

Impact of Institutional Owners on Housing Markets

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2024 Cornell Real Estate Symposium

The Rise of Single-Family Institutional Landlords

PROPUBLICA



When Private Equity Becomes Your Landlord

Amid a national housing crisis, giant private equity firms have been buying up apartment buildings en masse to squeeze them for profit, with the help of government-backed Freddie Mac. Meanwhile, tenants say they're the ones paying the price.

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Why are Investors Interested in Single-Family Rentals (SFR)?

- ▶ **Supply side:** historic lack of new building, both in single-family and multifamily housing since Great Recession (Gorback & Keys (2023))
- ▶ **Demand Side:** Rise in Millennial population saddled with debt, lower incomes, and less wealth \implies \downarrow homeownership as they begin to demand more space (Mabille (2023))
- ▶ **Equilibrium:** Potentially lucrative to own SFR and extract rents

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▶ **Demand Side:** rising incomes, and more space needed for remote work, but, lower income to demand

▶ **Equilibrium:** imbalance between supply and demand

The New York Times

New Legislation Proposes to Take Wall Street Out of the Housing Market

A bill introduced in the House and Senate would prevent hedge funds from owning single-family houses in the United States.

Research Question

What is the impact of increased institutional ownership of single-family rentals (SFRs) on local housing markets?

1. Prices, rents, stocks
2. How do these impacts vary by reallocation of existing stock?
 - ▶ owner → renter
 - ▶ small → professional landlord
 - ▶ between professional landlords

Ex-ante: while institutional ownership likely increases prices, unclear how it impacts rents and through which channels.

What this paper does

1. Construct panel of single-family portfolio holdings for each investor
2. Develop novel instrument for *Long Term Rental* (LTR) entry into local housing markets
3. Estimate price/rent impact and reallocation of stock due to rise in LTRs

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1. Construct panel of single-family portfolio holdings for each investor
2. Develop novel instrument for *Long Term Rental* (LTR) entry into local housing markets
 - ▶ **Cross-Sectional**: Differential Market suitability for LTRs vs. Tradl. Landlords
 - ▶ **Temporal**: Development of decentralized management software
3. Estimate price/rent impact and reallocation of stock due to rise in LTRs

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 - ▶ Elasticity of house price change w.r.t. $\Delta\text{LTRshare} \sim 4.7$
 - ▶ **In our context:** 1- σ above mean \uparrow in $\Delta\text{LTR share} \implies +1.24\text{pp}$ house price increase, per year

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 - ▶ Elasticity of rent change w.r.t. $\Delta\text{LTRshare} \sim 6.3$
 - ▶ **In our context:** 1- σ above mean \uparrow in $\Delta\text{LTR share} \implies +2.51\text{pp}$ rent increase, per year

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3. Estimate price/rent impact and reallocation of stock due to rise in LTRs
 - ▶ Among tracts with top 5% LTR growth: **LTRs net-bought ~3pp of all transactions**
 - ▶ When buying from other landlords, no impact on prices or rents
 - ▶ When buying from owner-occupants, rents and prices fall
 - ▶ When markets have more active LTRs, rents fall

Contribution to the Literature

Estimate the impact of a new investor class on prices, rents, and reallocation of stock.

1. Rise of different investors post-Housing Bust
 - ▶ Out-of-town Buyers: Chino & Mayer (2016); Favilukis, van Nieuwerburgh
 - ▶ Speculators: DeFusco, Nathanson & Zwick (2022); Bayer, Geissler, Mangum, & Roberts (2020); Bayer, Mangum & Roberts (2021); Mian & Sufi (2022)
 - ▶ iBuyers: Buchak, Matvos, Piskorski, & Seru (2022)
 - ▶ LTRs: Goodman, Zinn, Reynolds, & Noble (2023)
2. Investors in the single-family housing market
 - ▶ Mills, Molloy, & Zarutskie (2022); Lambie-Hanson, Li, & Slonkosky (2022); Demers & Einfeldt (2022); Billings & Soliman (2023); Coven (2023); Hanson (2023)
3. Impact of investors on affordability
 - ▶ Austin (2023); Elster, Ater, Itai & Hoffman (2022); Gurun, Wu, Xiao & Xiao (2022); Garriga, Gete, Tsouderou (2023)

Data

1. **Corelogic Deed Records and Tax Assessment:** core dataset used to build portfolio holdings, internally consistent HPI; SF+townhomes, '00-'22
[Detail](#)
2. **ACS/Census:** used to collect tract-level housing, socioeconomic, and demographic characteristics; 1990 & 2010
3. **Validating house price indexes:** FHFA, Zillow [External Validation](#)
4. **Identifying investors:** SEC 10k filings, industry reports, OpenCorporates.com [Detail](#)
5. **Zillow Observed Rent Index (ZORI):** Zipcode level rent '15-'22 estimated using a repeat-rent methodology

Building Portfolio Holdings

Goal: We want to know which firms own what homes, when, and where.

1. Construct Ownership Panel [Details](#)
2. Potential Investor Set [Details](#)
 - ▶ **LTRs:** Rent-to-Own (RtO) + Single Family Rental (SFR) + Private Equity Real Estate (PERE) firms, with mean holding period ≥ 3 yrs (Bayer et al. (2020); DeFusco, Nathanson & Zwick (2022)))
3. Name Harmonization [Details](#)

This process yields: an annual panel of investor *holdings* (units or value)
For example, we know what AH4R owns by year & by census tract

Calculated vs. Reported Holdings

Investor Holding Periods

Defining Investor Types

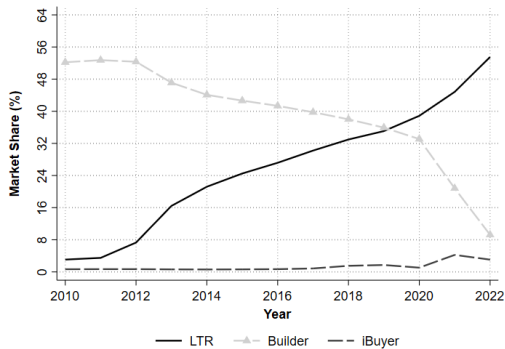
Top Portfolios, All Investor Types

Total Investor Share, over Time

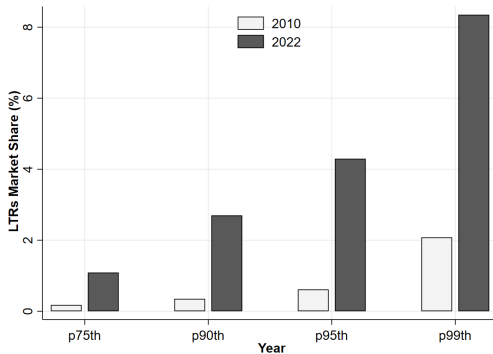
Overview of LTR Industry Growth

Growth: LTRs owned 55% of holdings among top ~ 1,000 investors Among All Homes

Concentration: LTRs owned $\geq 8\%$ of single-family homes in 99th percentile tracts Over Time



(a) National Investor Holding Share



(b) Local Single-Family Market Share

Notes: Panel (a): The national *investor* market share of firms identified as LTRs, Builders, and iBuyers, as measured by their portfolio holdings of single-family homes. Investors ranked by percentile in the distribution of average portfolio size (units). Panel (b): The distribution of *local* LTR market shares ($Share_{LTR_{it}} = LTR_{units_{it}} / SF_{units_{it}}$) between 2010 and 2022, as measured by their portfolio holdings of single-family homes.

