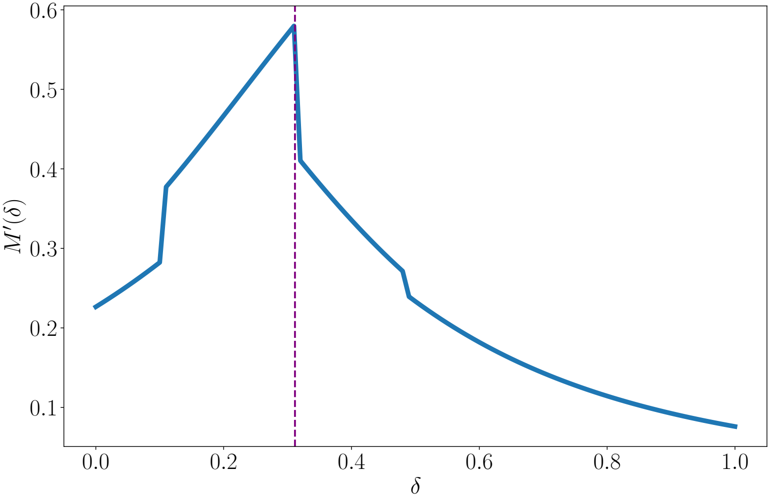
$$\gamma s G(\delta^*) = \gamma s(1-s)$$

Misallocation:

Assets are misallocated if a household has the 'wrong' asset position compared to the frictionless case:

$$M(\delta) = \int_0^{\delta} \mathbb{1}\{\delta' < \delta^*\} dH(1, \delta') + \int_0^{\delta} \mathbb{1}\{\delta' > \delta^*\} dH(0, \delta')$$

MISALLOCATION DENSITY $M'(\delta)$



- Extreme δ agents have high chance of meeting counterparty- they trade fast
- Near δ^* types account for frequent trade
- Those are types with highest misallocation at margin

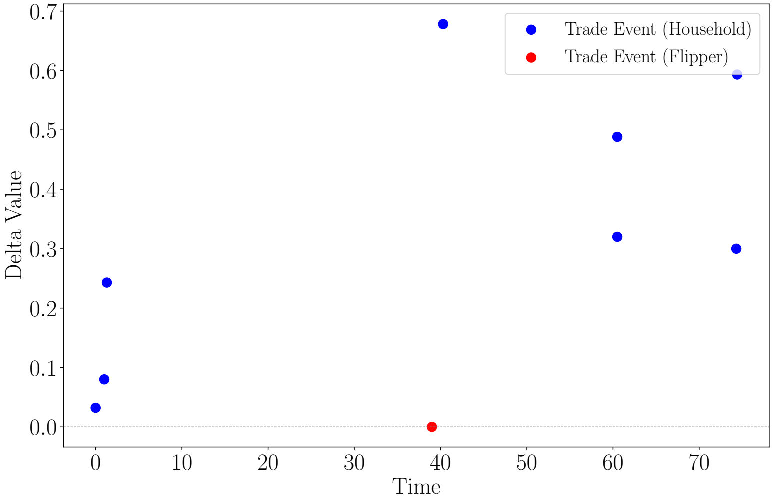
Simulation

Simulate model:
Draw $N = 1000$ δ agents and simulate for $T = 100$ periods with discretized step $dt = 0.1$.

Analyze ownership:
Observe the average δ of owners and non-owners over time.

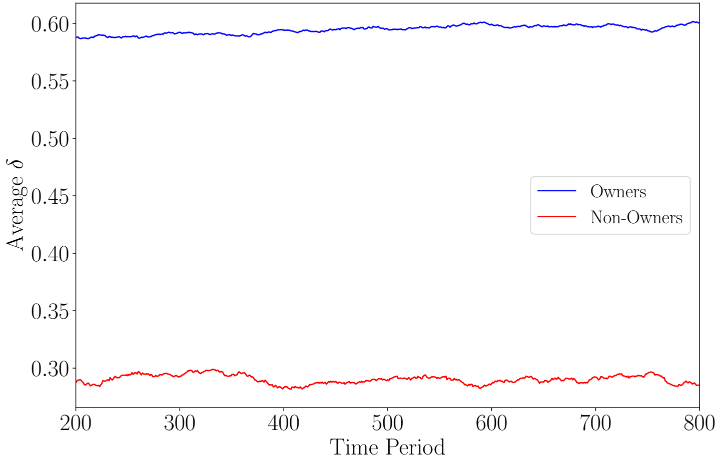
Event study:
Examine the behavior of the seller around the time of the transaction.