State of the Market in 2022

While LTR's hold a small share of total housing stock...

LTR ownership share among:	Median Across Tracts	Nationally
All Housing Units	0.24%	0.20%
Single Family & Townhome (SFTH) Units	0.37%	0.30%
Investor-Owned SFTH Units	3.28%	3.01%
(LTR+SLL)-Owned SFTH Units	4.26%	3.97%

... they own 1 of every 23 landlord-owned units in the median tract they've entered.

Turnover Rate

How does LTR Market Presence Impact Local Markets?

Naive OLS:

$$\Delta Y_{it} = \alpha + \beta \Delta LTRshare_{it} + \varepsilon_{it}$$

- ▶ Y_{it} is prices (P_{it}) or rents (R_{it})
- ▶ i indicates Census Tracts
- ▶ t indicates year
- ▶ $\Delta LTRshare_{it}$: change in share of single-family homes in tract i owned by any LTR at time t

How does LTR Market Presence Impact Local Markets?

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Endogeneity concerns: LTRs *select* locations nonrandomly

- ▶ Reverse Causality: Locations with high returns attract LTRs
- ▶ Omitted Variable Bias/Simultaneity: Unobserved gentrification driving both price increases and attracting LTRs
- ▶ Measurement Error: We underestimate $LTRshare_{it}$

Towards an Instrument for Market Share

Goal: Build an instrument that exogenously varies entry of LTRs over time and space

Variation:

- ▶ **Cross-Sectional:** lagged characteristics of built environment and landlord preferences
- ▶ **Temporal:** Fall in property management costs

Intuition: LTRs only begin acting as single-family landlords once they can easily manage decentralized properties, and do so only in locations with sufficient single-family stock available

Cross Sectional: Differential Landlord Preferences

1. Identify housing characteristics favored by LTRs: LASSO selects subset of pairwise product characteristics useful in predicting $\Delta MktShare_i^{LTR}$ [Details](#)

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2. Use selected pairwise characteristics to predict changes in market share for each landlord type $l \in \{LTR, SLL\}$ [Distribution of Portfolio Sizes](#)

$$\Delta MktShare_i^l = \sum_j \beta_j Prop_i^j + \sum_k \gamma_k X_i^k + \delta_c + \varepsilon_i$$

- ▶ tracts indexed by i , property characteristic by j , demographics+socioeconomics by k , county by c

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3. Apply delta method to identify *differential* product preferences

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3. Apply delta method to identify differential product preferences

⇒ **Yields list of product characteristics revealed preferred differently for LTRs vs. SLLs ($\hat{\beta}_j$)**

Cross Sectional: Examples of Differential Revealed Preferences

LTRs differentially **prefer** the following characteristics *relative* to SLLs:

- ▶ Single-family homes
 - 3-bed: 1.090***
 - 2-5 rooms: 0.601**

LTRs differentially **dislike** the following characteristics *relative* to SLLs:

- ▶ Buildings with 2-4 units: -3.355^{**}
- ▶ Older Homes
 - 3 bed & 40+ years: -1.332^{***}
 - 4+ bed & 21-40 years: -1.136^{***}
 - 2-5 rooms & 40+ years: -1.204^{***}

Notes: Coefficient is the differential predicted market share in percentage points between LTRs and SLLs, induced by the tract's share of housing stocks having each two-way product characteristic. I.e. if a tract is 100% made of buildings with 2-4 units, this predicts an LTR market share 3.355 percentage points lower than the SLL market share. [Table](#)

Cross Sectional: Suitability Index

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$$S_i = \sum_j \hat{\beta}_j \times \text{Prop}_i^{1990,j}$$

Cross Sectional: Suitability Index

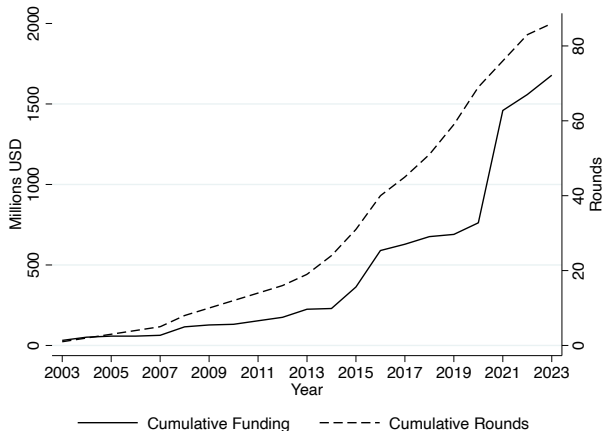
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Intuition: LTRs only move into locations that have product characteristics compatible with their business model. Partial 1st Stage

Temporal: Improvements in Management Technology

- ▶ Historically, difficult to manage decentralized properties \implies 67% of rental units are in multifamily buildings (Census, 2022)
- ▶ Online Property Management (OPM) platforms enable management of decentralized properties without on-site superintendent or staff Concurrent Debt Offerings



Research Design: OLS to IV

$$IV_{it} = \text{Z-Score} \left(S_i \times \hat{F}_{\text{funding}}(t) \times |PM|_{(-c)it} \right)$$

$$\text{First Stage:} \quad \Delta LTRshare_{it} = \alpha \Delta IV_{it} + \mathbf{X}_i' \mu + \delta_{ct} + \epsilon_{it},$$

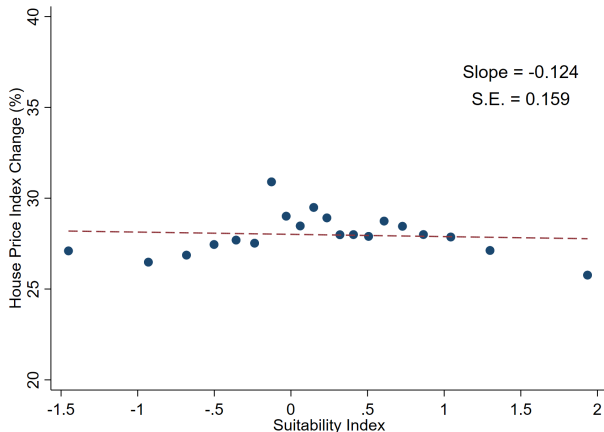
$$\text{Second Stage:} \quad \Delta Y_{it} = \tilde{\beta} \Delta \widehat{LTRshare}_{it} + \mathbf{X}_i' \tilde{\Gamma} + \delta_{ct} + \tilde{\epsilon}_{it}.$$

- ▶ i indexes tracts, t indexes years
- ▶ $Y_{it} \in P_{it}, R_{it}$
- ▶ \mathbf{X}_i : baseline tract characteristics (supply elasticities, price changes during prior boom (2000-2006) and bust (2006-2010))
- ▶ δ_{ct} : county-by-year fixed effects

Exclusion Restriction: $\mathbb{E}[IV_{it} \times \tilde{\epsilon}_{it} | \mathbf{X}_i, \delta_{ct}] = 0$ (not testable)

Placebo Test: Pre-period Price Changes against Suitability Index

We should not see any differential price changes in the period before LTRs or OPM for suitable vs. unsuitable locations.



Notes: This figure shows the binned scatterplot of total house price changes between 2000 and 2009 against our Suitability Index, S_i , controlling for county fixed effects, and local house price elasticities of supply.

Results: Impact of LTR growth on Price Change

$$\text{Second Stage : } \Delta P_{it} = \tilde{\beta} \widehat{\Delta LTR share}_{it} + \mathbf{X}_i' \tilde{\Gamma} + \delta_{ct} + \tilde{\varepsilon}_{it} \quad 1^{st} \text{ Stage}$$

Dep. Var: ΔHPI_{FHFA} (%)	(1) Full Sample	(2) $\Delta LTR \geq 0\%$	(3) $\Delta LTR \geq 1\%$ in 2022	(4) ΔLTR in Top 10pct
Z-score ΔLTR Market Share (%)	1.552*** (0.478)	0.605** (0.243)	0.851 (0.575)	0.657 (0.435)
Δ FHFA HPI 00-06 (%)	0.030*** (0.003)	0.027*** (0.003)	0.029*** (0.010)	0.031*** (0.008)
Δ FHFA HPI 06-10 (%)	-0.018* (0.010)	-0.041*** (0.011)	-0.020 (0.034)	-0.032 (0.026)
Housing Supply Elasticity	-0.550*** (0.087)	-0.629*** (0.112)	-0.433** (0.202)	-0.557*** (0.177)
Observations	384,348	129,348	26,592	35,688
County \times Year FE	Y	Y	Y	Y
Dep. Var Mean (%)	3.670	4.364	5.046	5.054
Elasticity (%)	12.12	4.727	6.648	5.133

Preferred Specification: Utilizes *intensive margin* variation in LTR share

Our Context: 1- σ above the mean annual $\Delta LTR share$ (0.26pp) \implies 1.24pp

$\uparrow \Delta HPI$

Results: Impact of LTR growth on Rent Change MLS Sample

$$\text{Second Stage: } \Delta R_{it} = \tilde{\beta} \Delta \widehat{LTRshare}_{it} + \mathbf{X}'_i \tilde{\Gamma} + \delta_{ct} + \tilde{\varepsilon}_{it} \quad \text{1}^{st} \text{ Stage}$$

Dep. Var: $\Delta ZORI$ (%)	(1) Full Sample	(2) $\Delta LTR \geq 0\%$	(3) $LTR \geq 1\%$ in 2022	(4) ΔLTR in Top 10pct
Z-score ΔLTR Share	3.384*** (1.074)	1.366*** (0.498)	0.348 (0.441)	0.335 (0.319)
Δ FHFA HPI 00-06 (%)	0.021*** (0.007)	0.012** (0.006)	0.004 (0.005)	0.004 (0.004)
Δ FHFA HPI 06-10 (%)	0.037** (0.016)	0.007 (0.016)	-0.032 (0.020)	-0.029* (0.017)
Housing Supply Elasticity	0.213 (0.331)	-0.372* (0.209)	-0.036 (0.259)	-0.105 (0.216)
Observations	46,841	22,675	8,451	10,398
County \times Year FE	Y	Y	Y	Y
Dep. Var Mean (%)	5.714	6.468	6.861	6.773
Elasticity (%)	15.52	6.266	1.596	1.537

Preferred Specification: Utilizes *intensive margin* variation in LTR share

Our Context: 1- σ above the mean annual $\Delta LTRshare$ (0.401pp) \implies 2.51pp

$\uparrow \Delta ZORI$

Potential Mechanisms & Hypotheses

1. **Professionalization:** SLLs → LTRs

- ▶ More aggressive rent-repricing (Calder-Wang and Kim, 2023) OR lower marginal costs: \sim rents

2. **Reallocation:** owners → renters

- ▶ Rising investor share in single-family housing stock (Lambie-Hanson et al., 2022)
- ▶ Expands local rental supply: \downarrow rents
- ▶ More bidders compete for remaining single-family homes (investors and owner-occupants) OR homophily bias: \sim prices

3. **Market Concentration:** LTRs → LTRs

- ▶ Increases market power $\rightarrow \sim$ prices, \uparrow rents (Austin, 2022; Billings and Soliman, 2023; Gurun et al., 2022)

Ownership Type Transition Matrix

- ▶ On net, LTR's purchase about 283k homes between 2010 and 2022.
- ▶ LTR's mainly buy from owner occupants (39%), each other (29%), speculators (23%), and other landlords (7%).
- ▶ Once a home is owned by an LTR, 70% of those remain held by an LTR.

	Other Investor	SLLs	LTRs	iBuyers	Builders	Speculators	Owner Occupants	Total
LTRs Buy from:	3,004	32,869	140,187	2,575	4,303	112,733	189,179	484,850
% from each	0.62	6.78	28.91	0.53	0.89	23.25	39.02	100.00
LTRs Sell to:	612	8,650	140,187	66	693	13,496	37,937	201,641
% from each	0.30	4.29	69.52	0.03	0.34	6.69	18.81	100.00

Among top 5%

Define Reallocation Metrics at Tract Level

We measure how much LTRs buy *on net* from each investor type, g :

- ▶ $g \in \{ \text{Owner Occupants, Small Landlords, iBuyers, Speculators, Builders} \}$

$$NetSales_g = (Transactions_{g \rightarrow LTR}) - (Transactions_{LTR \rightarrow g})$$

- ▶ Identify which tracts have the largest net purchases from each group:

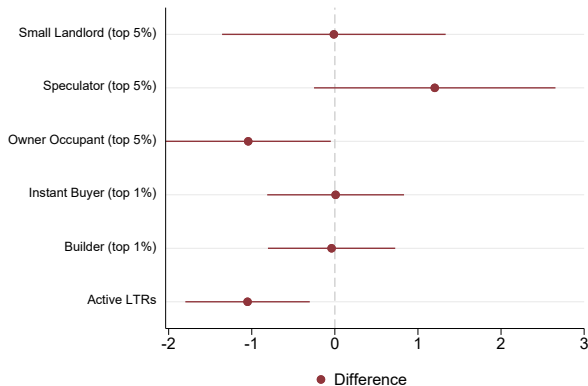
$$Top_g = \frac{NetSales_g}{SFTH_{2010}} \geq 95^{th} \text{ percentile or } 99^{th} \text{ percentile}$$

For homes traded *among* LTRs:

- ▶ Count the number of LTRs active in a given tract in a year

Reallocation Results - Horse Race, Rents

By Subsample

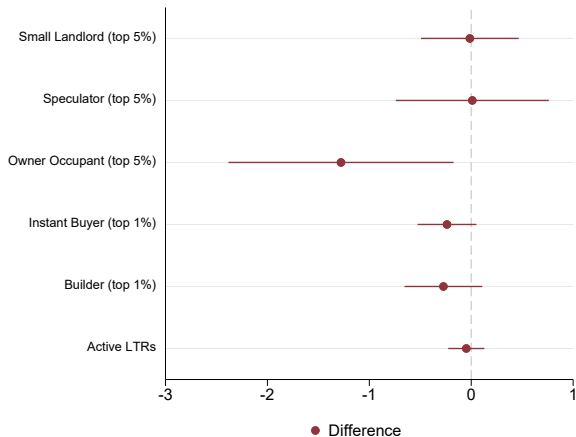


For the renter market:

Controlling for other reallocation channels, *reallocation from owner-occupants and more local competition* $\implies \downarrow \Delta ZORI$

Reallocation Results - Horse Race, Price

By Subsample



From owner's perspective:

Homes traded *among landlords* (speculators, LTRs, or SLLs) don't impact prices

Homes *reallocated from owners to renters* decrease local homeownership rates and depress prices

Consistent with homeowners not liking to live near renters

Conclusion

LTR growth has changed the distribution of single-family ownership in the US, with implications for prices, rents, and rental housing supply.

1. Showed LTR's now own ~ 283 k SFR units, concentrated in select tracts
2. Estimated an elasticity of ΔP_{it} w.r.t. $\Delta LTRshare_{it}$ of ~ 4.7
3. Estimated an elasticity of ΔR_{it} w.r.t. $\Delta LTRshare_{it}$ of ~ 6.3
4. Documented that who LTRs purchase from matters:
 - ▶ When buying from other landlords, no impact on prices or rents
 - ▶ When buying from owner-occupants, rents and prices fall
 - ▶ When markets have more active LTRs, rents fall
5. **Policy Implications:** Banning institutional ownership may harm renters, but restricting local market power could help.

Thank You!

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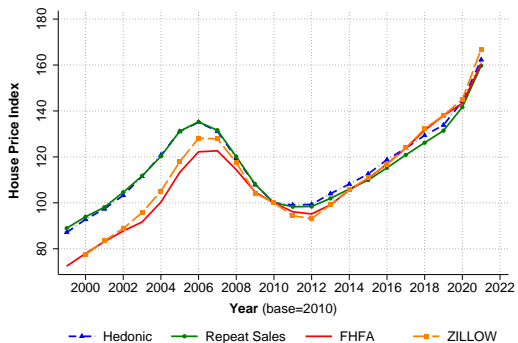
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CoreLogic Data Details

- ▶ >200 million detailed deed records from 1980s to 2022m10
- ▶ single-family houses and townhomes
- ▶ transaction dates, prices, addresses, buyer and seller information, etc.
- ▶ property characteristics from latest tax assessment
- ▶ only non-arms-length transactions
- ▶ Main sample: transactions between 2000 and 2022

[Back](#)

External Validity of Estimated House Price Index



Back

$$\log(P_{i,j,t}) = \sum_{\tau \in [1, N]} \beta_{i,\tau} X_{i,t,\tau} + \alpha_{j,t} + \phi_m + \varepsilon_{i,t}, \quad (1)$$

where $P_{i,j,t}$ is the price of unit i , in census tract j , in year t . $X_{i,t,\tau}$ includes a suite of property characteristics including square footage, acreage, bedrooms, bathrooms, total rooms, and whether the unit has a garage or carport. $\alpha_{j,t}$ is a census tract-by-year fixed effect, from which we construct our local HPI, and ϕ_m is a month indicator to control for seasonality in housing market cycles.

How We Identify Investors Details

Starting from industry lists:

- ▶ **SEC 10K Filings:** List of subsidiaries for publicly traded companies, such as REITs, single-family rental companies, or large asset managers in our data
- ▶ **OpenCorporates:** For the largest 10,000 investors we identify after name harmonization for which we cannot identify a parent, search OpenCorporates.com for parent company or shared addresses.

[Back](#)

Classifying Investor Types

Investor: a firm identified in our data as a non-owner-occupant.

1. Long Term Renter (LTR)
2. Builder
3. iBuyers
4. Small Landlords (SLL)
5. Other

[Back](#)

Classifying Investor Types

Investor: a firm identified in our data as a non-owner-occupant.

1. Long Term Renter (LTR) : SFR+PERE+RTO, 43 firms

- ▶ Single Family Rental Company (SFR): a firm whose main activity renting out single-family homes, may be public corporation (Tricon Residential), public REIT (Invitation Homes), or private firm (FirstKey Homes, owned by Cerberus)
- ▶ Private Equity Real Estate (PERE): a firm broadly active in private equity market, that reports significant single-family real estate holdings, i.e. The Carlyle Group
- ▶ Rent-to-Own (RTO): a firm that buys a home on behalf of an occupant, and rents the home to the occupant with an option to buy. i.e. Home Partners of America (owned by Blackstone)
- ▶ **Condition:** everyone must hold units for at least 3 years on average. Matches speculator definition used in Bayer et al. (2020) and DeFusco, Nathanson, and Zwick (2022). Holding Period Dist.
- ▶ **Intuition:** these real estate investors wish to accrue rental returns as well as (eventual) capital gains.

Classifying Investor Types

Investor: a firm identified in our data as a non-owner-occupant.

2. Builder: 232 firms

- ▶ a firm that builds homes (NVR, Pulte Homes, Lennar, etc.)

[Back](#)

Classifying Investor Types

Investor: a firm identified in our data as a non-owner-occupant.

3. iBuyers: 9 firms

- ▶ firms that buy/sell homes through online platforms; provide liquidity to existing owners who wish to avoid lengthy sales process (Offerpad, Opendoor, RedfinNow, etc.)

Back

Classifying Investor Types

Investor: a firm identified in our data as a non-owner-occupant.

4. Small Landlords (SLL):

- ▶ Investors that fall outside the right tail of portfolio holdings: ≤ 150 units
- ▶ Must hold units, on average, for ≥ 3 years (avoids speculators)
- ▶ Three types: units $\in [2, 5], [6, 25], [26, 150]$

Back

Classifying Investor Types

Investor: a firm identified in our data as a non-owner-occupant.

5. Other: speculators (those with mean holding periods < 3 years long) and investors with 1 unit .

[Back](#)

Classifying Investor Types

Investor: a firm identified in our data as a non-owner-occupant.

1. Long Term Renter (LTR)
2. Builder
3. iBuyers
4. Small Landlords (SLL)
5. Other

Revealed preference analysis compares LTR and SLL as other investors do not supply rental housing as landlords. [Back](#)

How to Construct Ownership Panels

1. CoreLogic Deeds database
2. Impute the ownership and a fair market price (between transactions) for *every property*
3. 2000 and 2022 (*or year built - 2022*)

[Back](#)

Filling in Missing Home Market Values

CoreLogic Deeds data only contains data on *transactions*, but we want an *annual* home value to later construct portfolio values for each investor.

- ▶ Impute market value by constructing tract-level HPIs from CoreLogic data
- ▶ If census tract does not have enough transactions in a given year to construct a valid HPI, impute value for entire tract based off of FHFA's published HPI.