Type of owner of house nr 5 ◂ Back



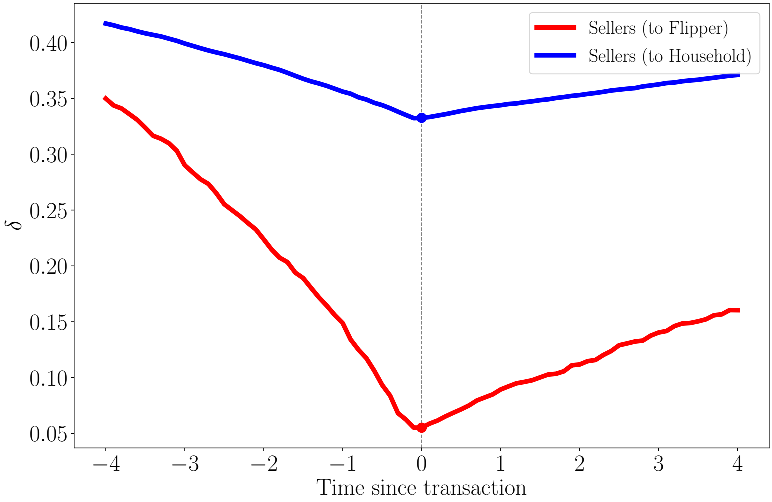
- Simulation allows to track history of owner type δ
- Is there a ladder?
- House moves only to higher type household until it's traded to flipper
- Then ladder restarts

Owner and Non-Owner Behavior ◂ Back



- 🏠 moves to higher δ agent
- But eventually traded with flipper
- $\Rightarrow$ Lack of ladder behavior

EVENT STUDY ◂ BACK



- Three types of shock γ, λ, ρ
- Who is the seller? Unlucky agent
- More extreme types sell to flipper
- Mean reversion after

Decomposition ◂ Back

	PE	GE Prices	GE HH distribution	Counterfactual
Mean Price	-0.00	0.00	0.31	-1.82
HH Trade	0.00	0.00	-7.95	0.00
Total Trade	-0.27	0.00	-6.82	12.24
Return	0.00	0.99	0.00	0.00
Turnover	-0.27	0.00	-6.82	12.24
Welfare HH pc	0.01	0.00	-0.38	0.17

- For $\rho = 0$ proof that if $f \uparrow$: $\delta_0(P_1), \delta_0(P_1) \downarrow \Rightarrow P_1, P_0 \downarrow$
- For $\rho = 0$ quantitative result $\lambda \uparrow$: $\delta_0(P_1), \delta_0(P_1) \uparrow \Rightarrow P_1, P_0 \uparrow$

ADDITIONAL MOMENTS ◂ BACK

Trade volume

$$\kappa = \underbrace{\rho \int_0^1 \int_0^1 \mathbb{1}[\delta' \geq \delta] dH(0,\delta) dH(1,\delta)}_{\kappa_1} + \underbrace{2\lambda F(0) H(1,\delta_1)}_{\kappa_2}$$

Price distribution (cdf)

$$F(p) := \frac{\rho}{\kappa} \int_0^1 \int_0^1 \mathbb{1}[P(\delta,\delta') \leq p] \mathbb{1}[\delta' \geq \delta] dH(0,\delta) dH(1,\delta) + \frac{\kappa_2}{2\kappa} \mathbb{1}[P(0) \leq p] +$$

$$+ \frac{\kappa_2}{2\kappa} \mathbb{1}[P(1) \leq p]$$

HH vs HH trade rate over 2 years

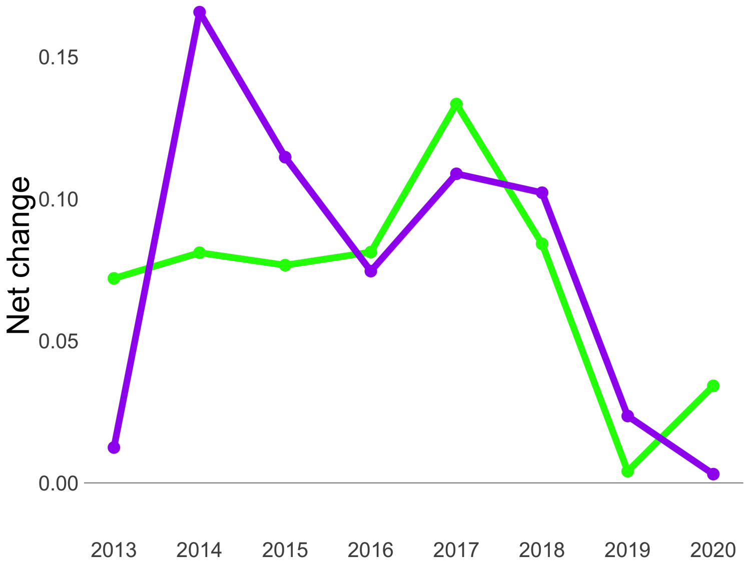
$$\rho \int_0^1 \int_\delta^1 dH(0,\delta') * \exp(-2\rho \int_0^\delta dH(1,\delta'')) dH(1,\delta)$$