[Back](#)

Identifying Potential Set of Investors

1. Create a comprehensive list of non-individual entities identified by key ownership strings such as "LLC", "Corp", "Inc", "Capital", etc.
2. Supplemented with CoreLogic's proprietary corporate indicator
3. Manually remove government, public, and non-profit entities as well as individual and family trusts

[Back](#)

Name Harmonization & Disaggregating Common Names

- ▶ RapidFuzz Python package: Levenshtein string distance and fuzzily matches strings i.e. “Assoc.” and “Association”
- ▶ Public Subsidiaries: collect a list of publicly traded firms from industry reports and scrape the SEC 10k filings for their lists of subsidiaries
- ▶ Private Subsidiaries: OpenCorporates, Florida Division of Corporations, and other online platforms for their subsidiaries. For example, “AMH4R Borrower YEAR-Q LLC.” matched to “American Homes 4 Rent”
- ▶ Common Individual Names: Many units owned by same harmonized name “Rodriguez, Jose” which maps to thousands of different investors such as “Rodriguez Jose Trust” or “Rodriguez Jose LLC.” For harmonized names identified as belonging to individuals, only allow portfolios up to county-level. Using Spacey Python package.

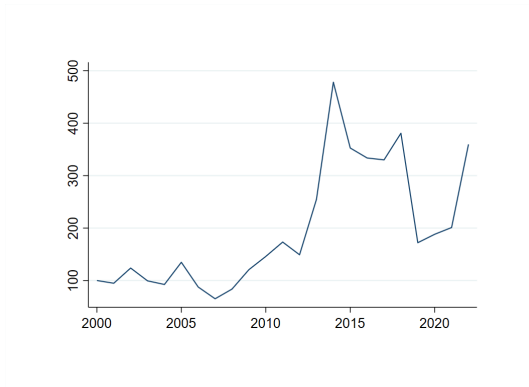
Why we do not aggregate based on shared mailing addresses: DEvidence

- ▶ We do not construct portfolios using mailing addresses due to the rise of institutions using professional *registered agents*, such as the Corporation Service Company.
- ▶ These agents handle all legal mailing and processing, and every LLC must list one.
- ▶ Professional registered agents may act on behalf of hundreds of clients; aggregating using a registered agent’s address would potentially roll many portfolios into one firm.

[Back](#)

Share of DE Mailing Addresses among non-DE Homes

Instead of tracking down a list of professional registered agent addresses, we leverage the fact that many of the largest firms (Corporation Services Company, Corporation Trust Company, etc.) have their registered agent offices in Delaware.



The share of DE mailing addresses for non-DE homes (2000q1=100) nearly quintupled around the time Invitation Homes launched the first ever public debt offering secured by single-family rental income.

[Back](#)

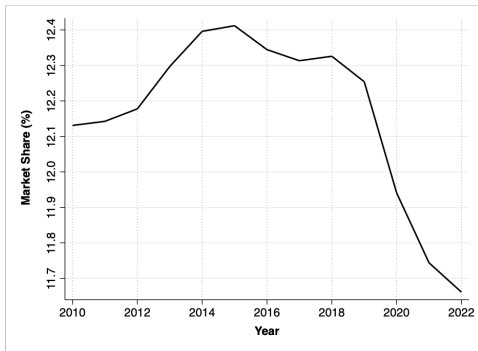
Who are our Top SF Portfolios?

- ▶ 24 LTRs active in 2022 report holding $\geq 466k$ units (missing 8 PERE)
- ▶ We identify 328,510 units held by these LTRs in 2022

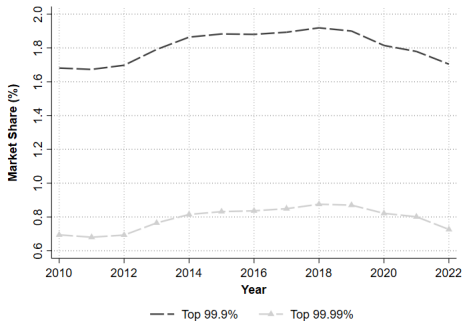
Rank	Name	Category	First Active	Last Active	Avg. Holdings (units)
1	D.R. Horton	Builder	1978	2023	46422
2	Lennar	Builder	1954	2023	28932
3	Pulte Group	Builder	1950	2023	27869
4	Invitation Homes	SFR	2012	2023	25678
5	American Homes 4 Rent	SFR	2012	2023	24388
6	NVR	Builder	1980	2023	12477
7	Progress Residential	SFR	2012	2023	10100
8	FirstKey Homes	SFR	2015	2023	7638
9	KB Home	Builder	1957	2023	7559
10	U.S. Bank	Holding	1863	2023	6683
11	Tri Pointe Homes	Builder	2009	2023	6501
12	DSL D Homes	Builder	2008	2023	6310
13	Meritage Homes	Builder	1985	2023	6040
14	Clayton Homes	Builder	1956	2023	5747
15	Tricon Residential	SFR	1988	2023	5210
16	Highland Homes	Builder	1985	2023	4884
17	M.D.C. Holdings	Builder	1972	2023	4214
18	LGI Homes	Builder	2003	2023	4060
19	Century Communities	Builder	2002	2023	4040
20	Home Partners of America	SFR	2012	2023	3903

Investors' National Share of Single-Family Housing Stock

No evidence of major national shift from owner-→renter-occupied stock.



(a) All Investors

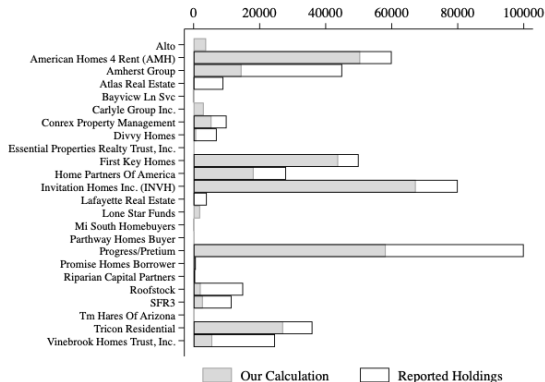


(b) Top 0.1% of Investors by Holding Size

Notes: These figures plot the national market share of properties owned by investors, rather than owner-occupants. Panel (A) shows the market share among all investors, while panel (B) shows the share among the largest investors, as measured by the average portfolio holding size in units between 2010 and 2022. [Back](#)

External Validity: Calculated vs. Reported Holdings

LTR Definition: Rent-to-Own (RtO) + Single Family Rental (SFR) + Private Equity Real Estate (PERE) firms, with mean holding period ≥ 3 years

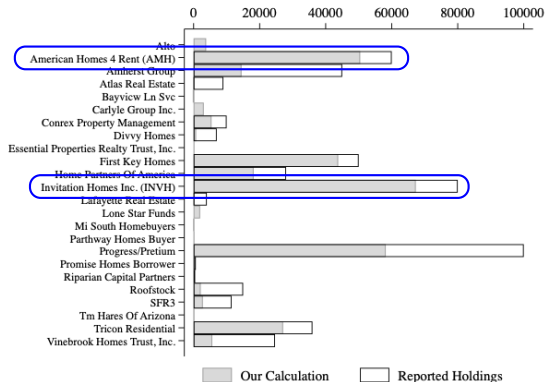


Notes: This figure plots our calculation of LTR's portfolio holdings as of 2022 in gray vs. reported holdings by said LTR's as of 2023.

[Back](#)

External Validity: Calculated vs. Reported Holdings

LTR Definition: Rent-to-Own (RtO) + Single Family Rental (SFR) + Private Equity Real Estate (PERE) firms, with mean holding period ≥ 3 years

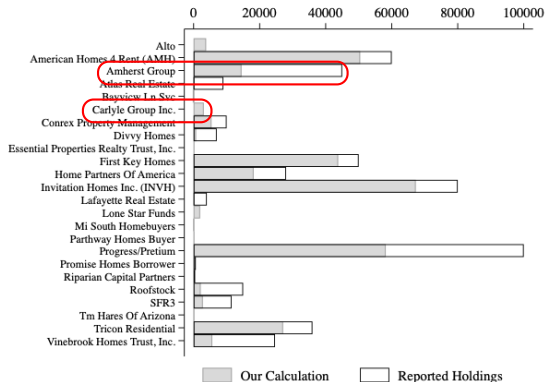


Notes: This figure plots our calculation of LTR's portfolio holdings as of 2022 in gray vs. reported holdings by said LTR's as of 2023.

[Back](#)

External Validity: Calculated vs. Reported Holdings

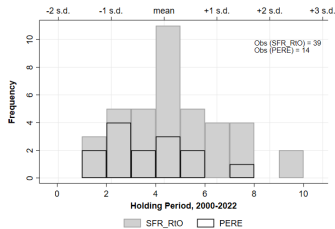
LTR Definition: Rent-to-Own (RtO) + Single Family Rental (SFR) + Private Equity Real Estate (PERE) firms, with mean holding period ≥ 3 years



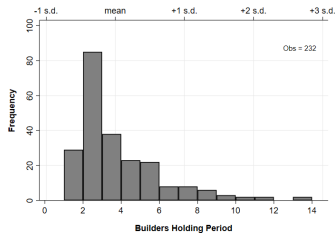
Notes: This figure plots our calculation of LTR's portfolio holdings as of 2022 in gray vs. reported holdings by said LTR's as of 2023.

[Back](#)

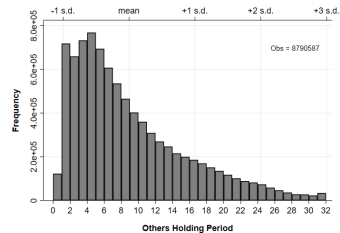
Distribution of Investors' Mean Holding Periods



(a) SFR's and PERE's



(b) Builders



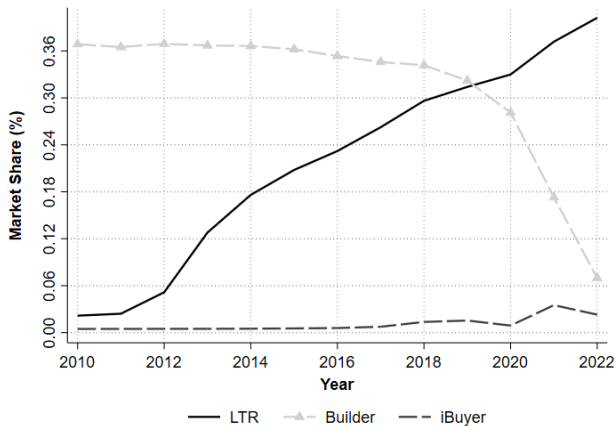
(c) Other

Notes: This figure plots the distribution of the average holding period for all properties within a given investors' portfolio between 2010 and 2019. Following Bayer et al. (2020) and DeFusco et al. (2022), we limit the sample of properties to those purchased by 2019, which allows for at least three years of post-purchase data. We also exclude iBuyers since they, by definition, are not actively renting out properties.

Back

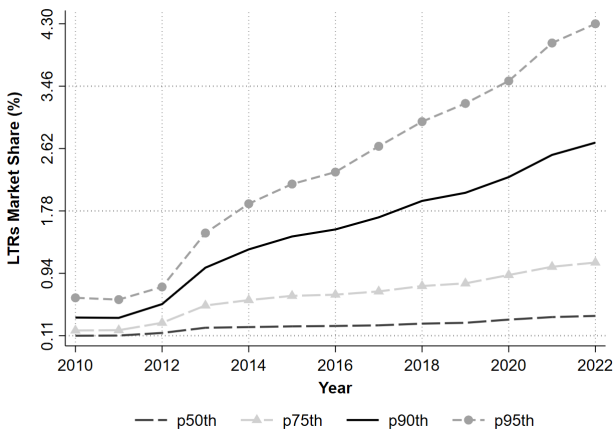
Market Share over Time

By 2022, LTRs owned 0.4% of all single-family & townhome units:



Concentration Over Time

Can calculate $ShareLTR_{it} = LTRunits_{it}/SFunits_{it}$ for each tract, between 2010 and 2022:



State of the Market in 2022, *Transactions*

While LTR's turned over only 0.11% of the total housing stock in the median tract...

LTR transaction rate among:	Median Across Tracts	Nationally
All Housing Units	0.11%	0.03%
Single Family & Townhome (SFTH) Units	0.16%	0.04%
Investor-Owned SFTH Units	1.33%	0.43%
(SLL+LTR)-Owned SFTH Units	9.09%	10.27%

they traded about 10% of the landlord-owned stock.

Note: The median tract sees about 6% of the stock turnover in a given year; nationally 6.5% of homes turnover. [Back](#)

Prior Literature Research Designs

1. LTR Mergers: Gurun et al (2023), Austin (2023)
 - ▶ Mergers potentially selected to increase concentration in particular cities
 - ▶ Mergers limited to impact of concentration among LTRs; cannot address impact of expansion of LTRs through other channels
2. F&F First Look: Lambie-Hansen et al. (2022)
 - ▶ Only relevant to REO & foreclosure sales
 - ▶ These sales have declined since 2013

Back

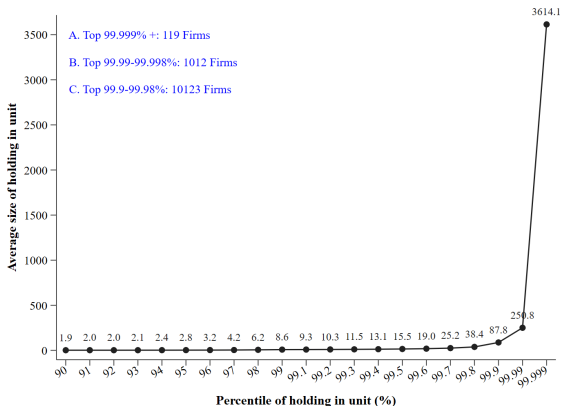
Details on Identifying Favored Characteristics