FF vs HH trade year under 2 years:

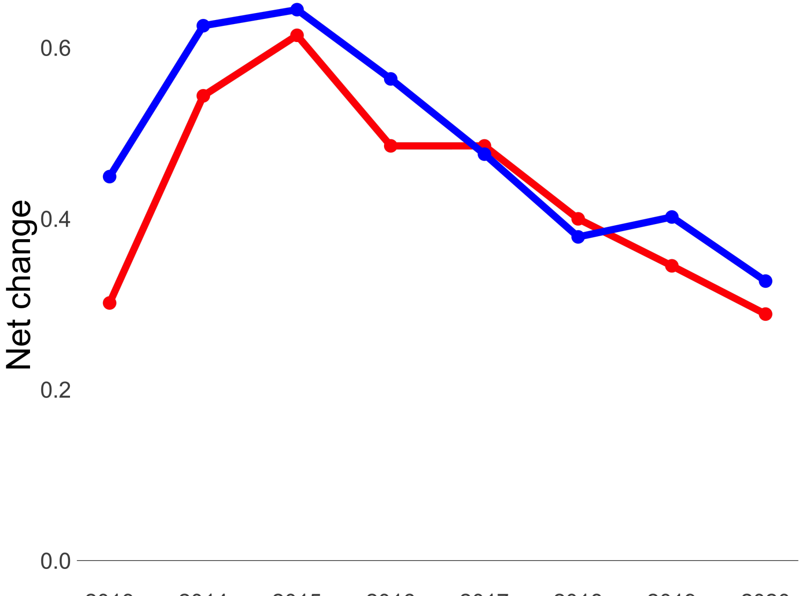
$$\lambda F(0) \int_0^{\delta_1} dH(1,\delta')(1 - \exp(-2\lambda \int_{\delta_0}^1 dH(0,\delta''))) + \lambda F(1) \int_{\delta_0}^1 dH(0,\delta')(1 - \exp(-2\lambda \int_0^{\delta_1} dH(1,\delta''$$

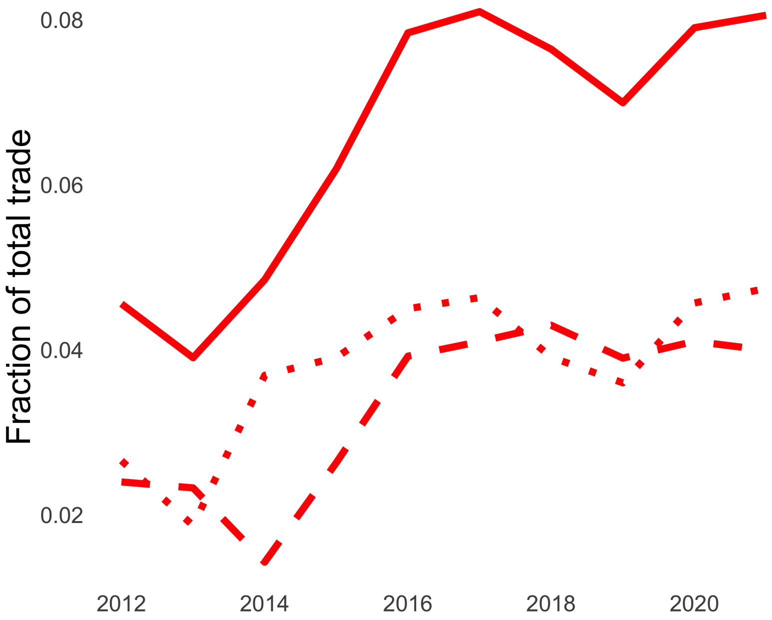
Validation

◂ Back



Case Shiller index




Fraction of total trade
0.08
0.06
0.04
0.02
2012
2014
2016
2018
2020

Go back

Robustness checks- 1, 2, 4 years between trades ◂ Back

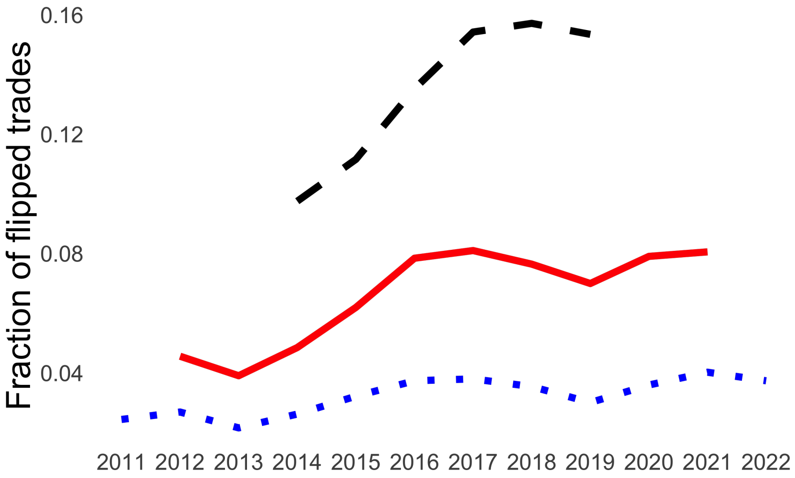
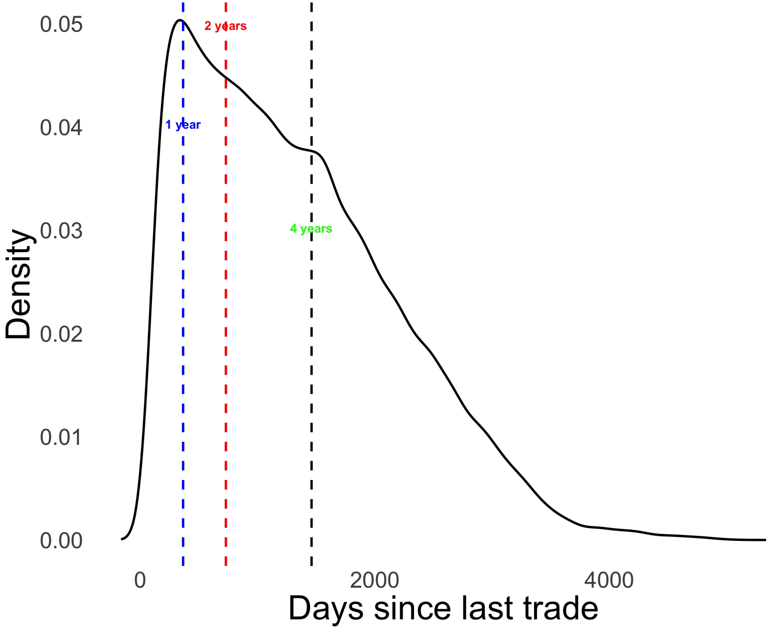


Figure: Blue-1y, Red-2y, **Black**-4y

All definitions imply ≈ doubling flipping. Results are consistent


0.05
0.04
0.03
0.02
0.01
0.00
Density
2 years
1 year
4 years
0
2000
4000
Days since last trade

◂ Back

Robustness checks ◂ Back

	1 year		2 years (baseline)		4 years	
f	0.009		0.0021		0.013	
γ	0.09		0.07		0.09	
ρ	0.3		0.3		0.3	
λ	3.0		3.0		5.0	
	Model	Data	Model	Data	Model	Data
Fraction of flipped	2.53%	2.44%	4.81%	4.56%	9.27%	9.75%
Mean price	11.98	12.88	11.62	11.42	11.85	12.54
Return on flipping	122.73%	111.29%	126.96%	129.33%	123.35%	151.41%
Tenure time	2.72%	5.59%	2.54%	5.59%	2.86%	5.59%
Loss function	0.28		0.30		0.28	