- ▶ Least absolute shrinkage and selection operator (LASSO) following Derenoncourt (2022)
- ▶ LASSO selects pairwise product combinations useful for predicting changes in landlord market share 2010-2022
- ▶ Product Characteristics: the full set of variables yields 90 two-way product combinations with positive housing shares

Benefit: Reduces the potential number of pairwise characteristics predictive of changes in market share from 90 down to 42; removing extraneous characteristics from later estimation. [Back](#)

Distribution of Investor Size: Average Portfolio Holdings

Most investors have small portfolios, but top 100 firms hold 3000+



Notes: This figure plots the distribution of average portfolio size, by percentile rank in the holding size distribution. We limit to the top 10% of investors by holding size for ease of inspection. [Back](#)

Cross Sectional: Differential Revealed Preferences

LTRs differentially **prefer** mid-size, single-family homes, and **dislike** older homes *relative to* SLLs:

	(1) $\Delta MktShare_{LTR}$	(2) $\Delta MktShare_{2to5}$	(3) Difference
Panel A: Property Characteristics			
Single Family & 3 Bed	0.620*** (0.159)	-0.471 (0.313)	1.090*** (0.353)
Townhome & 4+ Bed	-0.501 (0.339)	0.789* (0.428)	-1.290** (0.561)
2-4 Unit & 1 Bed	0.484 (0.312)	3.839*** (1.244)	-3.355** (1.191)
Single Family & 2-5 Room	0.408*** (0.129)	-0.193 (0.225)	0.601** (0.249)
2 Bed & 1-10 Year Built	-2.840*** (0.965)	-0.409 (0.602)	-2.430* (1.269)
	...		
21-40 Year Built & 1 Room	-1.161 (2.303)	5.822* (3.431)	-6.983* (3.929)
40+ Year Built & 2-5 Room	-0.212 (0.180)	0.991** (0.412)	-1.204*** (0.442)
Observations	78,644	78,644	78,644

Notes: This table shows the results of estimating preferences for LTRs (column (1)), SLLs with 2–5 units (column (2)), and the difference in their estimates calculated using a linear delta method. Standard errors in parentheses, clustered at the county level. Controls for demographics,

socioeconomics, and county fixed effects included but not shown. Significance: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

[Back](#)

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[Back](#)

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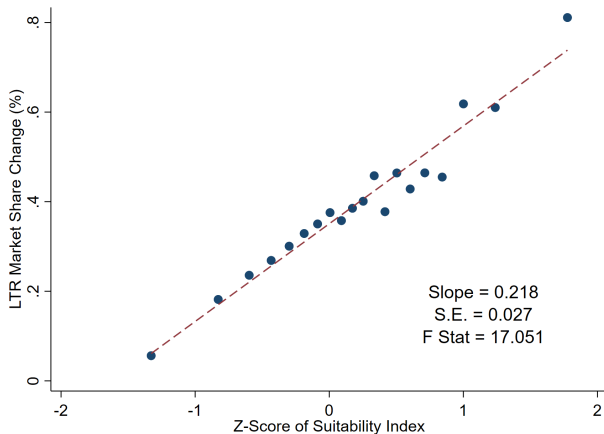
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[Back](#)

Cross Sectional: Partial 1st stage

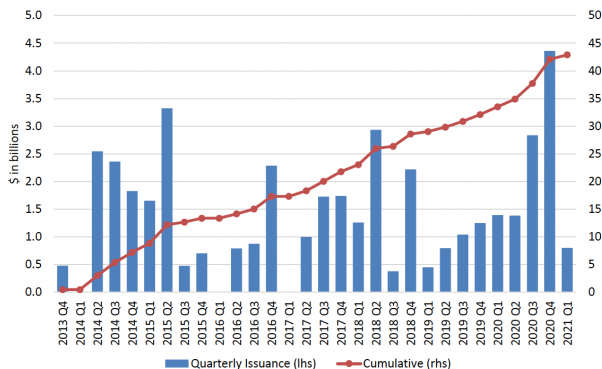


Notes: This figure shows a binned scatterplot as well as a linear fit of $\Delta LTRshare_i$ between 2010–2022 against the Z-score of the Suitability Index, S_i . We include county-level fixed effects to control for unobserved local heterogeneity, local house price elasticities of supply, and control for house price dynamics over the boom and bust periods before 2010. [Back](#)

Public Debt Offerings Over Time

Initial public offering of debt secured by rental income from single-family homes occurred in 2013q4. [Back](#)

Cumulative public issuance since 2013 of debt secured by portfolios of rented single-family homes has reached \$43 billion with debt outstanding of \$25 billion.



Note: A material amount of SFR debt has also been issued privately. Source: Bloomberg, Amherst Pierpont Securities

HPI Sample: Impact of ΔIV on ΔLTR

First Stage : $\Delta LTRshare_{it} = \alpha IV_{it} + \mathbf{X}'_i \mu + \delta_{ct} + \epsilon_{it}$ 2nd Stage

Dep. Var: Z-score ΔLTR	(1) Full Sample	(2) $\Delta LTR \geq 0\%$	(3) $\Delta LTR \geq 1\%$ in 2022	(4) ΔLTR in Top 10pct
Z-score ΔIV	0.085*** (0.013)	0.169*** (0.025)	0.187*** (0.067)	0.221*** (0.056)
Δ FHFA HPI 00-06 (%)	-0.005*** (0.001)	-0.010*** (0.003)	-0.015*** (0.005)	-0.015*** (0.005)
Δ FHFA HPI 06-10 (%)	-0.019*** (0.003)	-0.039*** (0.006)	-0.055*** (0.011)	-0.054*** (0.011)
Housing Supply Elasticity	-0.090*** (0.027)	-0.094* (0.054)	-0.227 (0.159)	-0.216 (0.133)
Observations	384,348	129,348	26,592	35,688
County \times Year FE	Y	Y	Y	Y
First Stage F Stat	43.62	45.64	7.757	15.50
ΔLTR Mean (%)	0.0200	0.0580	0.199	0.165
ΔLTR S.D. (%)	0.128	0.204	0.383	0.343

Interpretation: $1\text{-}\sigma \uparrow$ in $\Delta IV \implies 0.169\text{-}\sigma \uparrow \Delta LTRshare$

Our Context: With $\sigma^{\Delta LTRshare} = 0.128$ in full sample, $\implies 37.3\%$ ($= 0.128 \times 0.169 / 0.058$)

$\uparrow \Delta LTRshare$ relative to the mean

ZORI Sample: Impact of ΔIV on ΔLTR

First Stage : $\Delta LTRshare_{it} = \alpha IV_{it} + \mathbf{X}'_i \mu + \delta_{ct} + \epsilon_{it}$ 2nd Stage