Robustness checks ◂ Back

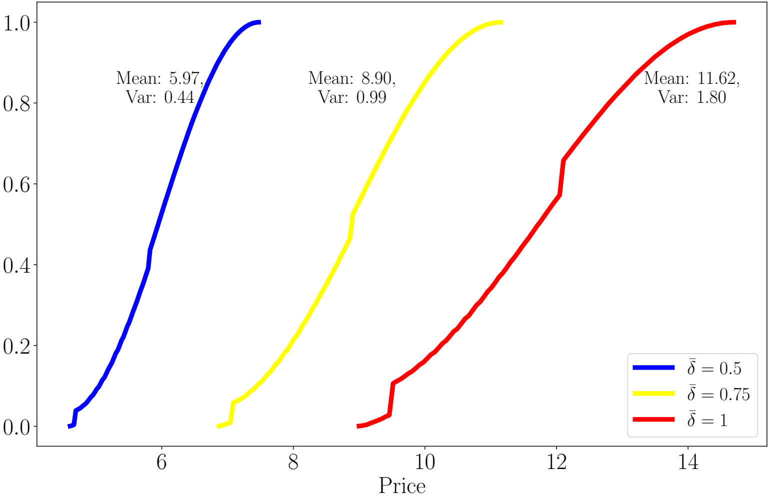
	1 year	2 years (baseline)	4 years
	Main Counterfactual % Change		
Mean Price	-2.34	-1.51	-2.53
Var Price	0.70	-0.31	-0.07
Flipper Share	240.90	67.42	104.13
HH Trade	-10.28	-7.95	-16.50
Total Trade	10.62	5.16	12.50
Return	0.90	0.99	1.45
Turnover	10.62	5.16	12.50
Welfare pc			
Total	-3.38	-2.44	-2.58
Household	-0.41	-0.20	-0.52
Homeowners	0.38	0.34	0.54
Non-Homeowners	5.49	3.02	5.53
Flipper	-29.41	-23.43	-32.67

Table: Untargeted moment: prices and intermediation

	1 Years	2 Year	4 Years
		Data	
Year	2011	2012	2014
β	-0.19	-0.21	-0.08
		Model	
β	-0.22	-0.29	-0.15

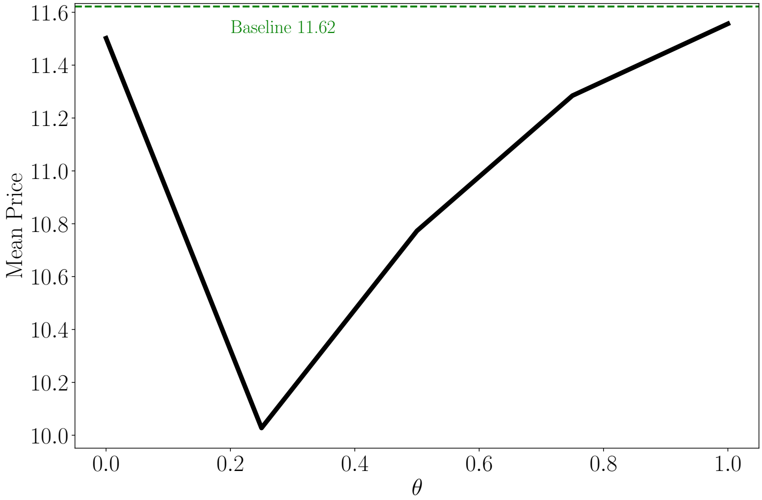
Note: The table presents results of regression from Table **??** applied to various definitions of flipping. Simulated data was run for $T = 100$ periods, burn in 20 periods with $N = 10000$ number of households

VARY $G(\cdot)$ BACK



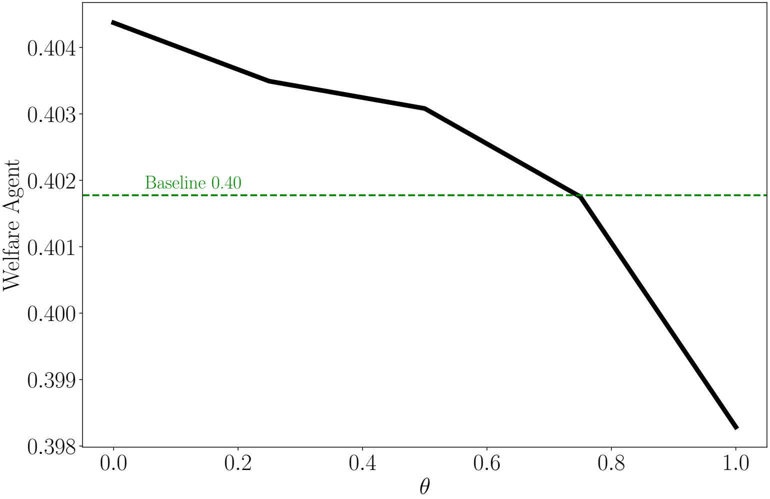
- Work with uniform $G \sim [0, \bar{\delta}]$ for upper bound $\bar{\delta} = 0.5, 0.75, 1$
- Changes in G are proportional to changes in price distribution
- It comes from linear flow utility

Role of private information ◂ Back



- Alternative price-setting mechanism: flipper observes the household's δ after meeting
- The surplus split via Nash Bargaining, with flipper weight $\theta \in (0, 1)$
- Prices are lower than in baseline, nonlinear in θ

Back



- Consumption equivalent of households is decreasing in flipper's bargaining weight θ
- $\theta = 1$ Model baseline