Dep. Var: Z-score $\Delta ZORI$ (%)	(1) Full Sample	(2) $\Delta LTR \geq 0\%$	(3) $LTR \geq 1\%$ in 2022	(4) ΔLTR in Top 10pct
Z-score ΔIV	0.112*** (0.020)	0.199*** (0.029)	0.236*** (0.054)	0.264*** (0.049)
Δ FHFA HPI 00-06 (%)	-0.005*** (0.002)	-0.007*** (0.002)	-0.003 (0.003)	-0.004 (0.004)
Δ FHFA HPI 06-10 (%)	-0.019*** (0.005)	-0.031*** (0.006)	-0.027*** (0.006)	-0.031*** (0.006)
Housing Supply Elasticity	-0.073 (0.074)	-0.006 (0.107)	0.048 (0.182)	0.094 (0.157)
Observations	46,841	22,675	8,451	10,398
County \times Year FE	Y	Y	Y	Y
First Stage F Stat	31.49	46.10	18.99	29.11
Δ LTR Mean (%)	0.0480	0.101	0.235	0.202
Δ LTR S.D. (%)	0.218	0.300	0.443	0.410

Interpretation: $1\text{-}\sigma \uparrow$ in $\Delta IV \implies 0.199\text{-}\sigma \uparrow \Delta LTRshare$

Our Context: With $\sigma^{\Delta LTRshare} = 0.218$ in full sample, $\implies 43.0\%$ ($= 0.218 \times 0.199 / 0.101$)

$\uparrow \Delta LTRshare$ relative to the mean

Ownership Type Transition Matrix, Top 5% LTR Share Tracts

LTRs bought nearly 5% of all homes transacted, and sold less than 2%.

		Seller Type				Total
		Other Investor	LTR	Builder	Owner Occupants	
Buyer Type	Other Investor	4.84	0.15	0.05	12.51	17.56
	LTR	1.56	1.40	0.05	1.82	4.83
	Builder	0.05	0.01	0.02	0.09	0.17
	Owner Occupants	13.08	0.15	0.30	63.91	77.44
Total		19.53	1.71	0.42	78.34	100.00

[Back](#)

Sanity checks

Builders sell 2.5x more than they buy (limited to tear-downs, no data on vacant land sales)

iBuyers (not shown) sold 80% of their purchases by 2022 → consistent with business model of intermediation rather than renting

Correlation between Top_g Flags, Prices

	SLL	Spec.	OO	iBuyer	Builder
SLL	1				
Spec.	0.47	1			
OO	0.46	0.56	1		
iBuyer	0.23	0.30	0.28	1	
Builder	0.21	0.24	0.19	0.18	1

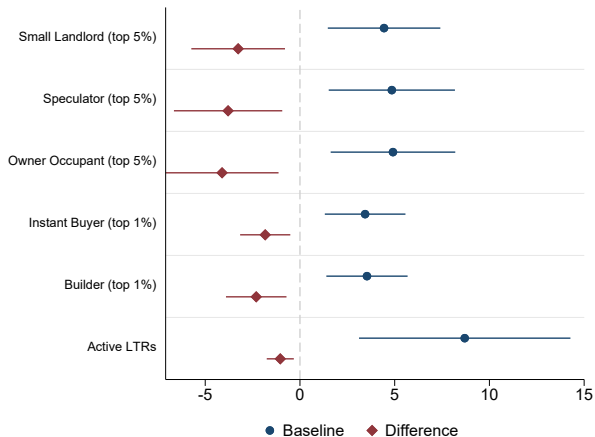
Back

Correlation between Top_g Flags, $Rents$

	SLL	Spec.	OO	iBuyer	Builder
SLL	1				
Spec.	0.43	1			
OO	0.36	0.57	1		
iBuyer	0.13	0.19	0.25	1	
Builder	0.08	0.13	0.13	0.03	1

Back

Reallocation Results - By Subsample, Rents

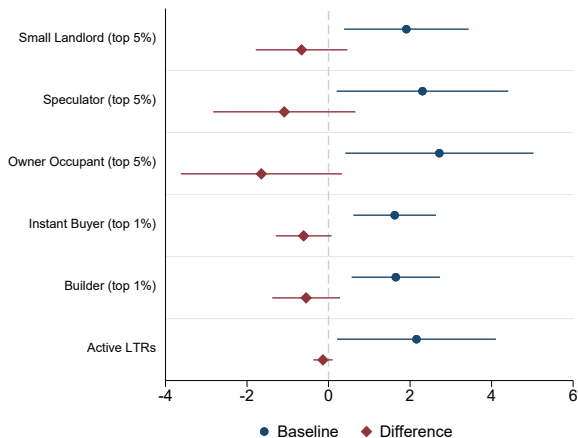


For the renter market:

Whenever there is a significant reallocation from owners to renters $\implies \downarrow \Delta ZORI$

More local competition $\implies \downarrow \Delta ZORI$ Horse Race, Rent

Reallocation Results - By Subsample, Price



MLS Sample (Hedonic Index)

$$\text{Second Stage : } \Delta R_{it} = \tilde{\beta} \Delta \widehat{LTR} share_{it} + \mathbf{X}_i' \tilde{\Gamma} + \delta_{ct} + \tilde{\varepsilon}_{it}$$

Dep. Var: Δ MLS (%)	(1) Full Sample	(2) Δ LTR \geq 0%	(3) LTR \geq 1% in 2022	(4) Δ LTR in Top 10pct
Z-score Δ LTR Share	2.267*** (0.846)	1.700*** (0.628)	1.278 (0.832)	1.342 (0.890)
Δ FHFA HPI 00-06 (%)	0.021*** (0.005)	0.022*** (0.006)	0.013* (0.008)	0.015* (0.008)
Δ FHFA HPI 06-10 (%)	0.050*** (0.016)	0.059*** (0.020)	0.028 (0.022)	0.033 (0.024)
Housing Supply Elasticity	0.060 (0.153)	-0.178 (0.183)	-0.172 (0.273)	-0.218 (0.255)
Observations	142,917	68,790	25,714	31,767
County \times Year FE	Y	Y	Y	Y
Dep. Var Mean (%)	3.857	4.176	4.517	4.459
Elasticity (%)	11.01	8.252	6.204	6.515

MLS Sample (Repeat Sales Index)

$$\text{Second Stage : } \Delta R_{it} = \tilde{\beta} \Delta \widehat{LTR} share_{it} + \mathbf{X}_i' \tilde{\Gamma} + \delta_{ct} + \tilde{\varepsilon}_{it}$$

Dep. Var: Δ MLS (%)	(1) Full Sample	(2) Δ LTR \geq 0%	(3) LTR \geq 1% in 2022	(4) Δ LTR in Top 10pct
Z-score Δ LTR Share	1.961*** (0.543)	1.621*** (0.505)	0.475 (0.573)	0.351 (0.583)
Δ FHFA HPI 00-06 (%)	0.021*** (0.004)	0.024*** (0.006)	0.010* (0.006)	0.011 (0.007)
Δ FHFA HPI 06-10 (%)	0.035** (0.014)	0.039** (0.019)	-0.005 (0.017)	-0.008 (0.018)
Housing Supply Elasticity	0.047 (0.164)	0.036 (0.178)	0.269** (0.133)	0.239* (0.131)
Observations	89,747	45,017	17,426	21,501
County \times Year FE	Y	Y	Y	Y
Dep. Var Mean (%)	3.317	3.571	3.924	3.864
Elasticity (%)	9.756	8.065	2.363	1.746